

# IMPLEMENTING ACTIVITY-BASED MANAGEMENT IN AN ACQUISITION ORGANIZATION

*Diana I. Angelis*

To manage costs and comply with financial management laws and regulations, government acquisition organizations must first understand *what* they do and *why* they do it. This is critical to identifying customers, defining outputs, and developing systems to collect and trace the cost of resources to outputs. One of the more popular models for collecting and tracing costs is known as activity-based costing (ABC). This article examines how one government acquisition organization is using ABC to understand and define outputs and processes, to collect and trace the cost of doing business, and how it plans to use this information in the future.

**T**he Federal Financial Management Improvement Act (FFMIA) of 1996 requires agencies to produce cost and financial information that will assist the Congress and financial managers with evaluating the cost and performance of federal programs and activities and thus improve decision making. The law is intended to increase the capability of agencies to monitor the execution of their budgets by providing better support for the preparation of reports that compare spending of resources to results of activities.

This Act has provided the impetus for government agencies to understand, measure, and manage their costs. Air Force

Materiel Command (AFMC), headquartered at Wright-Patterson Air Force Base in Ohio, has embraced this philosophy.

AFMC provides the Air Force with integrated management of research, development, test, acquisition and support activities needed to advance and use technology to acquire and sustain weapon systems. AFMC has reorganized itself into business areas to help identify and manage costs and measure performance. An important part of this effort has been the use of activity-based costing (ABC) to understand and define outputs and processes and to collect and trace the cost of doing business. This article describes the pilot

project used by AFMC to develop an ABC model for the Product Centers and some of the lessons learned along the way. It also discusses how the agency plans to use this information in the future to manage cost and performance using activity-based management.

## **BACKGROUND**

---

The Chief of Staff of the Air Force directed that each major command identify its principal tasks (what they do) and relate them to the missions and core competencies of the Air Force. The commander of AFMC submitted a list of principal tasks that support the Air Force core competencies and tie directly to each of the Air Force goals. AFMC Task 4 is intended to provide combat and support information systems and sustain them with the goal of reducing costs and improving performance. This requires AFMC to measure cost and performance.

One of AFMC's strategic objectives states: "By fiscal year 2005, reduce the command's unit costs of goods and services by 5 percent after inflation while meeting performance, service, and quality standards." Before AFMC can reduce unit cost, they must first be able to measure it. Managers must understand and document what AFMC does and how much it costs to do it. Additionally, managers must relate cost to performance, service, and quality in order to make informed cost-benefit tradeoffs.

When Gen George T. Babbitt assumed command of AFMC, he envisioned running the command like a business with a focus on accountability and management of costs (Ely, 1997). This is a departure

from the traditional government focus on managing budgets. To facilitate this concept AFMC was divided into eight business areas.

Each of the business areas is headed by a chief operating officer (COO) who is responsible for monitoring the cost and quality of its outputs.

## **MEASURING COST AT AFMC**

---

In October 1997 AFMC initiated the business area management philosophy. The business area management concept focuses on identifying the cost of mission output, not the budget requirement, to perform the mission. Prior to this initiative, AFMC used its financial systems and processes primarily to answer the basic question of whether the organization had spent the funding given to it for the purpose it was provided. Under the business model, the aim is to have and use financial systems and processes to answer the question, "What did we produce, and how much did it cost?"

What is the best way to go about this? One of the most successful methods used by industry today is known as ABC. Originally developed to measure manufacturing costs, it has been expanded and adapted for many kinds of businesses, including the service sector. As the name implies, ABC traces costs from resources (labor, supplies, travel funds, etc.) to activities and then to outputs (products or services).

By calculating the cost of activities the ABC methodology offers three significant benefits. The first lies in the identification of activities. The procedure of identifying and defining organizational activities provides managers with insight into

the business process: how and why we do things. This information is useful in understanding the effectiveness and value of activities.

The second benefit lies in the tracing of costs to activities. By measuring the cost of resources used to perform different activities, management is able to understand the efficiency of the business process. Each activity has its own output, which contributes to the final product or service. If we compute the unit cost of each activity, we can measure and compare the efficiency of the activities and the business processes. This allows us to make better resource allocation decisions.

Finally, tracing the cost to activities and understanding which products require which activities (or which services consume which activities) allow us to trace costs to the outputs in a logical and correct manner.

In 1997 AFMC began a pilot study using the product support business area (PSBA) to demonstrate the feasibility of implementing ABC.

