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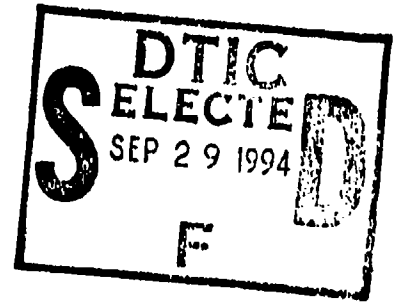COST SYSTEM WITHIN GOVERNMENT SERVICE
ORGANIZATIONS

THESIS

Robert W. Callahan, Captain, USAF
Daniel A. Marion, Captain, USAF
AFIT/GLM/LAL/94S-4

DEPARTMENT OF THE AIR FORCE

AIR UNIVERSITY

AIR FORCE INSTITUTE OF TECHNOLOGY

Wright-Patterson Air Force Base, Ohio

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APPLICABILITY OF AN ACTIVITY BASED

COST SYSTEM WITHIN GOVERNMENT SERVICE

ORGANIZATIONS

THESIS

Presented to the Faculty

of the Graduate School of Logistics and Acquisition Management

Air Force Institute of Technology

Air Education and Training Command

In Partial Fulfillment of

the Requirements for the Degree of

Master of Science in Logistics Management

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September 1994

Preface

The purpose of this thesis is to determine the applicability of implementing Activity-Based Cost (ABC) systems within government service organizations. Congressional legislation such as the Chief Financial Officers Act of 1990 and the Government Performance and Results Act of 1993 mandated that government agencies link mission related performance measures to operational budgets. However, government cost reporting systems employ fund accounting principles which are designed to trace costs to categories of expenses. Fund accounting tells a manager where the money was spent--not how to spend it. Originally developed for manufacturing industries, ABC presumes that activities consume resources and products consume activities. This new accounting methodology traces costs to their roots, and provides managers cost visibility not afforded by traditional government accounting system.

We would like to thank our advisors, Lt Col Shishoff and Maj Pohlen for their direction. Without it, many questions would have been left unanswered, and the quality of this document would be less than it is. To our families, Amy, and Pam, Robbie, and Stephanie, many thanks for your patience, support, and forbearance. Finally, to our golf clubs--we missed them tremendously.

Robert W. Callahan

Daniel A. Marion

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Abstract

This research focused on the applicability of Activity-Based Cost (ABC) systems within government service organizations. ABC implementation efforts within other government organizations were first examined to determine cot information shortfalls that caused managers to consider ABC implementation. Next, archival analysis was conducted within the case study organization to determine if the same accounting information shortfalls existed. An ABC system was then implemented within the case study organization. ABC information was compared with information provided by the case study organization's fund accounting system.

The case study organization's fund accounting system traced congressional appropriations to categories of expenditures for FY93. The fund accounting system reported aggregate category costs of the organization, and department costs by category of expense. However, the organization's fund accounting system was not able to provide information to link expenditures across expense categories to business processes within the organization. Conversely, the ABC system reported activity costs, process costs, and product costs. The research concluded that ABC offers government service organizations non-budgetary information which may be used to target opportunities for process improvement or cost reduction.

APPLICABILITY OF AN ACTIVITY BASED COST SYSTEM WITHIN GOVERNMENT SERVICE ORGANIZATIONS

I. Introduction

Background

Vice President Gore's *Creating a Government That Works Better & Costs Less* recognized that the input-oriented nature of government financial accounting systems does not provide a link between budget and operational performance. Government accounting systems do not provide the information needed by managers to measure performance or to manage complex processes and activities (Osborne & Gaebler, 1992: 147). Representative John Conyers of Michigan noted that "our financial management systems are antiquated and too numerous for sound financial management...our political culture encourages spending money rather than saving money" (Conyers, 1991: 24). Paul Juola, a Management Analyst with the DoD Comptroller, supports Conyers observation and states that "for activities financed through direct appropriations, financial managers tend to focus on executing the program rather than minimizing cost...the management imperative is to spend the entire budget for fear that budget reviewers (including Congress) would cut the budget" (Juola, 1993: 16).

Increasingly, managers within government agencies are becoming aware that shortfalls exist in their financial management systems. For example, the District Commissioner of the Boston Examinations Division of the Internal Revenue Service, described his financial accounting system by saying "this is not the way I'd run my own

business. I have a responsibility to spend money wisely and I'm not sure that I am now. I am only sure that I am spending it" (Geiger, 1994: 24).

Managers within the Defense Logistics Agency (DLA) also found their financial system to be inadequate. In 1987, the Agency's major financial performance goal was simply to ensure expenditures did not exceed obligation authority. In a study of its depot in Mechanicsburg, Pennsylvania, DLA found that "the real incentive was to ensure expenditures were exactly equal to funds provided, because the depot would likely face budget reductions if funds were not expended" (Harr & Godfrey, 1992: 16).

In a similar study of a Naval depot, research by Ansari and Euske reported that managers had supplemented the existing financial reporting system with other systems to provide more relevant cost accounting data. In describing the mandated federal accounting system, one manager stated "we don't use it--we comply with it--and for all the trouble it causes us, I sure hope somebody uses it" (Geiger, 1994: 24).

Government Accounting: A Fund Structure

From its inception, government accounting has evolved into a formal set of complex standards, though the principle means of tracing costs has remained closely linked to the concept of the fund (Snodgrass, 1993: 33). The National Committee on Governmental Accounting (NCGA) defines a fund as "a fiscal and accounting entity with a self-balancing set of accounts...which are segregated for the purpose of carrying on specific activities or attaining certain objectives in accordance with special regulations, restrictions, or limitations" (Snodgrass, 1993: 34). A principle characteristic of this type of accounting is that it allows managers to discern "revenues by source, and expenditures by object" (Snodgrass, 1993: 34). Fund accounting is therefore designed to trace costs by specific category; for example--fuel, personnel salaries, and travel reimbursement. This

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type of financial reporting provides meticulously detailed data regarding the expenditure of funds by category.

Mandate for Change in the Government Accounting System

The Chief Financial Officers Act of 1990 and the Government Performance and Results Act of 1993 established requirements for federal agencies to develop financial reporting systems that link budget expenditure to performance. The acts directed each agency to establish performance indicators, measure outputs, service levels and outcomes, and compare actual program results to performance goals.

In 1990, President Bush signed into law the Chief Financial Officers Act (CFO). This legislation mandated changes in government financial reporting systems and the manner in which tax dollars are managed (Conyers, 1994: 24). The essence of this legislation was to address the need for government agencies to develop financial reporting systems that are linked to performance (Duquette, 1991: 35). As cited in the CFO Act,

> Financial reporting practices of the federal government do not accurately disclose the current and probable future cost of operating and investment decisions, including the future need for cash or other resources, do not permit adequate comparison of actual cost among executive agencies, and do not provide the timely information required for efficient management of programs. (Duquette, 1991: 31)

By linking budgets to program outputs and outcomes, the CFO was also designed to help the Executive Branch and Congress finance, manage, and evaluate federal programs. Committed to improving the system's accounting, financial management, and internal controls of each agency of the federal government, the CFO Act was also intended to assure the issuance of reliable financial information and to deter fraud, waste, and abuse of government resources (Hodsoll, 1992: 9). As an initial attempt to develop performance driven budgets and to link costs to services, the CFO Act required the chief financial

officer of each government agency to systematically measure and report performance and costs (Tierney, 1994: 4).

More recently, the Government Performance and Results Act of 1993 required each agency to "establish performance indicators, measure outputs, service levels and outcomes and compare actual program results to performance goals" (Tierney, 1994: 5). Together, these two legislative acts seek to expand the information provided by the government accounting system. The present fund accounting system provides input-oriented accounting information about discrete categories of expenditure. An improved accounting system would additionally need to provide output-oriented accounting information to provide a link between budget expenditure and the level and quality of service.

ABC: A Possible Solution

As mandates of the CFO Act of 1990 and the Government Performance and Results Act of 1993 are implemented within government agencies, traditional cost systems may not provide managers the information necessary to determine the cost of providing services, or the usefulness of expenditures. Several organizations within the government have adopted an accounting system that may provide improved insight into organizational costs and performance. This cost system, first developed within private industry, is known as activity based costing (ABC).

ABC: An Outgrowth of Corporate Needs

Traditional corporate cost accounting systems trace overhead costs down to the department level, and then allocate overhead charges against products based upon some direct variable input, such as direct labor hours or machine hours. And as recently as 30

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years ago, direct labor and materials comprised the major proportion of a manufacturing corporation's costs, and traditional cost accounting provided accurate product costs (Johnson and Kaplan, 1991: 183) (Pare, 1993:125).

In the last three decades, corporate product lines have become increasingly diverse and overhead has grown considerably. Consequently, traditional cost accounting methods are no longer applicable. Traditional cost accounting systems rely upon volume related bases, like direct labor hours, to allocate overhead. But in many corporations, the costs of some product related activities are unrelated to volume; overhead costs like marketing, engineering, and contracting are fixed in the short term, so these costs do not vary with the number of products which roll off an assembly line. "Thus, conventional systems do not measure accurately the cost of resources used to design and produce products and to sell and deliver them to customers" (Cooper and Kaplan, 1992: 1).

Traditional cost accounting uses one cost driver, usually direct labor hours, to trace the cost of overhead to the products produced. An ABC system employs multiple cost drivers to trace resource costs to the activities consuming them. The use of multiple cost drivers allows a more accurate correlation between diverse resources and the activities that consume them (Cooper, 1989: 43).

An ABC system "measures the cost and performance of activities, resources, and cost objects. Resources are assigned to activities, then activities are assigned to cost objects based on their use. Activity based costing recognizes the causal relationships of cost drivers to activities" (Raffish and Turney, 1991: 2). Traditional accounting principles hold that products cause costs, in the form of machine hours or direct labor hours. ABC assumes that activities, "the processes or procedures that cause work to be performed in an organization," cause costs (Miller, 1990:8). In an ABC system, activities consume resources, and in turn, activities are consumed by products. ABC allows the manager to

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determine product costs by adding the costs of all activities required to manufacture or deliver a product (Cooper, 1988: 46).

ABC: Non-Budgetary Benefits

An ABC system provides non-budgetary information not contained in traditional accounting systems. Figure 1.1 presents a list of some of the benefits that may be obtained through analysis of an ABC system's non-budgetary information.

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Why is Non-Budgetary Information Important?

It can tell us whether we have spent the money provided through the budget for the the purposes intended, and whether those, who receive our money, have used those funds for the purposes intended

It can tell us about commitments we are making or have made and the resources needed to meet those commitments

It can tell us about the sums we have saved as a result of efficiencies and help us compare our efficiencies

It can tell us about the effectiveness of both our own performance and the outcomes of our policies and programs and help us compare effectiveness

Hodsoll, 1992:10

</div>

Figure 1.1 Why is Non-Budgetary Information Important?

1) An ABC system identifies activities and business processes and then traces the cost of resources consumed by an activity to the outputs of that activity. As activities are the building blocks of business processes, identifying and understanding these activities is essential as a step to improve business processes (Moravec and Yoemans, 1992: 32) (D. Appleton, 1993: 102).

2) The ability to place accurate costs on activities and their outputs provides a clear metric for improvement, whether for determining improvement priorities in the long-term or for measuring short-term success (Moravec and Yoemans, 1992: 35) (D. Appleton, 1993: 102).

3) ABC provides information regarding the amount of resources consumed across processes and activities. Understanding the relative consumption of resources allows a manager to assess the contribution each activity makes to a company's operations, which is important in controlling and reducing costs (Yoshikawa and others, 1994: 40). It is also possible to determine whether the relative cost of an activity is commensurate with the importance of the activity to its customers and management. Management can use this knowledge to prioritize activities for improvements or cost reductions through Pareto analysis stratification.

Similarities Between Traditional Cost Accounting and Government Fund Accounting

Traditional corporate cost accounting and the existing governmental fund accounting system appear similar since both are "vertically" oriented accounting systems. The corporate cost accounting system traces overhead costs downward to the department level, and then the costs are allocated to products according to a volume related base. Government fund accounting systems follow a similar approach by vertically tracing costs downward to identify expenditures by category of expense.

Johnson and Kaplan, in *Relevance Lost*, suggested that the traditional cost accounting approach was failing (Johnson and Kaplan, 1991:185). Tierney notes a parallel between government and traditional cost systems, and writes that some of the lessons learned from Johnson and Kaplan can also be applied to government accounting. "The study has some analogies to the federal government, particularly where for generations agency financial managers, budget executives, and accountants, believed that their job was done when the external reports were mailed to Treasury and OMB or delivered to

Congress, accounting for the status of expended appropriations. These reports selected only macro-level input-type data" (Tierney, 1994: 7).

Developing a cost model to explicitly capture the sum of the resources consumed by an activity or process represents a departure from the traditional financial reporting systems that trace costs downward by category, as in government organizations, or to departments, as in manufacturing organizations (Strategic Development Staff, 1993: 1). In private manufacturing organizations, ABC traces costs across departments to capture the cost of an entire business process. Within a government organization, an ABC system could trace costs across fund categories to capture the cost of an individual activity or of an entire public service consisting of several activities.

Applications of ABC have mainly been implemented in manufacturing organizations, but increasingly the benefits of ABC have been realized in service organizations as well. ABC also appears well suited for expansion into government organizations. "Though research about activity based costing was originally directed toward the manufacturing sector of our economy, the wider concept of Activity Based Management applies equally well to service, not-for-profit, and governmental organizations" (Antos, 1992: 13).

Problem Statement

Government fund accounting systems do not possess the capability to accurately determine the cost of activities or business processes. Government organizations require an accounting system capable of: determining resource consumption by business process and activity, targeting opportunities for cost reduction, and providing alternative, non-budgetary information.

Research Objectives

This research had the objectives of:

1. Identifying shortfalls in information provided by the existing government fund accounting system,

2. Examining how ABC would change the reporting of government costs,

3. Determining how a government service organization could analyze ABC information to trace overhead costs to operational organizations,

4. Developing a framework for designing and implementing an ABC system within a government service organization,

5. Identifying problems/obstacles to ABC implementation and techniques to overcome them,

6. Identifying opportunities for future research.

Investigative Questions

The specific research questions addressed in this research include:

1. Why did government organizations implement a new cost accounting system?

    a. What are the information shortfalls of the existing cost accounting systems that caused managers to consider an ABC system?

    b. What problems may result from the cost information provided by traditional accounting systems?

2. Do these same conditions exist within the case study organization?

    a. How does the existing fund accounting system trace costs within the case study organization?

3. How has activity-oriented accounting information impacted government organizations?

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a. How does ABC differ from government fund accounting systems in tracing costs to organizational activities?

b. How did the reporting of costs change in management reports?

c. What benefits can be expected from ABC implementation?

d. How did ABC information affect process improvement and re-engineering efforts?

e. How do government organizations use the non-financial information provided by an ABC system?

4. How would ABC implementation affect the case study organization?

    a. How would an ABC system trace costs within the case study organization?

    b. How would ABC costs differ from fund accounting costs?

    c. What benefits could be expected from ABC implementation?

5. How should a government service organization implement an ABC system to trace overhead?

    a. What design elements should be considered before implementing an ABC system?

    b. What changes are required to adapt ABC implementation procedures to a government service organization?

    c. What framework appears best suited for implementing ABC within a government service organization?

Scope and Limitations of the Research

The research applied a case study approach to gain an in-depth insight into the applicability of an ABC system within a government service organization. The study examined an existing government fund accounting system, and then compared the fund information with ABC accounting information. The focus of the research required a confined environment with internal overhead organizations and operational units. The Air Force Institute of Technology (AFIT), Wright-Patterson AFB, Dayton, Ohio, fulfilled these requirements. AFIT is an academic organization that supports the Air Force through graduate and professional education, research, and consultation. The organization is comprised of overhead departments, common to any academic institution, as well as operational departments providing academic instruction.

The research performed a case study of the government academic organization and archival analysis of its fund accounting system. Conclusions drawn from results of the case study and archival analysis pertain to the organization's fiscal year 1993 budget. Results of an analysis performed at a later time may differ.

The case study organization employed a traditional fund accounting system which traced congressional appropriations to categories of expenditures for FY93. This research considered operations and maintenance funds, military salaries, and non-direct fund cites. These fund categories were selected because expenditure of these funds was determined to be controlled by AFIT managers.

Research Propositions

The research employed research propositions to test support for the research objectives. Zikmund describes a proposition as a "statement concerned with the

relationships among concepts. At the explanatory level, a proposition is the logical linkage among concepts. A proposition asserts a universal connection between properties" (Zikmund, 1991: 89). Emory and Cooper suggest that the use of a proposition has several advantages. Use of a proposition "encourages researchers to crystallize their thinking about the likely relationships to be found [and] further encourages them to think about the implications of a supported or rejected finding" (Emory and Cooper: 1991: 59). This research employed the use of a proposition, prediction and rationale format. "The predicted directions reflected the direction of the relationships anticipated to be observed during the research. Case study data is used to ascertain the direction and magnitude of the studied relationships" (Pohlen, 1993: 149). This research presented propositions in the null case to identify specific relationships examined by the case study research. The rationale for the propositions is included in Chapter Three.

Applicability of ABC for use in a Government Service Organization

Proposition 1.a: The activity cost information provided by an ABC system cannot be used to determine the cost of activities within a government service organization.

Proposition 1.b: Government service organizations that implement an ABC system will not realize a difference in cost visibility.

Proposition 1.c: There will be no impact on the management of business processes within government service organizations due to the non-budgetary information provided by an ABC system.

Shortfall in Information Provided by the Government Fund Accounting System

Proposition 2:   The government fund accounting system provides information that ties budget expenditure to the cost of activities.

Framework for ABC Implementation within a Government Service Organization

Proposition 3:   Implementation procedures followed within corporate organizations cannot be use to implement ABC within a government service organization.

Research Methodology

The research performed an in-depth analysis of a government service organization to determine the applicability of an ABC system. The study examined an existing government fund accounting system, and then compared fund information with ABC accounting information. The focus of the research required a confined environment with internal overhead organizations and operational units. The Air Force Institute of Technology met these requirements.

Archival analysis of fund accounting budget information was performed. ABC implementation efforts within other government service organizations were analyzed to determine the factors which contributed to management's decision to consider a new cost accounting system. Afterward, the case study organization was analyzed to determine whether the same fund accounting system information shortfalls existed.

The research implemented an ABC system within the case study organization in order to determine the benefits a government service organization might expect to realize from ABC implementation. Personal interviews and archival analysis were conducted to determine the values of the following variables:

- Cost of a Process
- Cost of an Activity
- Cost of Overhead
- Cost of Dedicated Labor

Results obtained through archival analysis and personal interviews were analyzed to reach conclusions regarding propositions and to develop a framework for ABC implementation within other government service organizations.

Organization of the Research

This chapter suggested that government accounting systems are not capable of reporting the cost of activities and business processes, or the cost of a customer service level. The investigative questions, research objectives, and propositions provide goals of the research and topics to be covered in this study. The methodology suggests that a case study approach is the most appropriate method of performing the research.

Chapter Two reviews current ABC literature in order to develop a conceptual framework for the research. The chapter discusses the need for improved cost accounting information within private organizations. ABC is presented as providing improved accounting information. The chapter also examines the need for a new cost accounting system within a government setting, and then explores the application and implementation of ABC within the government.

Chapter 3 contains the methodology employed during the research. The chapter presents considerations in the design of the research methodology, variable and proposition validation, and finally the steps required for implementing the research design. The research analysis and results are gathered in Chapter 4. Chapter 5 summarizes the results of this research.

II. Literature Review

Overview

Chapter One provided the problem statement, research objectives, and an overview of this study's methodology. The first half of Chapter Two reviews current ABC literature in order to develop a conceptual foundation for the research. Section One is a discussion of the need for more accurate accounting information in a business setting. The movement toward a cost accounting system based upon activity accounting is presented in Section Two. ABC is defined and the cost assignment processes is described in Section Three. Section Four details key differences between traditional and ABC accounting methods, and Section Five presents management implications resulting from implementation of an ABC accounting system.

The second half of the literature review examines the need for a new cost accounting system within a government setting, and then explores the application and implementation of ABC within government agencies. Section Six discusses similarities between traditional cost accounting and government fund accounting systems. Section Seven examines the need for a new cost accounting system within the government. Section Eight describes several recent government applications of ABC. An ABC implementation process is detailed in Section Nine. Finally, Section Ten presents details of the case study organization.

Need for More Accurate Accounting Information in Business

Traditional cost accounting saw its beginnings with Samuel Wedgewood and the need for more accurate accounting of the costs which went into china production. During the early 1700s, Wedgewood saw his business expand, but with the onset of a protracted

recession, the market for his china shrunk. In order to remain in business, Wedgewood found it necessary to gain a greater understanding of product costs so that he could make decisions about which lines of production were profitable, and what prices would give him an acceptable return (Shishoff, 1993).

From Samuel Wedgewood's day and up until 30 years ago, direct labor and materials made up the major proportion of corporate costs (Pare', 1993: 124). Now, however, corporations produce diverse product lines and require large overhead functions. Traditional accounting methods are no longer applicable. Because of production diversity and relatively low labor content, the traditional accounting methods tend to report distorted product costs (Pohlen, 1993: 7). Two problems follow directly from this evolution away from labor intensive processes in manufacturing. First, traditional accounting systems do not accurately reflect product costs if the mix produced in a facility is diverse (Cooper, 1989: 34).

> Managers in companies selling multiple products are making important decisions about pricing, product mix, and process technology based on distorted cost information...distorted cost information is the result of accounting choices made decades ago, when most companies manufactured a narrow range of products. (Cooper and Kaplan, 1988: 96)

The second problem resulting in accounting inaccuracies is that large overhead costs are traced to products based upon labor hours of production, even though the amount of overhead resources consumed is not proportional to labor effort. Traditional cost accounting systems rely upon volume related bases, like Wedgewood's labor hours, to allocate overhead, but in many corporations the costs of some product related activities are unrelated to volume (Cooper, 1988: 46). Costs like marketing, engineering, and contracting are fixed in the short term, so these costs do not vary with the number of products which roll off an assembly line.

Traditional cost systems use volume-driven allocation bases, such as direct labor dollars, machine hours, and sales dollars, to assign organizational expenses to individual products and customers. But many of the resource demands by individual products and customers are not proportional to the volume of units produced or sold. Thus, conventional systems do not measure accurately the costs of resources used to design and produce products and to sell and deliver them to customers. (Cooper and Kaplan, 1992: 1)

"Many companies' cost accounting systems are falling down on the job. They give management incorrect product costing information" (Cooper, 1989: 77). The implications for an inaccurate cost information system are significant. When direct labor hours are used to allocate, what in some cases is an enormous overhead burden, management attention is directed at micro-managing labor time, even though the labor hour cost may make up a very small portion of the corporate budget . The cost management does not focus on reducing long-run, overhead costs. "With overhead burden rates of 400 to 1,000 percent, small savings in direct labor time have large impacts on cost distributions and product costs" (Johnson and Kaplan, 1991: 188). Labor intensive processes soon become uneconomical because overhead is spread based upon labor hours of production. Thus, labor-intensive processes, seen as uneconomical, are outsourced. Once these labor-intensive processes are outsourced, though, the overhead burden is carried by even fewer direct-labor manufacturing hours, and other products become uneconomical to produce. To further compound the problem, outsourcing products drives overhead costs upward because of increased material handling, storage and contract management requirements . The remaining lines of production, those that would require low direct labor hours, consist of low-volume runs that required special handling, setup, and quality control (Johnson and Kaplan, 1991: 188).

> ...costs are shifted from small-volume, frequent set-up jobs onto long-running, infrequent set-up, standard products thr quire no special handling or attention. In this situation, the factory starts to take c broader product line (it is becoming a "full-line producer") that includes more low-volume products requiring frequent set-ups, special expediting, engineering design features, quality assurance, and engineering change orders to fine tune the production process. (Johnson and Kaplan, 1991: 188)

"During the 1980's, many companies woke up to the fact that their antiquated accounting systems were leading them to charge too much or too little for their products" (Pare', 1993: 124). Companies were still using the accounting systems developed 20 to 30 years ago. Early accounting systems were developed to be run on an adding machine, and more recent computerization only automated the existing book keeping system. Additionally, simplifying assumptions were made when the accounting systems were automated because of the limited capacity of early computers: overhead costs were traced to cost centers and then in a second allocation stage, costs were allocated to products based on direct labor hours (Johnson and Kaplan, 1991: 184).

Traditional accounting systems fail to provide managers accurate product cost information because product lines are increasingly diverse, and large corporate overhead costs are spread based on direct labor hours. New approaches, however, are being explored to more accurately assign costs. The next section will show the evolution toward an accounting system based upon activities and processes, rather than on the direct labor hours.

Movement Toward Activity Based Accounting

In recent years, managers found their existing accounting systems no longer gave them the information they needed to manage complex processes and activities. Existing cost systems traced overhead costs down to the department level, and then allocated overhead charges against products based upon some direct variable input, like direct labor hours or machine hours. These traditional accounting systems, which trace costs downward by department or function can be described as providing vertical accounting information (Miller, 1990: 8).

Traditional cost accounting systems trace costs vertically by function and department, but the building blocks of an organization, those "business *processes* and *activities* that transform inputs into outputs," cut horizontally across departments and functions (Miller, 1992: 41). Recent moves in corporate America toward continuous process improvement and total quality management emphasize management of these business processes and activities within an organization. Cooper and Kaplan suggest that a new accounting method is needed to trace the cost of resources used to the activities which produce outputs. They put emphasis on process or activity rather than product. Production managers, responsible for process improvement and quality control, are also concerned with activities and processes. "Management's focus is to reduce or change the set of activities in a production process instead of simply managing a given set of products" (Beaujon and Singhal, 1990: 51). Cooper and Kaplan found that "companies, including those with excellent traditional cost systems, have developed activity based cost systems so that they can directly link the costs of performing organizational activities to the products and customers for which these activities are performed" (Cooper and Kaplan, 1992: 1).

Activity Based Costing

> The driving force behind the new paradigm for cost management is a focus on the outputs of the cost management system--information to manage and improve activities and processes of the business as the means to achieve reduced cost (Miller, 1992: 41.)

Cooper and Kaplan suggested that traditional accounting systems needed to be replaced by a system that focused on providing managers with information to manage and improve activities and processes. Activity based costing (ABC) may provide an entirely new method for organizations to organize, allocate resources, examine processes, and manage activities. This section defines ABC, then develops a conceptual model of the

ABC cost assignment process, and finally shows the key differences between traditional and ABC accounting systems.

Definition of Activity Based Costing (ABC)

The *Computer Aided Manufacturing-International (CAM-I) Glossary of Activity Based Management* defines activity based costing as "a methodology that measures the cost and performance of activities, resources, and cost objects. Resources are assigned to activities, then activities are assigned to cost objects based on their use. Activity based costing recognizes the causal relationships of cost drivers to activities." Traditional accounting principles hold that products cause costs, in the form of machine hours or direct labor hours. But ABC assumes that activities, "the processes or procedures that cause work to be performed in an organization" cause costs (Miller, 1990: 8). In an ABC system, activities consume resources, and in turn, activities are consumed by products. ABC allows the manager to determine product costs by adding the costs of all activities required to manufacture or deliver a product (Cooper, 1988: 46).

- Activities are the focus of the costing process in activity-based cost systems. Costs are traced from activities to products based on the product's demand for these activities during the production process. The allocation bases used in activity based costing are thus measures of the activities performed. (Cooper, 1988: 45)

- In an ABC system, the cost of the product is the sum of the costs of all the activities performed in an organization. (Cooper, 1988: 46)

ABC Concept

Beaujon and Singhal describe a two stage cost assignment process (Figure 2.1). In the first cost assignment stage, the model traces the allocation of resources to activities. In this illustration, each activity consumes a portion of utilities, setup, material handling, and supervision resources. Cost pools "are generated by splitting each resource category among the activity centers (i.e., there will be one cost pool for each resource category in
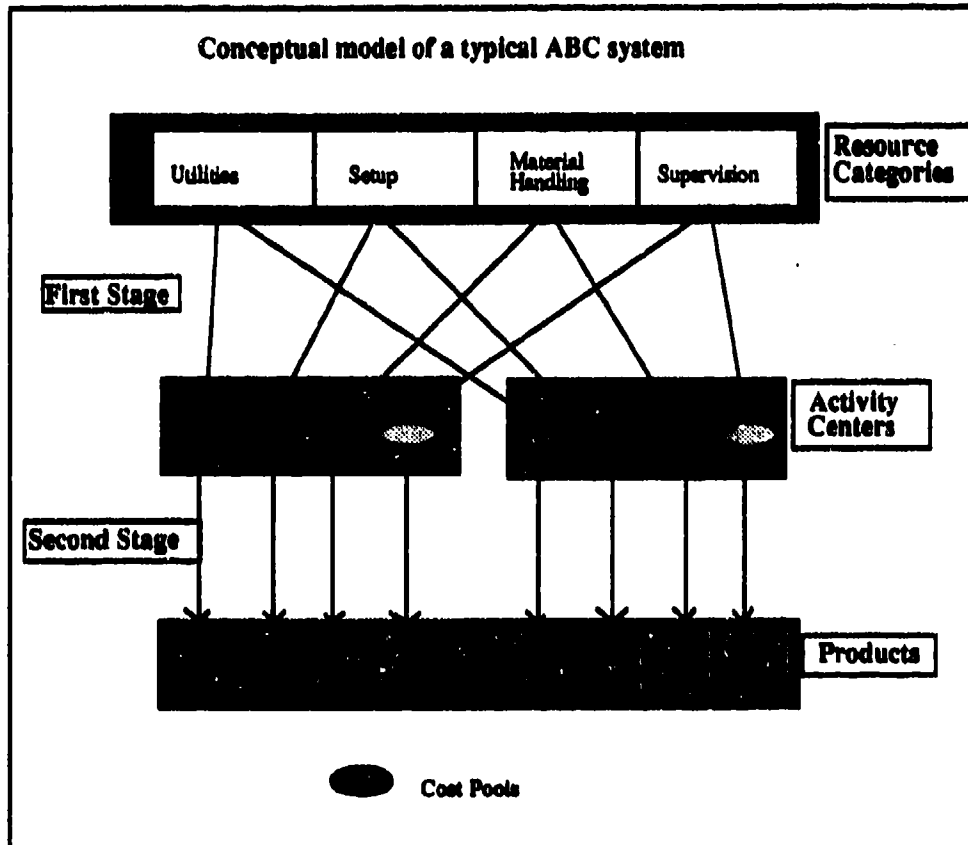
**Figure 2.1 Conceptual Model, Understanding the Activity Costs
in an Activity Based Cost System (Beaujon and Singhal, 1990: 53)**

1. The first process is splitting apart, or disaggregating, dissimilar resources, activities,
and products to capture important differences in the ways resources are consumed by
activities and products.

2. The second process is combining, or aggregating, similar resources, activities, and
products to simplify the efforts to gather data and the efforts required to interpret the
results. (Beaujon and Singhal, 1990: 53)

each activity center.) In the second stage, resources in each cost pool are assigned to products using a measure of the quantity of resources consumed" (Beaujon and Singhal, 1990: 52).

Singhal and Beaujon developed their two-stage conceptual model based on Cooper's cost assignment process:

> The first stage takes such resources as direct labor and supervision and splits them up into sections, each related to a segment of the production process. These segments can be machines,...collections of machines, or even entire departments...These costs are then traced, in the second stage, from the cost pool to the product using a measure of the quantity of resources consumed by the product. (Cooper, 1987: 44)

Key Differences Between Traditional and ABC Accounting Methods

Having examined the need for a new cost accounting system in business and presented activity based cost accounting as an alternative system, Section Four describes the key differences between traditional and ABC accounting methods. Key differences include objectives, principles, allocation measures, and output.

Traditional corporate cost accounting systems trace overhead costs down to the department level, and then allocate overhead charges against products based upon some direct variable input, like direct labor hours or machine hours. This method of overhead allocation is accurate when overhead burden rates are low and the product mix in a facility is not diverse (Cooper, 1989: 34). Up until 30 years ago, direct labor and materials made up the major proportion of a manufacturing corporation's costs, and traditional cost accounting provided accurate product costs.

More recently, however, corporations produce increasingly diverse product lines and support large overheads, and traditional cost accounting methods are no longer accurate. Traditional cost accounting systems rely upon volume related bases, like direct labor hours, to allocate overhead. But in many corporations the costs of some product

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related activities are unrelated to volume; overhead costs like marketing, engineering, and contracting are fixed in the short term, so these costs do not vary with the number of products which roll off an assembly line. "Thus, conventional systems do not measure accurately the cost of resources used to design and produce products and to sell and deliver them to customers" (Cooper and Kaplan, 1992: 1).

Traditional cost accounting utilizes only one cost driver, usually direct labor hours, to trace the cost of overhead to the products produced. An ABC system employs multiple cost drivers to trace the amount of resources consumed to the activities consuming them. The use of multiple cost drivers allows a more accurate correlation between diverse resources and the activities that consume them (Cooper, 1989: 43).

An ABC system "measures the cost and performance of activities, resources, and cost objects. Resources are assigned to activities, then activities are assigned to cost objects based on their use. Activity-based costing recognizes the causal relationships of cost drivers to activities" (Raffish and Turn' ', 1991). Traditional accounting principles hold that products cause costs, in the form of machine hours or direct labor hours. But ABC assumes that activities, "the processes or procedures that cause work to be performed in an organization," cause costs (Miller, 1990: 8). In an ABC system, activities consume resources, and in turn, activities are consumed by products. ABC allows the manager to determine product costs by adding the costs of all activities required to manufacture or deliver a product (Cooper, 1988: 46).

Miller explained the major difference between the two systems. "The driving force behind the new paradigm for cost management is a focus on the outputs of the cost management system--information to manage and improve activities and processes of the business as the means to achieve reduced cost" (Miller, 1992: 45).

Table 2.1 Key Differences Between Traditional and ABC Approaches to Accounting.

Elements of Approach	Activity Based Costing	Traditional Accounting
Overall Objective	Improve understanding of profitability through more accurate costing of products than traditional retail accounting.	Provide financial information on corporate sales, costs and profitability in order to meet financial reporting requirements and accurately quantify financial performance.
Basic Principle	Focuses on *Activities* That consume *Direct* and *Indirect* costs.	Collects most product costs in specific categories such as distribution center costs and direct labor costs.
Allocation Measures	Decomposes business units into activities. Allocates major direct and indirect cost to activities based on what drives the costs (e.g. drivers may be products, manufacturers, transactions).	Allocate direct costs to specific categories or to product/category level. Allocates indirect costs evenly on all products based on a measure such as volume, direct labor costs and shelf space used.
Output	Comprehensive information that facilitates decisions on: • prioritizing operations improvements • overall supply chain performance • product/category/ consumer-level decisions • Identification of opportunities for improvement in costs, business processes, rewards and measurements	Precise financial information. Generally, does not provide accurate or actionable by-product or by-category data.

Grocery Marketing, October 1993

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Miller also listed the following five ABC-specific cost management system outputs:

1. The cost of activities and business processes
2. The cost of non-value-added activities
3. Performance measurement
4. Product cost
5. Cost drivers (Miller, 1992: 42)

Traditional accounting systems, on the other hand, produced information on "managing cost by means of cost-based budgets, standards, variances, and measurements established at the departmental level" (Miller, 1992: 41). The table on the preceding page, from *Grocery Marketing*, 1993, further illustrates the key difference between accounting systems.

This section presented the key differences between traditional cost accounting methods and ABC. Perhaps most importantly, ABC provides non-financial, process oriented information. The next section will show the implications when management is given a system which tracks the costs of processes and activities.

Management Implications

This section demonstrates the benefits derived from ABC implementation. Miller found an ABC system promotes continuous process improvement and provides managers with the ability to judge how well cost management efforts are working. Information on activities can show the cost of activities that do not add value to a production process; examples of non-value adding activities are rework because of poor quality, moving materials, and waiting for the completion of an upstream process (Miller, 1992: 42). Additionally, managers will be able compare their processes and activities with those of other organizations (Pohlen, 1994: 11).

> The basic concept behind product costing in an ABC system is that the cost of a product equals the cost of the raw materials plus the sum of the cost of all the activities required to produce the product. Thus, ABC systems trace costs to activities and then to products. Product management benefits from having costs assigned more accurately to products. Activity management benefits from having cost associated with specific manageable activities. (Cooper, 1988: 46)

Pohlen found that overhead allocation based on consumption by activities "increases management visibility into how product, customers, or supply channels consume work and resources. The non-financial information produced by the ABC model facilitates the development of performance measures and continuous process improvement" (Pohlen, 1994:9).

ABC provides information detailing the relative consumption of resources across processes and activities. Understanding the relative consumption of resources allows a manager to assess the contribution that each activity makes to a company's operations, which is important in controlling and reducing costs (Yoshikawa and others, 1994: 40). It is also possible to determine whether the relative cost of an activity is commensurate with the importance of the activity to its customers and management. This knowledge allows management to prioritize activities for improvements or cost reductions through Pareto analysis stratification.

Miller shows that ABC also promotes productivity, quality, and processes improvement efforts. "Productivity improves when the cost per unit of output declines. This productivity calculation links the physical output of an activity to its cost, a linkage that is unique to the new paradigm for a CMS" (Miller, 1992: 43). The cost management system, (CMS) also makes a contribution toward management of quality efforts through tracking the cost of non-value adding activities like rework and scrap. Miller found that "linking cost management with continuous improvement broadens the definition and interpretation of cost management and drives a change in an organization's mind-set from managing costs to managing activities as the focal point of cost management" (Miller, 1992: 43).

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Similarities Between Traditional Cost Accounting and Governmental Fund Accounting

Traditional cost accounting and the existing governmental fund accounting system appear similar in that both are "vertically" oriented accounting systems. The corporate cost accounting system traces overhead costs downward to the department level, and then the costs are allocated to products according to some volume related base. In a similar "vertical" manner, the governmental fund accounting system traces costs downward to identify expenditures by category of expense.

Johnson and Kaplan suggested that the traditional corporate accounting system was failing. Tierney notes a parallel between governmental and failing corporate cost accounting systems. He writes that some of the lessons learned from the Johnson and Kaplan study can also be applied to government accounting. "The study has some analogies to the federal government, particularly where for generations agency financial managers, budget executives, and accountants, believed that their job was done when the external reports were mailed to Treasury and OMB or delivered to Congress, accounting for the status of expended appropriations. These reports selected only macro-level input-type data" (Tierney, 1994: 7).

Developing a cost model to explicitly capture the sum of the resources an activity or process consume represents a departure from the traditional financial reporting systems that trace costs downward by category, as in governmental organizations, or to departments, as in manufacturing organizations (Strategic Development Staff, 1993: 1). In private manufacturing organizations, ABC traces costs across departments to capture the cost of an entire business process. Within a government organization, an ABC system

could trace costs across fund categories to capture the cost of an individual activity or of an entire public service consisting of several activities.

ABC systems have mainly been implemented in manufacturing organizations, but increasingly the benefits of ABC have been realized in service organizations as well. ABC also appears well suited for expansion into government organizations. "Though research about activity-based costing was originally directed toward the manufacturing sector of our economy, the wider concept of activity based management applies equally well to service, not-for-profit, and governmental organizations" (Antos, 1992: 13).

Need for More Accurate Accounting Information in the Government

Vice President Gore's *Creating a Government That Works Better & Costs Less*, recognizes that mission-driven organizations with mission-driven budgets concentrate on outcomes rather than simply inputs. Existing governmental accounting systems, however, focus on inputs and do not give Government managers the information needed to manage complex processes and activities (Osborne & Gaebler, 1992: 147). Tierney writes that while input accountability is important and must continue, agencies must also cost and report on outputs, services levels, and outcomes" (Tierney, 1994: 6). Tierney further notes a parallel between failing governmental and traditional corporate accounting systems. Johnson and Kaplan suggested that the traditional corporate accounting system was failing. Tierney writes that the lessons learned from their study can also be applied to government accounting.

> The study has some analogies to the federal government, particularly where for generations agency financial managers, budget executives, and accountants, believed that their job was done when the external reports were mailed to Treasury and OMB or delivered to Congress, accounting for the status of expended appropriations. These reports selected only macro-level input-type data. (Tierney, 1994: 7)

Table 2.2 Key Differences Between Traditional and ABC Approaches to Accounting.

Elements of Approach	Activity Based Costing	Traditional Corporate Accounting	Government Fund Accounting
Overall Objective	Improve understanding of profitability through more accurate costing of products than traditional retail accounting.	Provide financial information on corporate sales, costs and profitability in order to meet financial reporting requirements and accurately quantify financial performance.	Segregate funds according to element of expense investment code.
Basic Principle	Focuses on *Activities* That consume *Direct* and *Indirect* costs.	Collects most product costs in specific categories such as distribution center costs and direct labor costs.	Trace every penny of expenditure.
Allocation Measures	Decomposes business units into activities. Allocates major direct and indirect cost to activities based on what drives the costs (e.g. drivers may be products, manufacturers, transactions).	Allocate direct costs to specific categories or to product/category level. Allocates indirect costs evenly on all products based on a measure such as volume, direct labor costs and shelf space used.	No allocation measure. Cost is not traced to output.
Output	Comprehensive information that facilitates decisions on: • prioritizing operations improvements • overall supply chain performance • product/category • /consumer-level • decisions • Identification of opportunities for improvement in costs, business processes, rewards and measurements.	Precise financial information. Generally, does not provide accurate or actionable by-product or by-category data.	Comprehensive information on expenditure vs. operation authority. • overview of all funds • combination statement presents funds by type • individual fund statements

Adapted from *Grocery Marketing*, October 1993.

Government Fund Accounting System

The traditional government accounting system traces overhead costs down to the department level, records revenues by source, and expenditures by object. Funds are segregated according to element of expense investment code (EEIC). "Almost from its inception, governmental accounting has relied on fund accounting...which structures financial data in discrete categories" (Snodgrass, 1993: 33). The fund reports do not, though, measure the cost of achieving a desired outcome or the total cost of providing a service (Tierney, 1994: 7). Table 2.2 further illustrates the differences between corporate, government, and ABC accounting information.

Government accounting was designed to trace congressional appropriations to categories of expenditures. As a consequence, the federal financial reporting structure provides managers visibility of expenditures by levels of indenture within the federal government, and by specific categories of expenses.

Initiated during the Johnson Administration, Program Budgeting facilitated consideration of policy objectives and resource allocation through groupings of programs. Figure 2.2 depicts the manner in which congressional budgeters are able to review appropriations by major program, organization, and category of expense. The 10 major force programs (MFP) in DoD represent the broadest categories of program expenditures. Within each MFP, the accounting system is able to derive the specific costs for organizations. Program Budgeting provides an aggregate depiction of expenditure by federal agency, appropriation category, and fund program. (Shishoff, 1993).

Within each Major Force Program, there may be several Program Element Codes (PEC's). Program element codes identify the organizations that comprise an MFP. For example, MFP 8, which includes training and education, consists of Air Education and Training Command Headquarters and its affiliated organizations. At the organizational level, the budget is usually defined with a single program and thus reflects a single mission.
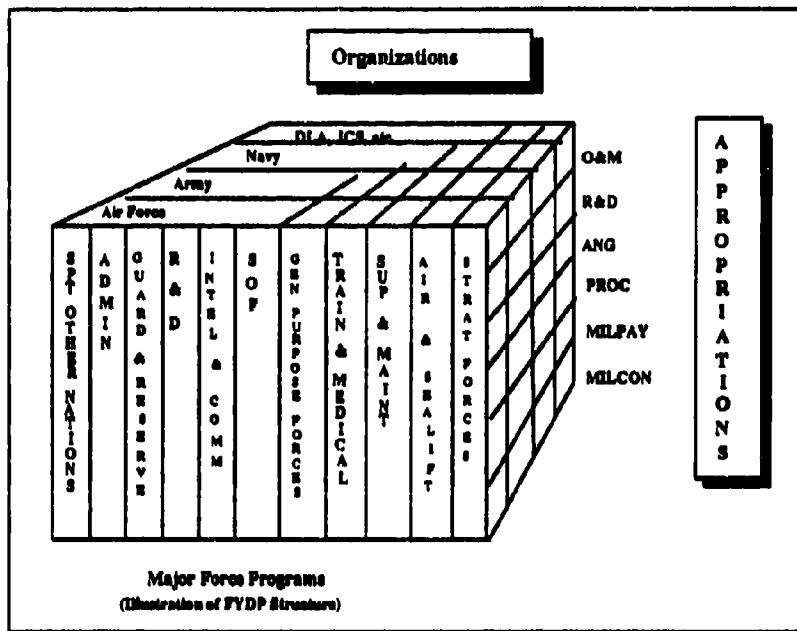
Figure 2.2 Program Budgeting
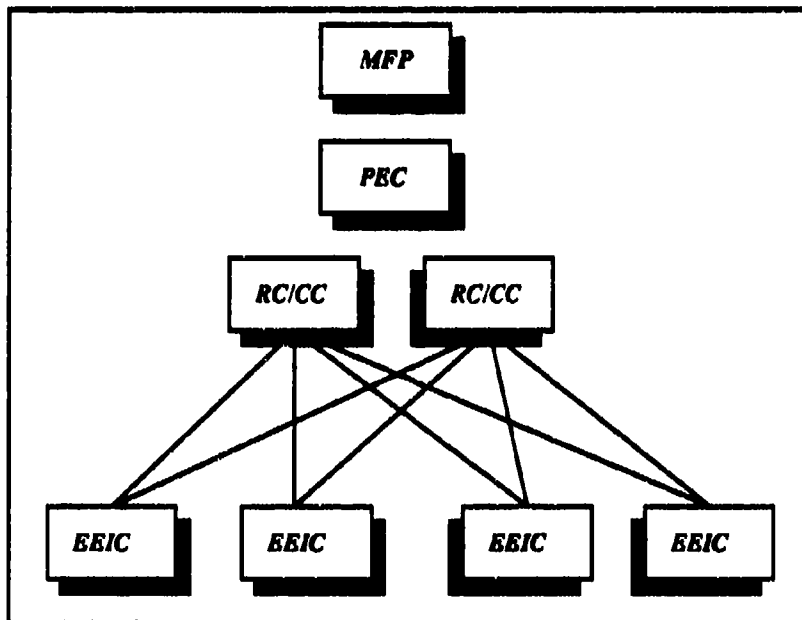
Figure 2.3 Object Classification Budgeting

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This form of budgeting, known of Object Classification Budgeting, identifies expenditures by category of expense, otherwise known as Element of Expense Investment Codes (EEIC).

As reflected in Figure 2.3, the bottom layer of the Object Classification Budgeting structure is composed of EEICs. This level of detail is managed at the unit level, and represents specific categories of expenses within the organization (travel, equipment repair, personal equipment, etc.). The next layer represents the responsibility center/cost center; at this level, organizational financial administrators manage money allocated to each EEIC. As a result of this type of budgeting, costs are traced meticulously within each EEIC, and consolidated within each indenture of the budgeting and accounting structure. Object Classification Budgeting, as is the case with Program Budgeting, does not link organization performance to budgets or costs to activities. Instead, costs are traced by element of expense codes and aggregated at each subsequent layer in the accounting process (Shishoff, 1993).

Mandate for Change in the Government Accounting System

Two recent pieces of legislation were enacted to expand the system from its present fund structure and its emphasis on budget execution to include a cost accounting emphasis on output measurement. The Chief Financial Officers Act of 1990 mandates that "An agency chief financial officer shall provide for the development and reporting of cost information and the systematic measurement of performance." Senator William Roth (R-Del) sponsored the Government Performance and Results Act of 1993 with the intention of tying budgets to program performance. The Act requires Congress to set goals for programs in legislation and link agency budgets to the performance of their programs (Tierney, 1994: 5).

> Each agency, for each program, shall establish performance
> indicators...measure or assess relevant outputs, service levels and
> outcomes of each program...be a basis for comparing actual program
> results with established performance goals.
> (Government Performance and Results Act of 1993)

As mandates of the CFO Act of 1990 and the Government Performance and
Results Act of 1993 are implemented within government agencies, traditional cost systems
may not provide managers the information necessary to determine the cost of providing
services, or the usefulness of expenditures. Several organizations within the government
have adopted an accounting system that may provide an improved insight into
organizational costs and performance.

Government Applications of ABC

Recent efforts within the government aimed at business, or functional, process
improvement use the organizational building blocks of processes and activities to identify
opportunities for improvement (D. Appleton, 1993: 4) (Farrell, 1993). But, existing
governmental accounting systems are unable to accurately cost the organizational
building blocks of business processes (Tierney, 1994: 7). Horizontally oriented business
processes drive the need for a horizontally oriented cost accounting system, like ABC,
that tracks costs according to process or activity (Miller, 1992: 41).

ABC Application within a DoD-wide Process Re-engineering Effort

> The current environment of fiscal restraint in the DoD compels change
> in how DoD does business. (Moravec and Yoemans, 1992: 33)

ABC provides process oriented accounting information that is being utilized in a
major, DoD-wide process re-engineering effort. This effort, known as the Corporate
Information Management (CIM) initiative, "is designed to help the DoD operate more

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along the lines of civilian businesses with an eye toward cost optimization and performance excellence" (D. Appleton, 1993: 5).

> The Department of Defense is actively involved in the improvement of logistics business processes to meet today's demands of reduced budgets and increased productivity. Through the *Corporate Information Management initiative*, DoD is applying process improvement principles and techniques to achieve the goals of improving productivity and military effectiveness.
>
> (D. Appleton, 1993: 6)

The CIM initiative is critical to senior DoD managers because the goal of enhanced military readiness will be unattainable without significant improvements in productivity-- Congress has already cut $35 billion from the military budget in anticipation of savings resulting from CIM (Moravec and Yoemans, 1992: 32). "Unlike other budget-driven programs, line (or functional) managers will be responsible for achieving these savings: After all, they are responsible for determining the budget and for deciding both the procedures and methods used to accomplish the mission" (Moravec and Yoemans, 1992: 32).

Functional managers will need to match costs with activities and the outputs of those activities, recognize where improvement is needed, prioritize improvement efforts, and then measure success while implementing CIM initiatives. The DoD handbook on CIM for functional managers, *Corporate Information Management Process Improvement Methodology for DoD Functional Managers*, mandates the use of ABC in re-engineering and process improvement efforts. The handbook reports that ABC provides functional managers the information necessary to manage processes and activities.

- ABC measures the opportunities for business improvement
- ABC provides the improvement baseline
- ABC focuses on improvement actions (D. Appleton, 1993)

Figure 2.4 on the following page lists the six key procedures for CIM functional process improvement.

Re-engineering Business in DoD
(Moravec and Yoemans, 1992: 33 and D. Appleton 1993: 9)

DoD has established a formal system, or re-engineering methodology, to support process improvement efforts and management initiatives.

1. **Establish Functional Project Framework:** kickoff meetings, develop business overview, select objectives, determine opportunity areas, and establish the project scope.

2. **Document and Analyze Current Baseline:** Conduct ABC baseline analysis to develop a model of the organization as it is and apply ABC techniques to show current business policies, methods, measures and costs.

3. **Perform Business Improvement Analysis:** Conduct ABC alternatives analysis to: eliminate non-value-added activities; simplify, improve, and consolidate value-added activities; apply modern business methods; increase performance and decrease cost; and use advanced technology when justified.

4. **Develop Management Plan and FEA:** Build business case: Define a project slate of business process improvement opportunities; each alternative is fully documented to show total costs and potential benefits and risks. The "business case" is considered to be met when it is clearly demonstrated or proven that the proposed alternatives achieve the allocated CIM cost savings while maintaining or increasing mission readiness. Develop transition plan: produce a project implementation plan that indicates the preferred solution, the staging, resourcing, and sequencing of related actions that must be accomplished to obtain the improvement.

5. **Review and Approve Program:** In this step the management decision is reviewed by appropriate approval authorities for policy, programming, and acquisition. If approved, the action plan is implemented.

6. **Execute Functional Process Improvement Program Decisions.**

Figure 2.4 Re-engineering Business in the DoD

ABC Implementation at the Defense Logistics Agency

Major General Lawrence P. Farrell, Principal Deputy Director of the Defense Logistics Agency (DLA), wrote that "DLA is seeking innovations to reduce costs and provide better service to its customers. We must find ways of reducing the costs of our products and services without reducing quality." ABC is being implemented within the Agency, independent of the CIM initiative, in order to more readily identify opportunities for improvement in costs, business processes, rewards, and measures. Overall objectives of the new activity accounting system as shown in the following figure were taken from DLA briefing slides.

> - To gain a comprehensive understanding of the supply centers' activities, business processes, and cost objects,
> - To incorporate performance measures,
> - To eliminate/reduce cost drivers,
> - To enable management to identify and affect continuous process improvement,
> - To increase the value received by the customer,
> - And to augment DLA's current unit cost program with information needed by operational managers. DISC Briefing Slides, 1993

Figure 2.5 Objectives of the New Accounting System

DLA is responsible for the management of over 3 million consumable items and will soon acquire 2 million more after a transfer from the military services. The Agency performs functions typically associated with consumable item management: item entry, requirements determination, management of assets, procurement of goods and services, and distribution of items (Farrell, 1993: Atch 1). Headquartered at Cameron Station, Alexandria, Virginia, and directed by Vice Admiral Straw, DLA is the primary manager of consumable items in the DoD. This section first contrasts the differences in accounting information provided by ABC and the existing accounting system. Then the section presents implications for business process improvement using activity based accounting information.

Differences in Accounting Information at DLA

A cost accounting system based upon ABC decomposes organizations into activities, and then allocates costs based upon an activity's consumption of resources. Once an accurate cost of an activity is understood, management can more easily identify opportunities for improvement in costs, business processes, rewards, and measures (Miller, 1992: 53). This improved information is provided by an ABC system because it is designed to:

1. Gather financial and operating information that reflects the performance of activities; and

2. Supply management with relevant information to plan, manage, control, and direct the activities of the business in order to improve processes and products, eliminate waste, and execute business operations and strategies. (Miller, 1992: 53)

Figure 2.6 illustrates accounting information derived from the traditional fund accounting system at the Defense Industrial Supply Center (DISC). This figure shows proportionate cost information by broad fund category. Note that cost information is stratified by function in this traditional accounting approach. The alternative, ABC, view of cost information at the supply center, Figure 2.7, breaks the cost of doing business down into major business activities, thus the center has a better picture of the cost of business processes and the relative consumption of resources by mission related activities.

After completion of the ABC prototype at DISC, Major General Lawrence P. Farrell, Principal Deputy Director of the Defense Logistics Agency reported that activity cost information:

1. Helps determine what it costs to perform specific activities

2. Management uses the new accounting information to decide which activities and processes should be scrutinized.

3. Management examines processes and activities to focus efforts to decrease inputs, improve processes, and satisfy the customer.
(Farrell, 1993: 1)

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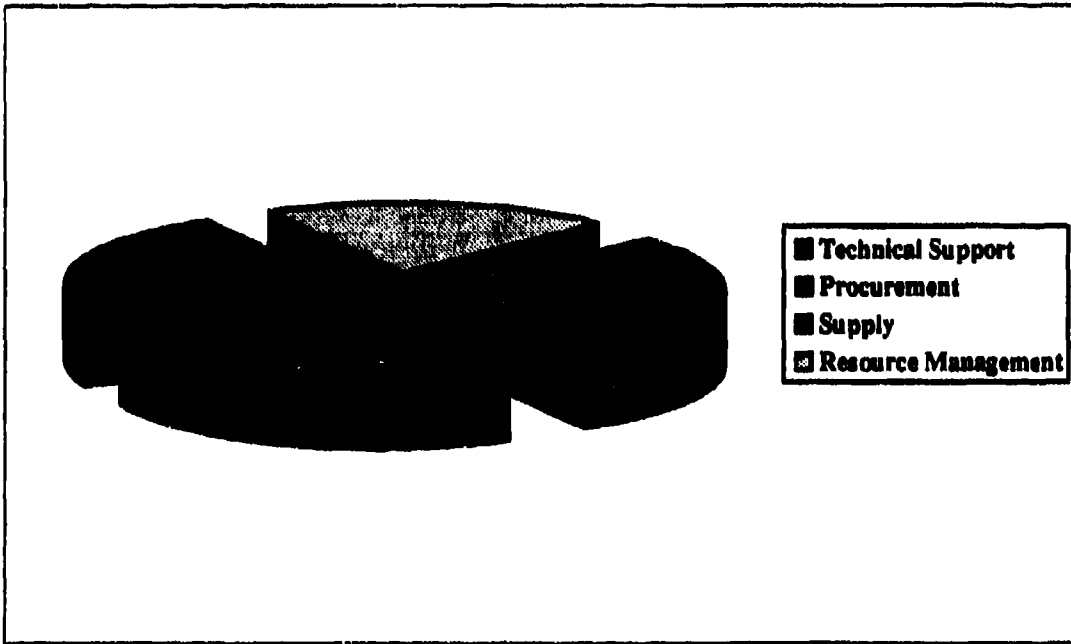
Figure 2.6 Cost Data by Function
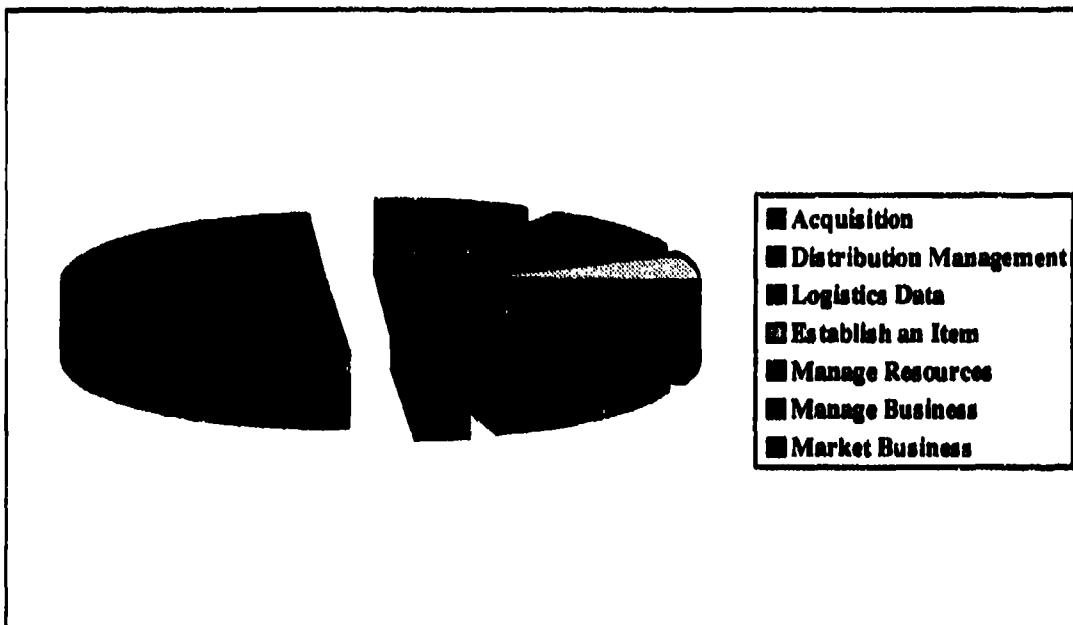
Figure 2.7 Cost Data by Activity

Implications of Activity Cost Information

The Defense Logistics Agency, DLA, is implementing ABC as a tool for business process improvement. Implementation initiatives include cost reduction, automation, reorganization, cycle time reduction, customer service improvement, and process re-engineering. Betty Baker, team leader of the ABC Cost Center Management Design Team at the Defense Construction Supply Center, Columbus, Ohio, believes this methodology provides an organized way to determine the causes of costs. "Reducing costs is accomplished by eliminating or resequencing tasks and redirecting resources to those tasks that produce corporate benefits, tasks such as supporting our customers....ABC as a tool is unique in that it will provide us with a guide to identify and focus our attention on process improvement opportunities, while measuring the impact of those cost improvements" (House, 1993: 2). A DCSC information sheet addressed the importance of the conversion to an ABC system, Figure 2.8.

Why is DCSC Implementing ABC?

Our customers pay us for the goods and services we provide to them. In order to better support our customers and be the supplier of choice, we must continually look for ways to improve our processes in terms of cost, quality and timeliness. Although DCSC has been continually pursuing improvement, ABC as a tool is unique in that it will provide us with a guide to identify and focus our attention on process improvement opportunities, while measuring the impact of those cost improvements. Specifically, we need to reduce our operating costs at DCSC...If we are interested in lowering costs, we need to know the relative value of activities and understand what drives them. Through ABC, cost drivers are defined and examined in order to reduce or eliminate them, thus reducing the cost of performing those activities. ABC allows our decisions on cost reductions to be based on really knowing how the reductions will affect the mission and our customers. It will provide information to managers over which they have control and can affect change.

Farrell, 1993: Atch 1

Figure 2.8 Information Provided to DCSC Employees about Implementation

ABC Implementation Procedures: Developing a Chart of Activities

John Miller, President of Miller-Newlin Consulting, and a consultant for
implementation of ABC throughout DLA, suggests that the first step in implementing an
ABC system within a government/DoD setting is to develop a chart of activities.

> ...most organizations do not collect financial and operational data about their
> activities; many have never even defined activities.   Therefore, before
> implementation can take place, significant resources must be devoted to
> defining activities and establishing methods, procedures, and systems to meet
> the fundamental design objective. (Miller, 1992: 46)

In developing implementation procedures to create a chart of activities, the Defense
Electronic Supply Center in Kettering, Ohio, adapted John Miller's conventional 8-step
process to accommodate the fundamental design objectives of an ABC system. Depicted
in Figure 2.9, the first milestone in the 8-step process is to secure management inputs and
approval regarding the ABC implementation objectives.
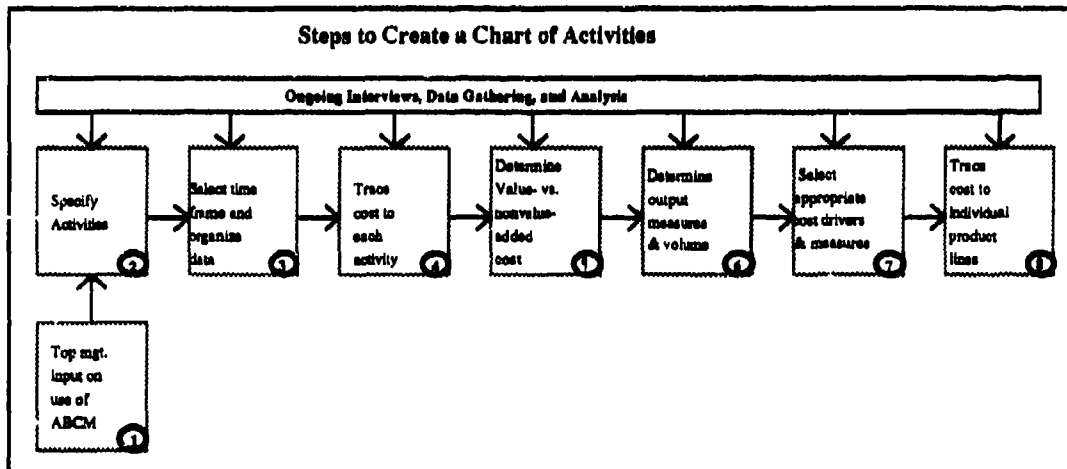
Figure 2.9 Miller's ABC Implementation Process

Having done this, DESC developed a seven-step cost implementation plan. Figure 2.10
depicts DESC's adaptation of Miller's conventional ABC implementation model
(Schmook, 1993).
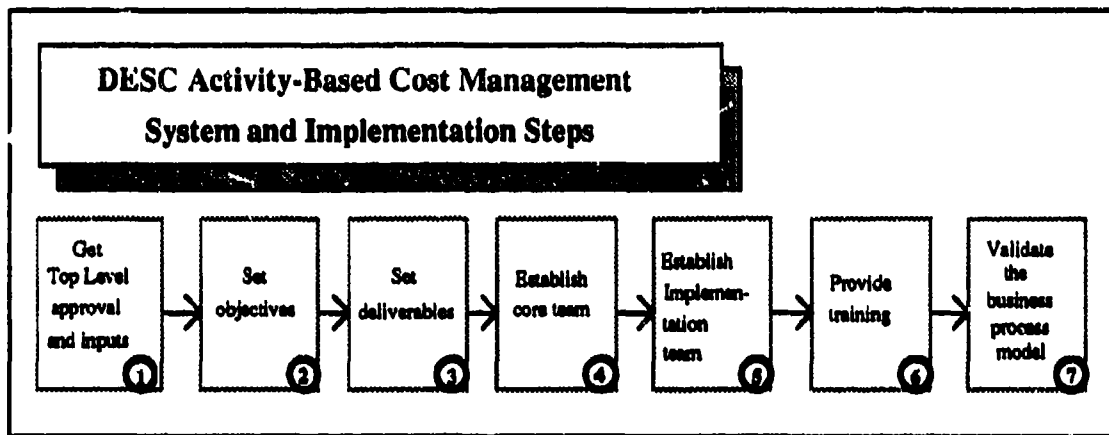
Figure 2.10 DESC's ABC Implementation Steps

DESC's methodology for developing an organizational chart of activities and implementing an ABC system would serve as a process blueprint for defining organizational activities and processes.

In order to define the organization's activities and processes, DESC trained a core implementation team responsible for developing a chart of activities. Dr. Schmook, an ABC implementation facilitator of Miller-Newlin Consulting, conducted a two-day ABC implementation training workshop at the center. The workshop's goal was to ensure that the team members gained the "knowledge, skills and confidence necessary to successfully implement ABC at DESC" (DESC, 1993: 1). Team members were also to:

- Understand the principles, philosophies, benefits, uses and methodologies of ABC;
- Gain knowledge of how to use ABC to support continuous improvement;
- Become familiar with the basic steps, criteria, and key success factors of implementation;
- Identify outputs and output measures, performance measures and cost drivers for business processes and key activities;
- Determine a basis for tracing costs to key activities, and finally
- Be aware of skill sets of effective data collection and interviewing. (DESC, 1993: 1)

Following the development of a core implementation team, DESC began taking steps to complete the specifications for a chart of activities.

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Complete Specifications for a Chart of Activities

At DESC, the chart of activities for their ABC system specified that the following elements be identified for each process or activity: cost effectiveness, efficiency, cost drivers, and product line profitability. While referring to the ABC Implementation Workshop presentation of Dr. Schmook, this section discusses how the chart of activities was created at DESC. First, the objectives of the data gathering exercise are presented, and then the advantages and disadvantages of the data collection options available to the ABC team chief are discussed. Next, the paper considers the suggested questions for an interview protocol, the required interviewers, suggested interview skills and competencies, and the subjects to be interviewed.

Develop a Data Collection Methodology

Data Collection Alternatives

Before selecting a method of data collection, DESC first had to define the data that was going to be amassed and what would be done with the data. In particular, DESC wanted to specify:

- Activities performed
- Percent of total time spent performing a specified activity
- Output of each activity
- Customer of each activity
- Performance measures
- Cost drivers
- Value-added/nonvalue-added activity.

These objectives were derived or established by management, and served as the basis for creating DESC's chart of activities. Having defined the objectives of the data collection process, DESC then reviewed their options for collecting the data.

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Table 2.3 Selection of Data Collection Techniques. (DESC, 1993: Training Slide)

Techniques	Major Advantages	Major Disadvantages
Interviews with branch/section heads	Provides adequate information on • activities • resource allocation • inputs/outputs • key issues Personal contact with management	• Typically long elapsed time (difficult to arrange interviews) • Need to be completed by other techniques as interviews may be short and cover many aspects
Interviews with staff in branches/sections	• Provides better information on tasks • May identify additional problems and improvement ideas • Possibility of observation	• Very time consuming/expensive • May disturb day to day business considerably
Questionnaires	• Least expensive method of gathering new information • Short elapsed time for collecting new information	• No personal contact, political and personal issues and many problems may not be identified • Only successful when used by managerial and administrative employees • Clarification/follow-up often required to complement responses
Analysis of Historical records and Documents	• No need to involve many people in collecting the information • May provide adequate information • Inexpensive	• Not always available or up to date • No personal contact • Key issue, political and personal issues, problems may be hidden
Panel of experts	• Take advantage of broad expertise • May highlight political issues, problems and create improvement ideas	Only effective for specific tasks (eg. activity analysis for newly created activities, business process analysis Time consuming, expensive
Analysis of diaries, time sheets and logs (employees record daily what they do)	• Percentage of time spent of each activity can easily be identified	• Very time consuming, expensive • Requires education and training • Many employees lack the skill and commitment to record activities
Observation	• Facilitates understanding of business processes if material or information flow is visible • Accurate information on how an activity is performed (tasks, operations)	Only suitable of short and repetitive activities and processes which are visible
Check sheet	Adequate picture on time percentage spent on each activity	• Only suitable for short and repetitive activities • Only suitable for direct production activities • Time consuming, expensive

Interviews are the Primary Data Collection Method

As depicted in John Miller's and DESC's implementation diagrams, the interviews and data gathering that occur at each ... ... implementation process are an integral part of creating a chart of activities. ... ... using personal interviews to collect data, the ABC team chief had other ... ... ng data. Table 2.3 presents advantages and disadvantages of the alterna... ... ... to the ABC team chief. Using the personal interview as the primary form of data collection, other sources of information included: timed observations, data processing transactions, and the labor reporting system. An interview protocol, or checklist was developed so that all personnel interviewed were asked similar questions about effort expended performing certain activities.

DESC's Protocol and Worksheet

During Dr. Schmook's training seminar at the Defense Electronic Supply Center, the slides depicted in Figure 2.11 on the next page were presented for consideration in developing a protocol which subsequently formed the basis of DESC's protocol. Coinciding with the protocol, John Miller had designed a worksheet which contains all of the elements required to construct an organizational chart of activities. This worksheet was used by DESC without modification throughout the data collection process.

Prior to beginning the interview process, DESC personnel were versed in the interview "do's" and "don'ts". The next section exhibits several of the workshop training slides presented to DESC personnel during their ABC initiation seminar, and discusses the atmosphere that Dr. Schmook encouraged personnel to foster during the ABC interviews.

Interview Protocol:

...Let's identify the activities you
do in your job:

Option A. Show the list of activities, and ask them to identify
which ones they do.
Option B: Ask them to describe what they do,
then, the interviewers match what the individual
says with the master list of activities.

-1-

Interview Protocol...

Do these activities account for 90% (or more) of what you do?
Is there any key or significant activity we need to add?

Now, let's estimate the percent of time spent on these activities...
Which one takes up most of your time?
Which one takes the least?
How would you rank the others?

For the activity marked #1, what percent of your time
is spent on it? Then proceed through the other
activities to get percentages which add up to 100%.

-2-

Interview Protocol

We have your activities and the percent of time spent.
We will now ask for your ideas about these activities. Let's
start with the highest activity:

-What is the output?
-Who is the customer?
-What performance measure/criteria could be used to
determine whether this activity is being done well?
-What are some cost drivers which drive the cost of the
activity up?

-3-

Interview Protocol

Next Steps:
If you think of something to add or change over the next 2 or 3 days,
give us a call.
Within____days, we'll give you a hard copy.
We may need to contact you for clarification on some item.
Please continue thinking about potential ways to improve
any of these activities we've discussed today.

-4-

Figure 2.11 DESC Workshop Slides of Protocol

Activity Evaluation Worksheet							
Branch/Section_____				Person Interviewed_____			
Date_____				Interviewer			
Activity Description	Input(s)	Output	Output Measure	Time %	Customer of Output	Activity Characteristics	Notes
1.							
2.							
3.							
4.							
5.							
6.							
7.							

Figure 2.12 John Miller's Worksheet for Documenting Interviews

Personal Interview

"What significant activities are performed within this department?" Often when people consider these questions, this will drive ideas on process improvement. (Dr. Schmook, 1993)

Data gathering, in the form of personal interviews, and analysis occur throughout the process of creating a chart of activities. An interview protocol, or checklist was developed so that all personnel interviewed were asked similar questions about effort expended performing certain activities. Dr. Schmook noted that sometimes it is easier to conduct several shorter interviews rather than one long one. In Dr. Schmook's experience, interviews with staff in branches/sections are the most effective--usually one interview for every six to eight people. The interview team chief needed to consider which people would provide the information needed as well as which team members would do the interviewing. Figure 2.13 on the facing page displays slides taken from Dr. Schmook's presentation that illustrate further implementation considerations.

After discussing the personnel to be involved in the interviewing process, the implementation workshop considered the interview methodology. The workshop recommended that a letter be sent to interviewees before the interview which defined ABC, related management expectations, and explained the interview's purpose.

At this point, DESC personnel were prepared to begin collecting the data required to create the chart of activities. This section provided an overview of the recommended procedures for establishing, conducting, and completing an ABC interview at DESC. Furthermore, it displayed several of the slides that Dr. Schmook, the ABC facilitator from the Miller-Newlin Consulting, used in training personnel during a two-day workshop held during the initial stages of developing an ABC methodology. Several of these slides or the ideas contained within them provided a foundation for developing the interview process used in the data collection of this thesis.
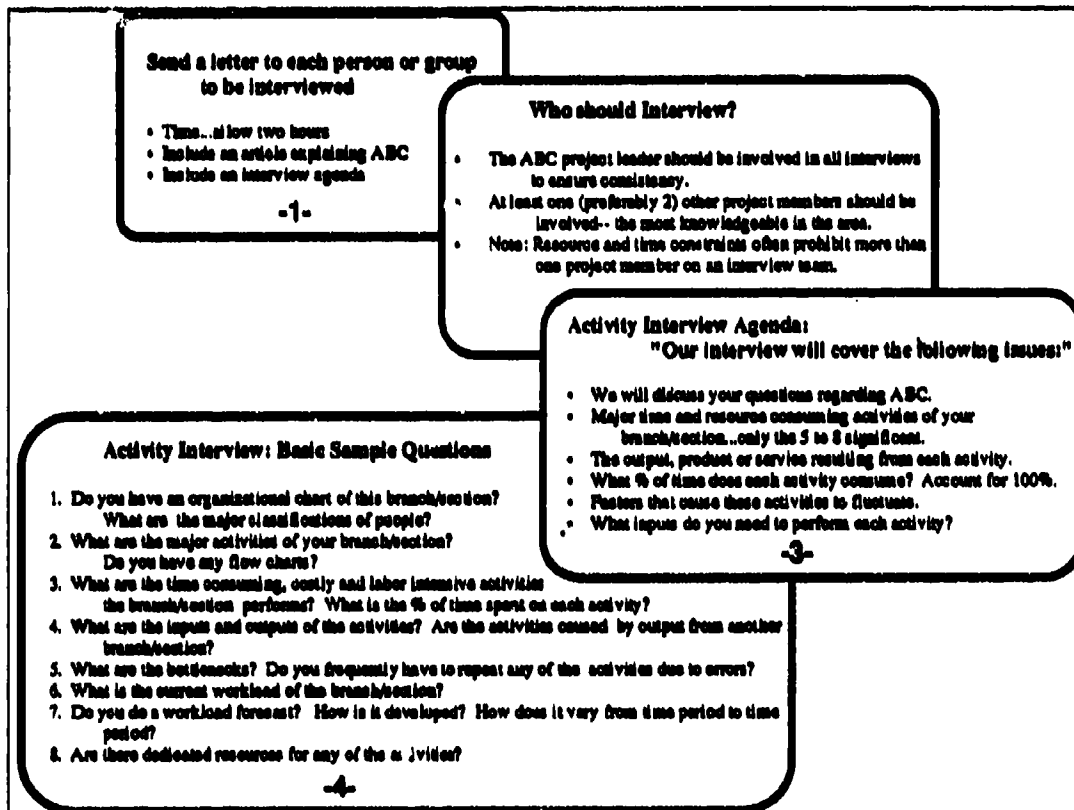
Figure 2.13 ABC Interview Slides

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Case Study Organization: Air Force Institute of Technology
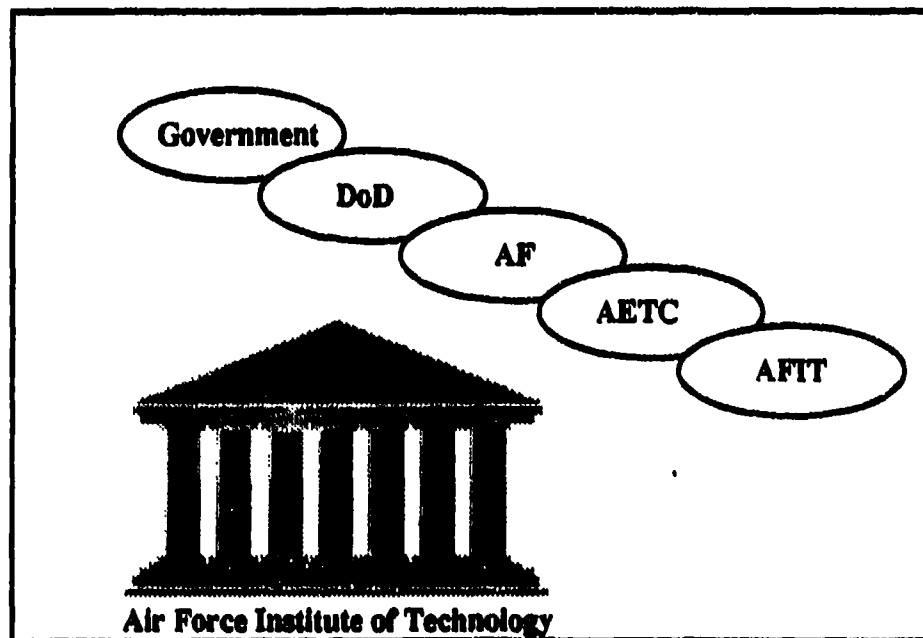
Figure 2.14 Case Study Organization: Air Force Institute of Technology

A component of the Air Force Air Education & Training Command (AETC), the Air Force Institute of Technology provides several unique services to the Air Force and Department of Defense. The primary mission of the Air Force Institute of Technology is to "support the Air Force through graduate and professional education, research, and consultation" (AFIT Graduate Catalogue, 1993: 1).

In 1954, Congress granted AFIT the authority to grant degrees. (AFIT Graduate Catalogue, 1993: 3) As such, "AFIT provides both MS and Ph.D. programs through its School of Engineering, and MS programs through its School of Logistics and Acquisition Management. Furthermore, a broad range of Professional Continuing Education Courses are offered through the School of Engineering and Services (EN) and School of Systems and Logistics (LS) (AFIT Graduate Catalogue, 1993: 4). However, as noted in the mission statement, AFIT does more than simply provide educational services. Students

and faculty are continually involved in performing research; the thesis is a requisite for completing the various MS programs the university offers. In addition, doctoral students perform in-depth analysis of relevant issues as a means of fulfilling their Ph.D. requirements. Since its inception in 1926, AFIT has made significant contributions in the fields of engineering, science, technology, medicine, logistics, and management. Research topics have ranged from the impact of contract cost overruns, to intra-theater mobilization, to developing expert systems for F-16 aircraft battle damage repair. Lastly, AFIT provides consulting services to DoD agencies. This is often a by-product of the unique expertise which faculty members possess and the streams of research which the institute sponsors.

Figure 2.15 presents the AFIT organizational structure and its components. As shown, the organization consists of overhead and operational departments, much like any other academic institution. The Institute uses a traditional government fund accounting system to track annual appropriations.
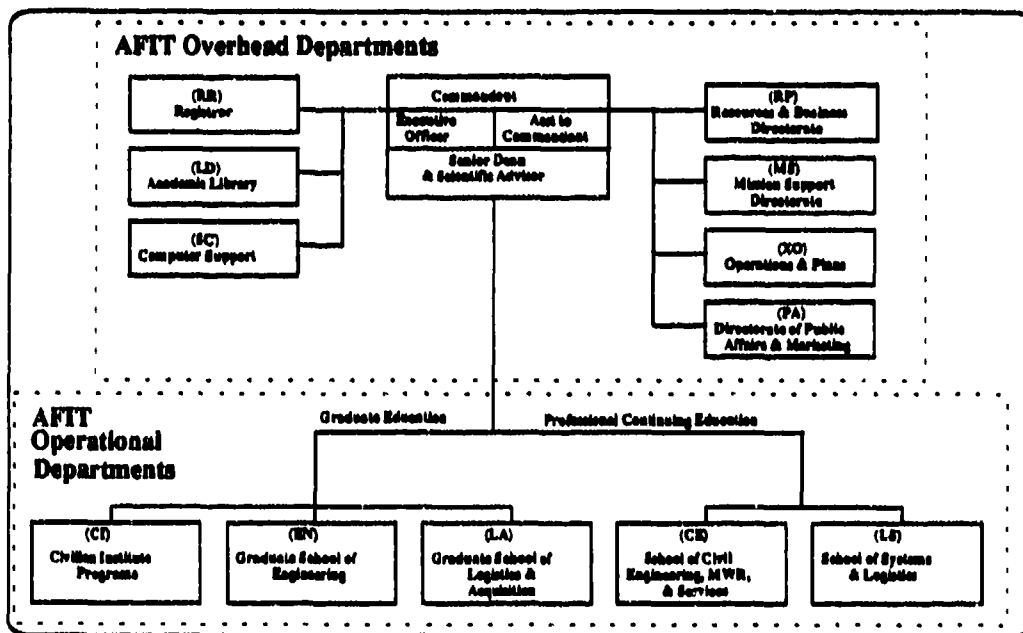
Figure 2.15 AFIT Organizational Chart

Summary

This literature review first demonstrated the inadequacies of traditional cost accounting systems in corporations with diverse product lines and high overhead allocations. These older, vertically oriented accounting systems, were originally designed to provide financial information to stock holders, not information needed to manage production. During the 1980's, many companies began to realize that their accounting systems had become outdated, and were causing them to charge too little or too much for their products. Automation of accounting system did not adjust for the changes that had taken place in industry, it simply computerized existing book keeping systems. This review also demonstrated that traditional accounting systems needed to be replaced by a system that focused on providing managers with information to manage and improve activities and processes. Activity based costing (ABC) provides organizations with an entirely new method of examining processes, allocating resources, and managing activities.

III. Methodology

Overview

Chapter Two suggested the need for a new cost accounting system capable of tracking activities and processes within government organizations. Recent legislation, like the Government Performance and Results Act and the Chief Financial Officer Act, suggest accounting deficiencies are recognized at the highest levels in the government. The DoD CIM initiative and ABC implementation within the Defense Logistics Agency represent attempts to attain improvements in cost accounting information.

Chapter Three contains the methodology employed during the research. The first section presents considerations in the design of the research methodology. Following sections detail variable, research question, and propositi.. validation. Finally, the steps required for implementing the research design are described.

Research Design

The research performed an in-depth analysis of a gov ment service organization to determine the applicability of an ABC system. The study examined an existing government fund accounting system, and then compared the fund information with ABC accounting information. The research consisted of archival analysis of organizational budget information and a case study of the Air Force Institute o' chnology (AFIT). The focus of the research required a confined environment with internal overhead organizations and operational units. AFIT fulfilled these requirements.

The research strategy employed case study and archival analysis. This strategy was selected in part using Yin's criteria for the selection of a research strategy.

Yin lists the following criteria:

- The type of research question posed

- The degree of focus on contemporary as opposed to historical events
  (Yin, 1984: 17)

Yin suggests research questions can be categorized as "who", "what", "where",
"how" and "why". Several of the research questions in this project are of the "what"
variety. For example, what information is provided by the government's existing input-
oriented fund accounting system?" The data needed to answer this question would be
found in budget records, and Yin suggests an archival analysis is the appropriate research
strategy (Yin, 1984: 17).

Several other research questions are also of the "what" variety. However, in this
case the "what" question is exploratory in nature. For example, "What new information
does an activity accounting system need to provide in order to determine the applicability
of an ABC system within a government service organization?" Yin writes that "this type
of question is a justifiable rationale for conducting an exploratory study, the goal being to
develop pertinent hypotheses and propositions for further inquiry" (Yin, 1984: 17). The
case study methodology was selected because answers to this type of "what" question
cannot be found through archival or historical research, but require in-depth personal
interviews with decision makers. Other research questions were of the "how" variety. Yin
suggests that these questions are exploratory in nature, but the further requirement for
current information rules out archival or historical research.

Emory and Cooper write that a case study methodology is most appropriately
employed when depth of information is necessary. Case studies place greater emphasis on
the "full contextual analysis of a limited number of events or conditions and their
interrelations" (Emory & Cooper, 1991: 142). Emory and Cooper also suggest that a case
study's reliance on qualitative data may make rejecting or supporting the research
hypothesis a more difficult task. However, "the emphasis on detail provides valuable

insight for problem solving, evaluation, and strategy" (Emory and Cooper, 1991: 143).
Emory and Cooper also contend that the data required for a case study analysis is often
secured from multiple sources so as to "permit verification of evidence and avoidance of
missing data" (Emory and Cooper, 1991: 143).

ABC implementation efforts within other government organizations were first
examined to determine the cost information shortfalls that caused managers to consider
ABC implementation. Next, archival analysis was conducted within the case study
organization to gain an understanding of the information provided by the existing fund
accounting system. Afterward the organization's fund accounting information was
examined to determine whether the same accounting system information shortfalls existed
within the government organizations that had previously implemented ABC.

An in-depth case study was conducted to determine the differences in cost
information and possible benefits a government service organization might expect to
realize from an ABC system. Activity cost information was gained through
implementation of an ABC system within the case study organization. The information
was analyzed:

    1) To define activities and processes,

    2) To cost activities,

    3) To define cost drivers, and

    4) To develop a framework for ABC implementation within other government
       service organizations.

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│  │  Ongoing Interviews, Data C¬thering, and Analysis             │       │
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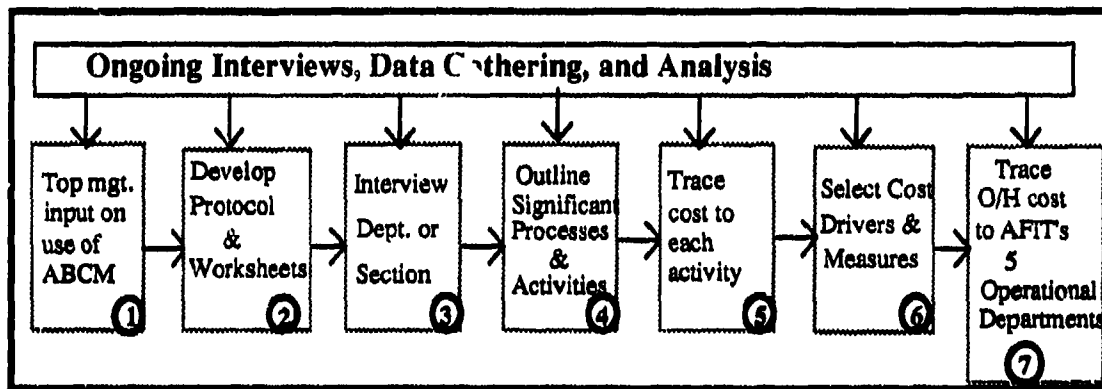
Figure 3.1 Steps to Implement an AFIT ABC System

ABC system implementation followed the seven-step schedule as shown in Figure
3.1. Interviews and data gathering occurred at each step of the implementation process.
Interviews were conducted within each overhead directorate and consisted of questions
contained in the interview protocol. Personnel were asked to specify the time and
resource consuming activities they performed. Next, for each activity, the personnel were
asked to detail the amount of time devoted by each person in the department to each
activity, the inputs of each activity, and the outputs and customers of each activity. Finally
personnel were asked define cost drivers for each activity.

Interview responses and data from the budget supported an analysis of the
applicability of ABC within the organization. An analysis of the budget and ABC
information revealed the cost of performing overhead activities. Activity outputs,
customers and cost drivers were analyzed to trace overhead costs to the operational unit-
level to determine a fully loaded cost of operation. Differences in cost visibility were
analyzed by comparing the ABC view of the fully loaded cost of operation to the
information provided by case study organization's fund accounting system. Costs were
also analyzed by tracing the consumption of overhead resources from individual overhead
departments to individual operational departments. An alternative view of resource
consumption was provided by tracing consumption from aggregate budget to individual
processes, and then from process to output and customer. ABC non-budgetary
information was analyzed to determine the possible impact on process improvement or

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re-engineering efforts. Finally, analysis of the interview results and fund accounting information led to the development of a framework for ABC implementation within other government service organizations.

Variables and Variable Validation

The research focused on the applicability of an activity based cost system within a government service organization. Activity cost information was gained through implementation of an ABC system within AFIT. Table 3.1 lists the variables employed to determine the costs of activities and processes, and to trace the consumption of overhead resources to operational departments.

Table 3.1 Definition of Variables

Variable	Definition
1. Cost of a Process	The *cost of a process* is the sum of the costs of activities within a specific process.
2. Cost of an Activity	The *cost of an activity* is the sum of the cost of resources consumed by an activity. The cost of an activity is equal to proportion of obligations across all EEIC's traced to consumption by a particular activity. These expense categories include: supplies, equipment, fuel, rentals, interest penalties, books, and periodicals, for example.
3. Cost of Overhead	The *cost of overhead* is the sum of the costs of all process within AFIT overhead directorates.
4. Cost of Labor	The *cost of labor* is equal to the proportion of labor hours devoted to performing a particular activity multiplied by the salaries of the personnel involved in performing the activity.
5. Net Obligations	*Net Obligations* is the money expended within an element of expense.

The values of the variables "Cost of a Process" and "Cost of an Activity" were determined after analysis of data gathered through personnel interviews and archival research. The research first employed personal interviews with directorate chiefs, branch chiefs, and section supervisors as the primary means of data collection. Often, though, supervisors called upon subordinates for expert knowledge. During an interview, personnel first detailed the processes and activities performed. Labor hours were

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allocated to the specified activities to obtain "Cost of Labor." Next other inputs were detailed to determine the total "Funds Consumed by an Activity". As a final verification of "Cost of an Activity" and "Cost of a Process" the team performed archival research of AFIT's annual budget. Total budget expenditure, as detailed by the annual report, was compared to total cost of all AFIT processes. The "cost of overhead" was determined by adding the costs of all processes within overhead directorates.

Research Objectives

The goal of the research was to determine the applicability of an ABC system within a government service organization. The first objective was to determine the shortfalls in information that caused managers of other government organizations to consider ABC implementation. The second objective was to examine how ABC has changed the reporting of government costs. The third objective was to examine how a government service organization could design and implement an ABC system. The fourth objective was to determine how a government service organization could analyze ABC information to trace overhead costs to operational organizations. The fifth objective was to develop a framework for designing and implementing an ABC system within a government service organization. The sixth objective was to identify problems/obstacles to ABC implementation and ways to overcome them. The final objective was to identify opportunities for future research.

Research Propositions

This research employed research propositions to address the research questions. Zikmund describes a proposition as a "statement concerned with the relationships among concepts. At the explanatory level, a proposition is the logical linkage among concepts.

A proposition asserts a universal connection between properties" (Zikmund, 1991: 89). Emory and Cooper suggest that the use of a proposition has several advantages. Use of a proposition "encourages researchers to crystallize their thinking about the likely relationships to be found [and] further encourages them to think about the implications of a supported or rejected finding" (Emory and Cooper: 1991: 59). This research employed a proposition, prediction and rationale format. "The predicted directions reflect the direction of the relationships anticipated to be observed during the research. The case study data is used to ascertain the direction and magnitude of the studied relationships" (Pohlen, 1993: 149). The research presented propositions in the null case to identify specific relationships examined by the case study research.

Proposition 1 - Applicability of ABC for use in a Government Service Organization

Proposition 1.a: The activity cost information provided by an ABC system cannot be used to determine the cost of activities within a government service organization.

Predicted: Activity cost information can be used to determine the costs of activities within government service organizations.

Rationale:

ABC systems have been successfully implemented within a government setting, for example, within the Internal Revenue Service. Prior to installing an activity based cost system, the District Commissioner of the Boston Examinations Division of the Internal Revenue Service, described his financial accounting system by stating "this is not the way I'd run my own business. I have a responsibility to spend money wisely and I'm not sure that I am now. I am only sure that I am spending it" (Geiger, 1994: 24). After implementing an ABC system, the District commissioner was able to determine the cost of activities within his organizatio and develop performance metrics comparing costs to benefits provided by activities (Geiger, 1994: 25). Operational performance data was used

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to redistribute and add staffing resources to those audit operations that recorded greater return to investment ratios, to identify and correct deficiencies within audit operations, and to consider alternative facility requirements for the hundreds of field operators that used their offices less than 20 percent of the time (Geiger, 1994: 25).

Proposition 1.b: Government service organizations that implement an
ABC system will not realize a difference in cost
visibility.

Predicted: Government service organizations that implement an ABC system
will realize an improvement in cost visibility.

Rationale:

Within the DoD, the Army realized increased cost visibility from activity cost information. The Fort Sill Directorate of Public Works (DPW) provides engineering services, master planning, mobilization planning, construction planning and execution, real property maintenance and repair, utilities, custodial and refuse removal services, environmental and fire protection, and housing management for the 2,500 buildings located on 150 square miles of Fort Sill and at the 54 U.S. Army Reserve Centers scattered throughout Oklahoma and Arkansas.

Figure 3.2 illustrates the relative distribution of real property maintenance expenditure at the Fort Sill DPW. But this presentation of cost information by fund category does not tie the relative proportion of expenditure to unit cost. "The Fort Sill DPW ABC project was initiated in order to understand this relationship, and to provide a framework for analyzing costs in a similar manner across all corresponding DoD installations" (D. Appleton, 1993: 109).
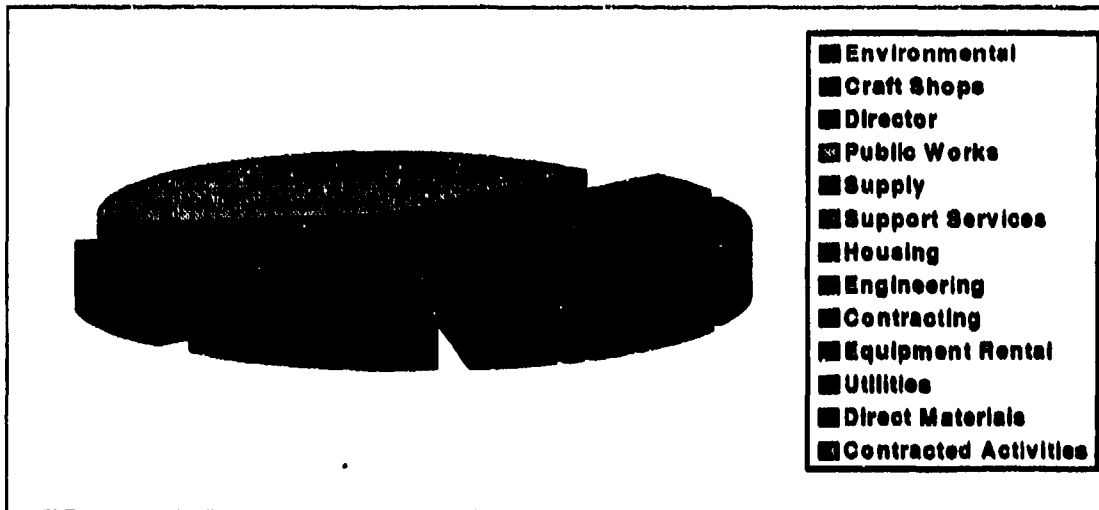
Figure 3.2 Fort Sill DPW: Relative Distribution of Real Property Maintenance Expenditures

Fort Sill DPW Relative
Distribution of Business Processes

Business Process	Activity Cost	Volume	Unit Cost
1. Prepare a Service Order			
2. Approve/Disapprove Work Order Request			
3. Develop Work Order Estimate			
4. Support In-house Work Order Activities			
5. Specify Supply/Service Request			
6. Receive Depot/Purchase Delivery			
7. Issue Supply Item			
8. Issue In-house Work Order Supply			
9. Process In-house Work Order			
10. Process In-house Work Order with Estimate			
11. Process Contracted Job Order			
12. Provide construction Order Engineering			
13. Provide Construction Order Contracting			

Figure 3.3 Relative Distribution of Real Property Expenditure Across Business Processes

After implementation of an ABC system, the DPW was able to determine the relationship between expenditure and unit cost. Figure 3.3 illustrates the relative distribution of real property expenditure by *business process*-- information provided by the new cost management system. Managers were able to determine the actual business activity cost and then the unit cost of an activity's output. Managers were further able to disaggregate these major business activities to show lower indenture activities, activity cost, and their unit cost of outputs. For example, the business activity "Develop Work Order Estimate" (business activity number 3 in figure 3.3) consists of six lower level activities: "Determine Work Scope", "Determine Work Phases", "Create Shop Drawings", create "Bill of Materials", "Specify Small Service Co.", and "Advise Customer/Reimbursement" (D. Appleton, 1993, 113).

Proposition 1.c:	There will be no impact on the management of business processes within government service organizations due to the non-budgetary information provided by an ABC system
Predicted:	An ABC system will provide government service organizations with non-budgetary information to manage business processes and activities.

Rationale:

ABC systematically identifies activities and business processes. ABC traces the cost of resources consumed by an activity to the outputs of that activity. Business processes encompass multiple activities, and the cost of the business process is the sum of activity costs (Cooper, 1988: 46). Activities are the building blocks of business processes, and understanding these activities is essential as a step to improve business processes. (Moravec and Yoemans, 1992: 32) (D. Appleton, 1993: 102).

ABC also provides information detailing the relative consumption of resources across processes and activities. Understanding the relative consumption of resources allows a manager to assess the contribution that each activity makes to a company's

operations, which is important in controlling and reducing costs (Yoshikawa and others, 1994: 40). With this information, it is possible to determine whether the relative cost of an activity is commensurate with the importance of the activity to its customers and management.

The knowledge of the relative consumption of resources allows management to prioritize activities for improvements or cost reductions; activities can be stratified according to Pareto analysis. The ability to place costs on activities and their outputs provides a clear metric for improvement, whether for determining improvement priorities in the long-term or for measuring short-term success (Moravec and Yoemans, 1992: 35) (D. Appleton, 1993: 102). This non-budgetary information is important and is not extractable from traditional accounting systems that trace costs by department or category of expense.

Proposition 2 - Shortfall in Information Provided by the Government Fund Accounting System

Proposition 2:   The government fund accounting system provides information that ties budget expenditure to the cost of activities.

Prediction: The present accounting system is designed to track expenditure to a category of expense. A new system will need to be implemented to link expenditure to the cost of providing a customer service.

Rationale:

Osborne and Gaebler, in their book *Reinventing Government,* propose that existing government accounting systems focus on inputs and do not give government managers the information needed to manage complex processes and activities (Osborne & Gaebler, 1991: 161). Tierney writes that "while input accountability is important and must continue, agencies must also cost and report on outputs, services levels, and outcomes" (Tierney, 1994:6). Tierney further notes a parallel between failing government and traditional corporate accounting systems. Johnson and Kaplan suggest that the traditional

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corporate accounting system is failing. Tierney writes that the lessons learned from the

Johnson and Kaplan study can also be applied to government accounting.

> The study has some analogies to the federal government, particularly
> where for generations agency financial managers, budget executives,
> and accountants, believed that their job was done when the external
> reports were mailed to Treasury and OMB or delivered to Congress,
> accounting for the status of expended appropriations. These reports
> selected only macro-level input-type data. (Tierney, 1994:7)

Proposition 3 - Framework for ABC Implementation within a Government Service Organization

Proposition 3:   ABC implementation procedures followed within corporate
organizations cannot be used to implement ABC within a
government service organization.

Prediction: Corporate ABC implementation procedures can be followed within
government organizations.

Rationale:

ABC systems have mainly been implemented in manufacturing organizations, but

increasingly the benefits of ABC have been realized in service organizations as well

(Antos, 1992) (Rotch, 1990). ABC also appears well suited for expansion into

government organizations (Moravec and Yoemans, 1992: 32) (D. Appleton, 1993: 108)

(Geiger, 1994: 24). Antos writes "Though research about activity based costing was

originally directed toward the manufacturing sector of our economy, the wider concept of

Activity Based Management applies equally well to service, not-for-profit, and

governmental organizations" (Antos, 1992: 13).