Four program offices were selected for the initial study: F-16 Fighter, Airborne Warning and Control System (AWACS), Global Positioning Satellite (GPS), and Special Operations Forces (SOF). The pilot programs were selected to provide a representative sample from different product lines (aeronautical, electronic, space and missile, and special operations) and included participation from both the acquisition and logistics centers. The pilot began in May 1998 and was completed in April 1999. ABC was favorably received by the pilot programs, and in June 1999 the Product Support Executive Board decided to implement ABC across the PSBA.

### **MANAGING COST**

---

There's more to managing costs than simply measuring, collecting, and tracing dollars. AFMC must be able to measure the efficiency and effectiveness of its activities and products. Efficiency can be measured by calculating unit cost. But to do this the program office must first identify



Official DoD Photo

**The F-16**

the outputs, determine how to count them, and establish a method to record the number of outputs. Some outputs are easy to count because they constitute a tangible final product such as a report or a briefing, while other outputs are more difficult to count due to lack of a tangible product or timing differences between cost data and output data.

Effectiveness is measured in terms of quality and timeliness. How good is the product or service? Is the customer satisfied with the product? Was the service delivered on time? Performance measures must be established, well documented, and matched to activities and outputs.

Management procedures must be established to facilitate decision making and resource allocation. These include establishing standards and goals, benchmarking processes and activities, establishing controls, and highlighting problems and trends. Most important, it requires careful analysis and consideration of the underlying

**“The value chain describes in general terms what the PSBA does that will add value to the product (output).”**

factors that drive costs (cost drivers) and how they relate to quality and timeliness. For example, if you want to increase timeliness (and customer satisfaction) you might set a goal of reducing cycle time for a given activity. But how much will it cost to do that? You may be able to cut cycle time in half by doubling the number of people performing the task, but is it worth it? Can I afford it? With a limited budget, what other activity is going to suffer? Likewise, if I cut cost, how will it impact the quality and timeliness

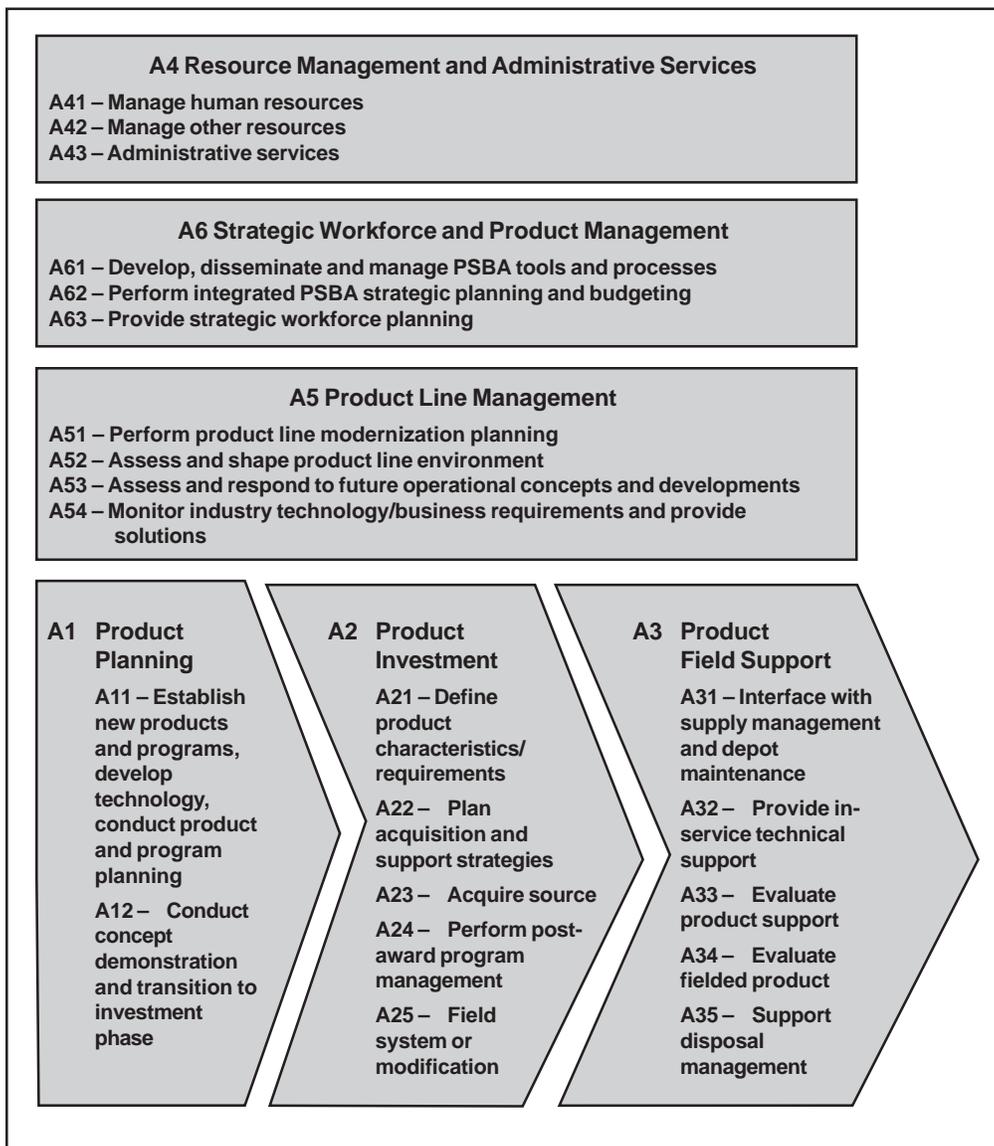
of my product? Efficiency and effectiveness decisions cannot be made separately. They must be made in the context of cost-benefit tradeoffs.