Steps to Create a Chart of Activities

Ongoing Interviews, Data Gathering, and Analysis

| Specify Activities ② | Select time frame and organize data ③ | Trace cost to each activity ④ | Determine Value- vs. nonvalue-added cost ⑤ | Determine output measures & volume ⑥ | Select appropriate cost drivers & measures ⑦ | Trace cost to individual product lines ⑧ |

Top mgt. input on use of ABCM ①
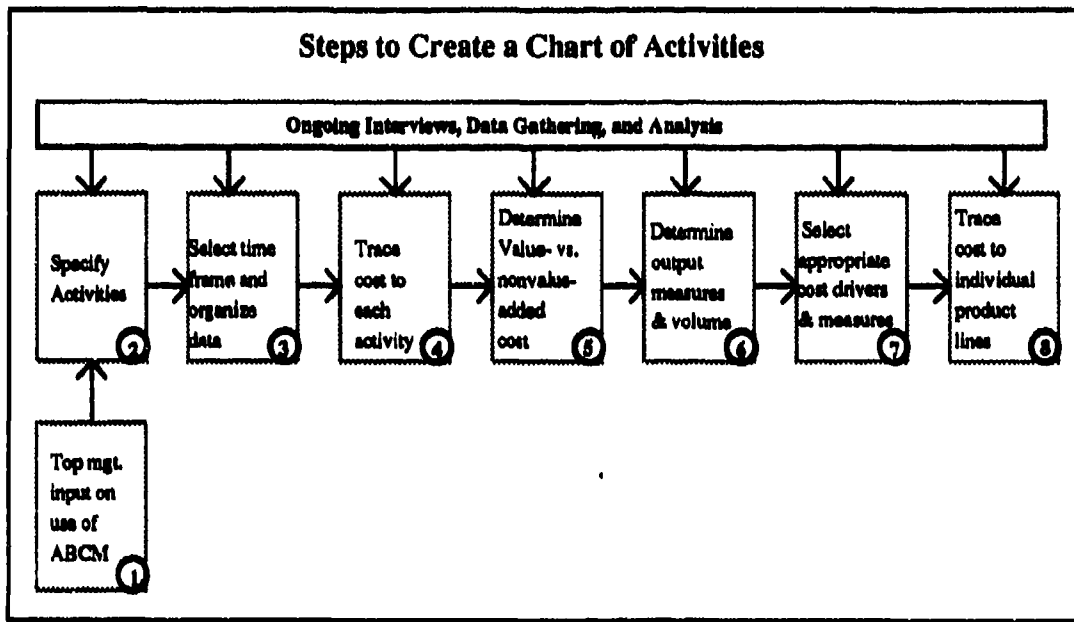
Figure 3.4 Miller's Eight-Step ABC Implementation Process

The Defense Logistics Agency applied Miller's implementation procedures in developing ABC systems. The Defense Industrial Supply Center (DISC), Philadelphia, PA followed the eight-step implementation process described by Miller, Figure 3.4. Miller, president of Miller-Newlin Consulting, and a consultant for implementation of ABC throughout DLA, suggests the eight-step procedure can be followed within a government service organization as well as within private corporations (Miller, 1992: 46) (DESC, 1993).

The Fort Sill Department of Public Works also implemented an ABC system. During management briefings, the organization identified potential barriers to implementation. One restriction was unique to government organizations: restrictions on the use of appropriated money. Government organizations are restricted by law on the use of one category of appropriated funds to achieve savings in another type of appropriation. This restriction was described as the "color of money" problem (D. Appleton, 1993: 112).

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Implementation of the Research Design

The research performed an in-depth analysis of a government service organization to determine the applicability of an ABC system. The research consisted of three phases. In the first phase, an ABC system was implemented within the case study organization to gain ABC information. The second phase consisted of archival analysis of organizational budget information. The third phase was used to complete analysis of budget and ABC information, interpretation and reporting of the results.

Implementation of an ABC System

Information gathered during this phase of the research was analyzed to define and cost activities and process, to define and measure cost drivers, and to trace overhead costs to operational departments. Activity cost information was gained through implementation of an ABC system within the case study organization. The research followed the seven step schedule as shown in Figure 3.5.
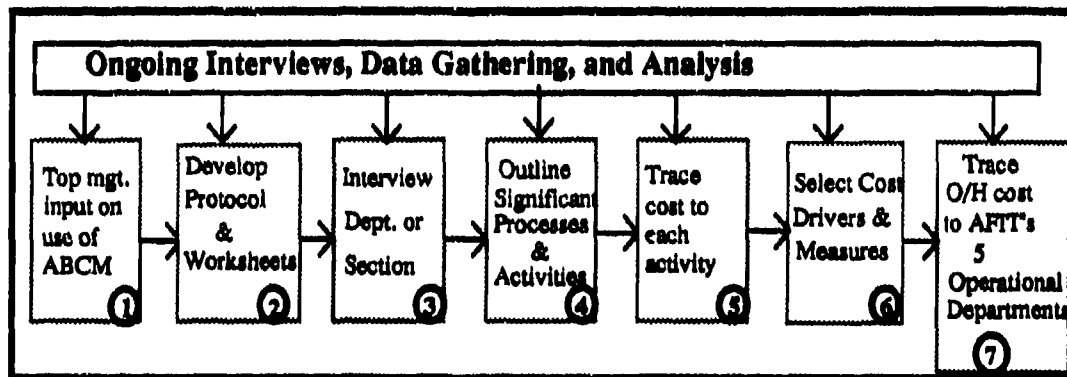
Figure 3.5 Steps to Implement an ABC System

Step 1. Top Management Input on Use of an ABC System

Management input about the design of a new cost system was achieved through personal interviews within the case study organization. Managers were asked to consider the following issues:

- Define the system's purpose and use
- Establish simplicity as an effective tool
- Maintain relevance of information for decision making
- Examine the hardware and software issues (Miller, 1992: 46).

The fundamental design objective of the implemented ABC system was to provide managers with information about the activities and processes of the case study organization that could be of practical use (Miller, 1992: 46) (Beaujon and Singhal, 1990: 52). The point of this phase of the research was to give managers alternative budgetary information that would be useful in making future resource allocation decisions and to depict, with the necessary degree of accuracy, the current allocation of resources across activities and processes.

Beaujon and Singhal have identified the following items as being critical in the development of an ABC system, and therefore warranting management input:

1. Constructing the resource categories (i.e. the financial inputs),
2. Defining the activity centers,
3. Choosing the first-stage cost drivers, and
4. Choosing the second-stage cost drivers.

Since each of these choices affects how departmental costs are aggregated and disaggregated, each choice "involves the three characteristics previously given (i.e., the level of detail, ease of access, and ease of interpretation) for evaluating how an ABC system contributes to managing activities" (Beaujon and Singhal, 1990: 54). Incorporating numerous activity centers may lead to a highly detailed model, but "creating

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separate activity centers for activities that are either identical or inseparable can just add complexity to the ABC system without providing any new insights into how resources are consumed" (Beaujon and Singhal, 1990: 55).

Step 2: Develop an Interview Protocol and an Evaluation Worksheet

The following section considers the development of a standardized data collection methodology. A standard methodology was employed to ensure the data gathered was consistent across all departments. More specifically, objectives of the data collection process were to achieve the following:

- Record significant activities/processes performed within a department.

- Trace the consumption of resources to activities.

- Determine the outputs and customers of processes and activities.

- Identify likely cost drivers.

Table 3.1 lists the benefits and disadvantages of various data collection techniques. This research employed personal interviews with directorate chiefs, branch chiefs, and section supervisors as the primary means of data collection. Often, though, supervisors called upon subordinates for expert knowledge.

Table 3.2 Selection of Data Collection Techniques (DESC ABC Implementation Workshop, 1993)

Techniques	Major Advantages	Major Disadvantages
Interviews with branch/section heads	Provides adequate information on • activities • resource allocation • inputs/outputs • key issues Personal contact with management	• Typically long elapsed time (difficulty to arrange interviews) • Need to be completed by other techniques as interviews may be short and cover many aspects
Interviews with staff in branches/sections	• Provides better information on tasks • May identify additional problems and improvement ideas • Possibility of observation	• Very time consuming/expensive • May disturb day to day business considerably
Questionnaires	• Least expensive method of gathering new information • Short elapsed time for collecting new information	No personal contact, political and personal issues and many problems may not be identified Only successful when used by managerial and administrative employees. Clarification/follow-up often required to complement responses
Analysis of Historical records and Documents	No need to involve many people in collecting the information May provide adequate information Inexpensive	• Not always available or up to date • No personal contact • Key issue, political and personal issues, problems may be hidden
Panel of experts	Take advantage of broad expertise may highlight political issues, problems and create improvement ideas	Only effective for specific tasks (e.g. activity analysis for newly created activities, business process analysis) Time consuming, expensive
Analysis of diaries, time sheets and logs (employees record daily what they do)	Percentage of time spent of each activity can easily be identified	• Very time consuming, expensive • Requires education and training • Many employees lack the skill and commitment to record activities
Observation	Facilitates understanding of business processes if material or information flow is visible Accurate information on how an activity is performed (tasks, operations)	Only suitable for short and repetitive activities and processes which are visible.
Check sheet	Adequate picture on time percentage spent on each activity	Only suitable for short and repetitive activities only suitable for direct production activities Time consuming, expensive

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Selection of Personnel to be Interviewed

Figure 3.6 outlines sampling approaches for gathering data at the branch or section level of an organization. As a first option, the figure lists personal interviews with branch/section experts. Expert opinion offer the benefit of a relatively small sample size-- one person for each section or branch. However, the expert's knowledge may only be effective for specific tasks. Interviewing a cross-section of the branch or section is offered as the second possibility. The last approach requires all personnel within a branch or section to be interviewed. These last two interviewing alternatives require a larger sample of personnel interviewees and therefore require more time to complete the data gathering process. In selecting a method, the following factors were considered:

- Available time frame to complete the research

- Level of detail required by AFIT management

- Number of personnel in the branch, section, or department

Throughout the personal interview phase of the research, department, branch and section managers were interviewed. Where possible, the data was validated by randomly interviewing personnel from within the branch or section. In this manner, the number of interviews performed was minimized. At the same time, this methodology achieved the degree of detail required to support the research objectives.

Interview Protocol

Emory and Cooper write that a case study methodology is most appropriately employed when depth of information is necessary. Case studies place emphasis on the "full contextual analysis of a limited number of events or conditions and their interrelations" (Emory & Cooper, 1991: 142). In research involving complex topics requiring in-depth detail, Emory and Cooper recommend that the researcher develop a list of specific points to be discussed during the interview (Emory & Cooper, 1991: 352).
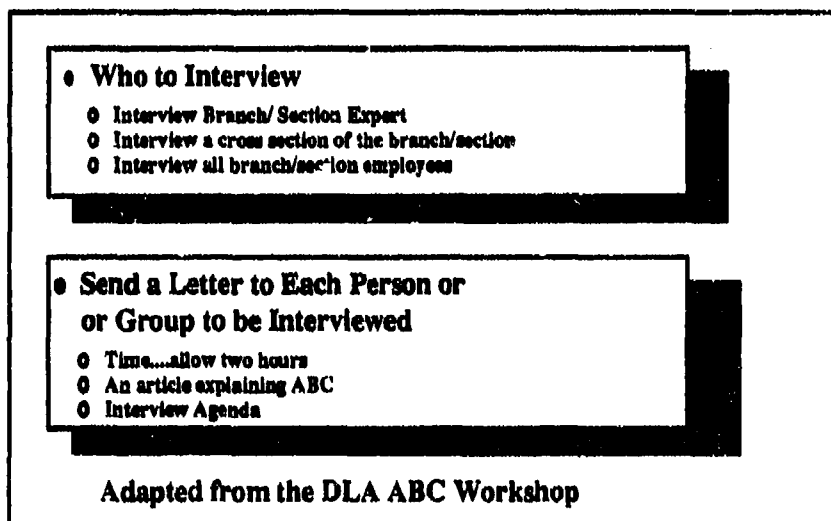
Figure 3.6 Who to Interview and How to Get Started

ACTIVITY INTERVIEW AGENDA: "OUR INTERVIEW WILL COVER
THE FOLLOWING ISSUES...."

* We will discuss your questions regarding ABC.
* Major time and resource consuming activities of your
          branch/section...only the 5 to 8 significant
* The output, product or service resulting from each activity
* What % of time does each activity consume? Account for 100%.
* Factors that cause these activities to flucuate
* What inputs do you need to perform each activity?

ACTIVITY INTERVIEW: BASIC SAMPLE QUESTIONS

1. Do you have an organizational chart of this bracnh/section?
    What are the major classifications of people?
2. What are the major activities of your branch/section? Do
    you have any flow charts?
3. What are the time consuming, costly and labor intensive activities
    the brach/section performs? What is the % of time spent on each
    activity?
4. What are the inputs and outputs of the activities? Are the activities
    caused by an output from another branch/section?
5. What are the bottlenecks? Do you frequently have to repeat any of
    the activities due to errors?
6. What is the current workload of the branch/section?
7. Do you do a workload forecast? how is it developed? how does it
    vary from time period to time period?
8. Are there dedicated resources for any of the activities?

Figure 3.7 Miller-Newlin Activity Interview Agenda and Sample Questions

The list of questions contained within the interview protocol allows the researcher to guide the interview, promoting discussion and elaboration on necessary topics.

This methodology combined ideas from slides presented at the DESC ABC implementation workshop and presented by Miller-Newlin Consulting, Figure 3.7. These ideas were incorporated within the protocol (Appendix C) to develop a list of questions comprehensive enough in nature to capture the information required, and also to ensure the interview protocol avoided unnecessary detail.

Step 3. Interview Department or Section

Having decided on the types of data that needed to be collected and a method of standardizing the data collection process, the next important question was "Where do we begin the data collection process?" This section discusses the factors that lead to the selection of a starting point in the data collection process and then the use of that department as a pilot for validating the protocol and worksheet. Afterward, the section reviews important interview techniques.

Protocol Validation

Selecting the right starting point in the data collection process was an important tactical decision. Choosing a department that was too large could result in the oversight of critical data; conversely, starting with a department that was too small could result in developing a standardized method of data collection which would not be comprehensive enough for the larger departments. Consequently, in choosing the pilot department, the team considered the following factors:

- Number of assigned personnel
- Sources of departmental funding
- Diversity in customers
- Diversity in activities and processes
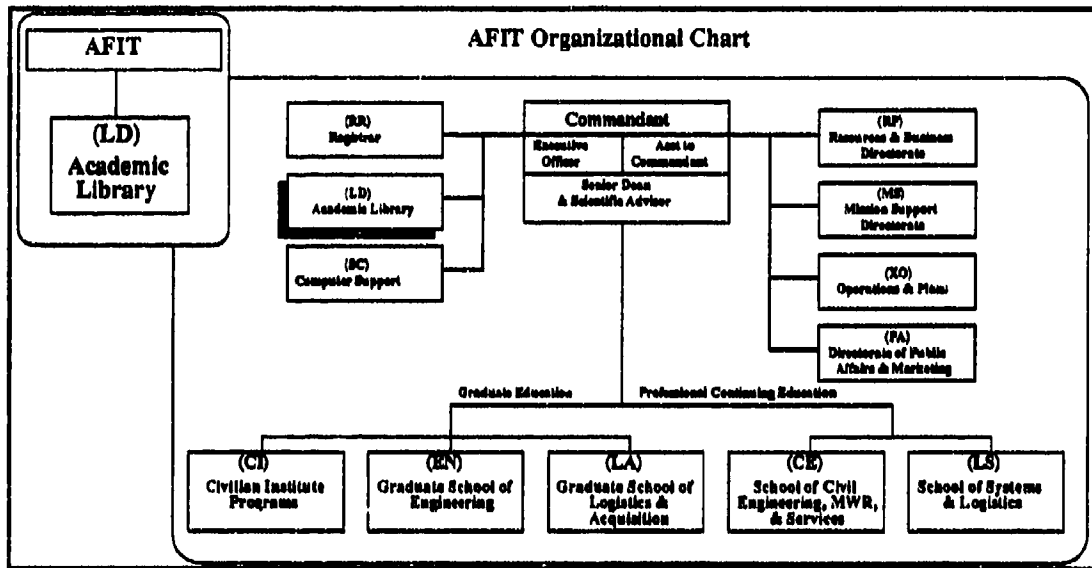
Figure 3.8 Selection of the Pilot Department

A pilot test was conducted to validate the research protocol. Pilot testing has improved countless survey research projects that were poorly worded, and has resulted in significant improvements in the design of research instruments (Emory & Cooper, 1993: 422). "A pilot test is conducted to detect weaknesses in design and instrumentation and provide proxy data for selection of a probability sample. It should therefore draw subjects from the target population and simulate the procedures and protocols that have been designated for data collection" (Emory & Cooper, 1993: 88). In addition to revealing errors in design and instrumentation, the pilot test represents the best opportunity to "revise scripts for the administration of the experiment, look for control problems with laboratory conditions, and scan the environment that might confound the results" (Emory & Cooper, 1993: 422).

Step 4.   Outline Significant Processes & Activities

Significant processes and activities are characterized by their consumption of significant amounts of resources (Pohlen, 1994). Referring to Step 2 of the protocol (Appendix C), the team was first interested in documenting those activities that accounted for approximately 90% of the time of the department or section, or were a major resource consuming activity.

Interview: Specify Major Activities and Processes

The interview process followed the structure of the protocol in an iterative manner, Figure 3.9. First, the major activities were listed. These major activities represented the significant time and resource consuming activities within the department or section. Following the questions on page 2 of the protocol (Appendix C), the team documented the responses on Worksheet 1 (Appendix C). Once this was accomplished, the team next decomposed each of the major activities into significant sub-activities. This flowcharting process provided an additional indenture of detail, and was necessary to discriminate the major consumers of the activities and the consumption of resources by each activity.

The Interview Process

State the Research Objective

Determine Major Activities — Activity 1 — Activity 2 — Activity "N"

Determine Inputs for Each Activity — Inputs to Activity 1 — Inputs to Activity 2 — Inputs to Activity "N"

Determine Outputs for Each Activity — Outputs of Activity 1 — Outputs of Activity 2 — Outputs of Activity "N"

● *"N" denotes the last activity listed*
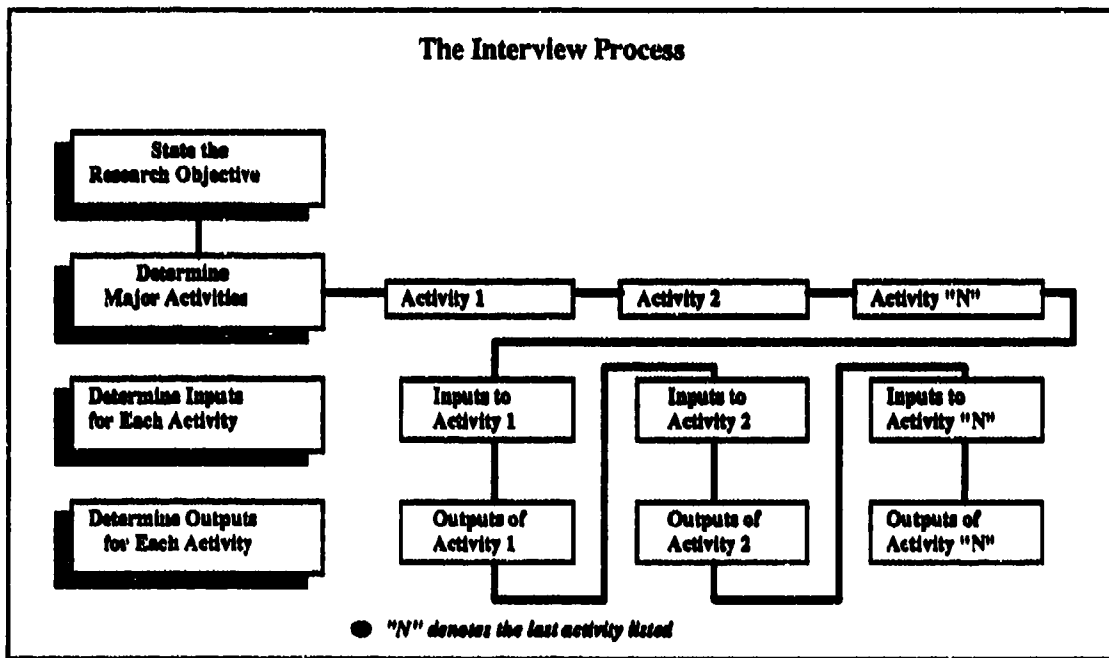
Figure 3.9 The Interview Process

Step 5. Trace Cost to Each Activity

Step five of this seven-step process involved tracing the costs associated with each of the activities. In a broad sense, the cost of an activity is equal to the sum of the resources required to perform the activity. As discussed earlier, ABC provides cost information on processes and activities rather than costs by department or function . In order to calculate the cost of an activity, the team developed a system to trace consumption of resources within a department and to trace resources, like overhead, which were external to the department being interviewed.

Appropriateness of a Spreadsheet Cost Reporting System

While proprietary ABC software is available, some companies have developed spreadsheets of their own. Drumheller writes that organizations are capable of developing a reporting system of their own because the reporting system need be neither difficult to develop nor maintain (Drumheller, 1993: 21). He provides as an example a case study of Tycos Corporation.

> At Tycos, we developed an ABC system using a common spreadsheet. The
> design required only nominal skills. No macros were essential, although some
> were used; simple formulas and look-up tables sufficed. Using a spreadsheet
> that the staff already uses is important, because when managers can understand
> the calculations, they more readily accept the answers. (Drumheller, 1993: 22)

Employing a similar spreadsheet architecture, DCSC and DESC developed a series

of spreadsheets to implement their ABC systems. The experiences of designers at DLA

and Tycos suggest that an activity reporting system implemented on a spreadsheet is

appropriate for the case study organization.

This research effort employed a MicroSoft Excel spreadsheet. This software

package was selected based on the following criteria:

- Was the software available to the end-users of this research?
- How large of a learning curve had to be overcome to learn the software?
- What were the capabilities of the software?

Step 6. Select Cost Drivers & Measures

The sixth step in Phase One was the selection of appropriate cost drivers and

measures. A cost driver is "any factor that causes a change in the total cost of an activity"

(Miller, 1992: 44). Traditional cost accounting utilizes only one cost driver, usually direct

labor hours, to trace the cost of resources consumed to the products produced. This

research, however, employed multiple cost drivers to trace the amount of resources

consumed to the activities consuming them. Cooper writes that the art of designing an

effective and accurate activity based costing system "depends largely on two

considerations: *how many cost drivers to use and which cost drivers to use*" (Cooper,

1989: 34).

This methodology employed Cooper's criteria when determining the possible use

of *multiple cost drivers*:

- *Desired accuracy of reported costs.* The higher the accuracy desired, the more cost drivers required.

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- *Degree of product diversity*. The greater the degree of product diversity, the more cost drivers required.

- *Relative cost of different activities*. The greater the number of activities that represent a significant proportion of the total cost of the products, the more cost drivers required.

- *Degree of volume diversity*. The greater the range of batch sizes, the more cost drivers required.

- *Use of imperfectly correlated cost drivers*. The lower the correlation of the cost driver to actual consumption of the activity, the more cost drivers required. (Cooper, 1989: 45)

The selection of a *particular cost driver* will be influenced by the cost and ease of measuring the cost driver and the correlation of the selected cost drivers to the actual consumption by the activity. Activity based costing achieves increased accuracy when compared with traditional cost accounting because of the use of multiple cost drivers. The key to keeping the cost of data collection down is to "use cost drivers whose quantities are relatively easy to obtain. This is accomplished in part by substituting drivers that capture indirectly the consumption of activities by product" (Cooper, 1989: 43). As an example, he suggests that managers measure the number of transactions rather than the duration of individual transactions.

Cooper notes, however, that indirect measurement of cost drivers will be accurate to the degree that the individual transactions are homogeneous and also "reflect the actual consumption of activities" (Cooper, 1989: 43).

> How well a given cost driver captures the actual consumption by
> products of an activity is measured by the correlation of the quantities
> of each activity that the driver traces to the products versus the actual
> consumption of the activity by the products. (Cooper, 1989: 43)

The degree of correlation becomes increasingly important as the relative cost of an activity increases. Cost distortion can be reduced, though, by increasing the number of cost drivers. Several cost drivers may be used to accurately capture the diversity in resource consumption (Cooper, 1989: 43).

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Step 7. Trace Overhead Costs to AFIT's Operational Departments

After overhead costs were determined, and cost drivers were defined, this research traced overhead consumption to operational departments. This research employed multiple cost drivers to trace the amount of resources consumed by overhead departments to operational departments. Overhead was traced according to the relative proportion of cost drivers consumed by a department.

Analysis of Budget Data

Phase Two of the research consisted of archival analysis of the case study organization's fiscal year 1993 (FY 93) budget. FY 93 operations and maintenance obligations were categorized according to fund source, category of expense, and department within the budget document. The research reported aggregate organizational expenditure stratified according to expense category. The next level of indenture reported expenditure by department across all expense categories. Total budget expenditure was stratified according to overhead and operational department to determine relative consumption of resources.

Interpretation and Reporting

The third phase was used to complete analysis of budget and ABC information, interpretation and reporting of the results. Analysis of ABC data provided cost information on the activities and processes within the case study organization's overhead departments. An analysis of the case study organization's budget and ABC cost information was performed to determine the similarities and differences between accounting information provided by the two systems. Activity outputs, customers and cost drivers were analyzed to trace overhead costs to the operational departments to determine a fully loaded cost of operation. Differences in cost visibility were analyzed by comparing the ABC view of the fully loaded cost of operation to the information provided by AFIT's fund accounting system. Costs were also analyzed by tracing the consumption

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of overhead resources from individual overhead departments to individual operational departments. An alternative view of resource consumption was provided by tracing consumption from AFIT's budget to individual processes, and then from process to output and customer. ABC non-budgetary information was analyzed to determine the possible impact on process improvement or re-engineering efforts. Finally, analysis of the interview results and organizational budget information led to the development of a framework for ABC implementation within other government service organizations.

Summary

Chapter Three outlined the research methodology used to determine the applicability of an ABC system within a government service organization. The study examined an existing government fund accounting system, and then compared the fund information with ABC accounting information. The research consisted of a case study of an academic organization within the Department of Defense and archival analysis of organizational budget information. The research strategy employed was selected because the exploratory nature of the research required in-depth personal interviews as well as an examination of historical budget data. The results obtained from the research are contained in Chapter Four.

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IV. Results of the Study

Introduction

This chapter presents the findings relative to the case study of a government academic organization and archival analysis of its fund accounting budget. The chapter is comprised of two sections. The first section presents findings relative to the propositions. Findings relative to the applicability of an ABC system within a government service organization are presented first. Applicability issues included: definition and cost of activities and processes, cost visibility, and possible impact on the management of business processes due to non-budgetary information. The section next considers the information provided by the case study organization's fund accounting system. Finally, the section considers ABC implementation procedures. Implementation issues addressed: the ABC conceptual model, the cost assignment process, and implementation procedures. The second section presents other findings related to the applicability of ABC within a government service organization, but not directly related to the propositions.

Findings Relative to the Research Propositions

Propositions and predictions were rejected or accepted based upon the following decision criteria: The results rejected or accepted the first proposition or prediction based upon tracing at least 90 percent of the case study organization's FY 93 expenditures to activities and processes (Cooper and Kaplan, 1988: 100). A difference threshold of 10 percent was employed as the decision criteria for the second proposition. The 10 percent threshold was employed to establish a monetary difference in product and overhead allocation costs (Cooper and Kaplan, 1988: 100). The research results rejected or accepted the third, fourth, and fifth propositions or predictions using a consensus level of

a simple majority of departments interviewed. The following pages detail the research findings.

Proposition 1 - Applicability of ABC for use in a Government Service Organization

Proposition 1.a: The activity cost information provided by an ABC system cannot be used to determine the cost of activities within a government service organization.

Results: Proposition rejected.

Predicted: Activity cost information can be used to determine the costs of activities within government service organizations

Results: Prediction supported.

Findings:

ABC information was analyzed to determine the costs of activities and processes within the case study organization's overhead departments. The research considered total FY 1993 expenditures to consist of: FY 93 Operations and Maintenance obligations, military salaries, and non-direct fund cites. The research traced 99 percent of the case study organization's FY 93 expenditures to determine the cost of business processes and activities. Using a 90 percent threshold as the decision criteria (Cooper and Kaplan, 1988: 100), the research results rejected the proposition, and supported the prediction that activity cost information can be used to determine the costs of activities within a government service organization.

The cost model developed for the case study organization provides activity cost information for all of the overhead departments. The activity cost information was gained through implementation of an ABC system. Information gained through personal interviews and archival analysis was analyzed to define activities and processes and to

determine the cost of activities. Detailed definitions and cost information are contained in the Appendix A and Appendix B. One example follows.

Personal interviews within the Library Directorate led to the definition of three major processes: Process 1, Administer the library; Process 2, Provide technical services; and Process 3, Provide reader services. A further level of indenture led to the description of the activities that comprised, for example, Process 2 (Table 4.1): Activity 2.1, Purchase serials; Activity 2.2, Purchase monographs; and Activity 2.3, Catalogue material.

The cost of a process was calculated as the sum of the costs of the activities within a specific process. The cost of an activity was calculated to be the sum of the cost of resources consumed by an activity. The cost of an activity was determined to be equal to the proportion of obligations across all EEIC's traced to consumption by a particular activity. Figure 4.1 demonstrates the disaggregation of costs down to the activity level within the Library Directorate.

Table 4.1 Library Process 2, Provide Technical Services

Library (LD)	Description
Process 2	Provide customers with technical services
Activity 2.1	Purchase Serials • preliminary administrative checks with the Library of Congress for BPA • periodic determination of requirements • validate the information • place an order with the Contracting Office • daily receipt and check-in • process claims for non-receipted issues • update financial records
Activity 2.2	Purchase Monographs • receive an order from Reader Services AFIT form 4, or E-mail • check for BPA or an existing contract • order book through contracting • receive books • update financial records
Activity 2.3	Catalogue Material • receive books/videos • checks on-line to see if there is a record • if record, then download record • if no record, then create a record • input a library location • update the hold record • create labels • eliminate obsolete books • salvage unserviceable books

Disaggregation of the Costs of Library Processes and Activities

Library FY93 Expenditures

637

619

39

Fund Information 592/501/502

Library Resource Consumption by Process

Process3　　　　　Process1

ABC Information　Process2

Library Process 2: Provide Technical Services

68%
Books and Periodicals

Administrative Supplies
19%
Civilian Salaries
13%

ABC Information

Cost of Activities Comprising Process 2

Activity 2.3　5%

76%
Activity 2.2

Activity 2.1　19%

ABC Information

Activity 2.2: Purchase Monographs Resource Consumption

10%
Administration/ Supplies

83%
Monographs

Civilian Salaries
7%

ABC Information

Figure 4.1 Library Processes and Activities.

Proposition 1.b: Government service organizations that implement an ABC system will not realize a difference in cost visibility.

Results: Proposition rejected.

Predicted: Government service organizations that implement an ABC system will realize an improvement in cost visibility.

Results: Prediction supported.

Findings:

The ABC model converted FY 93 fund accounting information into process and activity costs. Overhead department process costs were allocated to operational functions according to the relative consumption of cost drivers. Information was examined to determine the relative consumption of individual overhead departments. Overhead cost pools were aggregated within operational departments to determine total overhead consumption. The results of ABC overhead allocation were compared with archival estimates of FY 1993 overhead allocation calculated by the case study organization. Percent differences in overhead allocation to operational functions were EN: -36; CE: 33; CI: -100; LA: 437; LS: 67, and Others 100%. Monetary differences in overhead allocation to operational departments are shown in Figure 4.2.

Within the two degree-granting departments, overhead costs were added to direct costs to determine the total cost of department operations. Total costs were next traced to department products. The ABC cost of product was compared with product cost estimates developed by the case study organization. Percent differences in product costs were: Product 1: -208 ; Product 2: -105; Product 3: 20, and Product 4: 4. Monetary differences in product costs are shown in Figure 4.3.
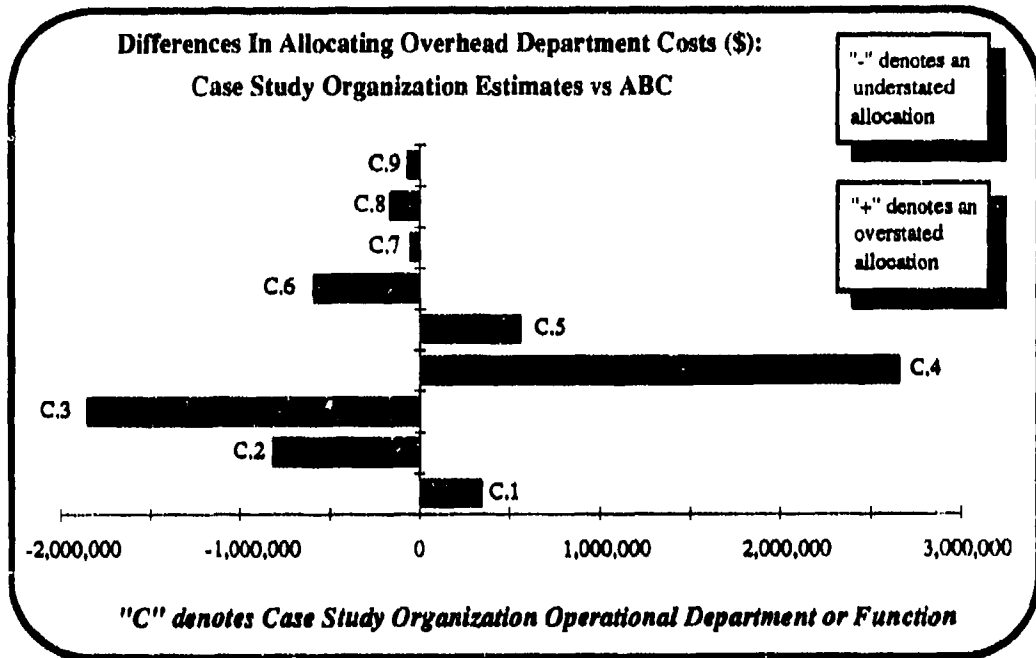
Figure 4.2 Differences in Overhead Allocation: Case Study Organization Estimate vs. ABC.
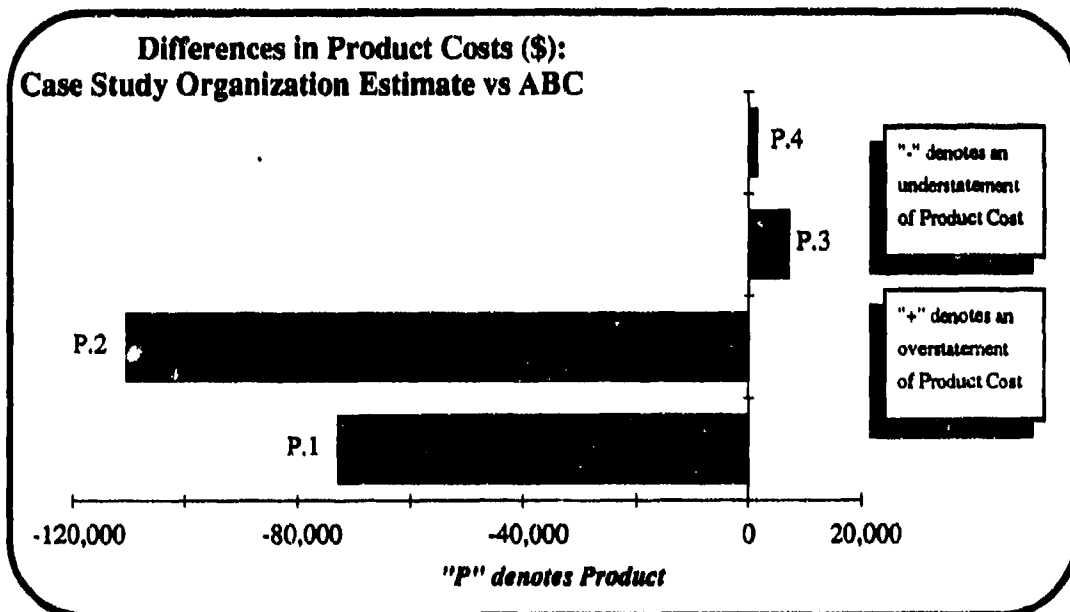
Figure 4.3 Differences in Product Costs: Case Study Organization Estimate vs. ABC

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A 10 percent threshold was employed as suggesting a difference in cost information (Cooper and Kaplan, 1988: 100). Differences in cost information were noted in all operational department aggregate-overhead-cost-pools. Differences were also noted in three out of four product costs. Using a simple majority of departments and products as decision criteria, the research results rejected the proposition, and supported the prediction that government service organizations that implement an ABC system will realize a difference in cost visibility. Detailed resource consumption, overhead allocation, and product cost information is contained in appendix Appendix A. Two examples of the type of information this research may provide are presented here.

Example 1: Figure 4.4 illustrates a five-step process. Step one presents total operating obligations for the fiscal year 1993 according to the case study organization's fund accounting budget. The fund accounting system can also determine aggregate expenditure within operational and overhead departments, step 2. A further indenture within the fund accounting system, noted here as step 3, provides information to determine expenditure within a particular department by category of expense. The research analyzed ABC information to determine the relative consumption of resources within a department by process, step 4. Finally, step 5 illustrates relative activity consumption by operational department.

In the example presented in Figure 4.4, the overhead organization, Library, consists of three processes: Process 1, Administer the Library; Process 2, Provide Technical Services; and Process 3, Provide Reader Services. The process costs of this overhead department were allocated to operational departments according to the relative proportion of cost drivers consumed. The cost driver for process 2, Provide Technical Services, was defined as the "relative proportion of monograph and serials purchased for a department".

Cost Information Provided by the AFIT Fund Accounting System

AFIT FY93 Budget by EEIC
(40, 44, 55, 39, 568, 569, 592, 605/609, 637, 627, 598)
STEP 1

Consumption of Funds by Department
(SC, XO, AAPDP, CE, LD, CI, CC, LS, LA, EN)
STEP 2

Library FY93 Expenditures
(637, 619, 39, Fund Information 592/501/502)
STEP 3

Information Provided by the AFIT ABC System

Library Resource Consumption by Process
Process3 21%, Process1 18%, Process2 61%
ABC Information
STEP 4

Process 2: Consumption by Operational Department
86% EN, LA 2%, LS 3%, CE 9%, CI 0%
ABC Information
STEP 5

Figure 4.4 Fund Accounting and ABC Information

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Example 2: An alternative view of accounting information provided by the ABC system is illustrated in Figure 4.5. The research traces overhead costs to operational departments according to the relative consumption of cost drivers. The total cost for each department is then defined as the sum of overhead costs and direct expenses.

Step 1 shows the consumption of FY 1993 funds by department. Step 2 illustrates the relative proportion of FY 1993 obligations dedicated to overhead and operational departments. The relative consumption of obligated funds by overhead department is presented in Step 3. In Step 4, cost drivers were employed to trace resource consumption from overhead departments to operational departments. Individual overhead cost pools were next aggregated to assign the relative consumption of total overhead to operational departments in Step 5. Step 6 presents the total cost for each operational department.
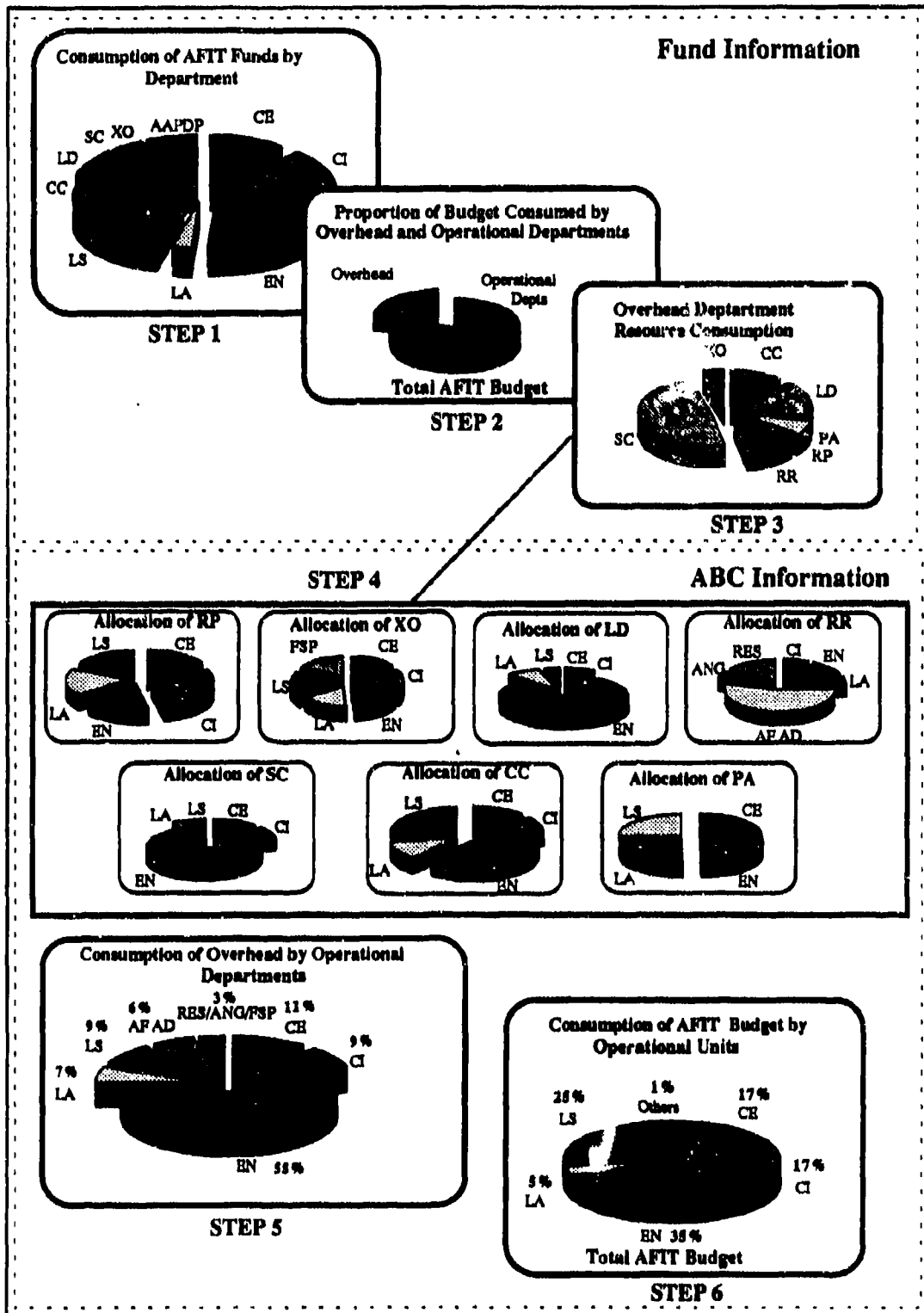
Figure 4.5 Costs Traced from Overhead Departments to Operational Departments.

Proposition 1.c:	There will be no impact on the management of business processes within government service organizations due to the non-budgetary information provided by an ABC system
Results:	Proposition rejected.
Predicted:	An ABC system will provide government service organizations with non-budgetary information to manage business processes and activities.
Results:	Prediction supported.

Findings:

The research first traced organizational costs to processes and activities within the case study organization. Secondly, the research traced organizational funds from business processes and activities to customers. Non-budgetary information was derived through analysis of cost information provided in the two steps presented above. This non-budgetary information was provided for all overhead and operational departments, thus the simple majority threshold used as the decision criteria was exceeded. The research results rejected the research proposition and supported the prediction that an ABC system can provide a government service organization with non-budgetary information to manage business processes and activities. Detailed non-budgetary information is contained in Appendix A. An example of possible uses of non-budgetary information follows (Figure 5.6).

Example : Faced with significant budget cuts, management may determine that AFIT overhead processes require evaluation, Step 1. In Step 2, management may examine ABC information detailing the relative consumption of resources by overhead department. The Computer-Communications Directorate is clearly the largest consumer of AFIT resources among overhead departments. The cost model, in Step 3, next shows relative consumption by *loaded* SC process: Process 2, Support AFIT Communication-Computer Systems; Process 3, Develop Database Applications; Process 4, Support AFIT

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Communication-Computer Operations. Loaded process costs were determined as follows. Process 1, Administer the SC Directorate, was allocated across Process 2, Process 3, and Process 4 according to their relative consumption of resources. Process 2 can be seen to consume the largest share of resources. This process may next be analyzed to determine resource consumption by expense category, Step 4a, and resource consumption by activity, Step 4b. In Step 4b management find that Activity 2.8, Provide User Training, Consultation Assistance, and Technical Assistance, consumes the largest proportion of resources. With the information provided in Step 5, it is possible to determine whether the relative cost of Activity 2.8 is commensurate with the importance of the activity to its customers and management.
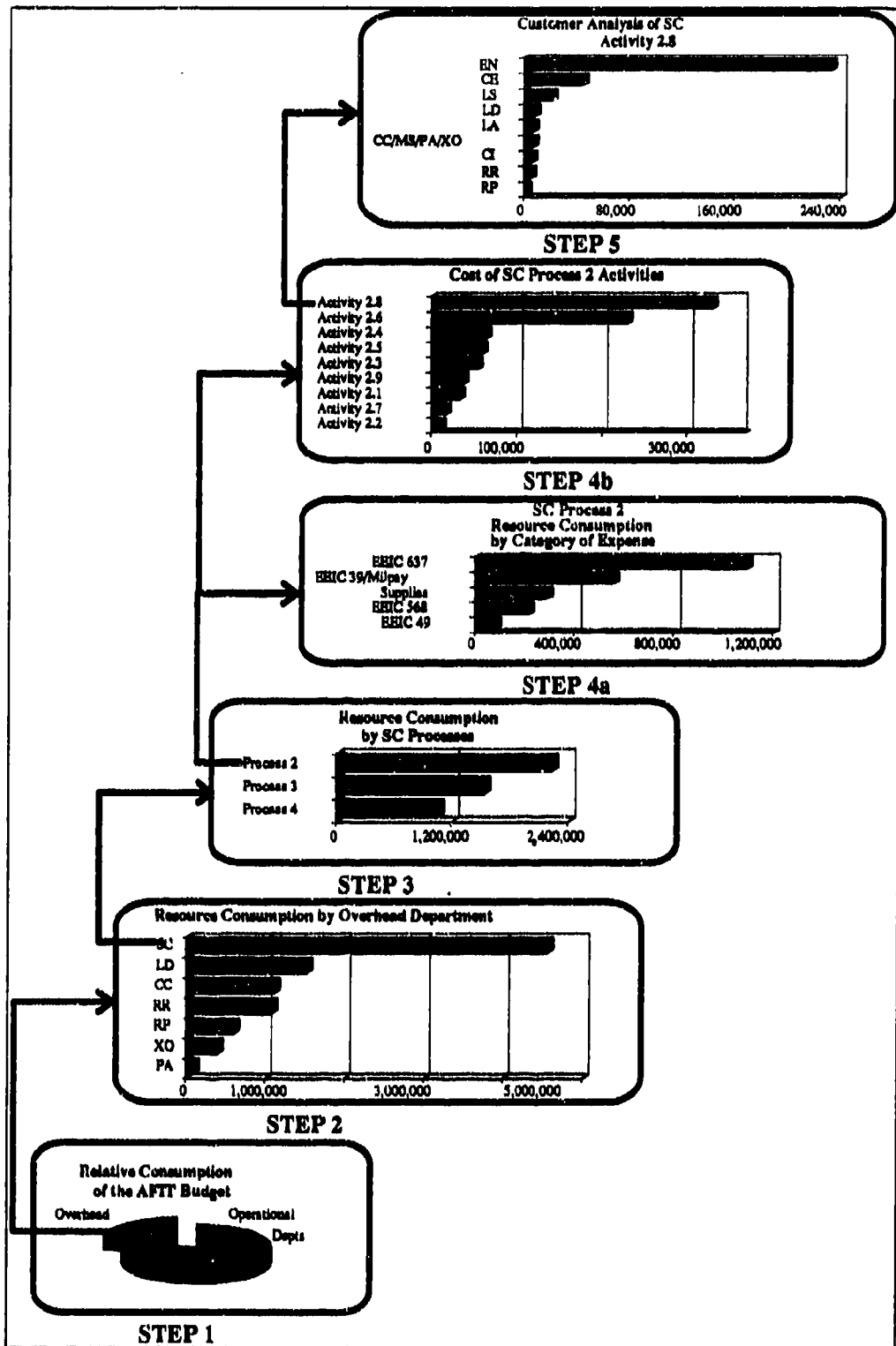
Figure 4.6 Example of Non-Budgetary Information Provided by ABC.

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Proposition 2 - Shortfall in Information Provided by the Government Fund Accounting System

Proposition 2: The government fund accounting system provides information that ties budget expenditure to the cost of activities.

Results: Proposition rejected.

Prediction: The present accounting system is designed to track expenditure to a category of expense. A new system will need to be implemented to link expenditure to the cost of providing a customer service.

Results: Prediction supported.

Rationale:

Through archival analysis of the case study organization's fund accounting system, the research traced expenditure by category of expense from the aggregate organizational budget to individual departments. The organization's budget provided information to link expenditure across expense categories to a business process within one out of seven overhead departments. Using a simple majority threshold as the decision criteria, the research results rejected the research proposition and supported the prediction that a new accounting system is needed to link expenditure to the cost of business processes and activities. Detailed budgetary information is contained in the appendix A. An example of the cost information provided by the case study organization's fund accounting system is provided below.

Input accountability is the focus of Figure 4.7. In Step 1, aggregate expenditure is categorized by EEIC in the case study organization's FY 93 budget. In Step 2, total expenditure is reported by department. In the final step, expenditure by department is reported by category of expense. The fund accounting system does not provide a link between Step 3 and the cost of activities and processes; however, the new cost system developed by the research does provide this link. For example, in Figure 4.8 the research defined and costed activities and processes in the SC Directorate.
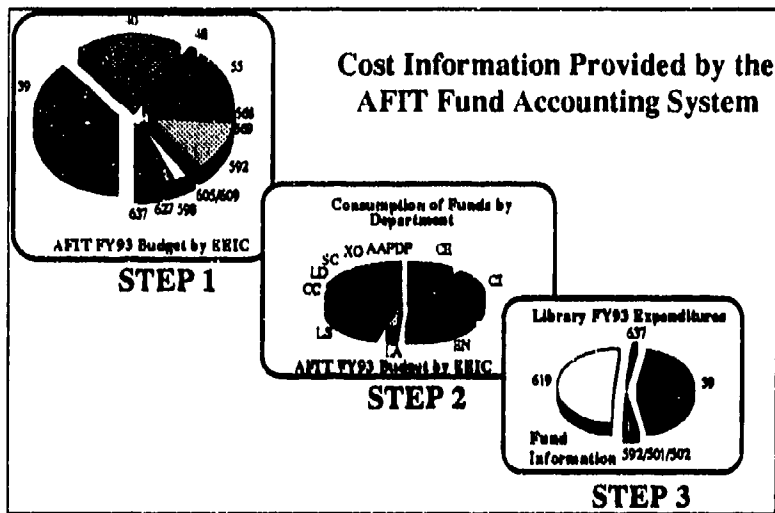
Figure 4.7 AFIT Fund Accounting Levels of Indenture
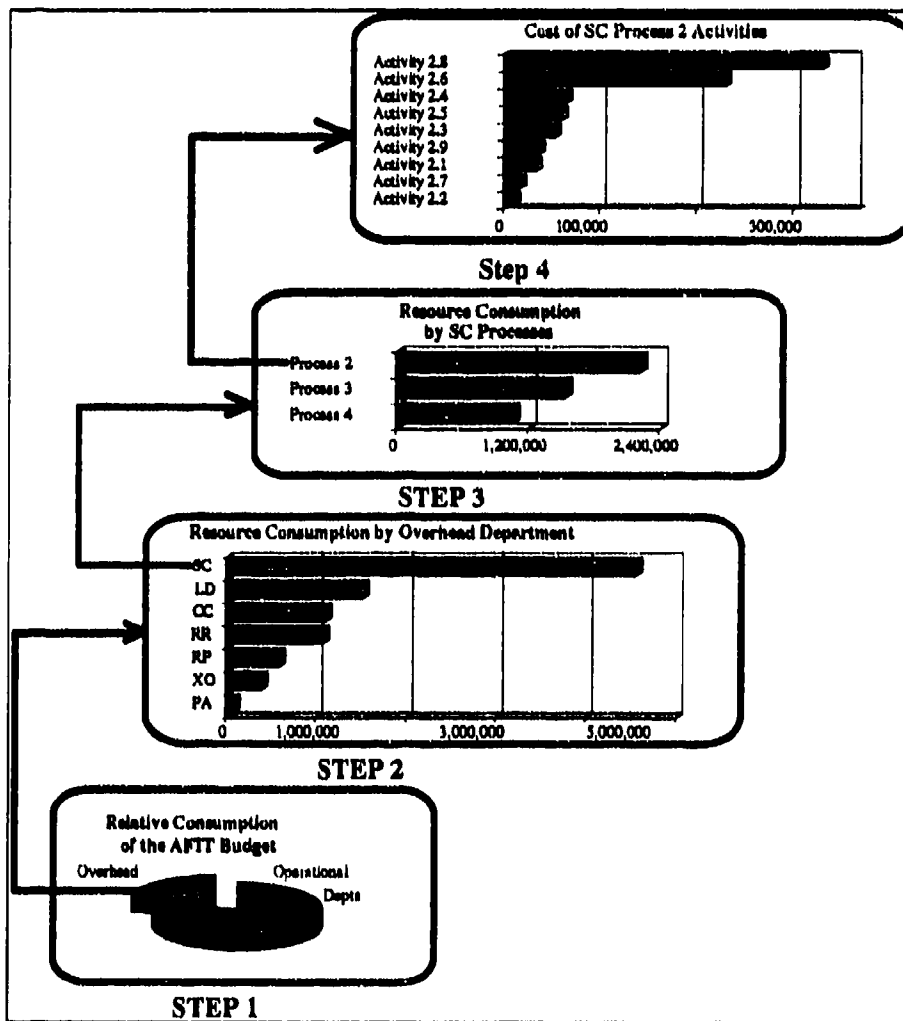
Figure 4.8 ABC Information

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Proposition 3 - ABC Implementation Procedures

Proposition 3:	ABC implementation procedures followed within corporate organizations cannot be used to implement ABC within a government service organization.
Results:	Proposition rejected.
Prediction:	Corporate ABC implementation procedures can be followed within government service organizations.
Results:	Prediction supported.

Findings:

This research employed corporate ABC implementation procedures within a government service organization to 1) define and cost activities and processes, 2) define and measure cost drivers, and 3) trace overhead costs to operational departments. The two-stage conceptual model of an ABC system described by Beaujon and Singhal was adapted to describe activity costs within the case study organization (Beaujon and Singhal, 1990: 53). Cooper's cost assignment process was first applied to trace overhead departmental expenditure to activities and processes. Process and activity costs were next traced to operational departments using a measure of the proportion of cost driver consumed (Cooper, 1987: 44) (Cooper, 1988: 45). Finally, the case study employed Miller's eight-step implementation process to create a chart of activities. Beaujon and Singhal's two-stage conceptual model, Cooper's cost assignment process, and Miller's eight-step implementation process were employed within all overhead departments. Using a simple majority of overhead departments as the decision criteria, the research results rejected the research proposition and supported the prediction that corporate ABC implementation procedures can be followed within a government service organization. Detailed implementation procedures are contained in Appendix D. A comparison of corporate implementation procedures and actual procedures employed in the research effort follows.

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Conceptual Model

Beaujon and Singhal describe a two-stage conceptual model of an ABC system (Figure 4.9). This research adapted the model, shown in Figure 4.10, to describe activity costs within a government service organization (Beaujon and Singhal, 1990: 53). Resource categories and values for the AFIT cost model were obtained from the AFIT FY 93 Budget. In the first stage, the AFIT cost model traces the allocation of obligated funds to cost pools within the activities and processes of overhead departments. In the second stage, the resources in each cost pool are assigned to operational departments using a measure of the quantity of resources consumed.

In the first cost assignment stage, the model traces the allocation of resources to activities. In this illustration, each activity consumes a portion of utilities, setup, material handling, and supervision resources.

Cost pools "are generated by splitting each resource category among the activity centers (i.e., there will be one cost pool for each resource category in each activity center." Singhal

In the second stage, resources in each cost pool are assigned to products "using a measure of the quantity of resources consumed." Cooper/Singhal

Resource Categories

| Utilities | Setup | Material Handling | Supervision |

First Stage

Activity Centers

Second Stage

Products

Cost Pools

Figure 4.9 Two-Stage Conceptual Model of an ABC System

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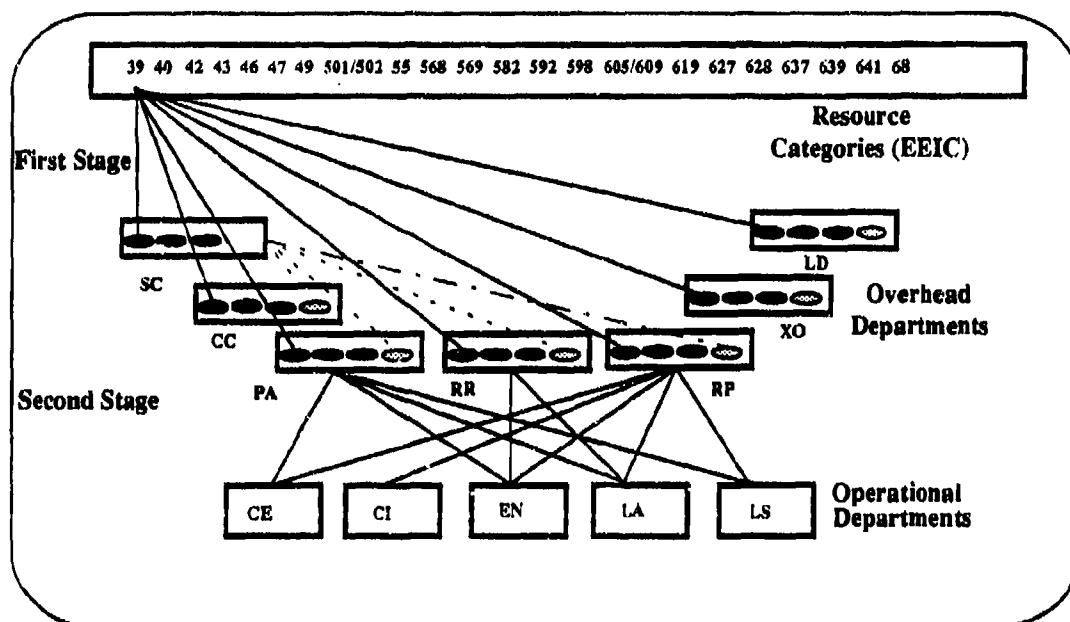
Figure 4.10 Two-Stage Conceptual Model of the Case Study Organization's ABC System.

Cooper's Cost Assignment Process

Cooper's cost assignment process was applied to trace overhead departmental expenditure to activities and processes. "The first stage takes such resources as direct labor and supervision and splits them up into sections...or ᴄ ˉˉˉ entire departments. These costs are then traced, in the second stage, from the cost pool to the product using a measure of the quantity of resources consumed by the product" (Cooper, 1987: 44).

Figure 4.10 illustrates the application of Cooper's cost assignment process to a government service organization. Resources within the AFIT cost model consist of the FY 93 expense categories. The consumption of these resources is traced in the first cost assignment stage to activities and processes within overhead departments. The costs of these activities and processes was determined through analysis of interview and AFIT budget data. The cost of an activity was defined as the sum of the cost of resources consumed; this cost is equal to the proportion of obligations across all EEIC's traced to consumption by a particular activity. The cost of a process was calculated as the sum of the costs of activities within a specific process. In the second cost assignment stage, the

costs of overhead activities were traced to operational departments according to the proportion of cost drivers consumed.

Implementation Procedures

This research effort adapted Miller's eight-step implementation process to develop an ABC system within the case study organization (Figure 4.11).

Ongoing Interviews, Data Gathering, and Analysis

| Top mgt. input on use of ABCM ① | Develop Protocol & Worksheets ② | Interview Dept. or Section ③ | Outline Significant Processes & Activities ④ | Trace cost to each activity ⑤ | Select Cost Drivers & Measures ⑥ | Trace O/H cost to AFIT's 5 Operational Departments ⑦ |
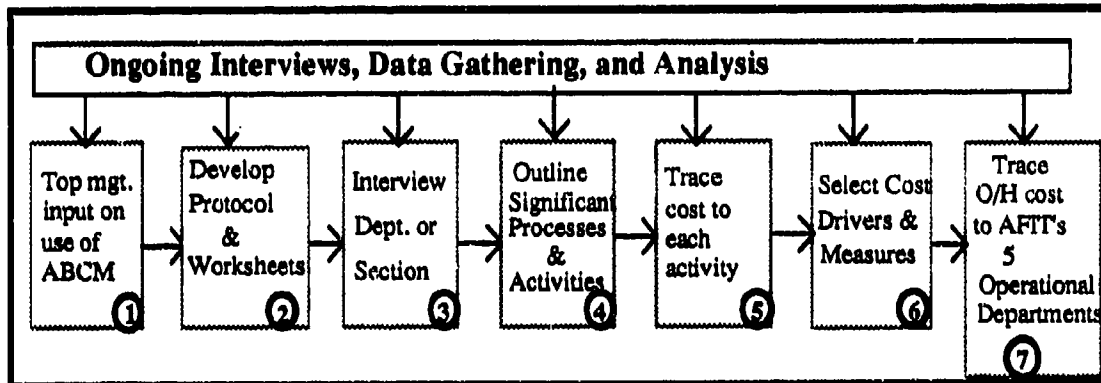
Figure 4.11 Steps to Implement the Case Study Organization's ABC System

Step 1 involved top management input on the use of the cost management system. Miller notes that management should 1) define the system's purpose and use, 2) maintain relevance of information for decision making, and 3) examine the hardware and software issues of implementation.

AFIT's fund accounting system traces expenditure by expense category to departments. The system does not, however, provide information on overhead consumption by operational department; therefore, management required a system designed to trace overhead consumption to operational departments. Management also required information about activities and processes within overhead departments. This information was to be used for process improvement and re-engineering necessitated by a significant budget cut. Finally, management needed a system implemented on common software at minimal cost. The AFIT ABC system was implemented on an EXCEL spreadsheet.

Step 2 considers the development of a standardized data collection methodology. This research employed personal interviews with directorate chiefs, branch chiefs, and section supervisors as the primary means of data collection. Often, though, supervisors called upon subordinates for expert knowledge.

An interview protocol was employed during interviews. The list of questions contained within the interview protocol enabled the researcher to guide the interview, promoting discussion and elaboration on necessary topics. A pilot test was conducted within the Library Directorate to detect weaknesses in the design of the interview protocol.

Step 3, Step 4, and Step 5: Interviews were conducted throughout AFIT overhead departments to define activities and processes, to trace resource consumption, to define cost drivers, and to determine customers. The interview process progressed in the following manner:
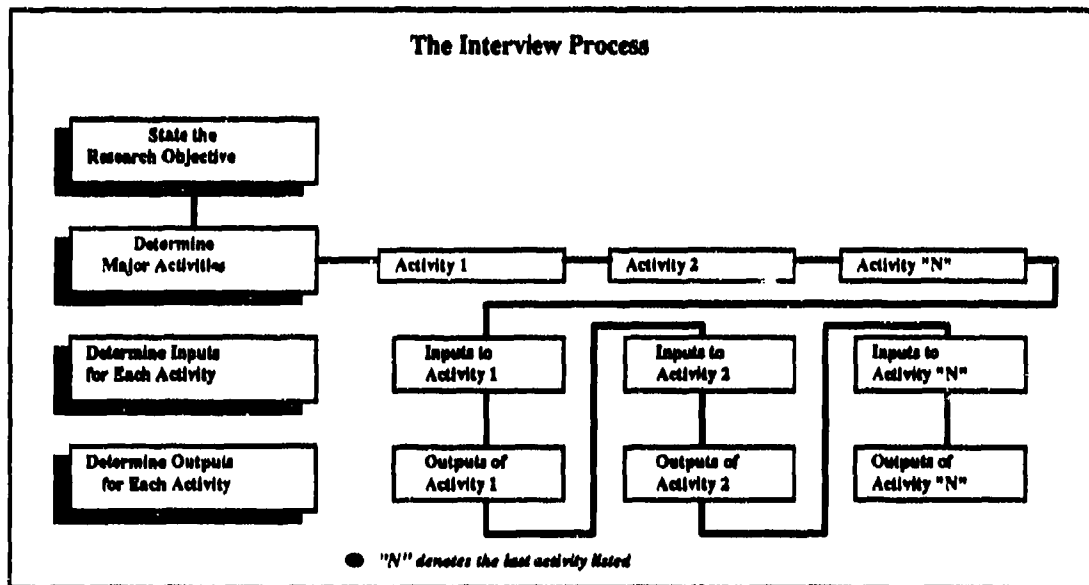
Figure 4.12 The Interview Process

Major activities were listed. These major activities represented the significant time and resource consuming activities within the department or section. Following the

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questions on page 2 of the protocol, the team documented the responses on Worksheet 1 (Appendix C). Once this was accomplished, the team next decomposed each of the major activities into significant sub-activities. This flowcharting process provided an additional indenture of detail, and was necessary to discriminate the major consumers of the activities and the consumption of resources by each activity.

Step 6: Select appropriate cost drivers and measures. According to Miller, a cost driver is "any factor that causes a change in the total cost of an activity" (Miller, 1992: 44). This research employed multiple cost drivers to trace the amount of overhead resources consumed to operational departments. Cooper writes that the art of designing an effective and accurate activity based costing system "depends largely on two considerations: *how many cost drivers to use and which cost drivers to use*" (Cooper, 1989: 34).

This methodology employed Cooper's criteria when determining the possible use of *multiple cost drivers*:

> *Desired accuracy of reported costs*. The higher the accuracy desired, the more cost drivers required.
>
> *Degree of product diversity*. The greater the degree of product diversity, the more cost drivers required.
>
> *Relative cost of different activities*. The greater the number of activities that represent a significant proportion of the total cost of the products, the more cost drivers required.
>
> *Degree of volume diversity*. The greater the range of batch sizes, the more cost drivers required.
>
> *Use of imperfectly correlated cost drivers*. The lower the correlation of the cost driver to actual consumption of the activity, the more cost drivers required. (Cooper, 1989: 45)

The selection of a *particular cost driver* was influenced by the cost and ease of measuring the cost driver and the correlation of the selected cost drivers to the actual consumption by the activity. Cooper writes that the key to keeping the cost of data collection down is to "use cost drivers whose quantities are relatively easy to obtain. This

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is accomplished in part by substituting drivers that capture indirectly the consumption of activities by product" (Cooper, 1989: 43). For example, Library Process 2, Provide Technical Services, consists of three activities: Purchase Serials, Purchase Monographs, and Catalogue Material (Figure 4.13 and Table 4.2). The value of serials and monographs purchased over the fiscal year through Process 2 is an indication of the amount of work performed. The cost of Process 2 was allocated based upon the relative value of books and serials purchased for a particular department. Use of "cost of books and serials purchased" as a cost driver is an indirect measurement of the consumption of Process 2 resources. This indirect measurement will be accurate to the degree that processing purchase requests is a relatively homogeneous transaction and accurately reflects actual consumption of the process (Cooper, 1989: 43).

Cooper writes that the degree of correlation becomes increasingly important as the relative cost of an activity increases; however, distortion can be reduced by increasing the number of cost drivers. Several cost drivers may be used to accurately capture the diversity in resource consumption (Cooper, 1989: 43). Library Process 2 activities were relatively homogeneous and required only one cost driver.

In the Computer/Communications Directorate, though, the activities contained within some processes required separate cost drivers. Within one process, consumption of several activities was determined to be most accurately allocated to all two-letter directorates evenly. Other activities, however, such as computer equipment maintenance, was best allocated using another cost driver. In this case, the relative value of computer equipment within a directorate was determined to be the most accurate indication of maintenance effort.

Table 4.2. Library Chart of Activities.

Process or Activity	Description
Process 2	Provide customers with technical services
Activity 2.1	Purchase Serials • preliminary administrative checks with the Library of Congress for BPA • periodic determination of requirements • validate the information • place an order with the Contracting Office • daily receipt and check-in • process claims for non-receipted issues • update financial records
Activity 2.2	Purchase Monographs • receive an order from Reader Services AFIT form 4, or E-mail • check for BPA or an existing contract • order book through contracting • receive books • update financial records
Activity 2.3	Catalogue Material • receive books/videos • checks on-line to see if there is a record • if record, then download record • if no record, then create a record • input a library location • update the hold record • create labels • eliminate obsolete books • salvage unserviceable books

Figure 4.13 Library Processes, Customers, and Relative Consumption.

Step 7: After the activity and process costs of overhead departments were determined, and cost drivers were defined, this research traced overhead consumption to operational departments. Overhead is traced according to the relative proportion of cost drivers consumed by operational department.

Overhead was allocated in two manners. As a primary resource, consumption of overhead was measured as a proportion of cost drivers consumed by a department. Often though, overhead was consumed by other overhead departments. Thus operational departments consumed overhead directly, in the form of consumption of a primary resource, and also consumed redirected overhead, considered a secondary resource. For example, all departments within AFIT consume the resources of the Computer-Communications Directorate (SC), and costs were allocated across departments based upon their relative consumption of cost drivers. SC, though, also consumes resources from other overhead departments. For instance, the cost of administrative overhead provided by the Command Section was allocated to all departments based upon the proportion of faculty and staff. SC consumption of this resource was in-turn reallocated to operational departments based upon a weighted average of the department's consumption of all SC resources.

Other Findings

Analysis of information gathered during interviews within overhead departments revealed findings not directly related to the research propositions but relevant to implementing ABC within a government service organization.

Issue: Impact of ABC interviews on personnel behavior
        and attitudes.

Finding:

Reactions to the personnel interview and data gathering phase of the ABC implementation process were dependent upon the grade of the interviewee. Personnel reactions are categorized according to management, and other workers.

Management: Five out of seven directorate chiefs were concerned with motives behind the cost study. These managers were generally concerned that the results of the study would result in position cuts within their departments. As a result of this concern, they attempted to influence their subordinates' interview responses. This influence occasionally resulted in excessively detailed activity descriptions resembling time-motion studies. This detail was noted at the time in the interests of diplomacy, but when recording data on the department's chart of activities, detailed activities were aggregated under significant activities for supporting description and later validation.

Management concern also extended to civilian job descriptions. Management was concerned that personnel of the same pay grade be shown as performing exactly the same number of activities and processes; a related concern was that the activities and processes recorded on the department's chart of activities mirrored a person's job description. Also, managers were concerned that their subordinates' reported time allocation to supervisory responsibilities appeared appropriate to the person's grade.

Finally, managers were concerned with their own time allocations on the chart of activities. First, managers were concerned that they be portrayed as performing the same

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processes and activities, and in the same proportions, as others of their pay grade and seniority. Secondly, these managers were concerned when their time allocation was recorded against activities or processes within their departments. These managers performed necessary oversight of processes, so their time was allocated accordingly across processes. Management's concern arose when they were shown as devoting time to the same process as an entry-level worker. However, management guidance and worker performance are necessary for any business process; they just act in different capacities.

Other Workers: Workers across all departments appeared to conscientiously answer questions contained in the interview protocol. Interviewees appeared apprehensive at the beginning of interviews. Interviewee apprehension was lessened after assurance that data would be brought back for validation.

Summary

This chapter presented results of the case study of a government service organization and an archival analysis of its fund accounting budget. The research included findings relative to the applicability of an ABC system within a government service organization. Applicability issues included: definition and cost of activities and processes, cost visibility, and possible impact on the management of business processes due to non-budgetary information. The section next considered the information provided by the case study organization's fund accounting system. Third, the section considered ABC implementation procedures. Finally, other findings related to the applicability of ABC within a government service organization, but not directly related to the propositions, were detailed. Chapters Five presents conclusions drawn from these results.

V. Conclusions and Management Implications

Overview

This chapter presents the conclusions derived from the research findings. Information is presented in the following form: 1) a summary of the research proposition, 2) a summary of the findings relating to the proposition, 3) conclusions drawn from the findings, and 4) management implications. This chapter begins by providing the research objectives, research propositions, findings, and conclusions. The chapter also discusses issues not addressed in the research propositions. The closing section of this chapter outlines a recommendation to extend this research.

Objectives of the Research

The research had the objectives of:

1. Identifying shortfalls in information provided by the existing government fund accounting system,

2. Examining how ABC would change the reporting of government costs,

3. Determining how a government service organization could analyze ABC information to trace overhead costs to operational organizations,

4. Developing a framework for designing and implementing an ABC system within a government service organization,

5. Identifying problems/obstacles to ABC implementation and techniques to overcome them,

6. Identifying opportunities for future research.

Conclusions

This section contains the research propositions and related findings. Data gathered during the research process is used to support conclusions for each proposition, and serves as a basis for determining management implications.

Applicability of ABC for use in a Government Service Organization

Proposition 1.a:

> The activity cost information provided by an ABC system cannot be used to determine the cost of activities within a government service organization.

Findings:

The proposition is rejected. An analysis of the case study organization's budget and ABC information defined and costed the activities and process within every overhead department. Personnel time allocations, materials, and other resources required to perform each activity within the case study organization were quantified in cost terms and summed to calculate the cost of each activity performed within a process. Figure 5.1 depicts this process. In Step 1, personnel time allocations were transformed into a portion of the total activity cost by multiplying the percentage of time spent performing the activity by the individual's salary. In Step 2 of the process, the archival analysis and data gathered during personal interviews was used to trace categories of expenditure to activities. Detailed activity cost information for each overhead department within the case study organization is contained in Appendix A and Appendix B.

Conclusion(s):

Data collected from personal interviews, coupled with data retrieved from archival accounting records, was translated into activity costs. The cost of each process within an

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Step 1: Transform Personnel Time Allocations to Activity Costs

Person	Grade	Activity#	% Time	Total	Salary	Activity 1.1	Activity 1.2	Activity 1.3	Activity 2	Activity 3	Activity 4
Jones	Capt	1.1	15			6,000					
		1.2	25				10,000				
		3	50							20,000	
		4	10								4,000
				100	40,000						
Smith	GS-11	1.2	30				10,500				
		1.3	25					8,750			
		4	45								15,750
				100	35,000						
Adams	WG-6	1.3	10					1,800			
		2	70						12,600		
		3	20							3,600	
				100	18,000						
				Totals	93,000	6,000	20,500	10,550	12,600	23,600	19,750

Step 2: Trace Resource Categories (EEIC's) to Each Activity/Process

		EEIC									
		39	Printing			1,000					
		40	TDY's				3,000				
		609	Equip							8,000	

Figure 5.1 An Example: Tracing Costs to Activities

* "N" represents the last activity or EEIC
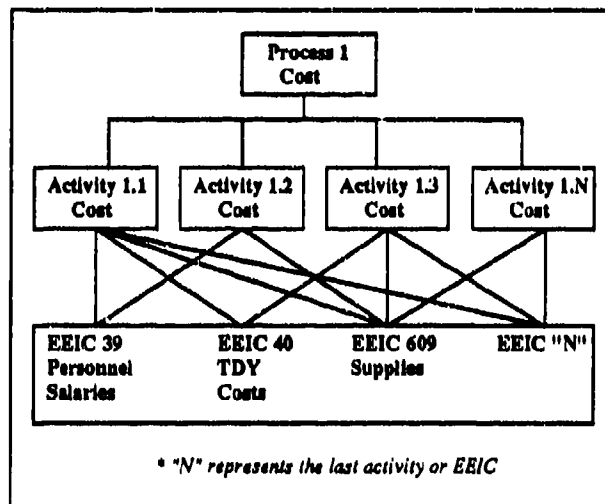
Figure 5.2 Calculating Activity and Process Costs

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overhead function was calculated as the sum of the costs of the activities within each process. The cost of each activity was calculated to be the sum of the cost of resources consumed by the activity. The cost of an activity was determined to be equal to the proportion of obligations across all EEIC's traced to consumption by a particular activity. Figure 5.2 (previous page) demonstrates this principle. The research was able to apply this concept of tracing costs to each activity performed within each overhead department. Therefore, the research concludes that information provided by an ABC system can be used to determine the costs of activities within government service organizations.

Management Implications

An ABC system is designed to report process and activity costs. Though originally designed for implementation within manufacturing organizations, "the wider concept of Activity Based Management applies equally well to service, not-for-profit, and government organizations" (Antos, 1992:13). The case study ABC cost model supports this statement, and proved adept at reporting activity and process costs within a government service organization.

Proposition 1.b:

> Government service organizations that implement an
> ABC system will not realize a difference in cost
> visibility.

Findings:

The proposition is rejected. The literature review reported that government accounting systems employ fund accounting principles, and as a result, trace expenditures by category of expense. Consequently, government accounting systems provide detailed information regarding expenditure of funds by category. Conversely, the ABC model implemented within the case study organization transformed government fund accounting

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information into process and activity costs for each of the overhead departments. In addition, the ABC model allocated overhead department process costs to customers according to the relative consumption of cost drivers. At this point, the ABC model created three types of information not offered by the fund accounting system. First, as revealed in proposition 1a., the ABC model provided information regarding the relative cost of activities performed within each overhead department. Second, the ABC model provided the total cost of supporting each operational and overhead department. Last, the ABC model reported the consumption of overhead department resources within the case study organization by external customers. Figure 5.3 summarizes the differences in cost visibility provided by the case study organization's accounting system and the ABC model developed for the case study organization.

Costs Reported by the Case Study Fund Accounting System	Costs Reported by the ABC Model
● Expenditures of each department ● Categories of costs for each department ● Total expenditures within each category of expense (for the organization)	● Cost of each activity performed within each overhead department ● Consumption of overhead departments by operational and overhead departments ● Consumption of overhead departments by external customers

Figure 5.3 Fund vs. ABC Cost Information

Conclusion(s):

Implementation of an ABC system within the case study organization resulted in visibility of activity costs and process costs within each overhead department. Also, using the ABC system, the cost of supporting a department was calculated as the sum of direct costs (as depicted in operational department EEIC's)--plus the proportional amount of

each overhead department consumed. The research concluded that ABC cost visibility differs from that of the case study organization's fund accounting system. Furthermore, government service organizations that employ similar fund accounting principles will realize new cost visibility through implementing an ABC system. The following examples illustrate the types of cost visibility provided by the ABC and government fund accounting systems.

In Example 1, Figure 5.4 illustrates the conversion of fund information into process cost information. As shown in Figure 5.4, the case study organization's fund accounting system delineated expenditures by EEIC for the organization, and in the next level of indenture, reported the expenditures of each department by EEIC. Conversely, the ABC model implemented in the case study organization translated fund expenditures into process costs, and utilizing cost drivers, reported the consumption of resources by operational departments. Though not depicted in this figure, consumption of resources was also traced to other overhead functions; however, these costs were reallocated within the ABC cost model to operational departments in proportion to the consumption overhead resources. This type of information, consumption of overhead functions by operational departments, was only reported by the ABC cost model. From this information, the research concludes that ABC cost models provide process cost information that is not provided by government fund accounting systems.

In Example 2, Figure 5.5, an expanded view of the case study ABC cost model reflects the allocation of each overhead function to each of the operational departments. Whereas the case study organization's fund accounting system reported the consumption of direct resources (in the form of EEIC expenditures) by each operational department, the ABC cost model reported the consumption of direct resources *plus* the consumption of overhead resources. As depicted in Figure 5.5, the ABC cost model also reported costs

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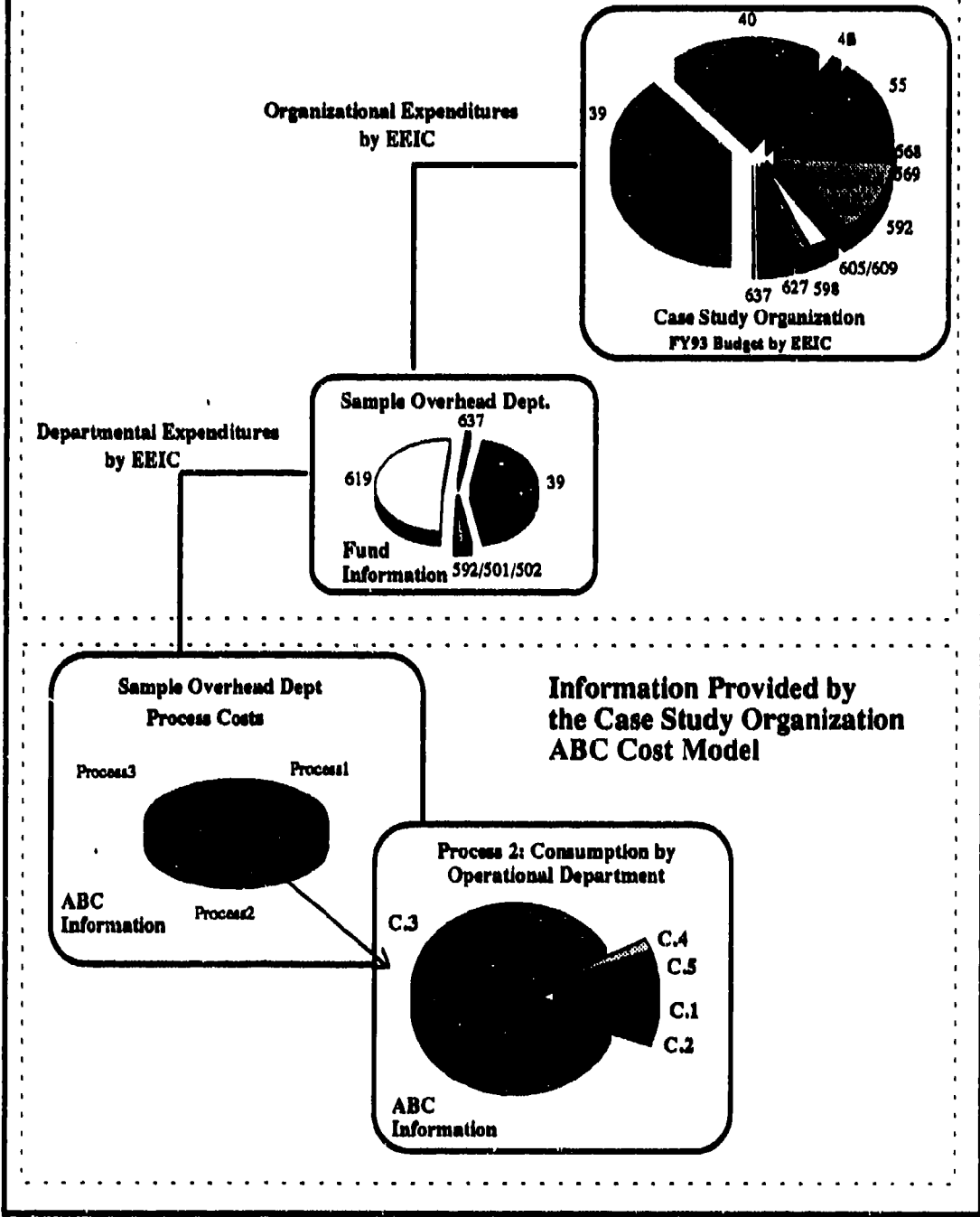
Figure 5.4 ABC Model Provided Process Costs

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to external customers based on the relative consumption of resources within the case study organization, and the full cost of supporting an operational department. Figure 5.6 depicts how fund accounting cost visibility in the case study organization differed from the ABC model in this regard. Whereas the fund accounting system reported only the direct consumption of resources by operational departments, the ABC model reported direct expenditures and the amount of resources consumed in overhead departments.

In conclusion, neither process costs nor consumption of overhead departments were reported by the fund accounting system of the case study organization. In each example, the ABC cost model provided non-budgetary information that the case study organization's fund accounting system did not.

Management Implications

Understanding the relative consumption of resources allows managers to assess the contribution that each process makes to a company's operations, which is important in controlling and reducing costs (Yoshikawa and others, 1994: 40). In addition, the ability to place costs on processes and their outputs provides a clear metric for improvement, whether for determining improvement priorities in the long-term or for measuring short-term success (Moravec and Yoemans, 1992: 35). This type of cost visibility provides managers a more comprehensive view of the cost to support an operational department or overhead function. Tracing costs to their roots and the sources of consumption provided the full spectrum of cost visibility within the case study organization--ranging from the cost of each activity to the full cost of supporting a department. These types of cost visibility provide managers a means to measure the impact of existing policies and the output of those policies. Government service organizations that implement an ABC system will realize these different types of cost visibility that are not provided by fund accounting systems.
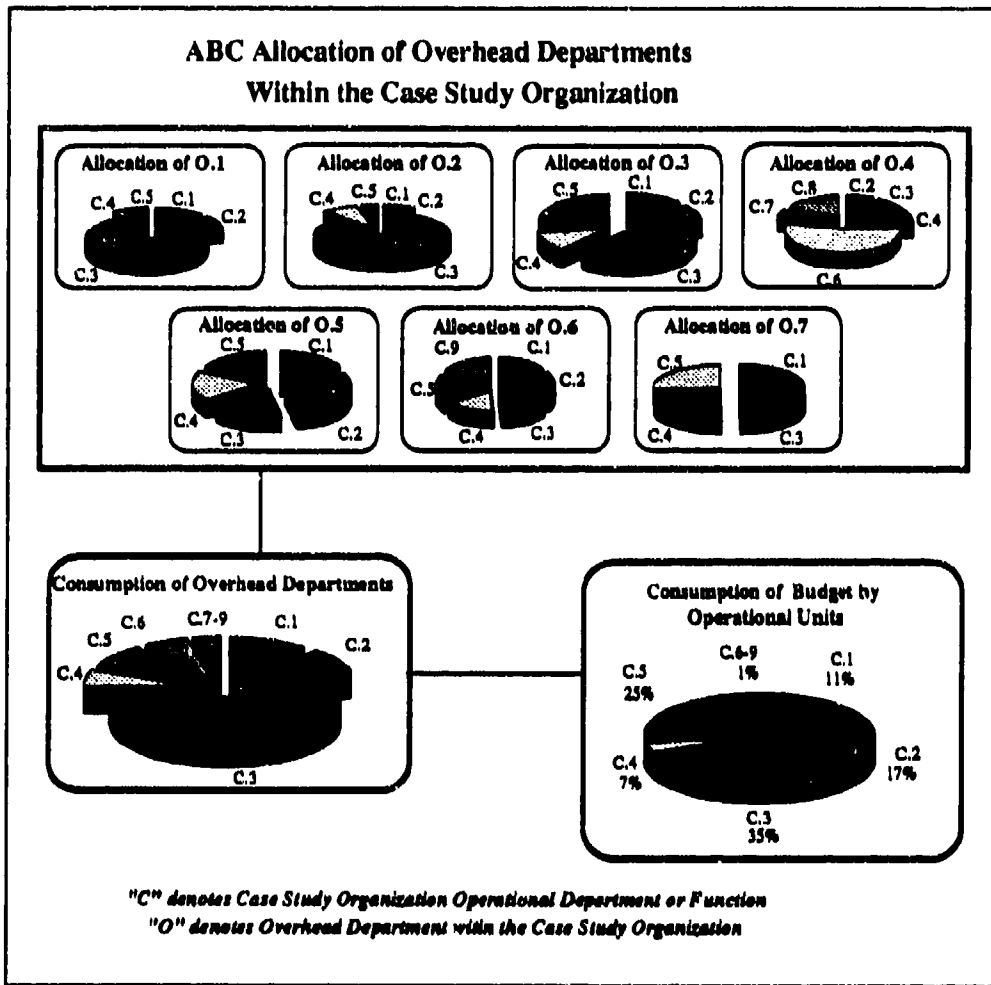
Figure 5.5 Expanded View of ABC Cost Model and Resource Consumption
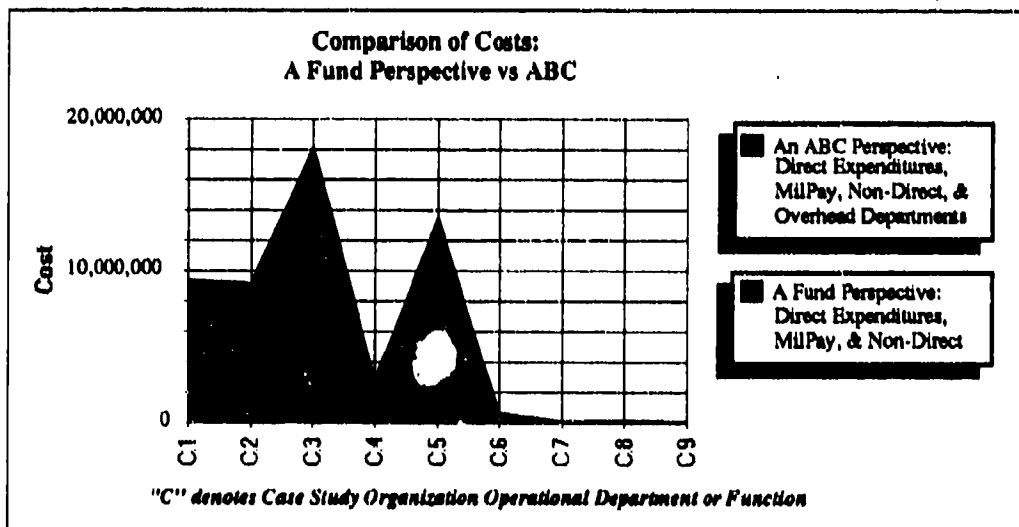
Figure 5.6 "Spreading" Overhead Across Operational Departments and Functions

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Proposition 1.c:

There will be no impact on the management of business
processes within government service organizations due to
the non-budgetary information provided by an ABC system.

Findings:

The proposition is rejected. Managers are able to use information provided by an

ABC system to determine activity and process costs, as well as resource allocation. The

Pareto analysis technique depicted in Figure 5.7 was used to analyze the information

provided by the ABC cost model. The analysis revealed:

- Which overhead departments consumed the most
  resources
- Which process within an overhead department
  consumed the majority of a department's
  resources
- Which activity within a process consumed the
  most resources
- Which customer consumed the majority of an
  activity or process

Also, activity and process cost information provided by the case study organization's cost

model was used to compute product costs. Within the case study organization, resource

allocation estimates and product costs were different from those reported by the ABC cost
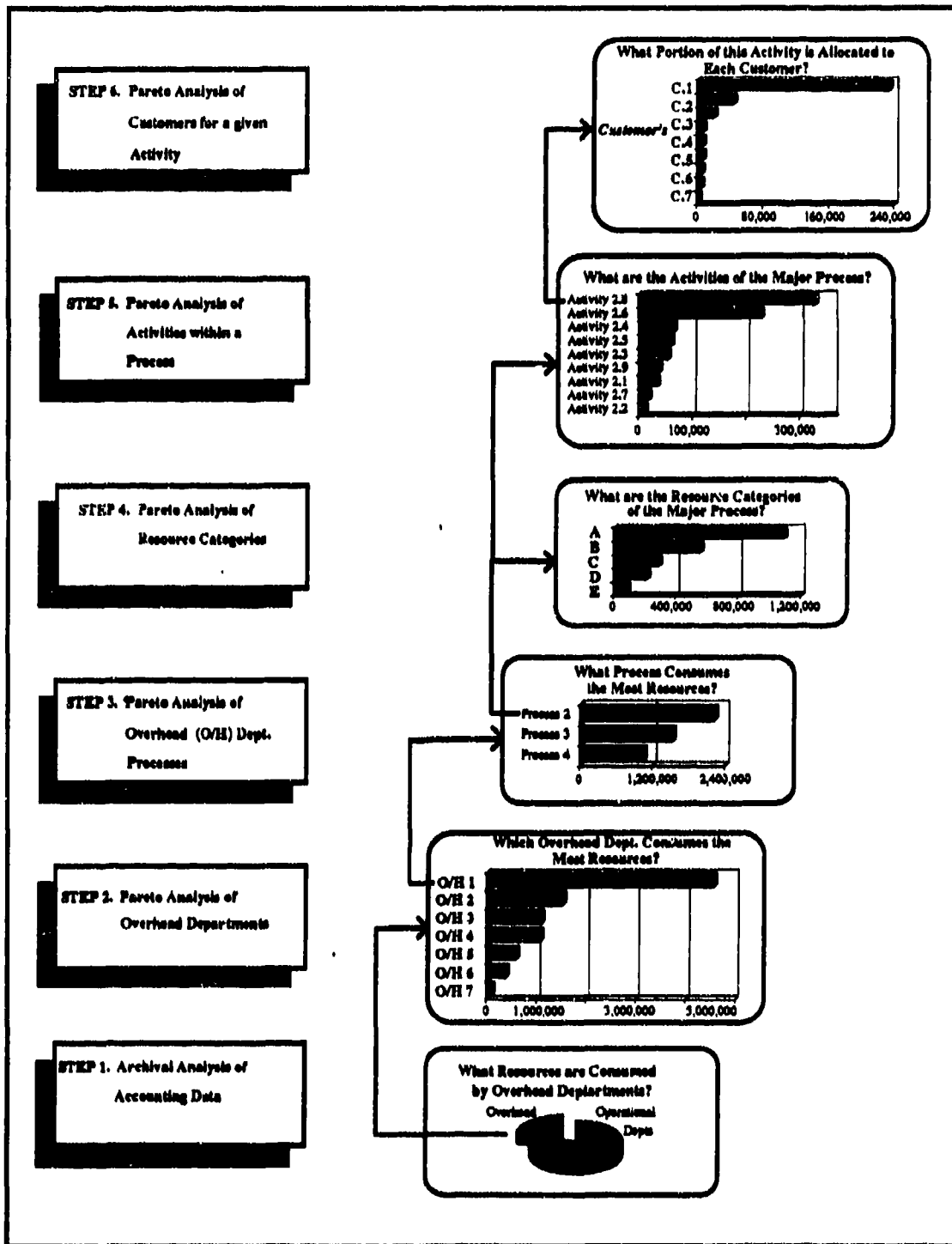
model.

Figure 5.7 Pareto Analysis of ABC Cost Data

Conclusion(s):

Consistent with the benefits Hodsoll defined for non-budgetary information (Figure 5.8 on the facing page), the ABC cost model developed for the case study organization illuminated the resources committed to management policies, operational departments, overhead departments, and external customers. This information was also used to determine product costs. Next, the case study organization estimates of overhead department allocations and product costs were compared to the results of the ABC model.

The Pareto analysis technique employed in this analysis visually showed where the largest opportunities for savings were within a department or process. This analysis technique provided non-budgetary information which would allow managers to focus their efforts on the major resource consuming activities and processes. This information can be used to evaluate the relative contribution an activity makes to the operations of an organization, and eliminate or resequence tasks and direct resources to tasks that produced corporate benefits (House, 1993: 2).

Figure 5.9 and 5.10 depict the case study organization's estimate of allocating overhead department resources to operational departments. As noted in each of the figures, the fund accounting system employed by the case study organization did not show the costs of resources being consumed by external customers. This oversight might result in unrecovered costs. The disparity in resource consumption by operational departments and functions between the ABC model and costs reported by the fund accounting system ranged from an understatement of almost $2,000,000, to an over statement of almost $3,000,000. Misestimating the resources a department or process consumes can result in misallocating management efforts in cost reduction or process improvement. Also, basing resource reduction or addition decisions on misestimations can result in adding waste to a process or degrading the process.

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Why is Non-Budgetary Information Important?
It can tell us whether we have spent the money provided through the budget for the the purposes intended, and whether those who receive our money have used those funds for the purposes intended
It can tell us about commitments we are making or have made and the resources needed to meet those commitments
It can tell us about the sums we have saved as a result of efficiences and help us compare our efficiencies
It can tell us about the effectiveness of both our own performance and the outcomes of our policies and programs and help us compare effectiveness
Hodsoll, 1992:10

Figure 5.8 Why is Non-Budgetary Information Important?
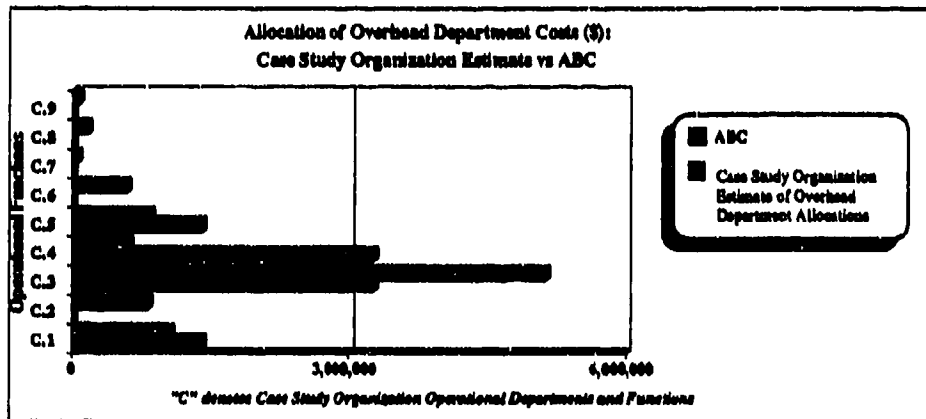
Figure 5.9 Allocation of Overhead Departments to Operational Departments
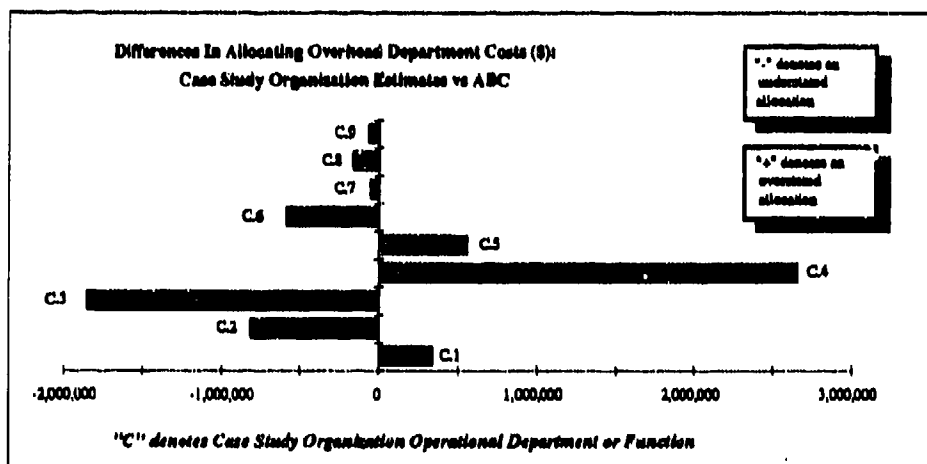
Figure 5.10 Differences in Allocation of Overhead Departments:
Case Study Organization vs ABC

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Figure 5.11 and 5.12 reflect the differences in the case study organization's estimates of its product costs and those reported by the ABC cost model. The differences ranged from an understatement of product cost by almost $120,000, to an overstated product cost of almost $20,000. This type of misestimation creates several problems. Undercharging customers for services and products creates a deficit for each transaction. In a market where products are substitutable, overcharging customers for services can result in a loss of market share as customers seek alternative providers. Also, this type of misestimation could result in departments appearing more--or less--profitable or efficient than they might actually be.

Management Implications

This ability to place costs on processes and their outputs provides a clear metric for targeting opportunities for cost reduction or general process improvement (Moravec and Yoemans, 1992:35). Furthermore, comprehending the resources that an activity or process requires allows a manager to assess the contribution that an activity or process makes to a company's operations (Yoshikawa and others, 1994:40). In addition, this same information can be used to develop product costs. Without this information, managers are at a distinct disadvantage in determining the impact of resource allocation decisions. The impact of allocating resources based on misestimations ranges from adding waste to a process to degrading a process. Furthermore, these same misestimations invariably lead to errors in product costing that may impact the organization in one of two ways. Underestimating a product cost results in the organization expending more resources than it is getting in return, thereby resulting in the loss of opportunity cost. Overstating product costs in a substitutable market results in the loss of customers to alternative providers.

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In an environment of competing products, government service organizations must accurately price services if they are to recoup the resources expended for a process, or to avoid losing customers as a result of overpricing. In addition, misestimating the resources consumed by a process or department can result in misallocating process improvement or cost reduction efforts. The ABC cost information provides managers cost visibility that increases the probability of avoiding these pitfalls.
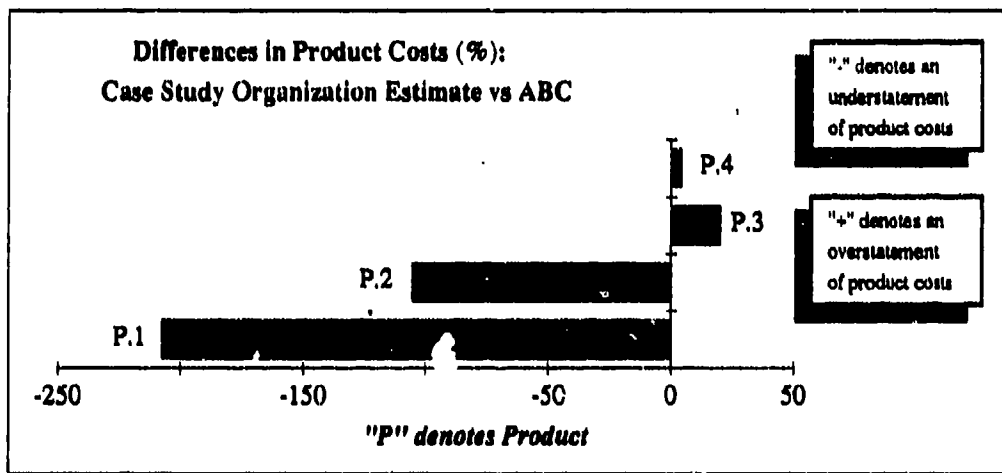
Figure 5.11 Percent Difference in Product Costs: Case Study Organization Estimates vs ABC
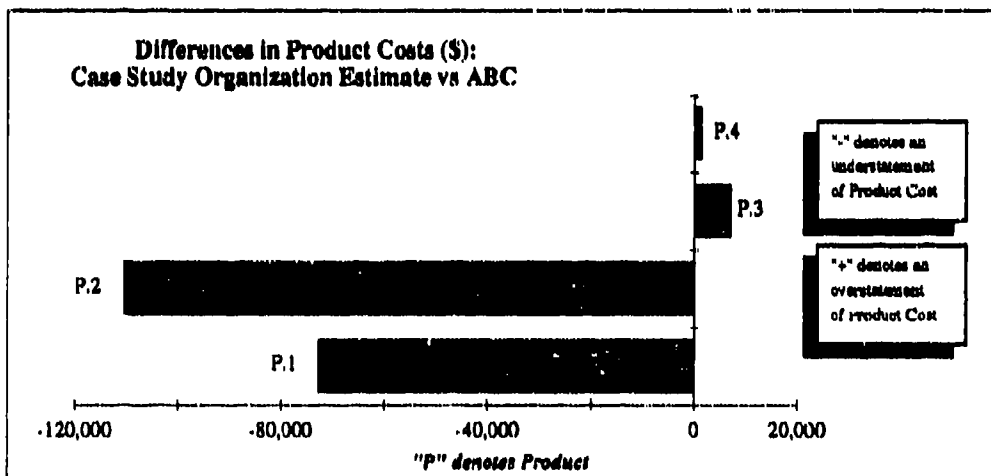
Figure 5.12 Range of Differences in Product Costs: Case Study Organization Estimate vs ABC

Shortfall in Information Provided by the Fund Accounting System within the Government

Proposition 2:

The government fund accounting system provides
information that ties budget expenditure to the cost
of activities.

Findings:

The proposition is rejected. The literature review reported that government cost accounting systems trace expenditures by categories of expense. Archival analysis of the case study organization's FY93 budget revealed that expenditures were reported by operational department, categories of expense within each department, and aggregated by EEIC at the organizational level.

Conclusion(s):

The research concludes that government fund accounting systems do not tie budget expenditures to the costs of activities. Fund accounting systems are designed to report expenditures by categories of expense, not the cost of activities. Based on results of the archival analysis of the case study organization's FY93 budget data, fund accounting principles will not tie budget expenditures to the costs of activities. Conclusively, government service organizations that solely employ fund accounting principles will not be able to tie budget expenditures to activity costs. The following discussion supports the conclusions drawn in this paragraph.

The literature review revealed that government cost reporting systems are based on fund accounting principles which trace costs by categories of expense. Cost reporting systems based on fund accounting principles allow managers to trace costs by category of expense, and can be aggregated at several levels. At the highest level of management, costs are aggregated by Major Force Program (MFP); these are the broadest categories

of expenditures to which an EEIC can be traced. Within each MFP, there may be several Program Element Codes (PEC's). Program element codes identify the
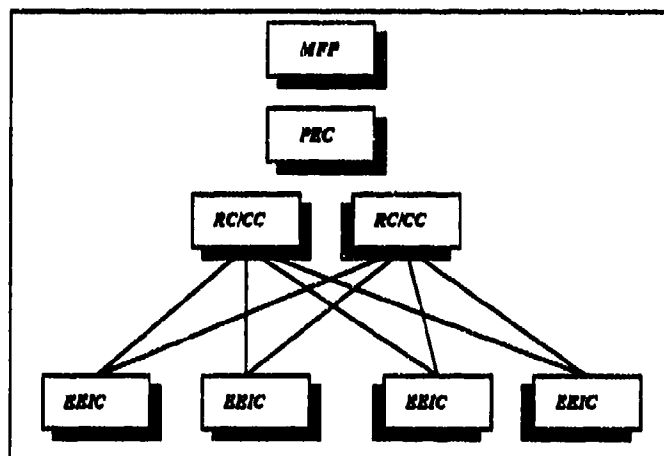
Figure 5.13. Object Classification Budgeting

organizations that comprise an MFP. For example, MFP 8, which includes training and education, consists of Air Education and Training Command Headquarters and its affiliated organizations. The case study organization selected for this research was an MFP 8 category organization. Consistent with findings of the literature review, the case study organization employed fund accounting principles depicted in Figure 5.13. An archival analysis of the case study organization's budget revealed expenditures were tracked by category of expense, otherwise known as Element of Expense Investment Codes (EEIC's). This cost reporting methodology provided managers at the lowest level of the organization, the Resource Center/ Cost Center (RC/CC), visibility of costs by categories. At the next level, costs were found to be aggregated by EEIC to provide the organization manager visibility of costs within each EEIC, and the funds appropriated to each RC/CC. However, as meticulously as the funds and appropriations are accounted for, the cost reporting system did not disclose the costs of activities within the case

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study organization. Instead, costs are traced by element of expense codes and aggregated at each subsequent layer in the accounting process (Shishoff, 1993). The existing fund accounting system employed within the case study organization was designed to trace congressional appropriations to categories of expenditures. This financial reporting structure provided managers visibility of what resources were expended for, not the costs associated with specific activities.

Management Implications

Fund accounting systems are designed to report expenditures by categories of expense at several indentures within the government. As presently instituted, fund accounting encourages managers to focus on executing their budgets. However, the degree to which a manager is successful in executing a budget does not provide information regarding the effectiveness of a given program. Without knowing what measures of performance a budget is intended to fund, managers have no criteria on which to base their outputs. The inability of government fund accounting systems to tie budget expenditures to mission related performance measures results in speculative criteria when determining which processes or activities can be targeted for improvement or cost reduction. Government service organizations that rely solely on fund accounting principles will continue to focus on inputs, not outcomes. This practice invariably leads to increased waste, speculative improvement efforts, and general uncertainty regarding the effectiveness in which funds are allocated.

Framework for ABC Implementation within a Government Service Organization

Proposition 3:

ABC implementation procedures followed within corporate organizations cannot be used to implement ABC within a government service organization.

Findings:

The proposition is rejected. ABC implementation procedures used within corporate organizations were also used to implement ABC within the case study organization. ABC implementation requires that processes be broken down into activities, that resources devoted to each activity be accounted for, and that the costs of activities be allocated to customers in proportion to the consumption of the activity.

Conclusion(s):

This research employed corporate ABC implementation procedures within a government service organization to 1) define and cost activities and processes, 2) define and measure cost drivers, and 3) trace overhead costs to operational departments. The case study employed Miller's eight-step implementation process to create a chart of activities for each overhead function within the case study organization. To calculate activity costs within the case study organization, this research employed the two-stage conceptual model of an ABC system described by Beaujon and Singhal (Beaujon and Singhal, 1990: 53). Subsequently, Cooper's cost assignment process was applied to trace overhead function expenditures to activities and processes, and next traced to operational departments using a measure of the proportion of cost driver consumed (Cooper, 1987: 44) (Cooper, 19 8: 45). As demonstrated in the case study organization, the process by which an ABC system is implemented can be applied to government service organizations.

Develop Chart of Activities

This research employed John Miller's 8-step methodology for creating a chart of activities for each overhead function within the case study organization. In developing an ABC system, activities represent the building blocks of business processes (Moravec & Yoemans, 1992:32)(D. Appleton, 1993: 102). Modifications to Miller's methodology were consistent with step one of Miller's process, which recommends management be consulted in developing the outputs of the ABC system. Figure 5.14 depicts the subtle adaptations to Miller's methodology which were implemented in the case study organization.
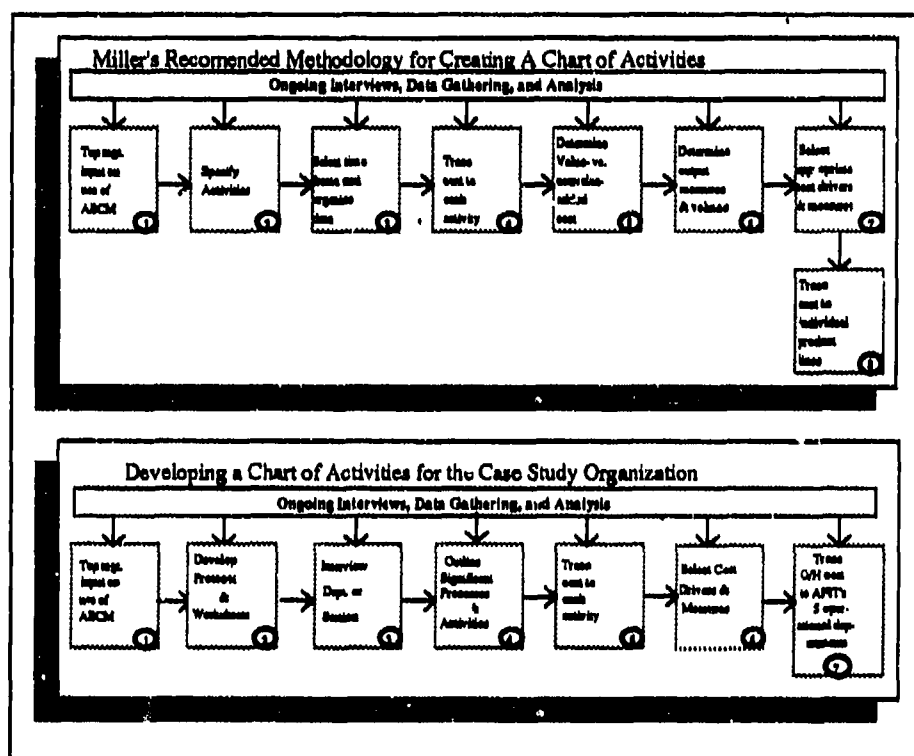
Figure 5.14 Steps to Implement ABC in the Case Study Organization

Account For all Resources Consumed by Each Activity

This step of the ABC implementation methodology required an archival analysis of the case study organization's FY93 budget, as well as information gathered during the

interviews. The major resource categories identified in this research were personnel salaries and benefits (EEIC 39), TDY costs (EEIC 40), educational services (EEIC 55), miscellaneous contract services (EEIC 592), and pay to military personnel. These categories accounted for over 91% of the resources considered, with total salaries accounting for approximately 55.2% of the case study organization's expenditures.

Allocate Activity Costs to Customers

The cost allocation methodology employed by the case study ABC cost model followed the conceptual model described by Beaujon & Singhal(Beaujon and Singhal, 1990: 53). Having developed resource categories and values for the case study organization from FY 93 Budget information, this research then employed Cooper's cost assignment process to trace overhead departmental expenditure to activities and processes. Cooper wrote "The first stage takes such resources as direct labor and supervision and splits them up into section...or even entire departments. These costs are then traced, in the second stage, from the cost pool to the product using a measure of the quantity of resources consumed by the product" (Cooper, 1987: 44). Figure 5.15 illustrates the application of Cooper's cost assignment process to the case study organization. Resource categories consisted of Element of Expense Investment Code expenditures, and the consumption of resources was traced in the first cost assignment stage to activities and processes within overhead departments in the case study organization. The cost of an activity was defined as the sum of the cost of resources consumed; this cost is equal to the proportion of obligations across all EEIC's traced to consumption by a particular activity. Process costs were calculated as the sum of the costs of activities within the process. In the second cost assignment stage, the costs of overhead activities were traced to operational departments according to the proportion of cost drivers consumed.

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Figure 5.15 Conceptual Representation of ABC Cost Model Implemented within the Case Study Organization

Management Implications

The ABC implementation methodology developed for the case study organization evolved from principles developed for commercial ABC implementation practices. The case study employed Miller's eight-step implementation process to create a chart of activities for each overhead function within the case study organization. Allocation of activity costs within the case study organization were founded in Beaujon & Singhal's two-stage conceptual model and Cooper's cost assignment process. Operational department activity costs were calculated as a measure of the proportion of cost driver consumed for each activity. In total, these principles established a framework for ABC implementation within other government service organizations.

Other Implications of the Research

· This section addresses management implications of findings which were not addressed within the bounds of the research propositions. First, implications to organizational behavior are discussed. Next, the implication of overhead departments consuming other overhead department resources is discussed.

Issue 1. Personnel Behavior and Attitudes

Government fund accounting focuses management attention on the inputs of the budgeting process; that is, managers are encouraged to expend all funds at the sake of losing whatever is not expended. However, an ABC system shifts emphasis from a focus on inputs to a focus on outputs. This type of accounting places new emphasis on performance measurements. "Many people in government resist the idea of performance measurement because they have seen it done poorly" (Osborne and Gaebler, 1992: 155). During the personal interviews, directorate managers and personnel supervisors in particular were wary of the implementation of a new cost system and the new types of cost visibility it promised to provide. When implementing an ABC system, government service organizations must be cognizant of the categories of personnel it employs. For instance, the civil service system is predicated on delineating categories of responsibilities, and classifying personnel within those categories. Within the case study organization, civilian management personnel were adamant about presenting detailed process and activity descriptions which would be commensurate with their grade. This reaction is fostered by the civil service system, and resulted in unnecessary detail in the ABC cost model. Furthermore, in general, management personnel were territorial in apportioning management responsibilities. Implications of this behavior may be listed as follows:

- The ABC implementation team should include personnel external and internal to the organization. This creates a mix of personnel familiar with organization operations while maintaining objectivity.

- The number of activities to which a person allocates their time should be in direct proportion to the customers supported or significant processes performed. Little benefit is derived from restating personnel job descriptions.

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- The organization should be aware and constantly
  informed of the ABC implementation process and
  progress. ABC provides data to restructure
  processes, and focus attention on activities and
  processes that are profitable, while eliminating or
  improving those that are not. ABC is not a job-
  cutting initiative.

Though personnel reactions and attitudes are difficult to quantify or anticipate,
government service organizations seeking to implement an ABC system must be aware of
the impact they can have. ABC represents a radical departure from traditional fund
accounting principles, and will alter the behavior of personnel within the organization.

Issue 2. Overhead Departments Consuming Other Overhead Departments

The literature review of this research provided detailed information regarding the
implementation of ABC. However, nowhere in the literature search for this study was
information found regarding the allocation of overhead departments to other overhead
departments. Initially, this posed a problem in developing the cost model, as overhead
department allocations to other overhead departments created an infinite loop in
reallocating those resources to operational departments. The conceptual model developed
by Beaujon and Singhal depicts resource categories being traced to activity centers, and
then directly allocated to products in the second stage. Figure 5.16 shows how this model
was initially adapted to the case study organization. However, the model does not address
the condition wherein activity centers consume the resources of other activity centers.
Figure 5.17 presents an alternative view of the ABC two-stage allocation process.
However, in the second model, dashed lines represent the resources of overhead
department being consumed by another overhead department. Within the cost model
developed for the case study organization, this allocation was treated separately and
apportioned to operational departments in proportion to their consumption of an overhead

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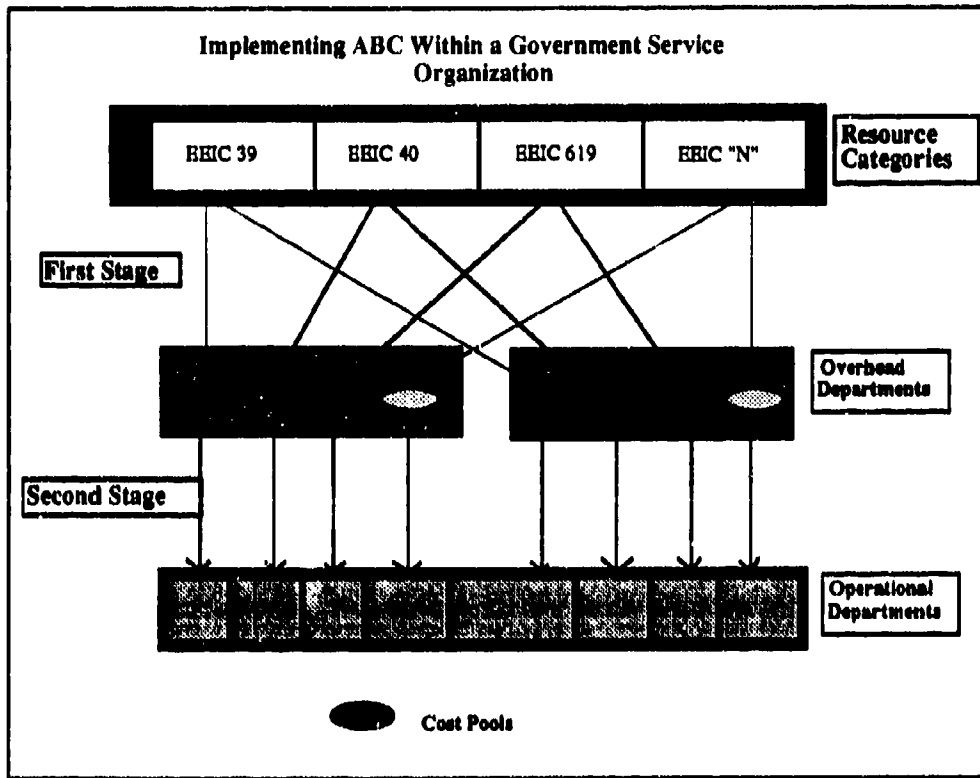
Figure 5.16 Application of Beaujon and Singhal to Case Study Organization
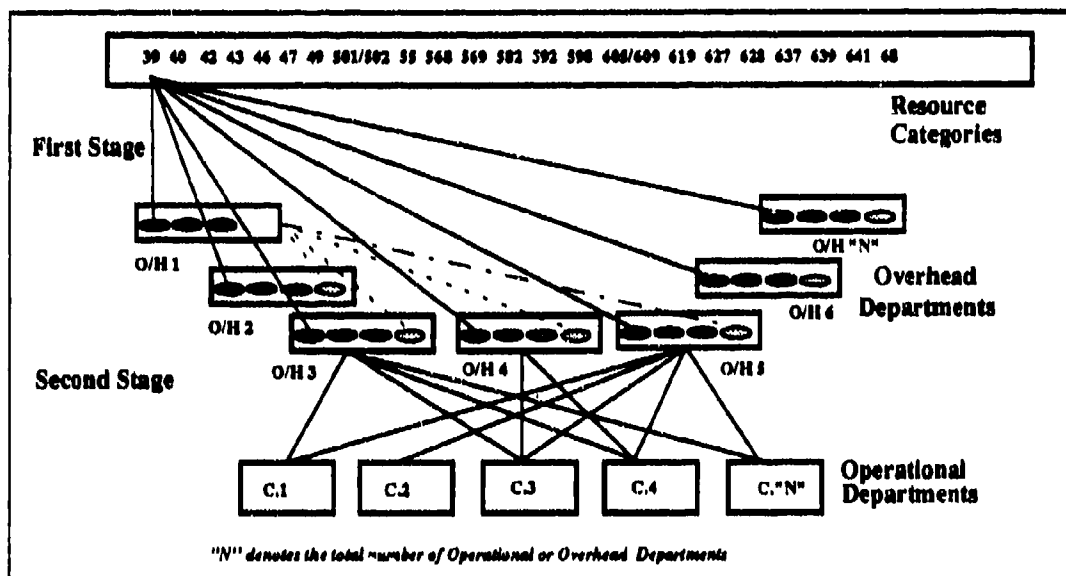
Figure 5.17 Alternative View of ABC Two-Stage Allocation Process

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department's cost drivers. Figure 5.18 presents a conceptual model of how the allocation process was performed within the spreadsheet architecture.

This four-stage allocation process offers several distinct advantages when compared to fund accounting principles. First, this allocation process provides a foundation for accurately allocating overhead departments. In turn, a more accurate total cost to operate overhead and operational departments is provided. Where the fund accounting system traced only direct expenditures to an operational or overhead department, this allocation process recognizes the resources consumed from other departments when computing the total resources consumed by an operational or overhead department. Consequently, this more accurate total cost may provide managers with more accurate product or service costs. In an environment where services and products are competed, accurate product costing is critical to the livelihood of the organization.

The last implication of this type of cost visibility is that it allows managers to gauge the relative impact of reducing or eliminating an overhead department, process, or activity. Where the fund accounting system traces only direct expenditures to department, and subsequently to processes or activities, this allocation process spans the entire organization and provides managers with the total resources that support an activity, process, or department. In short, this allocation process answers the question "If this service or department is reduced or eliminated, what resources would I expect to go with it?"

Recommendation

This section provides a recommendation for further research in implementing ABC cost models within government service organizations. As revealed in this research, commercial ABC implementation practices are applicable to government service

Step 1. Allocate Direct Consumption of Resources

O&M, Non-Direct Cites, Etc

Operational Department

Overhead Departments

Step 2. Allocations to Operational and Overhead Departments

Primary Allocation from Overhead Department

Allocations to other Overhead Departments

Step 3. Allocate Resources Consumed from other Overhead Departments to Operational Departments

Secondary Allocation to Overhead Department

Step 4. Sum the Allocations to Operational Department or Function

Total Allocation is the sum of Direct Resources, Primary Allocation, & Secondary Allocation

Figure 5.18 Secondary Allocation of Overhead Departments

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organizations. However, several factors which limited the scope of this research should be addressed to ascertain whether additional benefits beyond those listed in this research can be realized with an ABC system in government service organizations.

Accounting for Costs

The ABC model developed for the case study organization limited the costs considered to several fund categories reported in the FY93 budget. This limitation resulted in the exclusion of expenditures which would have invariably altered the output of the ABC cost model implemented in the case study organization. This section addresses limitations imposed by the case study organization's accounting system which influenced the eventual output of the model, and serve as the basis for further research.

The case study organization employed traditional fund accounting principles which traced congressional appropriations to categories of expenditures for FY93. However, this accounting methodology does not recognize prior year expenditures, but instead, focuses on expenditures executed in the present Fiscal Year. Examples of categories of expenses which are not addressed in fund accounting include:

- Equipment expensed in prior years
- Building depreciation costs

An example of the impact these costs may have can be seen in the purchase of an equipment item valued at over $500,000 for one of the case study organization overhead departments. Funds for the equipment asset were appropriated 5 years ago; however, the equipment asset was being installed during this research. In addition, a new wing was being added to the structure of the case study organization. Through depreciating capital and equipment, accrual accounting provides a means of addressing these costs, whereas fund accounting does not. For consistency, this research recognized only those costs that were realized during the period of the study. Conclusively, these two sources of costs represent cost pools which would have altered the model output.

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A second point to be addressed in developing an ABC cost model is "What sources of funding will be considered?" A related question might be "what costs are the organization trying to recoup?" If the objective of management is to recoup Operations and Maintenance (O&M) funds, then the ABC cost model should be designed to recoup those expended resources tied to O&M. Within the case study organization, there were several categories of funding directly tied to specific programs which fell outside the O&M funds, and which the organization director had no control over. For example, Defense Environmental Recovery Act (DERA), Base Support, and Medical Program funds represent fund categories which the case study organization director administered--but was powerless to manage. In the case of Medical Program funds, the case study organization provided personnel to administer the funds, but the output of the expenditures is designed to benefit the Air Force, not the case study organization.

In developing an ABC cost model for a government service organization, this research recommends that a methodology be developed to consider the categories or costs addressed in this section.

Summary

This chapter presented conclusions and management implications derived from the research findings. Information was presented in the following form: 1) a summary of the research proposition, 2) a summary of the findings relating to the proposition, 3) conclusions drawn from the findings, and 4) management implications. Issues not addressed in the research propositions but uncovered during the research process included the reaction of personnel to the implementation of an ABC system, and the secondary allocation of overhead departments to operational departments. The closing section of

this chapter outlined a recommendation to extend this research to determine if additional benefits can be derived from implementing ABC in government service organizations.

The Government Performance and Results Act of 1993 mandated that government agencies tie mission related performance measures to operational budgets. Fund accounting systems do not provide managers with an avenue to meet this mandate. In an era of declining budgets and shrinking resources, managers require information that allows them to target opportunities for cost reduction or process improvement. ABC provides managers cost visibility that gives them this capability.

Appendix A. Cost Model

This appendix contains detailed cost information for each of the activities and processes performed by the overhead departments within the case study organization. A segregation of the case study organization's FY93 budget is presented, in addition to a spreadsheet containing the allocations from overhead departments to operational departments. Following are spreadsheets for each of the overhead departments which detail activity cost information, allocations from other overhead departments, and allocations to other overhead and operational departments.

AFIT FY93 O&M Budget

B	C EBC	D K2 BI	E K2 LS	F K4 CE	G K5 CI	H K6 CI	I K7 CI	J K6 CI	K K9 LA	L K01060 PA	M K1060 DET-2	N K01630 / K01610 RP
Civ Pay/Benefits/OT	39	5,830,065	4,024,324	675,511		461,068	23,527	1,794	659,094	1,531	72,535	196,101
TDY's	40	199,648	3,270,236	3,778,410		1,143,951	1,074		53,274	2,310	1,758	1,169
PCS-Civilian	42	o15		448								
Passenger Vehicle Rental	43			130		83						
Transportation	44	16,137										
Rental of Other Equipment	47											
Communications/DMATS	49											
Printing Services	501/502		111,043	8,600	-150	5,169,816	183,930	54,963				
Education Services	55											
DoD ADPE Mgmt	568		1,000									
Maint of Other Equipment	599	224,466	527									
Contract P Svs	582	30,016										
Misc Contract Svs (Copiers, Etc)	592	310,280	1,495,337	266,127		65,930	20		87,065	843	54	23
Clothing Allowance	598											
Supplies (GSD SSD Other)	605/609	219,028	74,427	44,645		9,404			4,385	354	245	7,604
Non-SF (Other Supplies, Books, Copans, etc)	619	162,190	75,948	48,656					2,681	44		
GSD Information PE	627	7,792	930	370		18			23			319
GSD Equipment	628	274,614	15,830	198,766		449			1,512			
Non-AFSF PE	637	299,016	383,226	69,127					26,048		12,207	
Non-AFSF Expensed Equipment (Non-PE)	639	39,351	3,734						20,746			
POL	641	67										
Interest Penalties	68	976	104	179		41			0			
		7,614,351	9,656,660	4,091,169	-150	6,870,760	209,551	54,757	1,064,834	5,082	86,799	205,216

Section 1: Page 787

	K6 CI	K7 CI	3409 Contingency	Medical Programs	EBC
					39 Civ Pay/Benefits/OT
					40 TDY's
					55 Education Svs
					59 Misc Contract Svs
					61 Non-AFSF Inventories
					502 Defense Printing Svs
					592 Misc Contract Svs
					609 Supplies (Gen Spt Div)
					628 GSD Equip
					637 Equipment
					639 More Equipment

Totals	K6 CI
	99,633
	2,952,496
	22,256,146 (19,835,167)
	2,418,979
	9,541
	0
	0
	0
	0
	0
	0
	30,178
	0

AFIT FY93 O&M Budget

	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AS
	103540	1617	1466	13468/IC618	103(C)	103402	103403	3405	3467	4421	8301	108461		Boot End
EEIC	SC	CE	Personnel	Demand Svcs CC/CCQ	BS	XO	Foreign	AMPOP	LD	Fac. Projects	Ctr PCS g	SC	Total	Total
	1,733	68,096	57,779	379,832	610,279	35,970			607,315		-1,877		14,299,056	14,299,079
39 Civ Pay/Benefits OT	44,532	1,143,200	-24	45,980	12,479	3,522		4,119	1,977				7,566,109	7,566,481
40 RPA's													615	615
42 PCS-Outlon													448	448
43 Passenger Vehicle Rental													16,350	16,352
46 Transportation				216									216	216
47 Rental of Other Equipment								100,000				121,562	221,562	221,562
49 Communications/DMATS				3,579	5,597			77,000	16,075				222,404	222,495
501/502 Printing Services		12,000						21,317					5,427,876	5,427,878
55 Co Location Service													1,000	1,000
548 DoD ADPE Maint	320			14,902					1,074				240,909	240,909
649 Maint of Other Equipment													30,016	30,016
602 Contract P Svci	52,093			4,015	4,175	9,106	29,000	2,463,252	19,277	135,716			4,983,313	4,983,354
		300											300	300
592 Misc Contract Svc (Copies, Etc)	29,093		495	8,914	3,400	2,191		27,276	10,651				415,034	415,101
	215			3,275					700,409				1,020,695	1,020,703
	171			4					897				10,524	10,529
	12,884			6,671	76			11,391	87				511,099	511,093
	865,256			5,903					11,777				1,703,951	1,703,955
				562									63,831	63,832
				69				22					429	629
												1,387	1,393
598 Clothing Allowance	1,485,113	6,033	58,250	473,388	636,080	50,786	29,000	2,725,379	1,369,936	135,716	-1,877	121,562	34,737,404	
	54,344	338,894												

	B	C	D	E	F	G	H	I	J	K	L	M	N
			EEIC 39, Section 3				EEIC 40, Section 3						
		Pg 798/797	Pg 797	pg 798			pg 798	pg 796		pg 796	pg 799-408	EBC 408	EBC 408
		1495	108	85			60	456		4019	-160	3098	17153
		130	12504	4494			77	155		1714	1652	915	4417
		1136	8439	29			619	19		562	84411	510	375
		125	22204	5761			2189	846		17828	11099	800	11527
		1338	60360	44443			263	1667		336	1953	2225	4920
		60031	980	12282			1188	3066		988	287	74848	1991
		34594	11523	85				3064		670	1220	5416	2328
		130404	60825	17291						671	629	686	15718
		305693	96891							44214	4980	9507	591
		4753	4581							57846	-81	46227	323
		46227	383							33992	15104	53506	198
		313313	118052							80678	5353	6597	3734
		507427	-384								1361	10456	3326
		31869	968115								859	439	4406
		5011	600175								3521	218333	2856
		489263	13064								1056	1417	356
		-1491	117434								20771	13763	227710
		480257	4702								23510	10397	-121
		3297630	68220								12166	701	131
		101143	14282								2204	2156	300838
		631683	0406								8246	43007	420
		21494	129802								342	27318	301493
		291998									889	22045	876169
		81225									519	6136	
		17059									418	1079A	
		712001									152	1096	
US		11991901	23272864	84469	14298656		4396	9313		243638			2616074
Book		11891911	23236996	84470	14299077		4396	9317		245539			2616098
Delta Book Minus Us		10	410	1	421	0	0	4		1	0	0	24
	B	C	D	E	F	G	H	I	J	K	L	M	N
										KO3617		KO3609	
										PO1088		KO4421	

	Sub-Totals	
	TOTAL	190053
	38,527,859	
		2466
		2466

Allocation of AFE O&M Funds by Department

BO2483 BO2482 XO	BO2448 AMPDP	BO2487 LD	ESC	Totals for each ESC
35,970	0	607,315	39	14,299,058
3,522	4,149	1,977	40	7,564,100
0	0	0	42	615
0	0	0	43	440
0	0	0	46	14,330
0	0	0	47	210
0	100,000	0	49	221,562
0	77,000	14,175	501/602	222,464
0	21,317	0	56	5,427,076
0	0	0	564	1,000
0	0	1,824	569	240,999
0	0	0	582	30,014
38,106	2,864,252	19,277	592	4,983,313
0	0	0	596	300
2,591	0	10,461	605/606	415,039
0	27,278	740,456	614	1,022,465
0	0	897	607	10,534
0	0	67	628	511,049
0	11,991	11,777	637	1,703,951
0	0	0	639	63,831
0	0	0	641	429
0	0	22	68	1,382
$79,796 XO	$2,725,309 AMPDP	$1,349,938 LD		36,737,014

Resource Categories Contained in This Research

AF MPcy
05 Dmt
46.3%

MPcy/Non-Direct
5%

AFR O&M
66%

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	EBC	AFT O&M EI	BBA EI	AMPP EI		EBC	TOTAL
Civ Pay/Benefits/OT	39	5,510,085		0		39	5,510,085
TDYs	40	199,648	39,004	0		40	238,674
PCS-Civilian	42	615	0	0		42	615
Passenger Vehicle Rental	43	0	0	0		43	0
Transportation	46	14,137	0	0		46	14,137
Rental of Other Equipment	47	0	0	0		47	0
Communications/DMNS	49	0	0	0		49	0
Printing Services	501/502	0	0	0		501/502	0
Education Services	55	0	0	0		55	0
DoD ADPE Maint	566	0	0	0		566	0
Maint of Other Equipment	569	224,494	0	0		569	224,494
Contract P Svs	582	30,004	0	0		582	30,004
Misc Contract Svs (Copiers, Etc)	592	310,290	64,344	0		592	364,634
Clothing Allowance	598	0	0	0		598	0
Supplies (GSD, SD, Other)	605/609	219,078	1,400	0		605/609	219,078
Non-SF (Other Supplies Books, Copies, etc)	619	142,190	1,400	0		619	143,590
GSD Information PE	627	7,792	0	0		627	7,792
GSD Equipment	628	274,614	0	0		628	274,614
Non-AFSF PE	637	299,014	4,725	0		637	303,741
Non-AFSF Expensed Equipment (Non HP)	639	39,351	0	0		639	39,351
POL	641	67	0	0		641	67
Interest Penalties	64	976	0	0		64	976
		7,614,351		0			7,713,661

	EBC	AFT O&M CE	BBA CE	AMPP CE		EBC	TOTAL
Civ Pay/Benefits/OT	39	675,511	68,098	0		39	39,743,609
TDYs	40	2,778,410	1,148,200	0		40	40,921,610
PCS-Civilian	42	0	0	0		42	0
Passenger Vehicle Rental	43	448	0	0		43	448
Transportation	46	130	0	0		46	130
Rental of Other Equipment	47	0	0	0		47	0
Communications/DMNS	49	0	0	0		49	0
Printing Services	501/502	8,800	12,000	0		501/502	20,800
Education Services	55	0	0	0		55	0
DoD ADPE Maint	566	0	0	0		566	0
Maint of Other Equipment	569	0	0	0		569	0
Contract P Svs	582	0	0	0		582	0
Misc Contract Svs (Copiers, Etc)	592	266,127	338,894	0		592	605,021
Clothing Allowance	598	0	0	0		598	0
Supplies (GSD, SD, Other)	605/609	44,645	8,166	0		605/609	52,811
Non-SF (Other Supplies Books, Copies, etc)	619	41,656	4,147	0		619	62,803
GSD Information PE	627	370	0	0		627	370
GSD Equipment	628	198,766	14,118	0		628	214,884

Command Section/MS

All Personal Information Deleted. Only Department Allocations and Process Totals are Depicted. Command Section Treated as 100% Administrative Overhead.

allocated according to Faculty/Staff size within departments

	CC TOTAL					Allocation of Primary/Direct Resources		
	514,462					2. In Dept Personnel	% Allocation	Allocated CC/MS
						ID	16	0.03001876	37,918
MS TOTAL	396,466					PA	2	0.00375255	4,720
						RP	16	0.03001876	37,918
Total Salaries	918,738					RR	23	0.00315197	84,367
Military Salaries	595,792					SC	43	0.0800542	101,965
						XO	8	0.01500935	14,959
Calculated Civ Pay	334,938							
EBC 39 Civ Pay	437,311					CE	60	0.1125708	142,193
Calculated Benefits/OH	142,373					CI	36	0.0675422	85,316
						EN	166	0.30769231	388,440
Salaries (EBC 39+MS Pay)	1,033,100					LA	50	0.0930063	118,494
All Other EBC's	210043					LS	115	0.2157598	272,834
TOTAL ALLOCATION	1,243,144							
						Total	533	1.00	1,243,144

FY93 Budget Data	OEBC	CC				Allocation of Secondary Resources		
							%	Allocation
Civ Pay/Benefits/OH	39	437311				CE	142,193	0.14117640	13,563
DPx	40	45064				CI	85,316	0.08400568	8,135
PCS-Civilian	42	0				EN	388,440	0.3699255	37,073
Passenger Vehicle Rental	43	0				LA	118,494	0.11764700	11,303
Transportation	46	0				LS	272,834	0.27059604	25,996
Rental of Other Equipment	47	216						
Communications/DMAS	49	0				Total	1,007,199	1.00	96,074
Printing Service	501/502	3519						
Education Service	55	0				Allocations from Other Specialties		
DoD ADPE Maint	568	0						
Maint of Other Equipment	569	14500				SC	94,074		
Contract IP Svs	582	0						
Misc Contract Svs (Copies, Etc)	592	136731				Total	96,074		
Clothing Allowance	598	0						
Supplies (GSD, SSD, Other)	605/609	9489						
Non-SF (Other Supplies: Books, Copiers, etc)	619	3275						
GSD Information PE	627	0						
GSD Equipment	628	6871						
Non-AFSF PE	637	5903						

Non-AFSF Expensed Equipment (Non-PE)		
PCL	639	0
Interest Penalties	641	562
	66	59

Total Allocation	
CE	155,756
CI	93,64
EN	426,733
IA	129,797
IS	298,533
Totals	1,103,272

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LD: Library

Note: Personnel information deleted; only activity code and budget information are presented

	Process 1 294,226	Process 2 638,994	Process 3 288,422	SUB-TOTAL 1,119,716	TOTAL OF 2 AND 3	COSTS AS SHOWN ABOVE
Total of 2 & 3				1,119,716		
LOADED PROCESS COSTS		1,815,486	364,331	1,349,934		

PA: Public Affairs and Marketing

RP. Resources and Business Directorate

Note: As personal information deleted. Only aggregated activity costs and budget information are presented.

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SC: Communications/Computer Support and Operations

Allocation of Process 4

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Appendix B. Chart of Activities

This appendix contains the case study's organizational chart of activites. In combination with information contained in Appendix A, budget expenditures can be linked to the cost of providing a service or performing an activity.
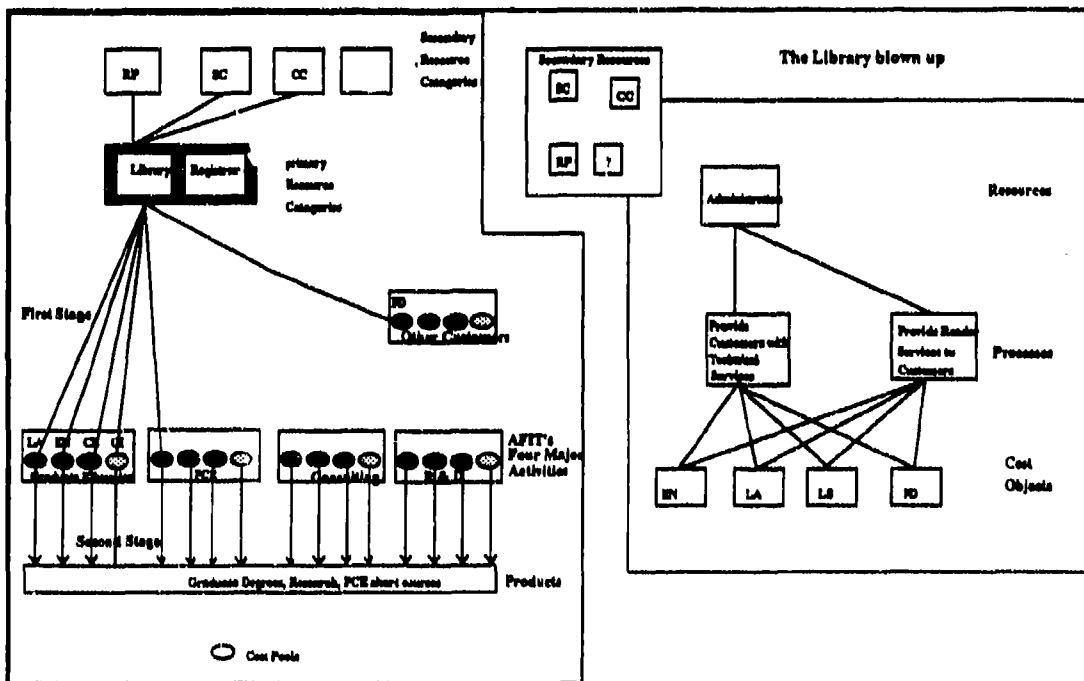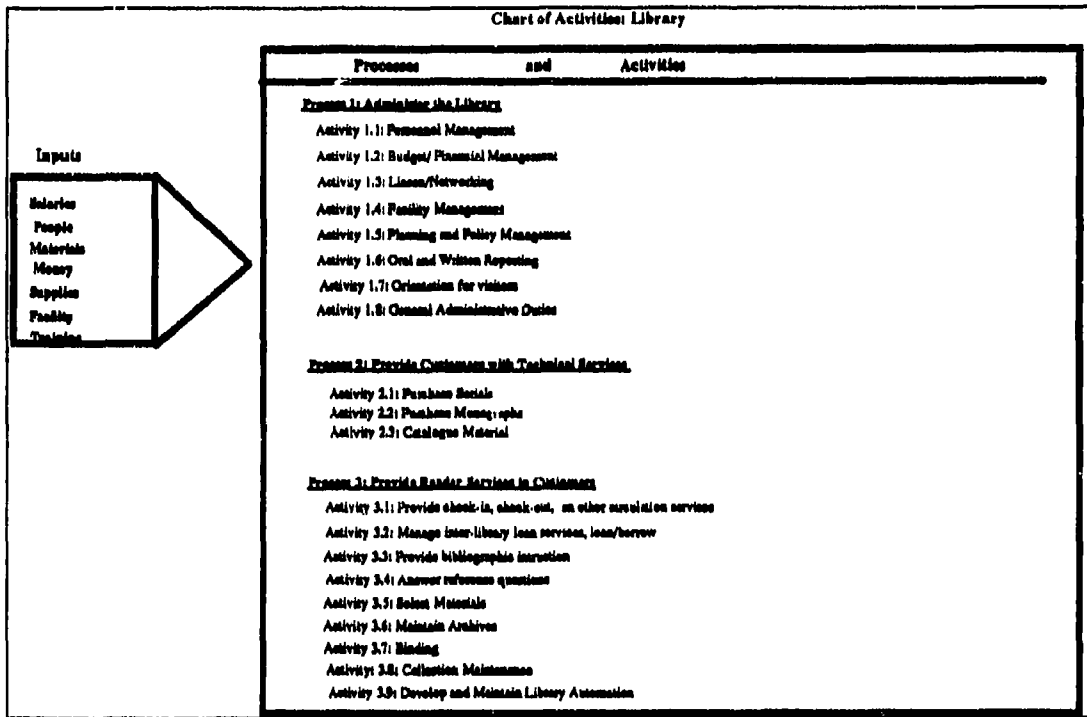
Chart of Library Activities

Chart of Activities: Library

Processes   and   Activities

Process 1: Administering the Library

Activity 1.1: Personnel Management

Activity 1.2: Budget/ Financial Management

Activity 1.3: Liason/Networking

Activity 1.4: Facility Management

Activity 1.5: Planning and Policy Management

Activity 1.6: Oral and Written Reporting

Activity 1.7: Orientation for visitors

Activity 1.8: General Administrative Duties

Process 2: Provide Customers with Technical Services

Activity 2.1: Purchase Serials

Activity 2.2: Purchase Monographs

Activity 2.3: Catalogue Material

Process 3: Provide Reader Services to Customers

Activity 3.1: Provide check-in, check-out, an other circulation services

Activity 3.2: Manage inter-library loan services, loan/borrow

Activity 3.3: Provide bibliographic instruction

Activity 3.4: Answer reference questions

Activity 3.5: Select Materials

Activity 3.6: Maintain Archives

Activity 3.7: Binding

Activity 3.8: Collection Maintenance

Activity 3.9: Develop and Maintain Library Automation

Inputs

Salaries
People
Materials
Money
Supplies
Facility
Training

The Library blown up

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Chart of Library Activities

Process or Activity	Description
Process 1 **allocate across activities based upon resource consumption**	**Administer the library** • compile library-use statistics • Special Assignments • Data collection and analysis
Activity 1.1 allocate across activities based upon the labor effort	Personnel Management • write performance reports • supervise, counsel, schedule workers
Activity 1.2 allocate across activities based upon the resources consumed	Budget/Financial Management • develop annual budget • develop and advise staff w.r.t. financial plans and programming, budgeting • monitor Library of Congress Agreements • gather and submit unfunded requirements
Activity 1.3 allocate to activities based upon customer consumption	Liason/Networking • Prepare for and meet with AFIT faculty/staff/department heads • Meet with other DoD activities (Wright Lab Library) • Attend/prepare for consortium meetings
Activity 1.4 allocate to activities and then to customers based upon area	Manage Facilities
Activity 1.5	Develop and Manage Plans and Policies • plan to meet strategic goals and objectives • manage the total quality program--continuous process improvement

Activity 1.6	Oral and Written Reporting
	• compile library-use statistics
	• Special Assignments
	• Data collection and analysis
	• meeting preparation
	• correspondence within the library
	• AFIT required metrics
	• develop reports/presentations for visits (for example, accreditation visits)
	• special projects
	• conduct user surveys of library resources and services: prepare survey/administer survey/compile results/publish results for AFIT management
Activity 1.7	Conduct Visitor Orientation
	• conduct orientation for AFIT faculty/staff
	• conduct orientation for non AFIT personnel
Activity 1.8	Perform General Administrative Duties
	• sort mail/order supplies/process travel orders

Process or Activity	Description
Process 2	Provide customers with technical services
Activity 2.1 allocate personnel costs to customers based upon weighted average of serials purchased	Purchase Serials
	• preliminary administrative checks with the Library of Congress for BPA
	• periodic determination of requirements
	• validate the information
	• place an order with the Contracting Office
	• daily receipt and check-in
	• process claims for non-receipted issues
	• update financial records
Activity 2.2	Purchase Monographs
	• receive an order from Reader Services AFIT form 4, or E-mail
	• check for BPA or an existing contract
	• order book through contracting
	• receive books
	• update financial records

Activity 2.3	Catalogue Material
	• receive books/videos
	• checks on-line to see if there is a record
	• if record, then download record
	• if no record, then create a record
	• input a library location
	• update the hold record
	• create labels
	• eliminate obsolete books
	• salvage unserviceable books

Process or Activity	Description
Process 3	**Provide reader services**
Activity 3.1	Provide circulation services • charge out an item • check an item in • clear an item from customer's record • check for a hold on the item/notify person • sensitize the item • put item on cart to be shelved • place an item in the Reserve Room • manage overdue book program • register users • answer phones • follow up on lost or damaged material • monitor micro fiche reader printers • monitor copiers
Activity 3.2	Manage inter-library loan services, loan/borrow • loan--request received over the OCLC network • librarian checks location • pack/ship/send confirmation of shipment • borrow--computerized request received • process request/verify data • locate • send request • msg sent back confirming shipment • received • bar code is placed on material • patron is notified • overdue notices sent out via e-mail--generated manually
Activity 3.3	Provide bibliographic instruction • Student/faculty/staff orientation • prepare library cards • prepare the briefing • schedule • bibliographic instruction • faculty member request • develop briefing • select samples of printed resources • brief

Process or Activity	Description
Activity 3.4	Answer reference questions • (80%) Computerized literature searches (mediated lit search) • (20%) manual request from customer • search/notify • One-on-question

Activity 3.5	Select materials
	• Provide broad guidelines and direction
	• Reading Trade Journals/Publisher's Flyers
	• Work with faculty to eliminate gaps in collection
	• Collection Development
	   -- Keep faculty members informed about new materials, publications
	   -- Orientating faculty
	   -- Manage collection development
	• culling material

Activity 3.6	Maintain archives • Bounding newly published material • Ensure library gets a copy of AFIT publications • Shelve, circulate, assist in accessing archive materials
Activity 3.7	Binding • selects and organizes material to be bound • prepare accompanying paperwork • prepare binding material for shipment • return shp: unpack and organize bound matl • check against order and all graphics correct • process bound material for shelving • shelve bound material

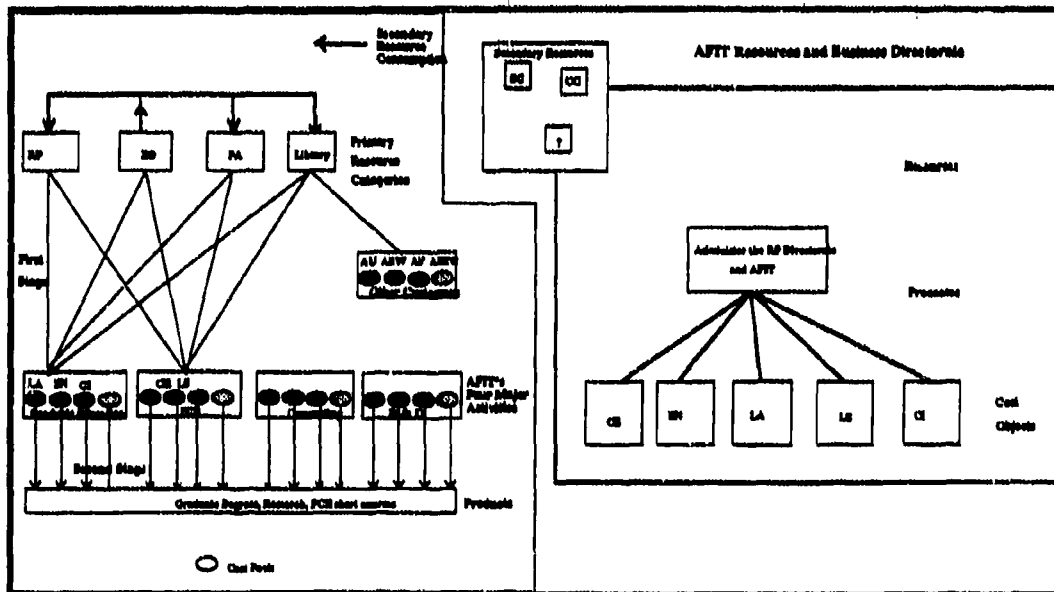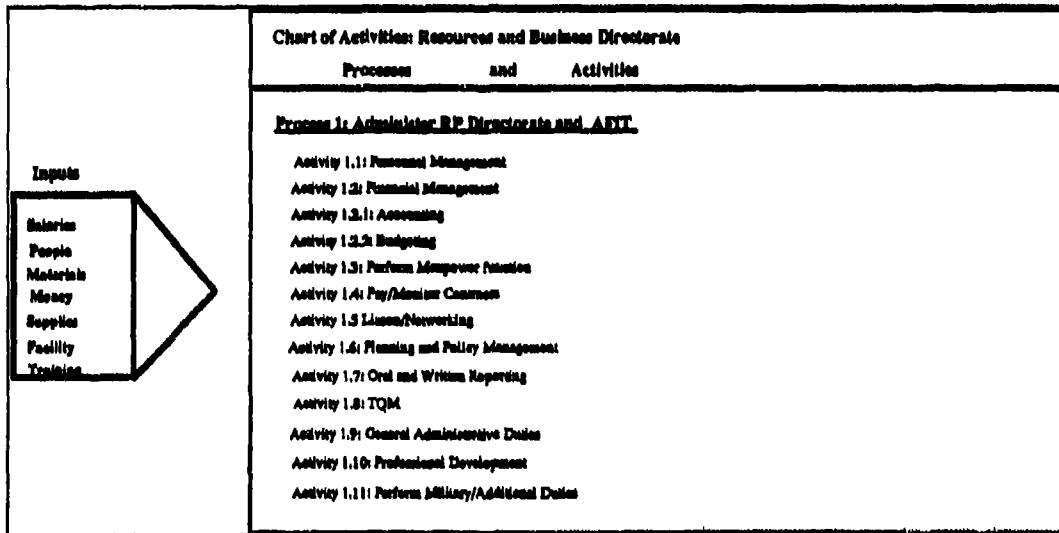| Process or Activity	Description
Activity 3.8	Collection Maintenance • shelve books/journals/audiovisual matl, newspapers, archival matl • file newly received micro fiche/film • put up current subscription as it comes in • perform misc admin duties • twice a day mail run • rearrange shelves as required • process new technical reports • property stamp matl • identify alpha numeric ref # • Process library matl for circulation • property stamp/label/magnetic strip • clears on oreder file • notify requester of item ready for pickup
Activity 3.9	Develop and Maintain Library Automation • maintain integrated library system-- training/troubleshooting • maintain office computers--load new software/training performed as required/troubleshoot as necessary • develop new automated systems and services

Public Affairs Directorate Chart of Activities

Process or Activity	Description
Process 1	Administer the Public Affairs Directorate
Activity 1.1	Personnel Management • write performance reports • supervise, counsel, schedule workers
Activity 1.2	Budget/Financial Management • develop annual budget • develop and advise staff w.r.t. financial plans and programming, budgeting • gather and submit unfunded requirements
Activity 1.3	Liaison/Networking • Prepare for and meet with AFIT faculty/staff/department heads • Meet with other DoD activities
Activity 1.4	Develop and Manage Plans and Policies • plan to meet strategic goals and objectives
Activity 1.5	Oral and Written Reporting • compile Registrar statistics • Special Assignments • Data collection and analysis • meeting preparation • correspondence within the office • AFIT required metrics • Develop AFIT catalogue
Activity 1.6	TQM prepare for meetings time in meetings team projects
Activity 1.7	Perform General Administrative Duties • sort mail/order supplies/process travel orders • typing • file management
Activity 1.8	Professional Development
Activity 1.9	Perform Military/Additional Duties
Process or Activity	Description
Process 2	Provide AFIT Staff with Public Affairs Support

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Activity 2.1	Advise commander and staff
Activity 2.2	Provide speech writing assistance
Activity 2.3	Provide Briefings as needed
Activity 2.4	Manage security and policy review programs
Activity 2.5	Manage hometown news release program
Activity 2.6	Prepare public affairs action plan for commandant

Process or Activity	Description
Process 3	**Market AFIT's Capabilities and Successes**
Activity 3.1	Market Educational Opportunities at AFIT
Activity 3.2	Market Consulting and R&D Opportunities at AFIT
Activity 3.3	Market AFIT Success Stories

Process or Activity	Description
Process 4	**Conduct Media and Community Relations Projects**
Activity 4.1	Advise and plan with staff appropriate action to create favorable public opinion of AFIT
Activity 4.2	Establish and maintain liaison with civic leaders and organizations on matters pertaining to AFIT
Activity 4.3	Arrange and conduct news conferences and editorial board
Activity 4.4	Plan and coordinate photographic team visits

Resources and Business Directorate

Chart of Activities: Resources and Business Directorate

Processes and Activities

Process 1: Administer RP Directorate and AFIT

Activity 1.1: Personnel Management
Activity 1.2: Financial Management
Activity 1.2.1: Accounting
Activity 1.2.2: Budgeting
Activity 1.3: Perform Manpower function
Activity 1.4: Pay/Monitor Contracts
Activity 1.5 Liason/Networking
Activity 1.6: Planning and Policy Management
Activity 1.7: Oral and Written Reporting
Activity 1.8: TQM
Activity 1.9: General Administrative Duties
Activity 1.10: Professional Development
Activity 1.11: Perform Military/Additional Duties

AFIT Resources and Business Directorate

Allocation: Allocate evenly across the schools: CE, EN, LA, LS, and CI.

Process or Activity	Description
Process 1	**Administer RP Directorate and AFIT**
Activity 1.1	Personnel Management • write performance reports • supervise, counsel, schedule workers
Activity 1.2	Financial Management
Activity 1.2.1	Accounting • pay bills • pay tuition--civilian institutions • pay reimbursemets (books, fees, etc.)
Activity 1.2.2	Budget • prepare, manage, execute budgets • unfunded requirements • reports • analysis
Activity 1.3	Perform Manpower Function • manpower studies • track authorizations, requirements, etc
Activity 1.4	Pay/Monitor Contracts procurement, review, QA Institute-level workshops
Activity 1.3	Liaison/Networking • Prepare for and meet with AFIT faculty/staff/department heads • Meet with other DoD activities
Activity 1.4	Develop and Manage Plans and Policies • plan to meet strategic goals and objectives
Activity 1.5	Oral and Written Reporting • compile Registrar statistics • Special Assignments • Data collection and analysis • meeting preparation • correspondence within the office • AFIT required metrics • Develop AFIT catalogue
Activity 1.6	TQM prepare for meetings time in meetings team projects
Activity 1.7	Perform General Administrative Duties • sort mail/order supplies/process travel orders • typing • file management • Supply/equipment custodian/Inventory management

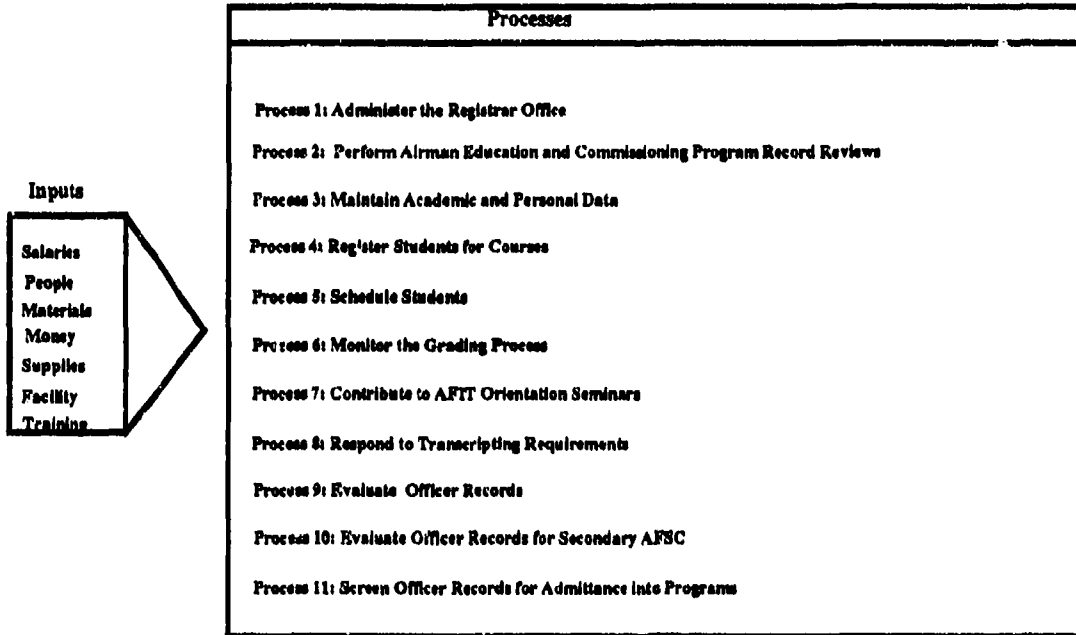| Activity 1.8	Professional Development • contracted on-site training • attedning off-site classes, seminars • correspondence courses • professional reading (journals, books)
Activity 1.9	Perform Military/Additional Duties

Chart of Activities: Registrar

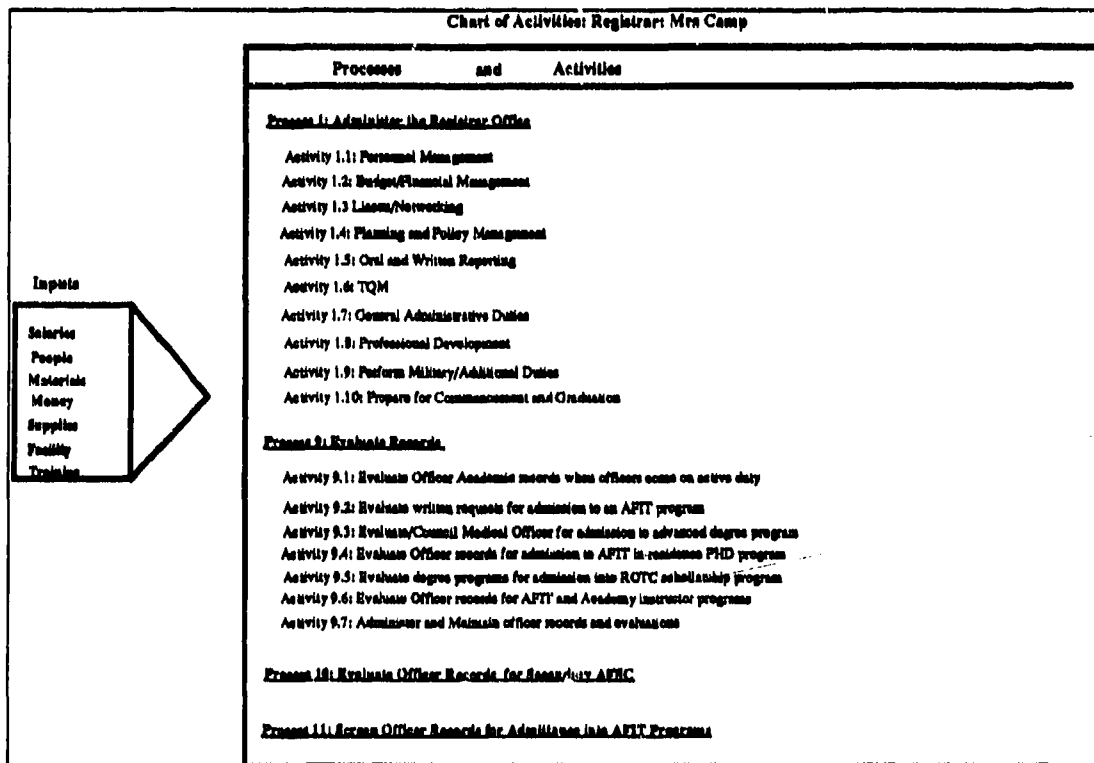| Processes |
| --- |
| Process 1: Administer the Registrar Office |
| Process 2: Perform Airman Education and Commissioning Program Record Reviews |
| Process 3: Maintain Academic and Personal Data |
| Process 4: Register Students for Courses |
| Process 5: Schedule Students |
| Process 6: Monitor the Grading Process |
| Process 7: Contribute to AFIT Orientation Seminars |
| Process 8: Respond to Transcripting Requirements |
| Process 9: Evaluate Officer Records |
| Process 10: Evaluate Officer Records for Secondary AFSC |
| Process 11: Screen Officer Records for Admittance into Programs |

Inputs

Salaries
People
Materials
Money
Supplies
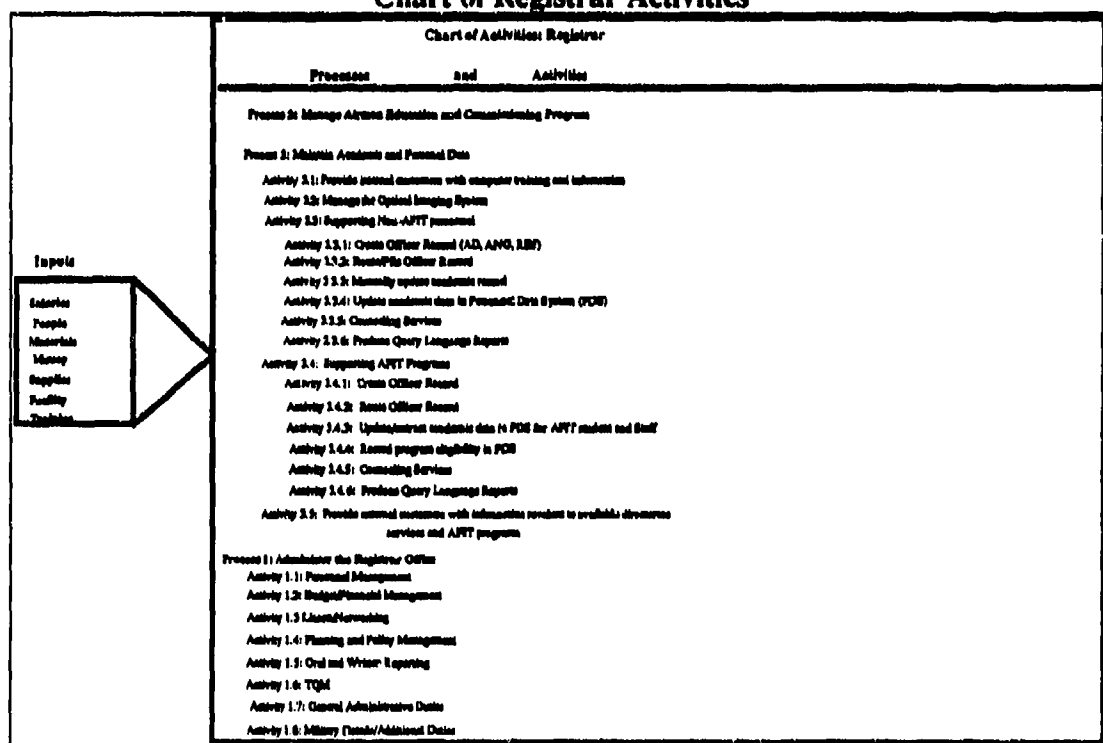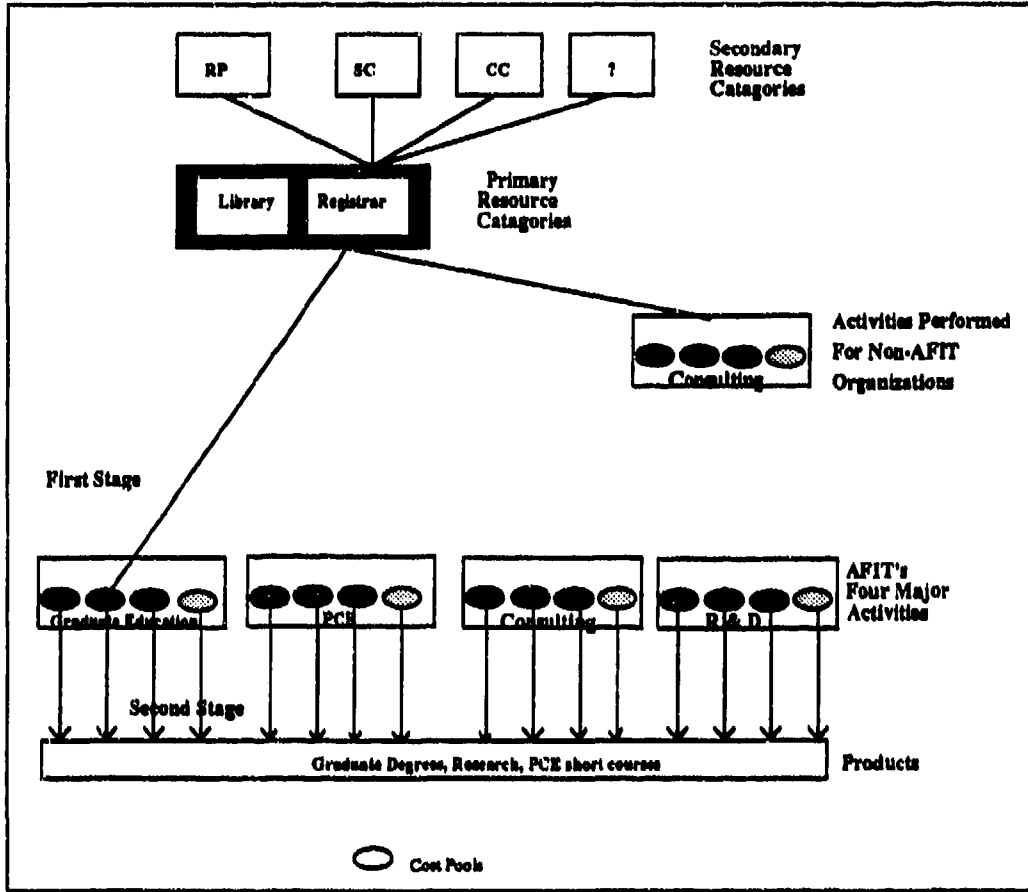Facility
Training

Chart of Registrar Activities

Chart of Activities: Registrar: Mrs Camp

Processes and Activities
Process 1: Administer the Registrar Office
Activity 1.1: Personnel Management
Activity 1.2: Budget/Financial Management
Activity 1.3 Liason/Networking
Activity 1.4: Planning and Policy Management
Activity 1.5: Oral and Written Reporting
Activity 1.6: TQM
Activity 1.7: General Administrative Duties
Activity 1.8: Professional Development
Activity 1.9: Perform Military/Additional Duties
Activity 1.10: Prepare for Commencement and Graduation
Process 9: Evaluate Records.
Activity 9.1: Evaluate Officer Academic records when officers come on active duty
Activity 9.2: Evaluate written requests for admission to an AFIT program
Activity 9.3: Evaluate/Counsel Medical Officer for admission to advanced degree program
Activity 9.4: Evaluate Officer records for admission to AFIT in-residence PHD program
Activity 9.5: Evaluate degree programs for admission into ROTC scholarship program
Activity 9.6: Evaluate Officer records for AFIT and Academy instructor programs
Activity 9.7: Administer and Maintain officer records and evaluations
Process 10: Evaluate Officer Records for Secondary AFSC
Process 11: Screen Officer Records for Admittance into AFIT Programs

Inputs

Salaries
People
Materials
Money
Supplies
Facility
Training

Chart of Registrar Activities

Chart of Activities: Registrar

Processes and Activities

Process 1: Administer the Registrar Office

Activity 1.1: Personnel Management
Activity 1.2: Budget/Financial Management
Activity 1.3: Liaison/Networking
Activity 1.4: Planning and Policy Management
Activity 1.5: Oral and Written Reporting
Activity 1.6: TQM
Activity 1.7: General Administrative Duties
Activity 1.8: Professional Development
Activity 1.9: Perform Military Duties/Additional Duties
Activity 1.10: Contribute Toward Commencement and Graduation preparation

Process 4: Register Students for Classes

Activity 4.1: Register full-time students
Activity 4.2: Register part-time students
Activity 4.3: Trouble shoot the registration process computers/hardware/staff

Process 5: Schedule Students

Activity 5.1: Schedule full-time students
Activity 5.2: Trouble shoot scheduling process computers/hardware/staff

Process 6: Monitor the Grading process

Activity 6.1: Periodically check student grades
Activity 6.2: Trouble shoot the process

Process 7: Orientation Sessions, position held/scheduled briefings

Process 8: Transcription

Inputs

Salaries
People
Materials
Money
Supplies
Facility

Chart of Registrar Activities

Chart of Activities: Registrar

Processes and Activities

Process 2: Manage Airmen Education and Commissioning Program

Process 3: Maintain Academic and Personal Data

Activity 3.1: Provide internal customers with computer training and information
Activity 3.2: Manage the Optical Imaging System
Activity 3.3: Supporting Non-AFIT personnel

Activity 3.3.1: Create Officer Record (AD, ANG, RES)
Activity 3.3.2: Route/File Officer Record
Activity 3.3.3: Manually update academic record
Activity 3.3.4: Update academic data in Personnel Data System (PDS)
Activity 3.3.5: Counseling Services
Activity 3.3.6: Produce Query Language Reports

Activity 3.4: Supporting AFIT Programs

Activity 3.4.1: Create Officer Record
Activity 3.4.2: Route Officer Record
Activity 3.4.3: Update/extract academic data in PDS for AFIT student and staff
Activity 3.4.4: Record program eligibility in PDS
Activity 3.4.5: Counseling Services
Activity 3.4.6: Produce Query Language Reports

Activity 3.5: Provide external customers with information resident to available classroom services and AFIT programs
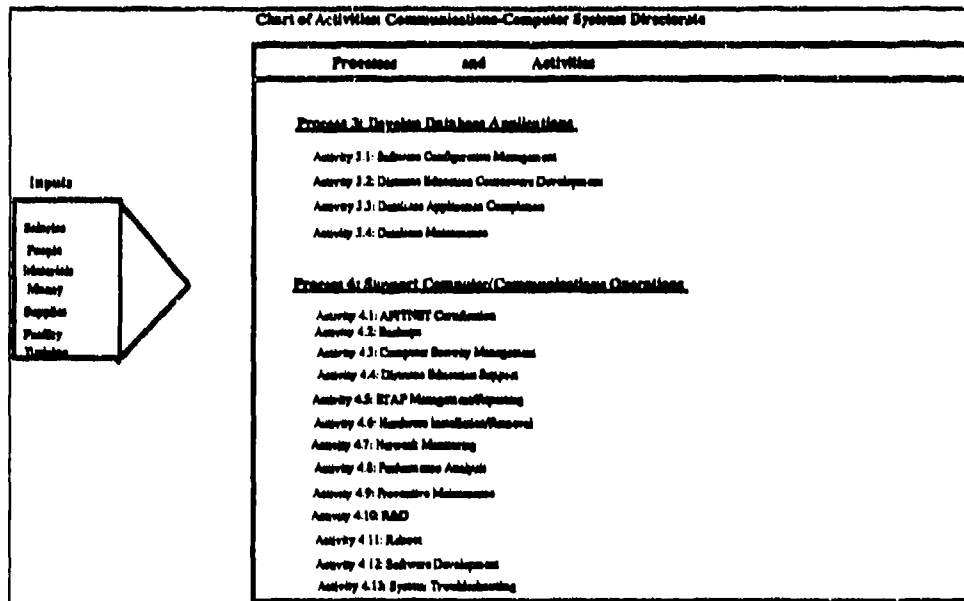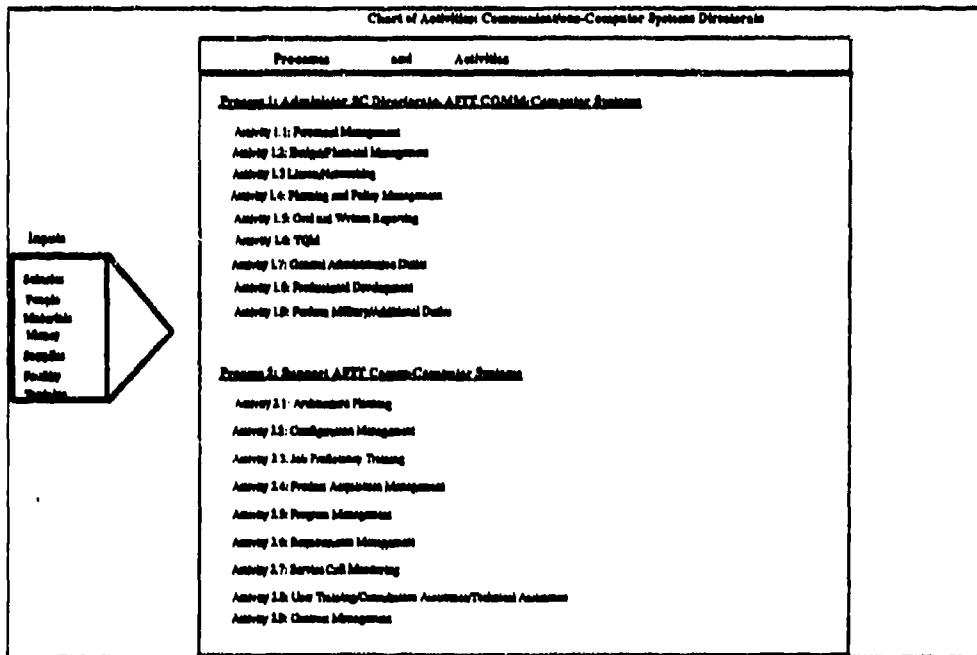
Process 1: Administer the Registrar Office

Activity 1.1: Personnel Management
Activity 1.2: Budget/Financial Management
Activity 1.3: Liaison/Networking
Activity 1.4: Planning and Policy Management
Activity 1.5: Oral and Written Reporting
Activity 1.6: TQM
Activity 1.7: General Administrative Duties
Activity 1.8: Military Duties/Additional Duties

Inputs

Salaries
People
Materials
Money
Supplies
Facility
Training

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ABC Conceptual Model of the Registrar Office

Secondary Resource Catagories

Primary Resource Catagories

Activities Performed For Non-AFIT Organizations

First Stage

AFIT's Four Major Activities

Second Stage

Products

Cost Pools

ABC Conceptual Model of the Registrar Office

The registrar blows up

Secondary Resources

Processes

Cost Objects

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Chart of Registrar Activities

Process or Activity	Description
Process 1	**Administer the Registrar Office**
Activity 1.1	Personnel Management • write performance reports • supervise, counsel, schedule workers
Activity 1.2	Budget/Financial Management • develop annual budget • develop and advise staff w.r.t. financial plans and programming, budgeting • gather and submit unfunded requirements
Activity 1.3	Liason/Networking • Prepare for and meet with AFIT faculty/staff/department heads • Meet with other DoD activities
Activity 1.4	Develop and Manage Plans and Policies • plan to meet strategic goals and objectives
Activity 1.5	Oral and Written Reporting • compile Registrar statistics • Special Assignments • Data collection and analysis • meeting preparation • correspondence within the office • AFIT required metrics • Develop AFIT catalogue
Activity 1.6	TQM prepare for meetings time in meetings team projects
Activity 1.7	Perform General Administrative Duties • sort mail/order supplies/process travel orders
Activity 1.8	Professional Development

Activity 1.9	Perform Military/Additional Duties • Terminal Area Security Monitor • Urinalysis Monitor • Flag Details • Retreat Ceremonies • Bay Orderly
Activity 1.10	Prepare for Commencement and Graduation

Process or Activity	Description
Process 2	**Perform Airman Education and Commissioning Program Record Reviews** • compute GPA's • forward packages to MPC • evaluate records for eligibility • provide consultation to the selection boards • answer questions • evaluate package for age waiver eleigibility

Process or Activity	Description
Process 3	**Maintain Academic and Personal Data**
Activity 3.1	Provide internal customers with computer training and information
Activity 3.2	Manage the Optical Imaging System
Activity 3.3	Support non-AFIT personnel
Activity 3.3.1	Create Officer Record • AD • Guard • Reserve
Activity 3.3.2	Route/file officer Record
Activity 3.3.3	Manually update academic record
Activity 3.3.4	Update academic data in personnel data system (PDS)
Activity 3.3.5	
Activity 3.3.6	Produce Query Language Reports
Activity 3.4	Support AFIT programs
Activity 3.4.1	Create officer records • AFIT students
Activity 3.4.2	Route/file officer record
Activity 3.4.3	Update/extract academic data in PDS for AFIT students and staff
Activity 3.4.4	Record program eligibility in PDS

Activity 3.4.5	Counseling Services
Activity 3.4.6	Produce query language reports
Activity 3.5	Provide external customers with information relevant to available directorate services and AFIT programs

Process or Activity	Description
Process 4	**Register Students for Courses**
Activity 4.1	Register full-time students
Activity 4.2	Register part-time students
Activity 4.3	Trouble shoot the registration process: computers/faculty/staff

Process or Activity	Description
Process 5	Schedule Students
Activity 5.1	Schedule full-time students
Activity 5.2	Trouble shoot scheduling process: computers/faculty/staff

Process or Activity	Description
Process 6	**Monitor the Grading Process**
Activity 6.1	Enter/quality check student grades
Activity 6.2	Trouble shoot the process

Process or Activity	Description
Process 7	**Contribute to AFIT Orientation Seminars**
Process 8	**Respond to transcripting requirements**

Process or Activity	Description
Process 9	**Evaluate Academic Records**
Activity 9.1	Evaluate officer academic records (when the officer comes on active duty • evaluate records for admission to an AFIT fully-funded program • council officers (generally over the phone)

Activity 9.2	Evaluate written requests for admission to an AFIT program • receive a letter from the officer of a message from MPC • evaluate officer requests • evaluate civilian requests • evaluate requests from officers of other services
Activity 9.3	Evaluate Medical Corps Officers' records for admission to an advanced degree program • evaluate records • council officers
Activity 9.4	Evaluate officer records for admission to AFIT in-residence PHD program • receive letter • process paperword • council officers
Activity 9.5	Evaluate college degree programs for admission into ROTC schollarship program
Activity 9.6	Evaluate officer records for AFIT and Academy instructor programs
Activity 9.7	Administer and maintain officer records and evaluations

Process or Activity	Description
Process 10	Evaluate Officers for Secondary AFSC
Process 11	Select officer records

Communications/Computer Support Directorate (SC)

Chart of Activities Communications-Computer Systems Directorate

Processes	and	Activities

Process 1: Administer SC Directorate AFIT COMM-Computer Systems

Inputs

Salaries
People
Materials
Money
Supplies
Facility
Training

- Activity 1.1: Personnel Management
- Activity 1.2: Budget/Financial Management
- Activity 1.3 License/Networking
- Activity 1.4: Planning and Policy Management
- Activity 1.5: Oral and Written Reporting
- Activity 1.6: TQM
- Activity 1.7: General Administrative Duties
- Activity 1.8: Professional Development
- Activity 1.9: Perform Military/Additional Duties

Process 2: Support AFIT Comm-Computer Systems

- Activity 2.1: Architecture Planning
- Activity 2.2: Configuration Management
- Activity 2.3: Job Proficiency Training
- Activity 2.4: Product Acquisition Management
- Activity 2.5: Program Management
- Activity 2.6: Requirements Management
- Activity 2.7: Service Call Monitoring
- Activity 2.8: User Training/Consultation Assistance/Technical Assistance
- Activity 2.9: Contract Management

Chart of Activities Communications-Computer Systems Directorate

Processes	and	Activities

Process 3: Develop Database Applications.

Inputs

Salaries
People
Materials
Money
Supplies
Facility
Training

- Activity 3.1: Software Configuration Management
- Activity 3.2: Database Interface Converters Development
- Activity 3.3: Database Application Completion
- Activity 3.4: Database Maintenance

Process 4: Support Computer/Communications Operations.

- Activity 4.1: AFITNET Coordination
- Activity 4.2: Backups
- Activity 4.3: Computer Security Management
- Activity 4.4: Database Interface Support
- Activity 4.5: RTAP Management/Reporting
- Activity 4.6: Hardware Installation/Removal
- Activity 4.7: Network Monitoring
- Activity 4.8: Performance Analysis
- Activity 4.9: Preventive Maintenance
- Activity 4.10: R&D
- Activity 4.11: Reboot
- Activity 4.12: Software Development
- Activity 4.13: System Troubleshooting

ABC Conceptual Model for the
Communications-Computer Systems Directorate

Chart of SC Activities

Process or Activity	Description
Process 1	**Administer SC Directorate and AFIT COMM/ Computer Systems**
Activity 1.1	Personnel Management • write performance reports • supervise, counsel, schedule workers
Activity 1.2	Budget/Financial Management • Certify/Pay invoices • develop annual budget • develop and advise staff w.r.t. financial plans and programming, budgeting • gather and submit unfunded requirements • BES and P-series updates • Monitor financial status
Activity 1.3	Liaison/Networking • Prepare for and meet with AFIT faculty/staff/department heads • Meet with other DoD activities
Activity 1.4	Develop and Manage Plans and Policies • plan to meet strategic goals and objectives
Activity 1.5	Oral and Written Reporting • compile Registrar statistics • Special Assignments • Data collection and analysis • meeting preparation • correspondence within the office • AFIT required metrics • Develop AFIT catalogue
Activity 1.6	TQM prepare for meetings time in meetings team projects
Activity 1.7	Perform General Administrative Duties • sort mail/order supplies/process travel orders • typing • file management • Supply/equipment custodian/Inventory management
Activity 1.8	Professional Development • contracted on-site training • attedning off-site classes, seminars • correspondence courses • professional reading (journals, books)
Activity 1.9	Perform Military/Additional Duties

Process or Activity	Description
Process 2	**Support AFIT Comm-Computer Systems**
Activity 2.1 Allocation: Use equipment	Architecture Planning build the POM write/maintain C-CS assessment
Activity 2.2 Allocation: Use equipment	Configuration Management
Activity 2.3 Allocation: Use equipment	Internal Job Proficiency Training
Activity 2.4 Allocation: Use equipment	Product Acquisition Management • IMPAC purchase monitoring • PR monitoring • prepare/validate SSJ/SMMJ
Activity 2.5 Allocation: Use equipment	Program Management • SOW preparation • source selection • status monitoring
Activity 2.6 Allocation: Use equipment	Requirements Management • develop technical solutions • validate requirements • staff requirements
Activity 2.7 Allocation: Use equipment	Service Call Monitoring • trouble ticket tracking
Activity 2.8 Allocation: Use equipment	User Training and Consultation Assistance/Technical Assistance • schedule/conduct training • support customers • develop training
Activity 2.9	Contract Management resolve proviems monitor status staff renewals

Process or Activity	Description
Process 3	**Develop Database Applications**
Activity 3.1	Software Configuration Management • configuration item tracking • version tracking
Activity 3.2	Distance Education Courseware Development
Activity 3.3	Database Application Completion docimentation development (4-7 docs per application) requirements analysis system design coding testing
Activity 3.4	Database Maintenance of 11 applications programs trouble teicet tracking schedule estimations software updates data integrity and updates documentation updates database redesign

Process or Activity	Description
Process 4	**Support Computer/Communications Operations**
Activity 4.1 Allocate: to two letter Department then by people if needed	AFITNET Certification
Activity 4.2 allocate to two letter department	Backups
Activity 4.3	Cumputer Security Management
Activity 4.4	Support Distance Education
Activity 4.5	ETAP management/Reporting
Activity 4.6	Hardware Installation/Removal
Activity 4.7	Network Monitoring
Activity 4.8	Performance Analysis
Activity 4.9	Preventive Maintenance
Activity 4.10	R&D
Activity 4.11	Reboot
Activity 4.12	Software Development
Activity 4.13	System Troubleshooting

Plans And Opeations Directorate (XO)

Chart of Activities: Directorate of Plans and Operations

Processes and Activities

Process 1: Administer XO

Activity 1.1: Personnel Management
Activity 1.2: Budget/Financial Management
Activity 1.3 Liason/Networking
Activity 1.4: Planning and Policy Management
Activity 1.5: Oral and Written Reporting
Activity 1.6: TQM
Activity 1.7: General Administrative Duties
Activity 1.8: Professional Development
Activity 1.9: Perform Military/Additional Duties

Process 2: Administer AFIT

Activity 2.1: Provide Graduate and Professional Continuing Education Support
Activity 2.2: Develop and Manage AFIT's Quality Program
Activity 2.3: Manage AFIT's Self-Inspection Program
Activity 2.4: Manage AFIT's Educational Evaluation Program
Activity 2.5: Performs Function of Institutional Analysis and Evaluation Office
Activity 2.6: Manage the AFIT Board of Visitors Program
Activity 2.7: Manage Foreign disclosure Function

Process 3: Manage AFIT's International Student Office

Inputs
Salaries
People
Materials
Money
Supplies
Facility
Training

ABC Conceptual Model for the Plans and Operations Directorate
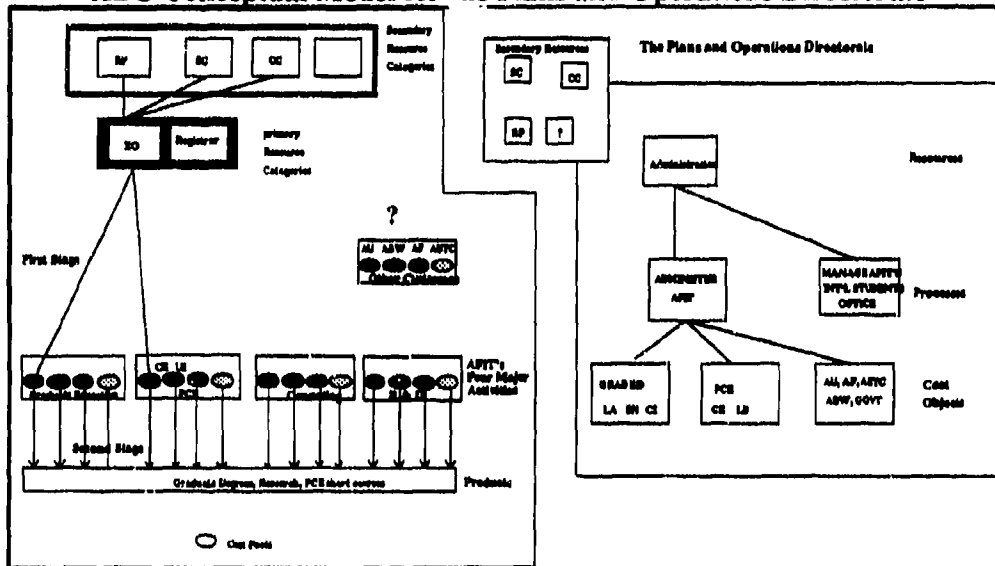
Chart of XO Activities

Process or Activity	Description
Process 1 Allocate Administration costs across Process 2 and 3 according to the weighted average of their resource consumption.	**Administer XO**
Activity 1.1	Personnel Management • write performance reports • supervise, counsel, schedule workers
Activity 1.2	Budget/Financial Management • develop annual budget • develop and advise staff w.r.t. financial plans and programming, budgeting • gather and submit unfunded requirements
Activity 1.3	Liaison/Networking • Prepare for and meet with AFIT faculty/staff/department heads • Meet with other DoD activities
Activity 1.4	Develop and Manage Plans and Policies • plan to meet strategic goals and objectives
Activity 1.5	Oral and Written Reporting • compile Registrar statistics • Special Assignments • Data collection and analysis • meeting preparation • correspondence within the office • AFIT required metrics • Develop AFIT catalogue
Activity 1.6	TQM prepare for meetings time in meetings team projects
Activity 1.7	Perform General Administrative Duties • sort mail/order supplies/process travel orders • typing • file management
Activity 1.8	Professional Development
Activity 1.9	Perform Military/Additional Duties

Process or Activity	Description
Process 2	**Administer AFIT**
Activity 2.1	Provide Graduate and Professional Continuing Education Support
Activity 2.1.1 Allocate based upon the number of departments. grad ed: 40% PCE: 40% staff: 20%	AFIT • Develops AFITstrategic/organization plan • Reviews educational plan and policy concerning the institute's role in the DAGSI • Develop, implement and monitor plans policies and procedures to support execution of AFIT graduate and PCE programs • Represent AFIT at the AFERB • Maintain library of AFIT MOU and MOA • Manage AFIT's Academic Instructor School quota by scheduling faculty for attendance
Activity 2.1.2 Allocate AU: 80% ATC: 15% ABW: 1% AF: 4%	External Customers • Represent AFIT as AETC, AU and ABW plans representative • Represent AFIT to the Base Energy Steering Group • Prepare AFIT input to AFCAT 36-2223 USAF Formal Schools, AU Digest, AU Facts and Figures, AU Catalog, and other documents • Review and process for 19 Request to Establish New Professional Continuing Education Short Course and Form 69 Request to Change USAF Formal School Catalog/Issuance of PDS Codes for AFIT courses
Activity 2.2 Allocate based upon the number of people per dept...because training classes are driven by the number requiring training	Develop and Manage AFIT's Quality Program • Develop, manage, and conduct TQ training • Manage TQ steering group • Manage Institute-level metrics reporting
Activity 2.3 Allocate based upon the number of departments	Manage AFIT's Self-Inspection Program • perform IGC function for AFIT • qtrly monitor meeting • advise school and staff agencies on IG preparation • represents AFIT to AU and AETC/IG • directs semi-annual self-inspection • prepares commander's tracking log of open inspection items • maintains IGC notebook/library IAW inspection regulation

Activity 2.4 Allocate based upon the the number of courses/programs?	Manage AFIT's Educational Evaluation Program • Advise school on development of internal and external evaluation instrument and administration of programs • consolidate portion of school's evaluation report into quarterly AETC Quality Indicators input • Forward AFIT's schedule of program/curriculum review to AU • maintain AFITR 53-27 Schools Evaluation Program, advises school on development of the corresponding OI • Provide AFITinput to AUR 53-13 Schools Air University Program Review, Joint Accreditation, and Evaluation • Manage AFIT's survey control process • Process student research survey, faculty research survey, graduate field evaluation survey and obtains appropriate USAF, AU, AETC Survey control number • Prepares AFIT response to external agency's survey of AFIT
Activity 2.5 Allocate 60% externaland 40% internal. Internally, allocate by dept	Perform Function of Institutional Analysis and Evaluation • disseminate information on educational plans and policies and directs appropriate action to comply with directive • advise command staff on educational program analysis and evaluation • advise Institute on educational plans and policies affecting program • develop and reviews discreet evaluation device for Institute and monitors their use for validity, reliability and objectivity • analyze and report Institute education performance • Maintain and update comprehensive computer database to analyze AFIT's educational statistics/information • reviews Institute accreditation self-study for accurate reflection of educational program analysis and evaluation data • analyze similar DOD and civilian institution to assist in bench marking AFIT's educational program
Activity 2.6 Allocate AFIT: 95% (50% GE, 50% PCE) AU: 5%	Manage the AFIT Board of Visitors Program • plan and execute annual visit • ensure AFIT BOV select recipient for Kotcher, Schriever, and Stone awards • prepare annual AFIT BOV report for inclusion in AU BOV report • follow up and update AFIT BOV report recommendation • maintain and update required personal documentation of board members

Activity 2.7	Perform foreign disclosure function and develop policy for the Institute
Charge to the Commander...	• direct and manage disclosure of information
	• monitor and make policy recommendations relative to international student graduate, doctoral and PCE programs
	• coordinate short-term visits
	• review and advise on scientific and technical meetings with international attendance
	• review and recommend release of graduate and PCE courses to foreign countries
	• advise, approve, and disapprove invitational speaker in the classroom concerning foreign disclosure
	• prepare slides on foreign disclosure process for Commandant, Deans, and Directors
	• plan and negotiate method of entrance to base for local international students

Process or Activity	Description
Process 3	**Manage AFIT's International Student Office**
	• develop and conduct Congressionally mandated Informational Program activity
Allocation driven by the number of foreign students	• develop and manage student officer sponsor program
	• process international application package for graduate program
	• manage student in-processing
	• develop, implement, and manage AFIT's International Officer Course

School of Civil Engineering and Services: Chart of Activities

Chart of Activities: School of Civil Engineering and Services

Processes and Activities

Process 1: Administer the School
- Activity 1.1: Personnel Management
- Activity 1.2: Budget/ Financial Management
- Activity 1.3: Liason/Networking
- Activity 1.4: Facility Management
- Activity 1.5: Planning and Policy Management
- Activity 1.6: Oral and Written Reporting
- Activity 1.7: General Administrative Duties
- Activity 1.8: Additional Duties
- Activity 1.9: PME/Professional Development

Process 2: Educate Students
- Activity 2.1: Provide Resident Course Instruction
- Activity 2.2: Provide Local Area Course Instruction
- Activity 2.3: Provide On-Site Instruction
- Activity 2.4: Provide Distance Education Instruction

Process 3: Perform Research

Process 4: Provide Consultation Service

Inputs
- Salaries
- People
- Materials
- Money
- Supplies
- Facility
- Training

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Chart of LA Activities

Process or Activity	Description
Process 1	**Administer the School**
Activity 1.1	Personnel Management • write performance reports • supervise, counsel, schedule workers
Activity 1.2	Budget/Financial Management • develop annual budget • develop and advise staff w.r.t. financial plans and programming, budgeting • gather and submit unfunded requirements
Activity 1.3	Liason/Networking • Prepare for and meet with AFIT faculty/staff/department heads • Consult with DoD, AF, and other AFITelements to determine objectives concerning the department's programs
Activity 1.4	Manage Facilities
Activity 1.5	Develop and Manage Plans and Policies, Department Objective • plan to meet strategic goals and objectives • manage the total quality program--continuous process improvement
Activity 1.6	Oral and Written Reporting • coordinate with and brief the program sponsor, DOD user, academic institution and accrediting body • compile statistics • special assignments from CC, etc. • Data collection and analysis • meeting preparation • correspondence within the dept • AFIT required metrics • develop reports/presentations for visits (for example, accreditation visits)
Activity 1.7	Perform General Administrative Duties • sort mail/order supplies/process travel orders

Activity 1.8	Perform Additional/Faculty Duties
Activity 1.9	PME/Professional Development • participates in professional assembly • referee for a technical journal • committee member of a society • brief a paper at a symposium • serve as a chapter officer of a society • attend professional society meetings • attend professional development course • read book/periodical/research paper/or technical journal

Process or Activity	Description
Process 2	**Educate Students**
Activity 2.1	**Provide Resident Course Instruction** • manage DERA program • receive input from education advisory group or committee regarding course dirction • receive other agency input regarding course direction • identifies course needs based on current issues and changing environment • determine and establish course composition, structure, subject sequence, and teaching methodology appropriate for course objectives • obtain commercially prepared course material • create course material • generate, review, and standardize course-related documents and references • develops and distributes evaluation tools to determine needs of course

Activity 2.1.1	**Make Course Arrangements and Administrate Course** • determine instructor/facility needs • make facility arrangements - resident and on-site • determine equipment needs • coordinate and obtain classroom equipment support • develop and coordinate course schedule • perform course marketing actions • prepare and distribute course administration documents • distribute course-related materials • report course information • develop and maintain course book • monitor course in progress (resident and on-site) and perform issue management/resolution
Activity 2.2	**Provide Local Area Course Instruction** • manage DERA program • receive input from education advisory group or committee regarding course dirction • receive other agency input regarding course direction • identifies course needs based on current issues and changing environment • determine and establish course composition, structure, subject sequence, and teaching methodology appropriate for course objectives • obtain commercially prepared course material • create course material • generate, review, and standardize course-related documents and references • develops and distributes evaluation tools to determine needs of course
Activity 2.2.1	**Make Course Arrangements and Administrate Course** • determine instructor/facility needs • make facility arrangements - resident and on-site • determine equipment needs • coordinate and obtain classroom equipment support • develop and coordinate course schedule • perform course marketing actions • prepare and distribute course administration documents • distribute course-related materials • report course information • develop and maintain course book • monitor course in progress (resident and on-site) and perform issue management/resolution

Activity 2.3	**Provide On-Site Course Instruction** • manage DERAprogram • receive input from education advisory group or committee regarding course dirction • receive other agency input regarding course direction • identifies course needs based on current issues and changing environment • determine and establish course composition, structure, subject sequence, and teaching methodology appropriate for course objectives • obtain commercially prepared course material • create course material • generate, review, and standardize course-related documents and references • develops and distributes evaluation tools to determine needs of course
Activity 2.3.1	**Make Course Arrangements and Administrate Course** • determine instructor/facility needs • make facility arrangements - resident and on-site • determine equipment needs • coordinate and obtain classroom equipment support • develop and coordinate course schedule • perform course marketing actions • prepare and distribute course administration documents • distribute course-related materials • report course information • develop and maintain course book • monitor course in progress (resident and on-site) and perform issue management/resolution

Activity 2.4	**Provide Distance Education Instruction**
	• manage DERA program
	• manage, develop and coordinate distance education delivery
	• report and coordinate course and student information
	• maintain, repair and operate AFIT audio-visual equipment
	• manage and maintain broadcast facility
	• manage DAU program courses
	• receive input from education advisory group or committee regarding course dirction
	• receive other agency input regarding course direction
	• identifies course needs based on current issues and changing environment
	• determine and establish course composition, structure, subject sequence, and teaching methodology appropriate for course objectives
	• obtain commercially prepared course material
	• create course material
	• generate, review, and standardize course-related documents and references
	• develops and distributes evaluation tools to determine needs of course
Activity 2.4.1	**Make Course Arrangements and Administrate Course**
	• determine instructor/facility needs
	• make facility arrangements - resident and on-site
	• determine equipment needs
	• coordinate and obtain classroom equipment support
	• develop and coordinate course schedule
	• perform course marketing actions
	• prepare and distribute course administration documents
	• distribute course-related materials
	• report course information
	• develop and maintain course book
	• monitor course in progress (resident and on-site) and perform issue management/resolution

Process or Activity	Description
Process 3	**Perform Research**
	• Perform Literary research: plan, conduct, write report
	• Perform nonliterary research: develop objective, conduct research, write report

Process 4	**Provide Consultation Services** • provide consultation serv ice on site: plan consultation, perform tdy for purpose of conducting consultation, write report • provide consultation service over telephone: receive request, write report • serve as guestspeaker in an official capacity: prepare briefing, present briefing

Civilian Institution Programs: Chart of Activities

Chart of Activities: Civilian Institution Programs (CI)

Processes	and	Activities

Process 1: Administer the Directorate and Students

    Activity 1.1: Personnel Management

    Activity 1.2: Budget/ Financial Management

    Activity 1.3: Liason/Networking

    Activity 1.4: Facility Management

    Activity 1.5: Planning and Policy Management

    Activity 1.6: Oral and Written Reporting

    Activity 1.7: General Administrative Duties

    Activity 1.8: Additional Duties

    Activity 1.9: PME/Professional Development

Process 2: Administer Student Selection and Programs

Process 3: Administer Special Programs

Process 4: Administer Medical Service Education Program

Inputs

Salaries
People
Materials
Money
Supplies
Facility
Training

The School of Civil Engineering and Services (CE)

Secondary Resource Categories: RP, SC, CC, Library

Secondary Resources: SC, CC, RP, ?

Primary Resource Categories: LA, LS, EN, CE, CI

First Stage

AFIT's Four Major Activities: Graduate Education, PCE, Consulting, R & D

Second Stage

Products: Graduate Degrees, Research, PCE short courses

○ Cost Pools

Resources: Administration

Processes: Perform Research, Provide Consultation Service, Educate Students

Cost Objects: Research Completed, Consultation Completed, Courses

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Chart of LA Activities

Process or Activity	Description
Process 1	**Administer the School**
Activity 1.1	Personnel Management • write performance reports • supervise, counsel, schedule workers
Activity 1.2	Budget/Financial Management • develop annual budget • develop and advise staff w.r.t. financial plans and programming, budgeting • gather and submit unfunded requirements
Activity 1.3	Liason/Networking • Prepare for and meet with AFIT faculty/staff/department heads • Consult with DoD, AF, and other AFITelements to determine objectives concerning the department's programs
Activity 1.4	Manage Facilities
Activity 1.5	Develop and Manage Plans and Policies, Department Objective • plan to meet strategic goals and objectives • manage the total quality program--continuous process improvement
Activity 1.6	Oral and Written Reporting • coordinate with and brief the program sponsor, DOD user, academic institution and accrediting body • compile statistics • special assignments from CC, etc. • Data collection and analysis • meeting preparation • correspondence within the dept • AFIT required metrics • develop reports/presentations for visits (for example, accreditation visits)
Activity 1.7	Perform General Administrative Duties • sort mail/order supplies/process travel orders

Activity 1.8	Perform Additional/Faculty Duties
Activity 1.9	PME/Professional Development • participates in professional assembly • referee for a technical journal • committee member of a society • brief a paper at a symposium • serve as a chapter officer of a society • attend professional society meetings • attend professional development course • read book/periodical/research paper/or technical journal

Process or Activity	Description
Process 2	Educate Students
Activity 2.1	Provide Resident Course Instruction • manage DERA program • receive input from education advisory group or committee regarding course dirction • receive other agency input regarding course direction • identifies course needs based on current issues and changing environment • determine and establish course composition, structure, subject sequence, and teaching methodology appropriate for course objectives • obtain commercially prepared course material • creaᴗ course material • generate, review, and standardize course-related documents and references • develops and distributes evaluation tools to determine needs of course
Activity 2.1.1	Make Course Arrangements and Administrate Course • determine instructor/facility needs • make facility arrangements - resident and on-site • determine equipment needs • coordinate and obtain classroom equipment support • develop and coordinate course schedule • perform course marketing actions • prepare and distribute course administration documents • distribute course-related materials • report course information • develop and maintain course book • monitor course in progress (resident and on-site) and perform issue management/resolution

Activity 2.2	**Provide Local Area Course Instruction**
	• manage DERA program
	• receive input from education advisory group or committee regarding course dirction
	• receive other agency input regarding course direction
	• identifies course needs based on current issues and changing environment
	• determine and establish course composition, structure, subject sequence, and teaching methodology appropriate for course objectives
	• obtain commercially prepared course material
	• create course material
	• generate, review, and standardize course-related documents and references
	• develops and distributes evaluation tools to determine needs of course
Activity 2.2.1	**Make Course Arrangements and Administrate Course**
	• determine instructor/facility needs
	• make facility arrangements - resident and on-site
	• determine equipment needs
	• coordinate and obtain classroom equipment support
	• develop and coordinate course schedule
	• perform course marketing actions
	• prepare and distribute course administration documents
	• distribute course-related materials
	• report course information
	• develop and maintain course book
	• monitor course in progress (resident and on-site) and perform issue management/resolution

Activity 2.3	**Provide On-Site Course Instruction** • manage DERAprogram • receive input from education advisory group or committee regarding course dirction • receive other agency input regarding course direction • identifies course needs based on current issues and changing environment • determine and establish course composition, structure, subject sequence, and teaching methodology appropriate for course objectives • obtain commercially prepared course material • create course material • generate, review, and standardize course-related documents and references • develops and distributes evaluation tools to determine needs of course
Activity 2.3.1	**Make Course Arrangements and Administrate Course** • determine instructor/facility needs • make facility arrangements - resident and on-site • determine equipment needs • coordinate and obtain classroom equipment support • develop and coordinate course schedule • perform course marketing actions • prepare and distribute course administration documents • distribute course-related materials • report course information • develop and maintain course book • monitor course in progress (resident and on-site) and perform issue management/resolution

Activity 2.4	**Provide Distance Education Instruction** • manage DERA program • manage, develop and coordinate distance education delivery • report and coordinate course and student information • maintain, repair and operate AFIT audio-visual equipment • manage and maintain broadcast facility • manage DAU program courses • receive input from education advisory group or committee regarding course dirction • receive other agency input regarding course direction • identifies course needs based on current issues and changing environment • determine and establish course composition, structure, subject sequence, and teaching methodology appropriate for course objectives • obtain commercially prepared course material • create course material • generate, review, and standardize course-related documents and references • develops and distributes evaluation tools to determine needs of course
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Process or Activity	Description
Process 3	**Perform Research** • Perform Literary research: plan, conduct, write report • Perform nonliterary research: develop objective, conduct research, write report

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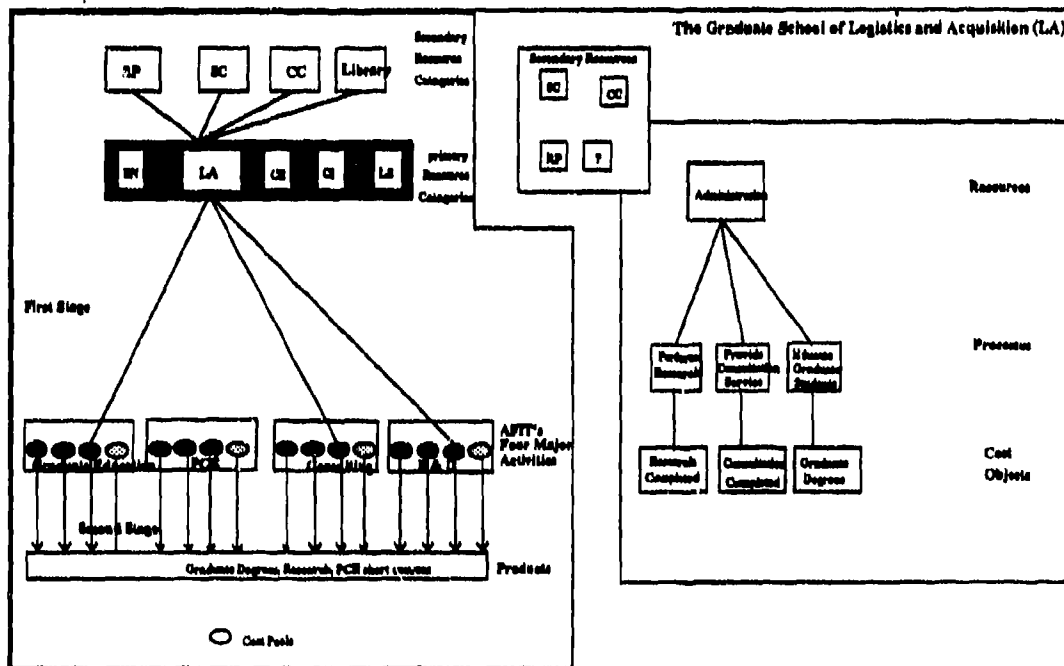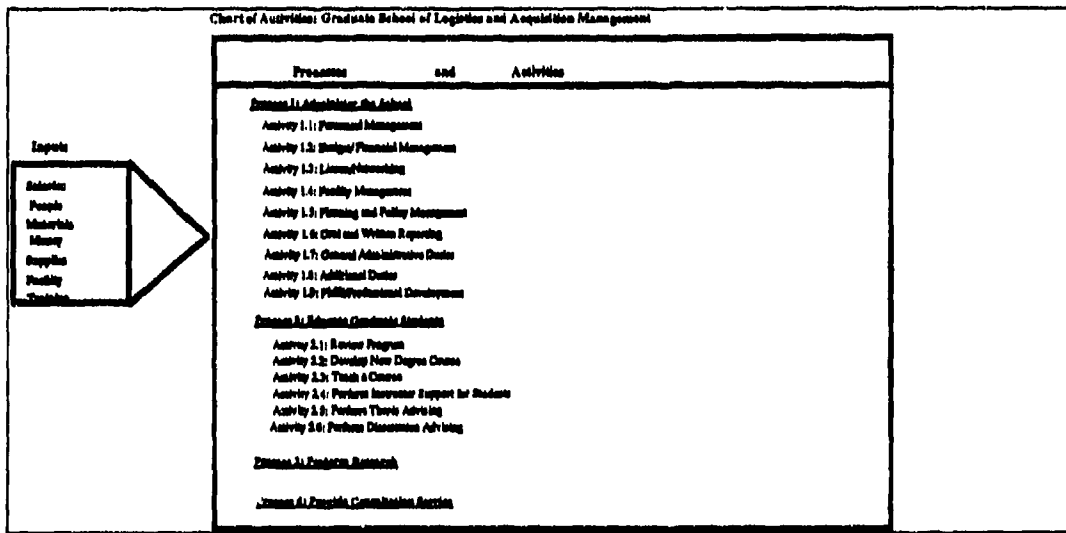| Process 4	**Provide Consultation Services**
	• provide consultation serv ice on site: plan consultation, perform tdy for purpose of conducting consultation, write report
	• provide consultation service over telephone: receive request, write report
	• serve as guestspeaker in an official capacity: prepare briefing, present briefing

Graduate School of Engineering: Chart of Activities
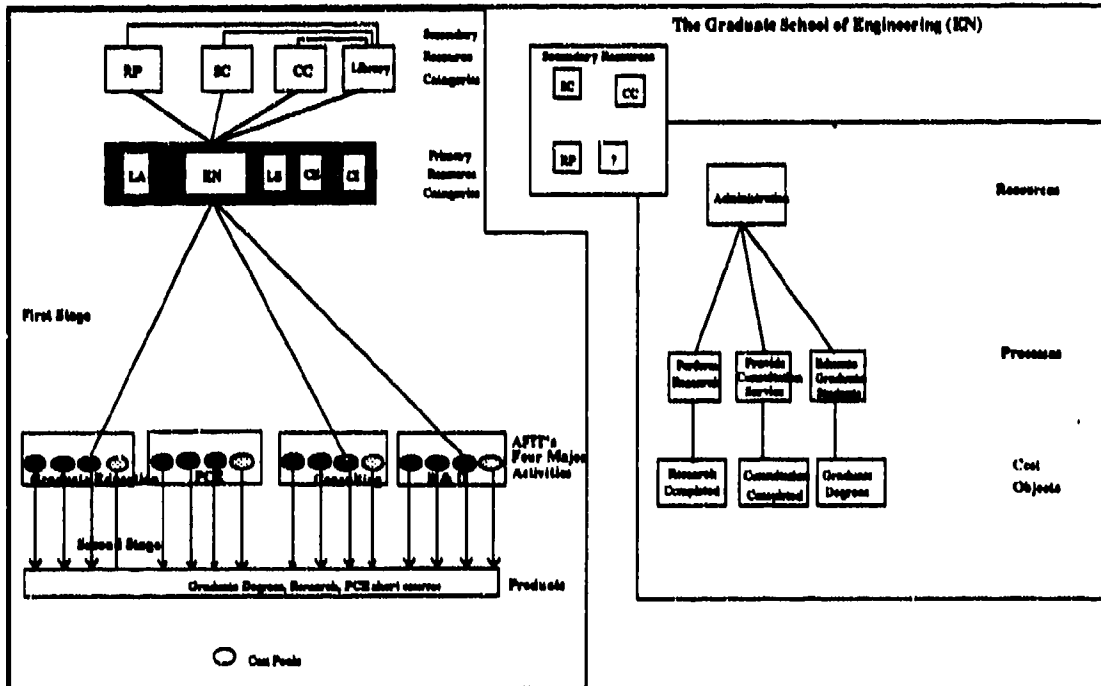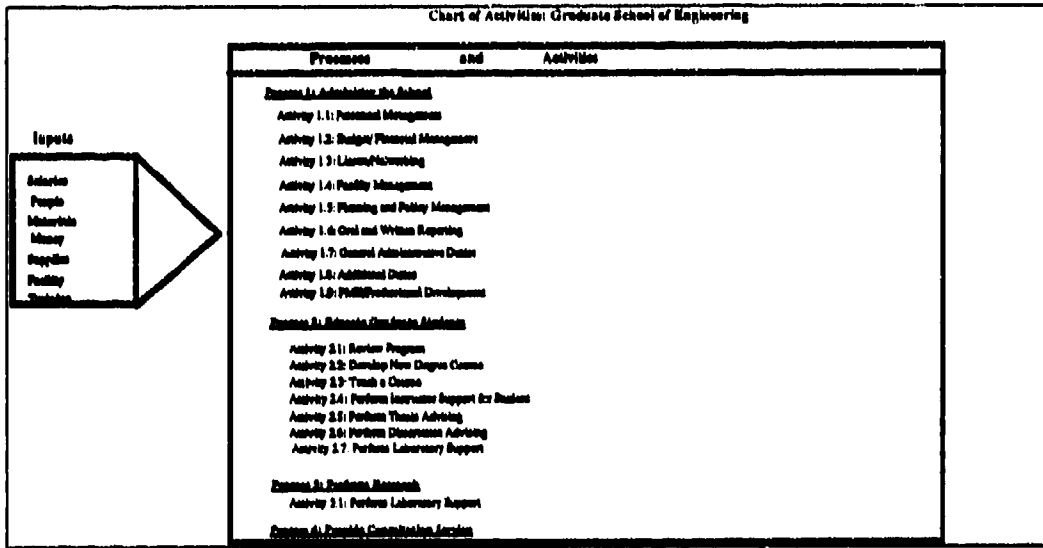
Chart of EN Activities

Process or Activity	Description
Process 1	**Administer the School**
Activity 1.1	Personnel Management • write performance reports • supervise, counsel, schedule workers
Activity 1.2	Budget/Financial Management • develop annual budget • develop and advise staff w.r.t. financial plans and programming, budgeting • gather and submit unfunded requirements
Activity 1.3	Liason/Networking • Prepare for and meet with AFIT faculty/staff/department heads • Consult with DoD, AF, and other AFITelements to determine objectives concerning the department's programs
Activity 1.4	Manage Facilities
Activity 1.5	Develop and Manage Plans and Policies, Department Objective • plan to meet strategic goals and objectives • manage the total quality program--continuous process improvement
Activity 1.6	Oral and Written Reporting • coordinate with and brief the program sponsor, DOD user, academic institution and accrediting body • compile statistics • special assignments from CC, etc. • Data collection and analysis • meeting preparation • correspondence within the dept • AFIT required metrics • develop reports/presentations for visits (for example, accreditation visits)
Activity 1.7	Perform General Administrative Duties • sort mail/order supplies/process travel orders

Activity 1.8	Perform Additional/Faculty Duties
	(Faculty Governance)
	• officer/member of the faculty senate
	• officer/member of the faculty council
	• officer/member of the academic rank committee
	• special projects
Activity 1.9	PME/Professional Development
	• participates in professional assembly
	• referee for a technical journal
	• committee member of a society
	• brief a paper at a symposium
	• serve as a chapter officer of a society
	• attend professional society meetings
	• attend professional development course
	• read book/periodical/research paper/or technical journal

Process or Activity	Description
Process 2	**Educate Graduate Students**
Activity 2.1	**Review Program**
	• evaluate input and feedback concerning the program
	• revisions and changes
	• review of all curriculum, course, and program content within and without the dept
Activity 2.2	**Develop New Degree Course**
	• conduct or attend workshop to determine new course requirements
	• develop course objective (research text, periodical, regulation and other material to provide the basis of the course
	• prepare catalog change
Activity 2.3	**Teach a course**
	• Prepare for course instruction: develop lesson plan, prepare student handouts, prepare class roll.
	• Prepare for lesson presentation: review lesson objective, obtain support material
	• Present lesson
	• Tutor Students
	• Evaluate Students: construct/monitor/grade quizes/tests/examinations, compute/post/submit final grades
	• review and summarize student critiques, prepare course evaluation, maintain course file

Activity 2.4	**Perform Instructor support for student**
	• review student application: re-examines a student's application on which RR can not make a determination of the administrative requirement and other applicable school policies in order to familiarize the student.
	• conduct orientation for incoming student: briefs incoming student on program administrative requirement and other applicable school policies in order to familiarize the student
	• prepare education plan: prepare education plan in coordination with stdent, assures plan meets department requirements and assures major sequences are satisfactory
	• maintain education plan: updates student education plan by processing changes and checking student's quarterly registration.
	• conducts nonacademic counseling: assists student with personal problem or emergency situation that may arise during the course of instruction
	• prepares student training report: prepares annual student training report for inclusion into student's personnel record.
	• prepare transcript credit record: summarizes student course credit for documentation in support of student's degree
	• prepares documentation for student extension: prepares documentation of student's progress, and reasons why the student needs more time to complete degree requirements
	• prepares student award nomination: gathers data, summarizes and submits student for award
	• participates in student graduation
Activity 2.5	**Perform Thesis Advising**
	• obtains thesis topic
	• advises student as primary advisor
	• advises student as a technical advisor
	• advises students as a part of a committee
	• grades final thesis project
Activity 2.6	**Perform Dissertation Advising**
	• obtains dissertation topic
	• advises student as primary advisor
	• advises student as technical advisor
	• advises student as part of a committee
	• evaluates final dissertation project

Activity 2.7	**Perform Laboratory Support** • assistance to faculty and students • conduct experiments and demonstrations to aid classroom teaching • maintain facilities, supplies and equipment

Process or Activity	Description
Process 3	**Perform Research** • Perform Literary research: plan, conduct, write report • Perform nonliterary research: develop objective, conduct research, write report
Activity 3.1	**Perform Laboratory Support** • assistance to faculty and students in the conduct of research, • maintain facilities, supplies and equipment
Process 4	**Provide Consultation Services** • provide consultation serv ice on site: plan consultation, perform tdy for purpose of conducting consultation, write report • provide consultation service over telephone: receive request, write report • serve as guestspeaker in an official capacity: prepare briefing, present briefing

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Graduate School of Logistics and Acquisition Management:
Chart of Activities

Chart of LA Activities

Process or Activity	Description
Process 1	**Administer the School**
Activity 1.1	Personnel Management • write performance reports • supervise, counsel, schedule workers
Activity 1.2	Budget/Financial Management • develop annual budget • develop and advise staff w.r.t. financial plans and programming, budgeting • gather and submit unfunded requirements
Activity 1.3	Liason/Networking • Prepare for and meet with AFIT faculty/staff/department heads • Consult with DoD, AF, and other AFITelements to determine objectives concerning the department's programs
Activity 1.4	Manage Facilities
Activity 1.5	Develop and Manage Plans and Policies, Department Objective • plan to meet strategic goals and objectives • manage the total quality program--continuous process improvement
Activity 1.6	Oral and Written Reporting • coordinate with and brief the program sponsor, DOD user, academic institution and accrediting body • compile statistics • special assignments from CC, etc. • Data collection and analysis • meeting preparation • correspondence within the dept • AFIT required metrics • develop reports/presentations for visits (for example, accreditation visits)
Activity 1.7	Perform General Administrative Duties • sort mail/order supplies/process travel orders

Activity 1.8	Perform Additional/Faculty Duties (Faculty Governance) • officer/member of the faculty senate • officer/member of the faculty council • officer/member of the academic rank committee • special projects
Activity 1.9	PME/Professional Development • participates in professional assembly • referee for a technical journal • committee member of a society • brief a paper at a symposium • serve as a chapter officer of a society • attend professional society meetings • attend professional development course • read book/periodical/research paper/or technical journal

Process or Activity	Description
Process 2	**Educate Graduate Students**
Activity 2.1	**Review Program** • evaluate input and feedback concerning the program • revisions and changes • review of all curriculum, course, and program content within and without the dept
Activity 2.2	**Develop New Degree Course** • conduct or attend workshop to determine new course requirements • develop course objective (research text, periodical, regulation and other material to provide the basis of the course • prepare catalog change

Activity 2.3	**Teach a course**
	• Prepare for course instruction: develop lesson plan, prepare student handouts, prepare class roll.
	• Prepare for lesson presentation: review lesson objective, obtain support material
	• Present lesson
	• Tutor Students
	• Evaluate Students: construct/monitor/grade quizes/tests/examinations, compute/post/submit final grades
	• review and summarize student critiques, prepare course evaluation, maintain course file

Activity 2.4	**Perform Instructor support for student**
	• review student application: re-examines a student's application on which RR can not make a determination of the administrative requirement and other applicable school policies in order to familiarize the student.
	• conduct orientation for incoming student: briefs incoming student on program administrative requirement and other applicable school policies in order to familiarize the student
	• prepare education plan: prepare education plan in coordination with stdent, assures plan meets department requirements and assures major sequences are satisfactory
	• maintain education plan: updates student education plan by processing changes and checking student's quarterly registration.
	• conducts nonacademic counseling: assists student with personal problem or emergency situation that may arise during the course of instruction
	• prepares student training report: prepares annual student training report for inclusion into student's personnel record.
	• prepare transcript credit record: summarizes student course credit for documentation in support of student's degree
	• prepares documentation for student extension: prepares documentation of student's progress, and reasons why the student needs more time to complete degree requirements
	• prepares student award nomination: gathers data, summarizes and submits student for award
	• participates in student graduation
Activity 2.5	Perform Thesis Advising
	• obtains thesis topic
	• advises student as primary advisor
	• advises student as a technical advisor
	• advises students as a part of a committee
	• grades final thesis project
Activity 2.6	Perform Dissertation Advising
	• obtains dissertation topic
	• advises student as primary advisor
	• advises student as technical advisor
	• advises student as part of a committee
	• evaluates final dissertation project

Process or Activity	Description
Process 3	**Perform Research** • Perform Literary research: plan, conduct, write report • Perform nonliterary research: develop objective, conduct research, write report
Process 4	**Provide Consultation Services** • provide consultation serv ice on site: plan consultation, perform tdy for purpose of conducting consultation, write report • provide consultation service over telephone: receive request, write report • serve as guestspeaker in an official capacity: prepare briefing, present briefing

School of Systems and Logistics Chart of Activities

Chart of LA Activities

Process or Activity	Description
Process 1	**Administer the School**
Activity 1.1	Personnel Management • write performance reports • supervise, counsel, schedule workers
Activity 1.2	Budget/Financial Management • develop annual budget • develop and advise staff w.r.t. financial plans and programming, budgeting • gather and submit unfunded requirements
Activity 1.3	Liason/Networking • Prepare for and meet with AFIT faculty/staff/department heads • Consult with DoD, AF, and other AFIT elements to determine objectives concerning the department's programs
Activity 1.4	Manage Facilities
Activity 1.5	Develop and Manage Plans and Policies, Department Objective • plan to meet strategic goals and objectives • manage the total quality program--continuous process improvement
Activity 1.6	Oral and Written Reporting • coordinate with and brief the program sponsor, DOD user, academic institution and accrediting body • compile statistics • special assignments from CC, etc. • Data collection and analysis • meeting preparation • correspondence within the dept • AFIT required metrics • develop reports/presentations for visits (for example, accreditation visits)

Activity 1.7	Perform General Administrative Duties • sort mail/order supplies/process travel orders
Activity 1.8	Perform Additional/Faculty Duties
Activity 1.9	PME/Professional Development • participates in professional assembly • referee for a technical journal • committee member of a society • brief a paper at a symposium • serve as a chapter officer of a society • attend professional society meetings • attend professional development course • read book/periodical/research paper/or technical journal

Process or Activity	Description
Process 2	**Educate Students**
Activity 2.1	**Provide Resident Course Instruction** • manage DAU program courses • receive input from education advisory group or committee regarding course dirction • receive other agency input regarding course direction • identifies course needs based on current issues and changing environment • determine and establish course composition, structure, subject sequence, and teaching methodology appropriate for course objectives • obtain commercially prepared course material • create course material • generate, review, and standardize course-related documents and references • develops and distributes evaluation tools to determine needs of course
Activity 2.1.1	**Make Course Arrangements and Administrate Course** • determine instructor/facility needs • make facility arrangements - resident and on-site • determine equipment needs • coordinate and obtain classroom equipment support • develop and coordinate course schedule • perform course marketing actions • prepare and distribute course administration documents • distribute course-related materials • report course information • develop and maintain course book • monitor course in progress (resident and on-site) and perform issue management/resolution

Activity 2.2	**Provide Local Area Course Instruction**
	• manage DAU program courses
	• receive input from education advisory group or committee regarding course dirction
	• receive other agency input regarding course direction
	• identifies course needs based on current issues and changing environment
	• determine and establish course composition, structure, subject sequence, and teaching methodology appropriate for course objectives
	• obtain commercially prepared course material
	• create course material
	• generate, review, and standardize course-related documents and references
	• develops and distributes evaluation tools to determine needs of course
Activity 2.2.1	**Make Course Arrangements and Administrate Course**
	• determine instructor/facility needs
	• make facility arrangements - resident and on-site
	• determine equipment needs
	• coordinate and obtain classroom equipment support
	• develop and coordinate course schedule
	• perform course marketing actions
	• prepare and distribute course administration documents
	• distribute course-related materials
	• report course information
	• develop and maintain course book
	• monitor course in progress (resident and on-site) and perform issue management/resolution

Activity 2.3	**Provide On-Site Course Instruction**
	• manage DAU program courses
	• receive input from education advisory group or committee regarding course dirction
	• receive other agency input regarding course direction
	• identifies course needs based on current issues and changing environment
	• determine and establish course composition, structure, subject sequence, and teaching methodology appropriate for course objectives
	• obtain commercially prepared course material
	• create course material
	• generate, review, and standardize course-related documents and references
	• develops and distributes evaluation tools to determine needs of course
Activity 2.3.1	**Make Course Arrangements and Administrate Course**
	• determine instructor/facility needs
	• make facility arrangements - resident and on-site
	• determine equipment needs
	• coordinate and obtain classroom equipment support
	• develop and coordinate course schedule
	• perform course marketing actions
	• prepare and distribute course administration documents
	• distribute course-related materials
	• report course information
	• develop and maintain course book
	• monitor course in progress (resident and on-site) and perform issue management/resolution

Activity 2.4	**Provide Distance Education Instruction**
	• manage, develop and coordinate distance education delivery
	• report and coordinate course and student information
	• maintain, repair and operate AFIT audio-visual equipment
	• manage and maintain broadcast facility
	• manage DAU program courses
	• receive input from education advisory group or committee regarding course dirction
	• receive other agency input regarding course direction
	• identifies course needs based on current issues and changing environment
	• determine and establish course composition, structure, subject sequence, and teaching methodology appropriate for course objectives
	• obtain commercially prepared course material
	• create course material
	• generate, review, and standardize course-related documents and references
	• develops and distributes evaluation tools to determine needs of course
Activity 2.4.1	**Make Course Arrangements and Administrate Course**
	• determine instructor/facility needs
	• make facility arrangements - resident and on-site
	• determine equipment needs
	• coordinate and obtain classroom equipment support
	• develop and coordinate course schedule
	• perform course marketing actions
	• prepare and distribute course administration documents
	• distribute course-related materials
	• report course information
	• develop and maintain course book
	• monitor course in progress (resident and on-site) and perform issue management/resolution

Process or Activity	Description
Process 3	**Perform Research**
	• Perform Literary research: plan, conduct, write report
	• Perform nonliterary research: develop objective, conduct research, write report

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Process 4	**Provide Consultation Services**
	• provide consultation serv ice on site: plan consultation, perform tdy for purpose of conducting consultation, write report
	• provide consultation service over telephone: receive request, write report
	• serve as guestspeaker in an official capacity: prepare briefing, present briefing

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Appendix C. Protocol and Worksheets

This appendix contains the protocol and worksheets employed by the research. These instruments were used to perform interviews and document activity inputs, outputs, and customers.

Interview Protocol

Interview Objective:

- The objective of our interview is to identify the major activities which people do in their jobs, and then to determine how much time is spent on each of those activities.
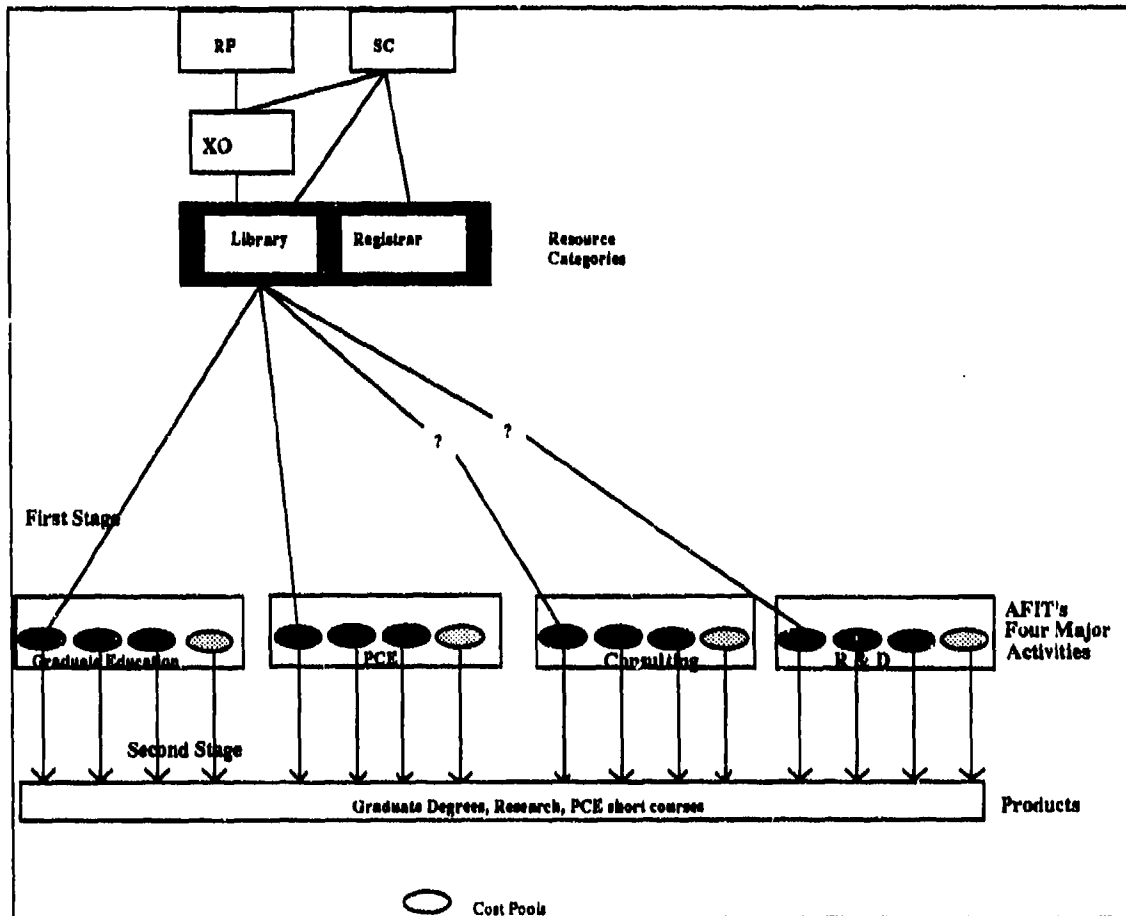
- **Specify Activities**

  - What are the time and resource consuming activities that you or your branch/section perform?

  - What are the **major** time and resource consuming activities that you or your branch/section perform?

  - What are the major tasks or activities which account for approximately 90% of your time?

  - What % of time does each activity consume? account for 100%

  - Can we see the civilian job descriptions for this department? We will use the job descriptions to determine the major activities performed and also to check that a major activity has not been missed in our interview.

  - Do you have any flow charts of work processes?

> *Directions: List the major activities on the master worksheet. The following questions and objectives will follow from the master. Iterations: Begin with the first activity, determine inputs, outputs, resources, customers, information needs, etc. Repeat for each activity.*

- **Determine Inputs for Each Activity**

  - What do you require to perform your job? What are the inputs or resources you require to perform the significant tasks you listed above? What are the factors that cause these activities to require either more or less of your time?

    - **people**
      - Do you have an organizational chart of this section? What are the major classifications of people--rank, wage grade etc?
      - What is your wage grade or classification
      - What classifications of people are required to perform this task?
      - Are there people dedicated specifically to this activity?
      - Do all people do all functions
      - Who are the people (grade/type) that do this job?

    - **money**
      - What are the sources of funding?
      - Who do you get this money from?
      - Do you operate with different pots of money?
      - What is/are the sources of funding for this particular activity or task?
      - Is there money allocated specifically for this activity?
      - How do you plan your annual budget?
      - What drives the amount of annual budget request (overtime projections, #students)?

    - **materiel**
      - Do you require any special supplies or equipment to perform this activity? Are there bottlenecks in the supply of these materiels which prevent the activity from being performed.
      - How much do you buy annually, how much this year?
      - Is there a recurring expense?
      - Are there any special equipment buys this year?

    - **information/communication/computer support**
      - Is there any important information you require to perform this activity? Who do you get this information from?
      - How many computers, types, special users, support costs?
      - How many telephone lines?

    - **Training**
      - Does this activity require any special training? How much time does the training take?

- Do you need to train people to perform this task? How long does this training take to complete?

- **Facilities**
    - How large is your area?
    - Do you have a blue print of this facility?
    - AFIT pays $6 million to the base per year for support. What do you buy with your money to support this facility.

- **Outputs from other activities**
    - Is this activity caused by output from another section?

- **Determine Outputs for Each Activity**

- What is the output, product or service resulting from this activity?

- Who is the customer of the output of this activity? Are there secondary customers?

- If there are multiple or diverse customers, what % of this activity is consumed by each?

- Is this activity intended to support a specific group or classification of personnel?
    - Who are your major customers--students, faculty, non-AFIT DoD?

- What causes you to perform this activity?

- Is there a factor which influences the frequency at which this activity is performed?

Chart of Activities		
Processes and Activities	Output	Cost Drivers
Process 1 Activity a Activity b		
Process 1 Activity a Activity b		

Department_____

Name_____

Position_____

Date_____
Start Time_____
Stop Time_____

ABC Worksheet

Activity Description	% Time	Activity Characteristics	Notes
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			

Department_____

Name_____

Position_____

Date_____
Start Time_____
Stop Time_____

ABC Worksheet

Activity Description	% Time	Activity Characteristics	Notes
9.			
10.			
11.			
12.			
13.			
14.			
15.			
16.			

Department _____

Name _____

Position _____

Date _____
Start Time _____
Stop Time _____

ABC Worksheet

Activity Description	% Time	Activity Characteristics	Notes
17.			
18.			
19.			
20.			
21.			
22.			
23.			
24.			

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			% Time	Date ___

Department ___
Name ___

Section ___
Position ___
Activity ___

Start Time ___
Stop Time ___

Activity Description & Characteristics		
Inputs (resources)	People:	
	Money:	
	Material:	
	Information/ Communications/Computer Support	
	Training:	
	Facilities:	
	Outputs from other Activities:	
Outputs	Product/SVS?	
	What causes you to perform this activity?	
	Factor(s) which affect(s) frequency?	
Customer of Outputs	Who?	
	Secondary?	
	Specific Group/Classification?	
Notes		

Appendix D. Implementing ABC in the Case Study Organization

This appendix was written to provide a general description of the ABC implementation process as it was originally planned. As such, it serves as a baseline to compare the resulting implementation process the research utilized. Organizations seeking to implement an ABC system should view the information in this document as a starting point for planning an ABC implementation process, and adjust the elements of the process as necessary to meet the needs of the organization--just as the research did. In addition, much of the information contained in this appendix is written from a practitioners point of view, reflects original thought, and cannot be found in ABC literature. It is the author's intent that this information be used to assist other government service organizations in their ABC implementation process, and to bridge the gap between theoretical and practical implementation practices.

Implementing ABC in the Case Study Organization

Overview

This appendix contains the methodology employed in implementing an ABC system within the case study organization. This methodology's structure follows the implementation procedures as described by Miller and implemented by the DLA (Figure 1). As depicted in Figure 2 , this methodology incorporates a seven-step process to create an Air Force Institute of Technology (AFIT) chart of activities.
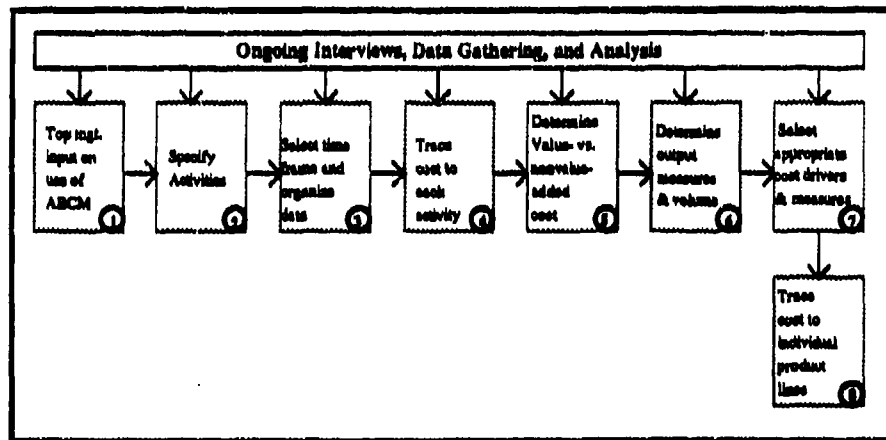
Figure 1. John Miller's Eight-Step Methodology for Creating an Organizational Chart of Activities
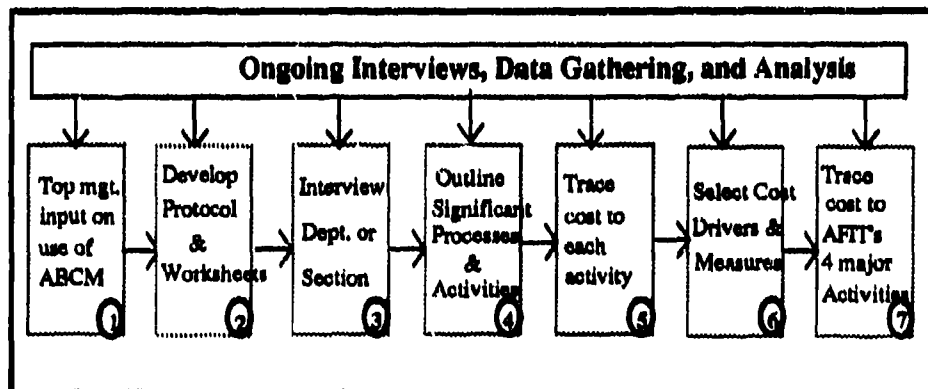
Figure 2. Adapting John Miller's Step s For Creating an Organizational Chart of Activities

The first section presents top management information requirements for an activity accounting system. Methods of data collection and standardization are next discussed in the second section. The last section describes the final four steps used to develop an AFIT chart of activities: 1) significant processes and activities are outlined, 2) activity cost is traced to customers, 3) cost drivers and measures are selected, and finally, 4)costs are traced to AFIT's four major activities.

Accounting System Information Requirements

According to John Miller, President of Miller-Newlin Consulting, and an ABC implementation consultant to DLA, "the fundamental design objective for a new CMS is to create methods, procedures, and systems to collect and report financial and operational data about the activities of an organization" (Miller, 1992: 46). When designing the CMS, Miller notes that management must consider the following issues:

- Define the systen .; purpose and use
- Establish simplicity as an effective tool
- Maintain relevance of information for decision making
- Examining the har' /are and software issues

Furthermore, Miller also recommends that "before implementation can take place, significant resources must be devoted to defining activities and establishing methods, procedures and systems to meet the fun(nental design objective" (Miller, 1992: 46). In developing a methodology, just as DLA i d previously done, this methodology adapts John Miller's basic approach for creating an organizational chart of activities.

Step 1. Top Management Input on Use of ABC

The first step in developing an Activity Based Cost Model is to solicit the inputs of management in determining the requirements of the cost model (Figure 3).
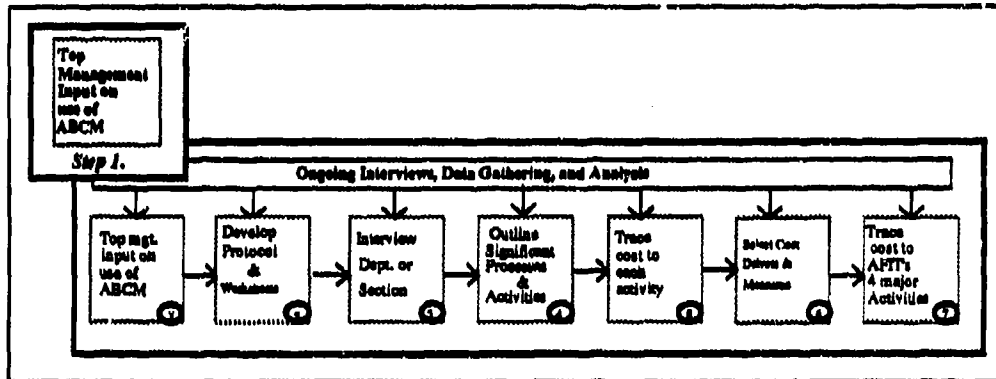
Figure 3. Step 1. Top Management Input on Use of the ABCS

According to Beaujon and Singhal, "the challenge for designers of ABC systems is to come up with a system that gives managers not only accurate product costs, but also information about the cost of activities that can be interpreted easily and correctly" (Beaujon: 1990: 52). The point of developing the model is to give managers alternative budgetary information that will be useful in making future resource allocation decisions and to depict, with the necessary degree of accuracy, the current allocation of resources across activities and processes. Accordingly, Beaujon and Singhal have identified the following items as being critical in the development of an ABC system, and therefore warranting management input:

1. Constructing the resource categories (i.e. the financial inputs)
2. Defining the Activity centers
3. Choosing the first-stage cost drivers, and
4. Choosing the second-stage cost drivers.

Since each of these choices affects how departmental costs are aggregated and disaggregated, each choice "involves the three characteristics previously given (i.e., the level of detail, ease of access, and ease of interpretation) for evaluating how an ABC

system contributes to managing activities" (Beaujon 1990: 54). Incorporating numerous activity centers may lead to a highly detailed model, but "creating separate activity centers for activities that are either identical or inseparable can just add complexity to the ABC system without providing any new insights into how resources are consumed" (Beaujon, 1990: 55).

AFIT Management Information Requirements

Step 1 involved top management input on the use of the cost management system. Miller notes that management should 1) define the system's purpose and use, 2) maintain relevance of information for decision making, and 3) examine the hardware and software issues of implementation.

AFIT's fund accounting system traces expenditure by expense category to departments. The system does not, however, provide information on overhead consumption by operational department; therefore, management required a system designed to trace overhead consumption to operational departments. Management also required information about activities and processes within overhead departments. This information was to be used for process improvement and re-engineering necessitated by a significant budget cut. Finally, management needed a system implemented on common software at minimal cost. The AFIT ABC system was implemented on a Microsoft EXCEL spreadsheet.

This section explained the importance of soliciting management inputs in developing an ABC system. As noted, management's data collection requirements have a direct impact on the ease of accessibility, interpretation, and collection. The next section first demonstrates the development of interview protocols and activity worksheets. Afterward, a pilot organization is selected in order to establish the validity of the protocol and worksheet.

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Step 2: Develop an Interview Protocol and an Evaluation Worksheet
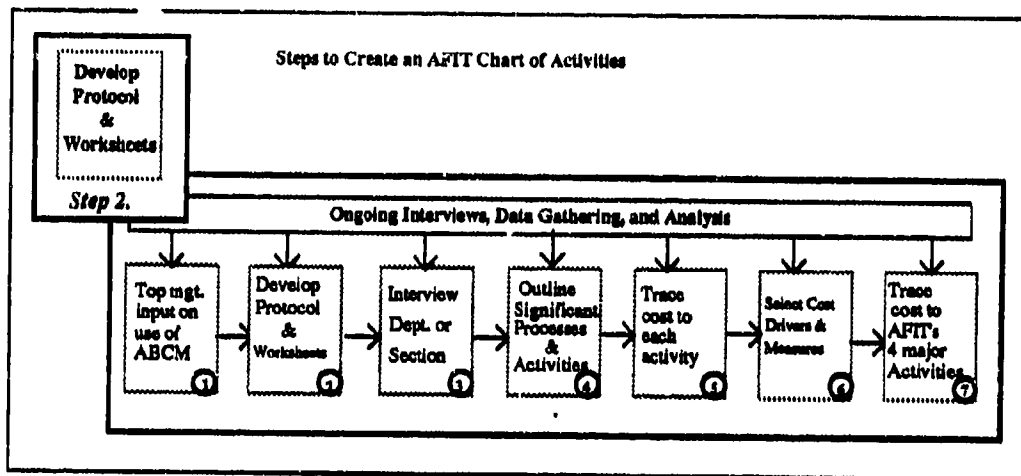
Figure 4. Step 2, Develop Protocol and Worksheets

Before beginning the interview process, the issue of developing a standardized method of data collection had to be resolved. Also, the method developed had to be consistent with the types of data that were going to be collected. These two issues are discussed in the following section.

Standardizing the Data Collection Process

Before beginning any data collection, it was important to develop a data collection method that would eliminate oversight during personal interviews. A standard methodology was employed to ensure the data gathered was consistent across all departments. More to the point, the methodology develops a procedure of collecting data that consistently reveals

- Significant activities/processes performed within a department
- Allocation of resources to activities
- Outputs of processes/activities
- Allocation of resources to the department

In developing or selecting a method of collecting the data that would consistently produce the same types of information from each of the departments within AFIT, the

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following table of data collection techniques, developed by Miller-Newlin Consulting, was reviewed.

Table 1. Selection of Data Collection Techniques

Techniques	Major Advantages	Major Disadvantages
Interviews with branch/section heads	Provides adequate information on • activities • resource allocation • inputs/outputs • key issues Personal contact with management	• Typically long elapsed time (difficulty to arrange interviews) • Need to be completed by other techniques as interviews may be short and cover many aspects
Interviews with staff in branches/sections	• Provides better information on tasks • May identify additional problems and improvement ideas • Possibility of observation	• Very time consuming/expensive • May disturb day to day business considerably
Questionnaires	• Least expensive method of gathering new information • Short elapsed time for collecting new information	No personal contact, political and personal issues and many problems may not be identified Only successful when used by managerial and administrative employees Clarification/follow-up often required to complement responses
Analysis of Historical records and Documents	No need to involve many people in collecting the information May provide adequate information Inexpensive	Not always available or up to date No personal contact Key issue, political and personal issues, problems may be hidden
Panel of experts	Take advantage of broad expertise may highlight political issues, problems and create improvement ideas	Only effective for specific tasks (eg. activity analysis for newly created activities, business process analysis Time consuming, expensive
Analysis of diaries, time sheets and logs (employees record daily what they do)	Percentage of time spent of each activity can easily be identified	Very time consuming, expensive Requires education and training Many employees lack the skill and commitment to record activities
Observation	Facilitates understanding of business processes if material or information flow is visible Accurate information on how an activity is performed (tasks, operations)	Only suitable for short and repetitive activities and processes which are visible
Check sheet	Adequate picture on time percentage spent on each activity	Only suitable for short and repetitive activities only suitable for direct production activities Time consuming, expensive

This research employed personal interviews with directorate chiefs, branch chiefs, and section supervisors as the primary means of data gathering. Often, though, subordinates were called upon for their experience and expert knowledge. An additional source of data was gathered from manpower studies conducted by the Resources and Business Directorate. Having established these techniques as the primary methods of collecting data, the next section considers the development of an interview protocol. Requirements and considerations in developing the protocol are discussed.

Developing an Interview Protocol

In developing a protocol, this methodology utilizes slides from the two-day ABC implementation workshop conducted at DESC by Miller-Newlin Consulting. During the workshop, the following chart was provided to each attendee as key points to cover during the interview process: The chart on page eight served as a template from which this methodology's interview protocol was developed.

Table 2. Miller-Newlin Activity Interview Agenda & Sample Questions

---

ACTIVITY INTERVIEW AGENDA: "OUR INTERVIEW WILL COVER THE FOLLOWING ISSUES...."

* We will discuss your questions regarding ABC.
* Major time and resource consuming activities of your
    branch/section...only the 5 to 8 significant
* The output, product or service resulting from each activity
* What % of time does each activity consume? Account for 100%.
* Factors that cause these activities to flucuate
* What inputs do you need to perform each activity?

ACTIVITY INTERVIEW: BASIC SAMPLE QUESTIONS

1. Do you have an organizational chart of this branch/section?
    What are the major classifications of people?
2. What are the major activities of your branch/section? Do
    you have any flow charts?
3. What are the time consuming, costly and labor intensive activities
    the branch/section performs? What is the % of time spent on each
    activity?
4. What are the inputs and outputs of the activities? Are the activities
    caused by an output from another branch/section?
5. What are the bottlenecks? Do you frequently have to repeat any of
    the activities due to errors?
6. What is the current workload of the branch/section?
7. Do you do a workload forecast? How is it developed? How does it
    vary from time period to time period?
8. Are there dedicated resources for any of the activities?

In developing this protocol, we wanted to meet several objectives. First, we wanted to develop a list of questions that would be comprehensive enough in nature to capture the information required from each department, and second, brief enough to avoid recording unnecessary detail. Having established these two criteria for developing our protocol, personalizing the contents of the Miller-Newlin Activity Interview Agenda yielded the following protocol:

Figure 5. Step One of Protocol: Explain the Research Objective
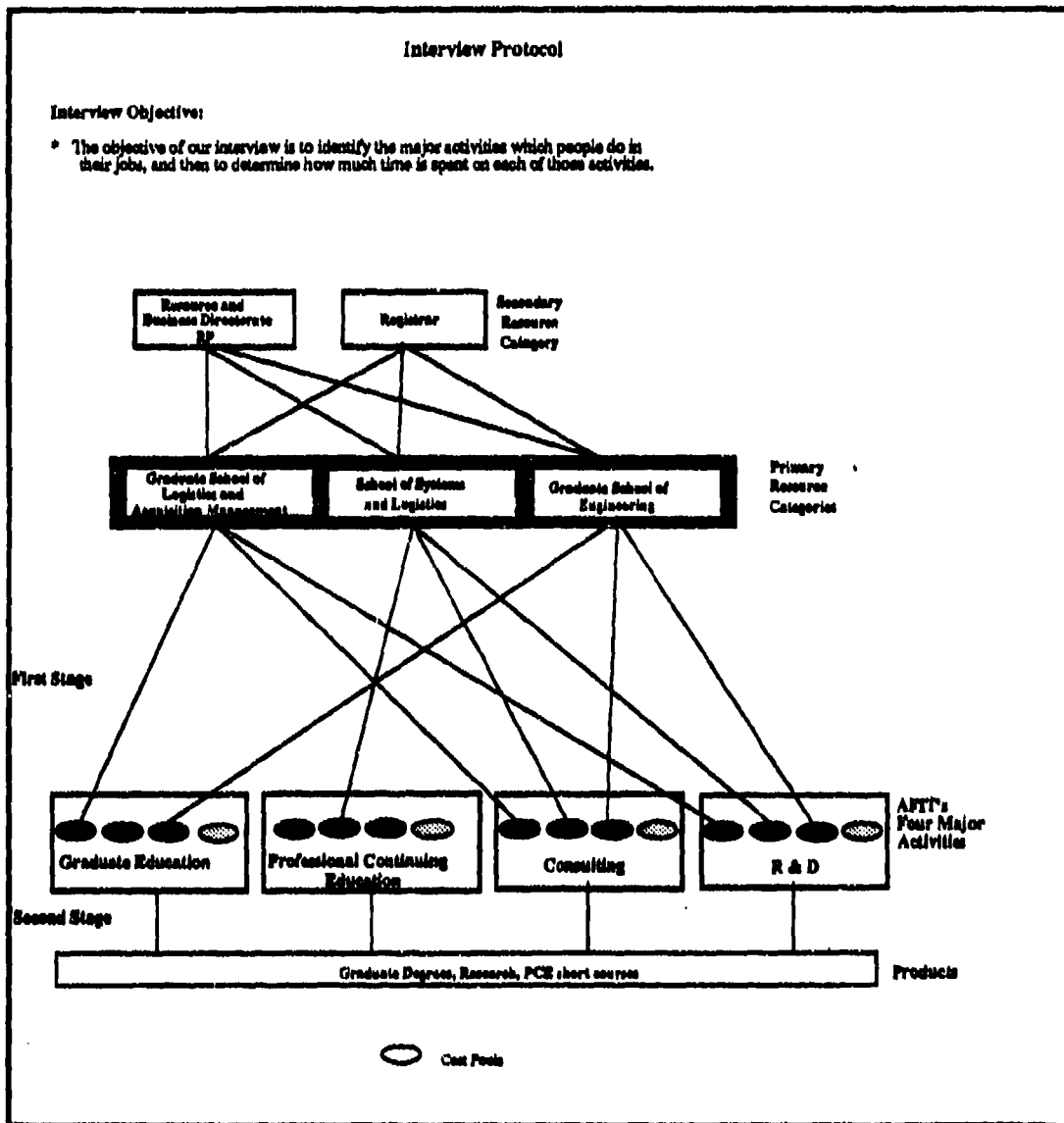
The first page of the protocol states the objective of our research and provides a schematic to illustrate Beaujon/Singhal's two stage allocation process. After providing a brief explanation of the research objective and the basic premise of an activity based accounting system, we then requested the interviewee to specify activities, the inputs for each activity, and the outputs for each activity. These pages of the protocol are listed in Figure 6, Figure 7, and Figure 8.

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Research Objectives/Questions

● **Specify Activities**

    O What are the time and resource consuming activities that you or your branch/section perform?

    O What are the major time and resource consuming activities that you or your branch/section perform?

    O What are the major tasks or activities which account for approximately 90% of your time?

    O What % of time does each activity consume? account for 100%.

    O Can we see the civilian job descriptions for this department? We will use the job descriptions to determine the major activities performed and also to verify a major activity has not been missed in our interview.

    O Do you have any flow charts of work processes?

> *Directions:*   *List the major activities on the master worksheet. The following questions and objectives will follow from the master. Iterations: Begin with the first activity, determine inputs, outputs, resources, customers, information needs, etc. Repeat for each activity.*

Figure 6. Step 2 of Protocol: Specification of Activities

This page of the protocol was designed to illicit the interviewee to describe the "most significant" or major resource consuming activities that his or her department, branch, or section performed. After creating a macro view of the activities and processes performed within the specified work center, the next important step in the interview process would be to determine the inputs for each of the activities listed. Hence, for each of the resource categories listed in the protocol, we developed a series of questions to aid the interviewee in determining the resources allocated to each activity listed. The questions used to determine the inputs are found in Figure 7.

- **Determine Inputs for Each Activity**

  - What do you require to perform your job? What are the inputs or resources you require to perform the significant tasks you listed above? What are the factors that cause these activities to require either more or less of your time?

    - **people**
      - Do you have an organizational chart of this section? What are the major classifications of people--rank, wage grade, etc?
      - What is your wage grade or classification?
      - What classifications of people are required to perform this task?
      - Are there people dedicated specifically to this activity?
      - Do all people do all functions?
      - Who are the people (grade/type) that do this job?

    - **money**
      - What are the sources of funding?
      - Who do you get this money from?
      - Do you operate with different pots of money?
      - What is/are the sources of funding for this particular activity or task?
      - Is there money allocated specifically for this activity?
      - How do you plan your annual budget?
      - What drives the amount of annual budget request (overtime projections, # students)?

    - **materiel**
      - Do you require any special supplies or equipment to perform this activity? Are there bottlenecks in the supply of these materiels which prevent the activity from being performed?
      - How much do you buy annually, how much this year?
      - Is there a recurring expense?
      - Are there any special equipment buys this year?

    - **information/communication/computer support**
      - Is there any important information you require to perform this activity? Who do you get this information from?
      - How many computers, types, special users, support costs?
      - How many telephone lines?

    - **training**
      - Does this activity require any special training? How much time does the training take?
      - Do you need to train people to perform this task? How long does this training take to complete?

    - **facilities**
      - How large is your area?
      - Do you have a blue print of this facility?
      - AFIT pays $6 million to the base per year for support. What do you buy with your money to support this facility?

    - **outputs from other activities**
      - Is this activity caused by an output from another section?

Figure 7. Step 3 of Protocol: Determine Inputs for Each Activity

As we continued to follow Miller's methodology for creating a chart of activities, the next step in developing the protocol would be to determine the outputs for each activity.   In

designing questions for this portion of the protocol, it was important to develop questions
which targeted information relating to the customers and products of each activity.
Specifically, what are the outputs and who are the customers of each activity listed to this
point in the interview process? Figure 8 depicts the questions we used to determine this
information.

● **Determine Outputs for Each Activity**   ○ What is the output, product or service resulting from this activity?   ○ Who is the customer of the output of this activity? Are there secondary customers?   ○ If there are multiple or diverse customers, what % of this activity is consumed by each?   ○ Is this activity intended to support a specific group or classification of personnel?   ○ Who are your major customers--students, faculty, non-AFIT DoD?   ○ What causes you to perform this activity?   ○ Is there a factor which influences the frequency at which this activity is performed?

Figure 8. Step 4 of Protocol: Determination of Outputs for Each Activity

Having developed a protocol, the next important step was to create an instrument
that we could use to record the information gathered during the interview. Design
considerations of this instrument are discussed in the following section.

Developing an Evaluation Worksheet

Before creating our own evaluation worksheet, we carefully studied the instrument
developed by Miller-Newlin Consulting. Their worksheet is depicted in Figure 9 on the
facing page. This worksheet served as a model from which were able to develop our own.
However, whereas the Miller-Newlin worksheet contains the entire process of our
protocol, we developed separate worksheets so as to disaggregate the process into two
basic components. First, we wanted the person being interviewed to describe a broad

picture of what was going on in his or her department, branch, or section. This objective
is consistent with step two of the interview process--which requires that the major
activities of the department or section be listed as the first step in creating a chart of
activities.

Activity Evaluation Worksheet							
Branch/Section_____ Date				Person Interviewed_____ Interviewer _____			
Activity Description	Input(s)	Output	Output Measure	Time %	Customer of Output	Activity Characteristics	Notes
1.							
2.							
3.							
4.							
5.							
6.							
7.							

Figure 9. Miller's Activity Evaluation Worksheet
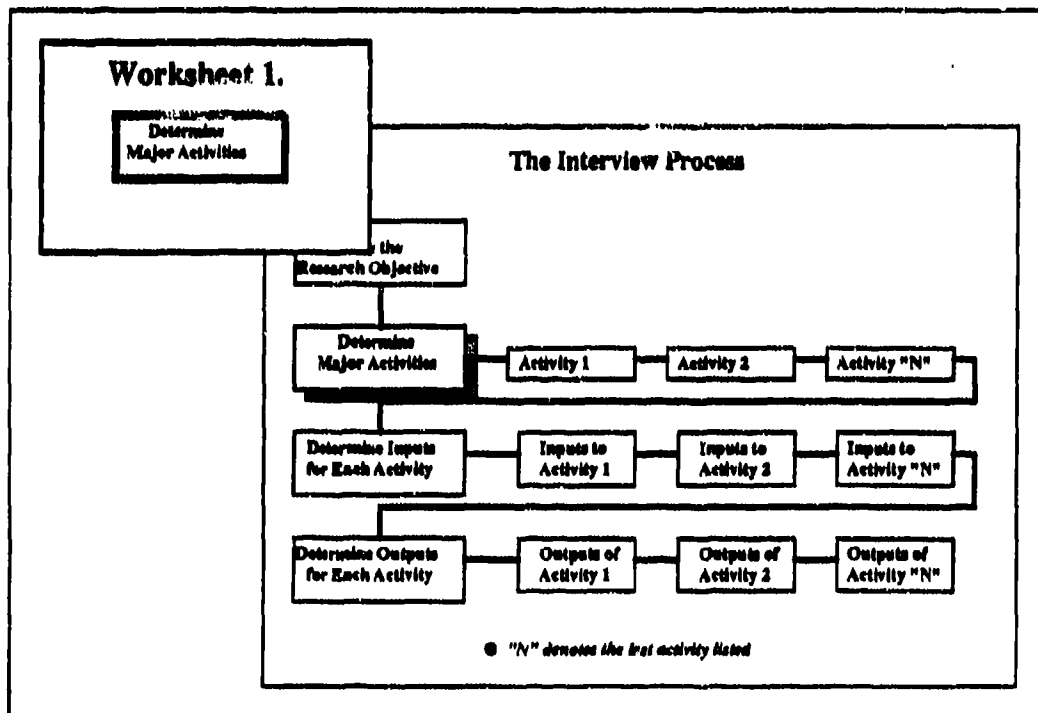
Figure 10. Worksheet 1: Determining the Major Activities

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To facilitate both the interviewee and ourselves in focusing on this portion of the interview, we developed a worksheet which solely addresses this part of the process. This worksheet is depicted in Figure 11, and though it can only contain eight significant activities, we simply replicated this form and changed the numbering so that up to 24 activities could by listed. Though the first column asks for the "Activity Description", our intent was actually to list the major processes within the work center or department, though for the purposes of this research, there are occasions where "significant activities" are synonymous with "processes". Having documented a macro view of the functional aspects of the department or work center, we would then move on to the next stage of the interview process--listing the activities that comprise each of the processes or major activities.

The worksheet designed for these component activities involve documenting different types of information. Referring to Figure 13, we see that after determining the activities, we need to document the inputs and outputs of each activity. In this diagram, Activity 1", "Activity 2" and "Activity N" are the most significant activities or processes within a department or section. Subsequently, each of these major activities or processes may be decomposed into smaller groups--or components--of activities or processes. The level of indenture for this process is defined by management and the required output of the ABC system.

Department_____			Date_____ Start Time_____ Stop Time_____
Name_____	Position_____		

ABC Worksheet

Activity Description	% Time	Activity Characteristics	Notes
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			

Figure 11. Worksheet 1--Listing the Major Activities"
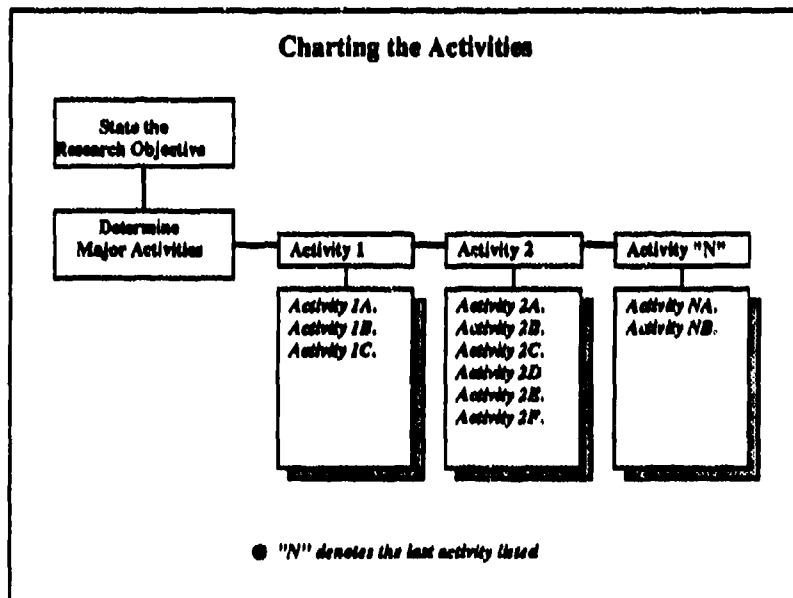
Figure 12. Charting the Activities

For each component activity, i.e. 1A, 2B, etc., we would need to annotate the input and output elements listed in the protocol. For simplification and redundancy, we designed a worksheet which mirrored the protocol. As depicted in Figure 14, designing the worksheet in this manner allowed the worksheet to serve dual functions as a protocol and a worksheet, and reduced the probability of skipping an important area of the protocol. Designing Worksheet 2 concluded development of the protocol. Upon resolving the design requirements for the protocol, we were then faced with the question of where to start our research.

Figure 13. Documenting the Component Activities

Figure 14. Worksheet 2

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Step 3. Interview Department or Section

Figure 15. Step 3. Interview Department or Section

Having decided on the types of data that needed to be collected and a method of standardizing the data collection process, the next important question was "Where do we begin the data collection process?" This section discusses that factors that lead to the selection of a starting point in the data collection process, the use of that department as a pilot for standardizing the protocol and worksheet, and finally, important aspects of interviewing that are recommended by John Miller.

Beginning the Data Collection Process

Selecting the right starting point in the data collection process was an important tactical decision. Choosing a department that was too large could result in the oversight of critical data; conversely, starting with a department that was too small could result in developing a standardized method of data collection which would not be comprehensive enough for the larger sections. Consequently, in choosing the right starting point, we considered these factors:

- Number of assigned personnel
- Sources of departmental funding
- Diversity in customers
- Diversity in activities and processes

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As selecting a department based on this criteria required a working knowledge of the departments within AFIT, we acted on the advice given us by our thesis advisors and selected the library as a starting point for this research effort.
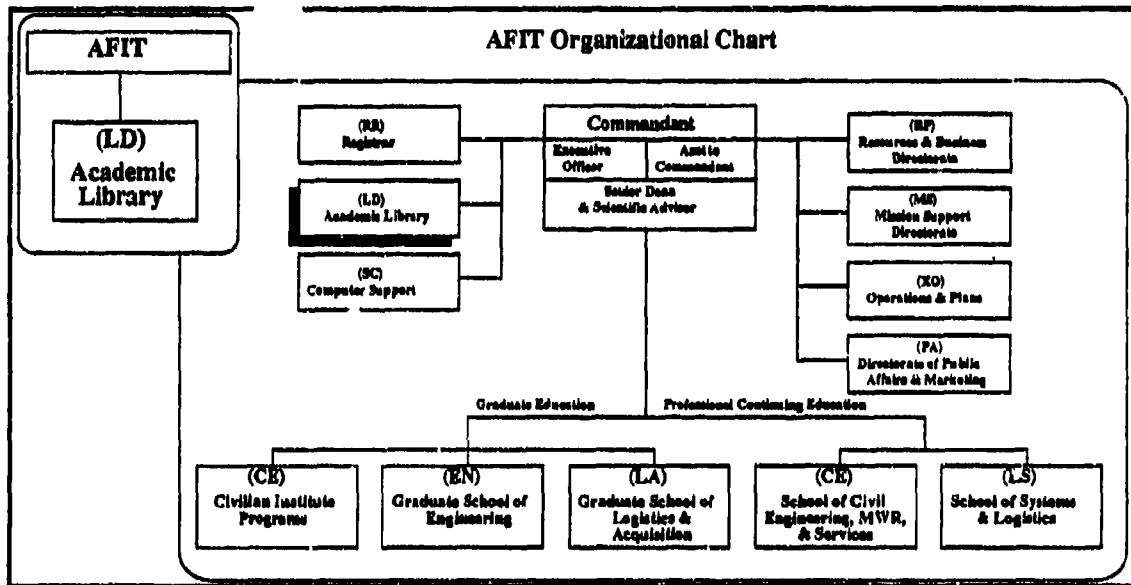
Figure 16. Selecting a Starting Point for the Data Collection Process

As we concluded the interview process in each department, we consulted our advisors in determining the next department or section we would interview. In principle, successive departments were selected based on their size, level of complexity, and availability of management personnel within the department.

Using the Library as A Pilot

The concept of pilot testing a data collection instrument or methodology is not new to the field of research. Emory and Cooper forward the idea that pilot testing has saved countless survey research projects that were poorly worded, and has resulted in significant improvements in the design of research instruments as a consequence of pilot testing (Emory & Cooper, 1991: 422). "A pilot test is conducted to detect weaknesses in design and instrumentation and provide proxy data for selection of a probability sample. It should therefore draw subjects from the target population and simulate the procedures and

protocols that have been designated for data collection" (Emory & Cooper, 1991: 88). In addition to revealing errors in the design and instrumentation, the pilot test represents the researcher's best opportunity to "revise scripts for the administration of the experiment, look for control problems with laboratory conditions, and scan the environment that might confound the results" (Emory & Cooper, 1991: 422). Selecting the Library as a starting point was a decision made in conjunction to pilot test the interview protocol and the accompanying worksheets. The pilot test provided a valuable opportunity to refine the worksheet and the protocol.

Interview Considerations & Competencies

Miller's ABC implementation methodology emphasizes the importance of developing a coherent interview format. In addition to suggesting who to interview, he discusses the atmosphere in which the interview should be conducted and the circumstances or conditions the interviewer should be cognizant of when establishing and conducting the interviews. This section reviews Miller's recommendations and considerations when establishing and conducting the ABC interviews.

When implementing an ABC system, Miller outlines three sampling approaches for gathering data from a branch or section. As Figure 17 demonstrates, the smallest sample may entail simply interviewing the expert(s) within the branch or section.

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Who to Interview
- O Interview Branch/ Section Expert
- O Interview a cross section of the branch/section
- O Interview all branch/section employees

Send a Letter to Each Person or Group to be Interviewed
- O Time....allow two hours
- O An article explaining ABC
- O Interview Agenda
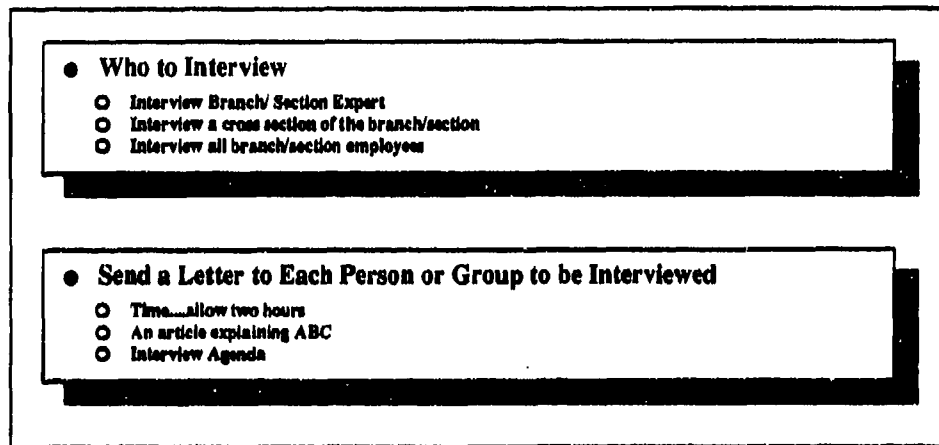
Figure 17. Who to Interview and How to Get Started

A second approach may involve interviewing a cross-section of the branch or section. Miller's last approach would require all personnel within a branch or section to be interviewed. Each subsequent method requires a larger sample of personnel to be interviewed, and therefore requires more time to complete the data gathering process. In selecting a method, the following factors were considered:

- Available time frame to complete the research
- Level of detail required to develop the ABC system
- Number of personnel in the branch, section, or department

As a general rule, we interviewed the branch or section manager, and where possible, validated data by randomly interviewing personnel from the branch or section. In this manr " we minimized the number of interviews we performed while simultaneously achieving the degree of detail previously established by management in developing the ABC system. As recommended by Miller, interviews generally lasted between one and two hours, whereas having section or branch personnel validate information required between 15 to 30 minutes.

Before beginning the interviews, Miller recommends that each interviewer be equipped with certain skills and competencies. As Figure 18 demonstrates, there are technical, political, and personal elements which the interviewer must be aware of during the interview. Of the skills and competencies listed in Figure 18, the area that posed the

greatest obstacle was related to understanding the key business processes. Whereas DLA agencies attempted to include a subject matter expert in each of their interviews, all of the interviews performed for this research were conducted by Capt Callahan and Capt Marion.

ABC Interviewing Skills/Areas of Interviewer Competencies

○ Technical
○ Political
○ Personal

- **Technical**

  ○ Understand the Business environment
     o organizational structure (total Company)
     o functional/deparmental structure
     o company strategy/vision/direction

  ○ Understand the Key Business Processes
     o process-owners
     o cross-functional
     o clearly defined and accepted

  ○ Understand the Interviewee's specific situation
     o size/volume
     o growth: steady/shrinking
     o recent changes in operations
     o supplier of input
     o customer of output

- **Political**

  ○ Timing
  ○ System Smarts
  ○ Ability to Gain Support
  ○ Committed to the Success of Your Interviewee
  ○ Translator/Interpretor vs auditor
  ○ Improvement Orientation vs Problem Identification Orientation

- **Personal**

  ○ Integrity--confidentiality, trustworthy
  ○ Listener/learner--active listening, be a student of the processes/activities

Figure 18. Miller's Recommended Interviewing Skills and Competencies

During the interview, Miller advocates creating a non-judgmental atmosphere. To do this, there are several points that were stressed before and during each interview. First, nothing is final. Information can always be changed to reflect reality. This would be an important point for the interviewee, as the information gathered would often be an educated estimate of individual experience, and as such, people being interviewed needed

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to know that their first response need not be their last response. Next, it was not necessary to answer questions in the sequence that they were asked, or for that matter, to answer a question during the interview session. There would be several occasions in which information or data would be retrieved at a later date or during a follow-up interview. Interviewees established the pace of the interview, and were encouraged to explain in detail the processes and activities performed in their section, branch, department, or directorate. Throughout the interview, the concept was stressed that the data gathered should be the interviewee's depiction of conditions as they perceived them, not our interpretation of their statements. As recommended by Miller, the following issues were discussed at the conclusion of each interview:
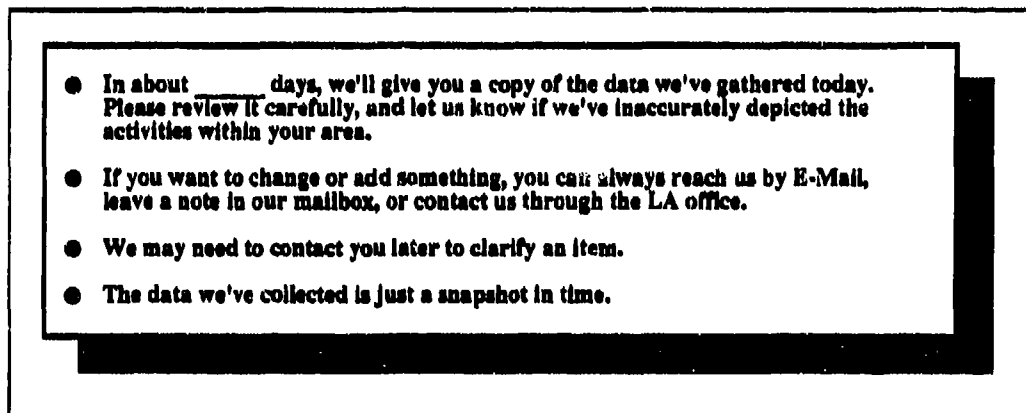
- In about _____ days, we'll give you a copy of the data we've gathered today. Please review it carefully, and let us know if we've inaccurately depicted the activities within your area.

- If you want to change or add something, you can always reach us by E-Mail, leave a note in our mailbox, or contact us through the LA office.

- We may need to contact you later to clarify an item.

- The data we've collected is just a snapshot in time.

Figure 19. Closing the Interview

Developing an interview protocol, a method of documenting the responses to the protocol, and a method of progressing through the AFIT organizational chart were important considerations which had to be addressed before the first interview could be accomplished. The decision to pilot test the research instruments provided an invaluable opportunity to refine the worksheets and the interview protocol. After developing mechanisms to begin the interview process and a rational for proceeding through the AFIT organization chart, we were then able to begin the process of interviewing departments and documenting the significant processes and activities within AFIT.

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Step 4. Outline Significant Processes & Activities
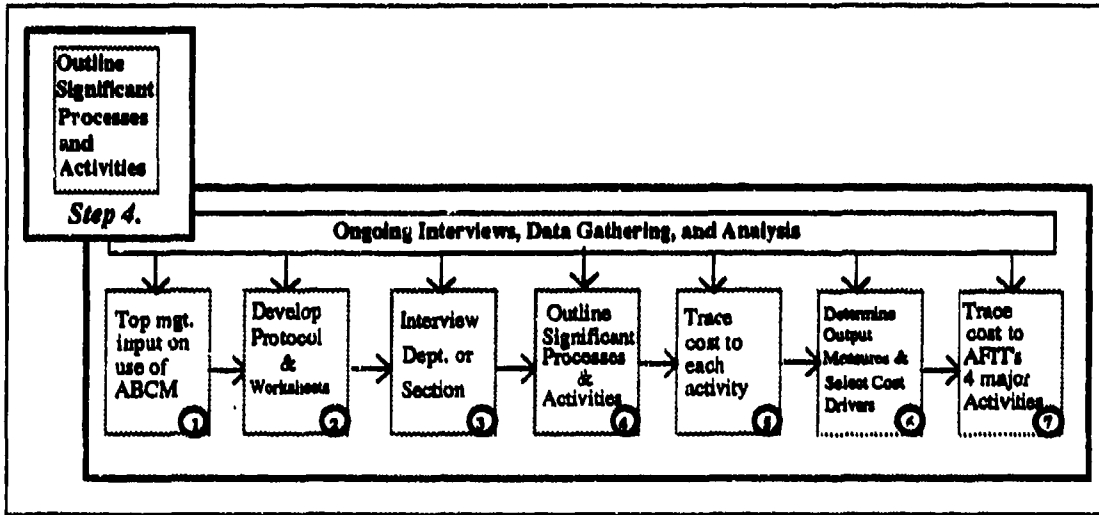
Figure 20. Outline Significant Processes and Activities

Significant processes and activities are characterized by their consumption of significant amounts of time or resources (Pohlen, Interview 94). Referring to Step 2 of the Protocol, we were interested in documenting those activities that accounted for approximately 90% of the time of the department or section, or were a major resource consuming activity. This degree of accuracy was determined by our advisors to be significant enough for the purposes of this research.

As you can see in Figure 21, the interview process followed the structure of the protocol in an iterative manner. First, the major activities were listed. These major activities represented the significant time and resource consuming activities within the department or section.

Following the questions on page 2 of the protocol, we documented the responses on Worksheet 1. Once this was accomplished, we then decomposed each of the major activities into significant subactivites. This flowcharting process provided an additional indenture of detail, and was necessary to discriminate the major consumers of the activities and the consumption of resources by each activity.

Figure 21. The Interview Process

Figure 22. Documenting Responses to Page 2 of Protocol on Worksheet 1.
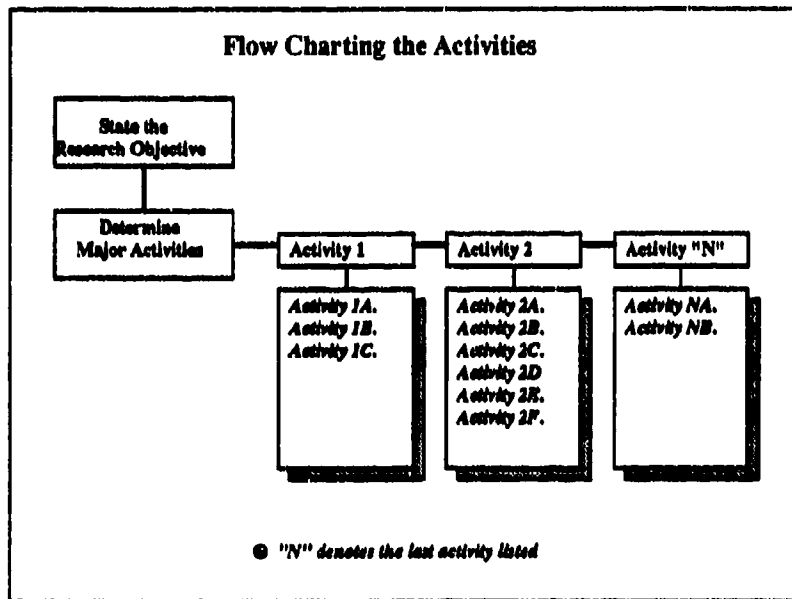
Figure 23. Flow Charting the Major Activities

Figure 23 illustrates how activities were decomposed. In this figure, Activity 1, Activity 2, and Activity N are all major activities within a department. However, Activity 1 can be thought of as requiring Activity 1A, Activity 1B, and Activity 1C in order to complete activity 1. For example, Activity 1 may be a process as general as budgeting. Using this as a major activity, conceivable component activities may be

      1A. Solicit Inputs for Annual Budget and Review Past Budgets
      2A. Consolidating Departmental/Section Budget Requests
      3A. Drafting/Formatting/Editing Final Budget

For each of these component activities, an additional indenture of activities can be established. For purposes of this research, this level of indenture was not deemed necessary, and was simply annotated on the back of Worksheet 2.

Figure 24. Documenting Inputs on Worksheet 2.

Once all the component activities for a work center were listed on separate

worksheets, we then used page 2 of the protocol to guide the interviewee in listing all

resources that were committed to each. As indicated in Figure 24 above, resources

included any source of funding for an activity, special materiels, training or personnel, time

of personnel in performing the activity, and all information support equipment used to

perform the activity. After these questions were answered, we attempted to determine the outputs for each of the activities.

Figure 25. Documenting Outputs on Worksheet 2.

Determining the outputs of each activity required two basic elements of information. First, what was the output of the activity? Was it a report, a hard file, a processed transaction, etc.? Second, who or what was the activity being done for? Was

the activity driven by student or faculty requests? Was the activity being done to comply with a regulation? These questions were designed to establish a foundation for creating an allocation basis for each of the activities--i.e., how much do we charge for this activity and who is charged what amount. After determining the inputs and outputs of each activity, we were then able to create a chart of activities. Charting the activities simply involved breaking each of the major activities into its component activities.

Step 5. Trace Cost to Each Activity
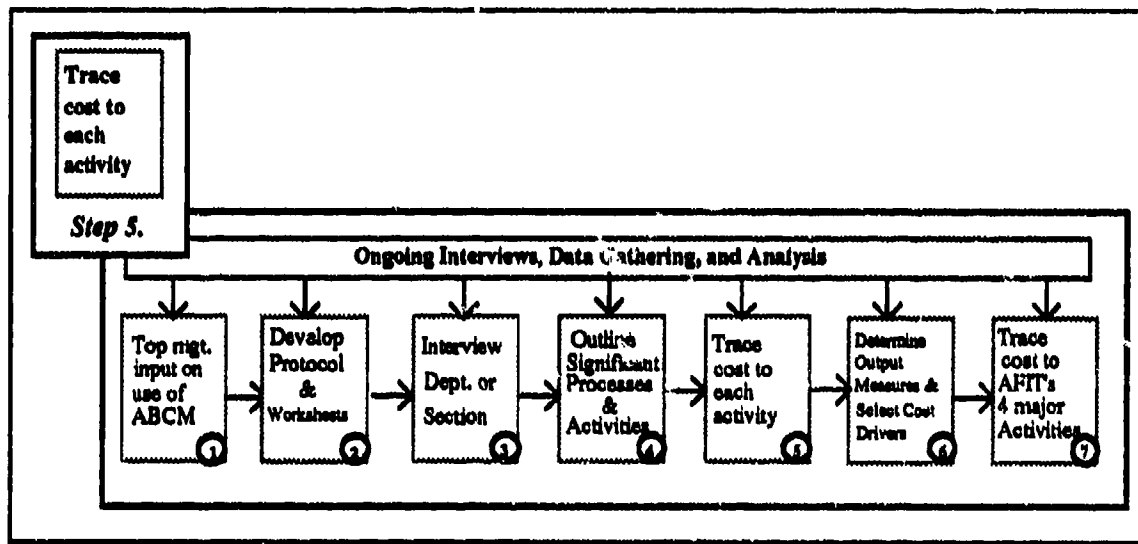
Figure 26. Step 5: Trace Cost to Each Activity

Step five of this seven-step process involved tracing the costs associated with each of the activities. In a broad sense, the cost of an activity is equal to the sum of the resources required to perform the activity. As discussed earlier, ABC looks at processes across departments, not at departmental budgets. In order to calculate the cost of an activity, the system had to be designed which would trace activity costs from the following two sources:

- Sum of the resources consumed within the department
- Sum of the resources consumed across departments

The following sections discuss how these requirements have been resolved in a corporate setting and within a DoD agency.

Spreadsheet Architecture Design Considerations

As stated earlier in this chapter, one of the fundamental design objectives of a new cost reporting system is to create a system to collect and report the financial and operational data about the activities of an organization (Miller, 1992: 46). However, the oldest known activity based costing system has only been in use for a few years (Cooper,

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1989: 48). As such, the guidance for developing the reporting system is not as proliferate as the literature detailing the principles of ABC. To ease the implementation process, some companies have resorted to buying existing software (Drumheller, 1993: 21). However, "an ABC system should not be expensive either to implement or maintain" (Drumheller, 1993: 21). The following quote illustrates Drumheller's point regarding the simplicity of an ABC system:

> At Tycos, we developed an ABC system using a common spreadsheet. The design required only nominal skills. No macros were essential, although some were used; simple formulas and look-up tables sufficed. Using a spreadsheet that the staff already uses is important, because when managers can understand the calculations, they more readily accept the answers. (Drumheller, 1993: 22)

Employing a similar spreadsheet architecture, DCSC also developed a series of spreadsheets to implement its ABC system. However, while trying to maintain simplicity, it is important to remember that the output of the ABC system is defined by management, and will determine the complexity of the system. In describing an ABC system, Cooper and Kaplan stress that an ABC system is not designed to report revenues; rather, it "merely allows managers to confront the cost side of the business...it reveals the economics behind the strategy" (*Transformation*, 1993: 21).

This section has discussed the various criteria for developing an ABC system. An alternative to purchasing a system, locally developed spreadsheet architectures have been used to meet the requirements of the ABC system. The next section discusses how a spreadsheet architecture was developed for AFIT which would sum the resources consumed by an activity within a department.

Resources Consumed by an Activity Within A Department

Having determined the percentages of time that personnel allocate to activities and the concomitant resources required to perform each activity, the next important phase of this methodology was to develop a system which would sum these costs. In selecting a spreadsheet program to develop an ABC system, these factors were considered:

- Was the software available to the end-users of this research?
- How large of a learning curve had to be overcome to learn the software?
- What were the capabilities of the software?

This last item in this list is discussed in the next section, nevertheless, it was an important consideration in selecting a software program. Based on this criteria, the spreadsheet architecture developed for this thesis incorporated Microsoft Excel software.

Having documented the resources categories that an activity consumes on page two of the worksheet, the objective in designing a spreadsheet architecture was to develop a format that would be compatible with Worksheet 2. The first step was to develop an architecture to annotate personnel and the time each person allocated to each activity. Figure 27 depicts how this portion of the spreadsheet was constructed. Consistent with the objectives of the protocol, 100% of each person's time is reconciled with the activities that each performs. Having documented the time each person apportioned to each activity, the next step was to trace the cost of the time each person allocated to each activity. This was done by simply multiplying the individual's salary by the percent of time he/she allocated to each activity. Figure 28 depicts how personnel salaries were allocated to activities.

Figure 27. Document Personnel & Time

Figure 28. An Example: Allocating Personnel Salaries to Activities

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After calculating the percentage of salary allocated to each activity, the totals were calculated for each of the activities. Afterwards, the sum of the salaries was calculated and reconciled with the sum of the activity costs; this was done to check for any logic or typographical errors in the spreadsheet formulas. For spreadsheets that exceeded a page in length, the row of activities was copied onto the next page; this made it unnecessary to refer to the first page of the spreadsheet when reviewing the calculations and inputting formulas.

Once the personnel salaries were traced to activities, the next step involved transcribing the materiel and miscellaneous costs from the worksheets into the spreadsheet. Though the worksheet listed facilities, training, and information/computer support as inputs to each of the activities, the data collected for these categories was aggregated into the "Misc" (miscellaneous) column of the spreadsheet.

Figure 29. Transcribing the Materiel and Miscellaneous Costs to the Spreadsheet

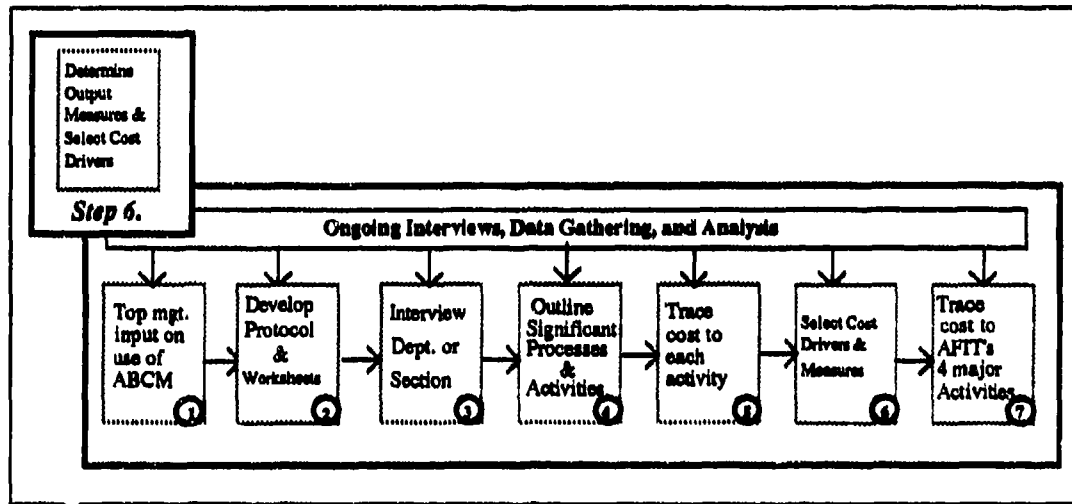## Step 6. Select Cost Drivers & Measures

Figure 30. Step 6. Determine Output Measures & Select Cost Drivers

The next step in creating AFIT's chart of activities is to select appropriate cost drivers and measures. According to Miller, a cost driver is "any factor that causes a change in the total cost of an activity" (Miller, 1992: 44). Traditional cost accounting utilizes only one cost driver, usually direct labor hours, to trace the cost of resources consumed to the products produced. This research, however, employs multiple cost drivers to trace the amount of resources consumed to the activities consuming them. Cooper writes that the art of designing an effective and accurate activity based costing system "depends largely on two considerations: *how many cost drivers to use and which cost drivers to use*" (Cooper, 1989: 34).

This methodology employs Cooper's criteria when determining the possible use of *multiple cost drivers*:

> *Desired accuracy of reported costs.* The higher the accuracy desired, the more cost drivers required.
>
> *Degree of product diversity.* The greater the degree of product diversity, the more cost drivers required.

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> *Relative cost of different activities.* The greater the number of
> activities that represent a significant proportion of the total cost of the
> products, the more cost drivers required.
>
> *Degree of volume diversity.* The greater the range of batch sizes, the
> more cost drivers required.
>
> *Use of imperfectly correlated cost drivers.* The lower the correlation of
> the cost driver to actual consumption of the activity, the more cost
> drivers required. (Cooper, 1989: 45)

The selection of a *particular cost driver* will be influenced by the cost and ease of measuring the cost driver and the correlation of the selected cost drivers to the actual consumption by the activity. Activity based costing achieves increased accuracy when compared with traditional cost accounting because of the use of multiple cost drivers. Cooper writes that the key to keeping the cost of data collection down is to "use cost drivers whose quantities are relatively easy to obtain. This is accomplished in part by substituting drivers that capture indirectly the consumption of activities by product" (Cooper, 1989: 43). As an example, he suggests that managers measure the number of transactions rather than the duration of individual transactions.

Cooper notes, however, that indirect measurement of cost drivers will be accurate to the degree that the individual transactions are homogeneous and also "reflect the actual consumption of activities" (Cooper, 1989:43).

> How well a given cost driver captures the actual consumption by
> products of an activity is measured by the correlation of the quantities
> of each activity that the driver traces to the products versus the actual
> consumption of the activity by the products. (Cooper, 1989: 43)

The degree of correlation becomes increasingly important as the relative cost of an activity increases. Cost distortion can be reduced, though, by increasing the number of cost drivers. Several cost drivers may be used to accurately capture the diversity in resource consumption (Cooper, 1989: 43).

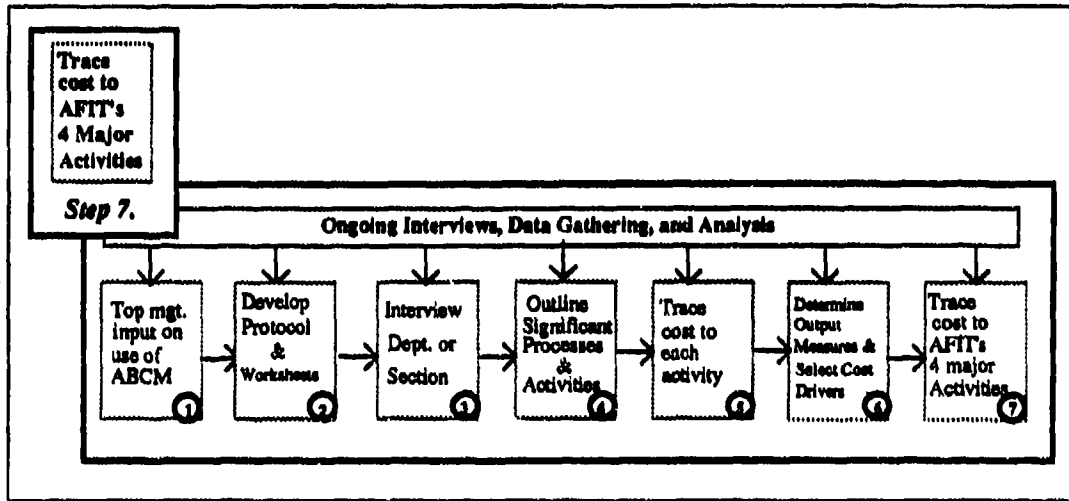## Step 7. Trace Cost to AFIT's Four Major Activities

Figure 31. Step 7. Trace Costs to AFIT's 4 Major Activities

This step of the ABC implementation methodology required an archival analysis of the case study organization's FY93 budget, as well as information gathered during the interviews. The major resource categories identified in this research consisted of personnel salaries and benefits (EEIC 39), Military pay, TDY costs (EEIC 40), educational services (EEIC 55), and miscellaneous contract services (EEIC 592). These categories of expenditures accounted for over 90 percent of the resources considered in the case study organization's FY93 budget.

The cost allocation methodology employed by the ABC cost model followed the conceptual model described by Beaujon & Singhal(Beaujon and Singhal, 1990: 53). Having developed resource categories and values for the case study organization from FY 93 Budget information, this research then employed Cooper's cost assignment process to trace overhead departmental expenditure to activities and processes. Cooper wrote "The first stage takes such resources as direct labor and supervision and splits them up into section...or even entire departments. These costs are then traced, in the second stage, from the cost pool to the product using a measure of the quantity of resources consumed

by the product" (Cooper, 1987: 44). Figure 5.15 illustrates the application of Cooper's cost assignment process to the case study organization. Resource categories consisted of Element of Expense Investment Code expenditures, and the consumption of resources was traced in the first cost assignment stage to activities and processes within overhead departments in the case study organization. The cost of an activity was defined as the sum of the cost of resources consumed; this cost is equal to the proportion of obligations across all EEIC's traced to consumption by a particular activity. Process costs were calculated as the sum of the costs of activities within the process. In the second cost assignment stage, the costs of overhead activities were traced to operational departments according to the proportion of cost drivers consumed.
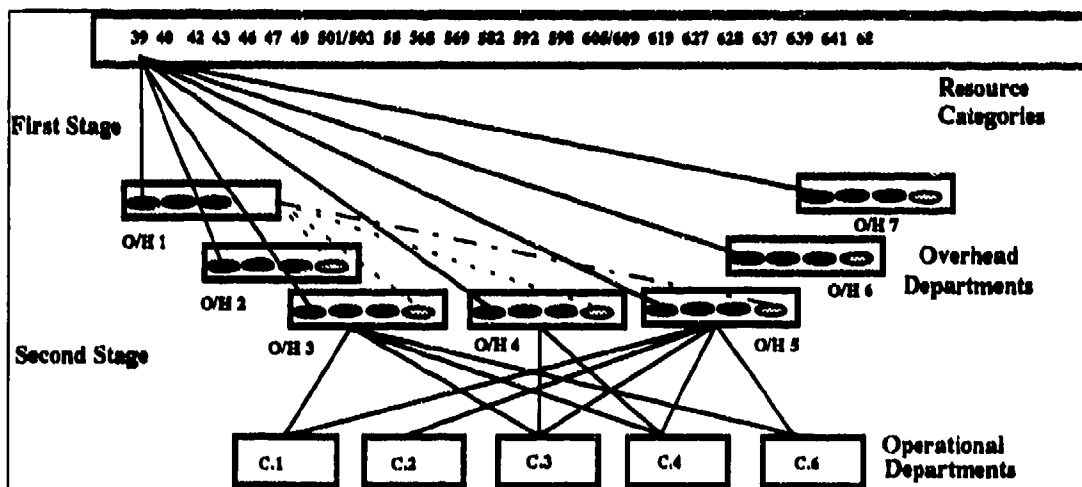

Figure 32. Conceptual Representation of ABC Cost Model Implemented within the Case Study Organization

Summary

This appendix was written to provide a general description of the ABC implementation process as it was originally planned. As such, it serves as a baseline to compare the resulting implementation process the research utilized. Organizations seeking to implement an ABC system should view the information in this document as a starting point for planning an ABC implementation process, and adjust the elements of the process as necessary to meet the needs of the organization--just as the research did. In addition, much of the information contained in this appendix is written from a practitioners point of view, reflects original thought, and cannot be found in ABC literature. It is the author's intent that this information be used to assist other government service organizations in their ABC implementation process, and to bridge the gap between theoretical and practical implementation practices.

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Vita

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13. ABSTRACT *(Maximum 200 words)* This research focused on the applicability of Activity-Based Cost (ABC) systems within government service organizations. ABC implementation efforts within other government organizations were first examined to determine what information shortfalls caused managers to consider ABC implementation. Next, archival analysis was conducted within the case study organization to determine if the same accounting information shortfalls existed. An ABC system was then implemented within the case study organization. ABC information was compared with information provided by the case study organization's fund accounting system.

The case study organization's fund accounting system traced congressional appropriations to categories of expenditures for FY93. The fund accounting system reported aggregate category costs of the organization and department costs by category of expense. However, the organization's fund accounting system was not able to provide information to link expenditures across expense categories to business processes within the organization. Conversely, the ABC system reported activity costs, process costs, and product costs. The research concluded that ABC offers government service organizations non-budgetary information which may be used to target opportunities for process improvement or cost reduction.

14. SUBJECT TERMS
Activity Based Costing, ABC, Cost Accounting, Fund Accounting, Overhead Allocation, Government Service Organizations, Cost Visibility, Implementing ABC

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DEPARTMENT OF THE AIR FORCE
AIR UNIVERSITY (AETC)

Date: 1 Mar 04

Re: Air Force Institute of Technology Thesis (AFIT/GLM/LAL/94S-4)

Please be advised that the distribution statement for "Applicability of an Activity Based Cost System Within Government Service Organizations," a Master's thesis prepared by Robert W. Callahan and Daniel A. Marion, dated September 1994, has been changed from category F. Permission from AFIT/RP is no longer required for each request.

The distribution statement is now category A – approved for public release.

Signed:

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