## **ABC PILOT PROGRAM**

---

The initial impact of implementing cost and performance measurement systems in an AFMC organization can be estimated by examining the pilot programs. The first step was to form an ABC implementation team that would be responsible for developing the model, collecting the data, inputting the data into the model, and presenting the results. Once the ABC team was selected and trained, they started describing what the organization does for a living, or better yet, what it does to support AFMC tasks. A good way to approach this issue is to create a value chain. The pilots started with a proposed value chain for the PSBA (see Figure 1).

The value chain describes in general terms what the PSBA does that will add value to the product (output). The three bottom categories, Product Planning (A1), Product Investment (A2), and Product Support (A3), are the most likely to be perceived by a customer as adding value to the final product. However, the upper three categories (A4 through A6) represent product-sustaining and organization-sustaining activities that make it possible for the PSBA to accomplish its tasks. Most of the program office activities occurred within categories A1 through A3. It was also necessary to identify the customers and outputs. In ABC terminology, the ABC team defined the cost objects (i.e., the final consumers of costs). The PSBA left it up to the program offices to decide



**Figure 1. PSBA Value Chain**

how they wanted to define their cost objects. It could be by platform, by program, by contract, by customer, or by some other means. In the future the PSBA may decide to use a standard definition for all the centers and program offices to facilitate benchmarking.

The next step is to break down the value chain into activities. This may be done in several levels, much like a work breakdown structure. The PSBA has a core model based on the PSBA value chain that contains most of the activities common to the centers and program offices. The core

model is described, in general, in the PSBA taxonomy and, in detail, in the PSBA activity dictionary. Activities are organized and numbered in accordance with the value chain categories. This is a hierarchical, not a chronological presentation. The program office was free to tailor this model (below the core set of activities) to fit its needs, but all program office activities had to “roll up” into one of the activities described in the PSBA activity dictionary.

The program office model was built using Integrated DEFinition (IDEF) notation and concepts and was created in the ABC software where the cost data would be input. Eventually, each center will implement an automated data collection system to capture labor hours and possibly other data. The ABC software computes the labor costs using standard labor rates. In addition to organic labor hours (military and civilian), the model had to be populated with the cost of other resources included in the program office and the corresponding air logistic center budgets (TDY, supplies, contract services, etc.) that are used for PSBA activities. (Note that the air logistics centers have other business areas that they support, so only part of their budgets will be included in the PSBA costs). These data were collected and inputted manually. These costs should be traced to the activities based on resource drivers, but initially AFMC will allocate them based on labor hours.

The ABC software allows the user to assign “attributes” to activities in order to summarize the data into categories (other than cost objects) that are useful to management. This required management to spend some time determining the

different ways in which they would like to see cost data presented in order to facilitate decision making.

After the model was populated with all the data, the team had to evaluate the validity of the data. Due to unfamiliarity with the system or misunderstanding of activity definitions, it is not uncommon for the initial data collection to contain significant errors. These must be identified and corrected before analyzing the data and using it to make decisions. Once the team was confident that the data were valid (reasonably accurate), they analyzed them to identify opportunities for improvement and presented their results to management.

The pilot at each program office described the organization’s processes and activities within a core framework specified by the PSBA taxonomy (a description of the high-level activities shown in Figure 1) and the PSBA ABC dictionary (a more detailed description of the activities included in the PSBA taxonomy). This process highlighted opportunities for improvement and provided a snapshot of cost distribution for a given period of time. It was not an activity-based management system, but only a demonstration of the usefulness and feasibility of ABC. This effort took about 3 months and required 5 to 10 people for each program office.

## **LESSONS LEARNED FROM THE PILOT**

---

### **GENERAL**

As is the case with most new initiatives, the key to the success of the ABC pilot program was the support and review of senior management. Involvement by senior leaders throughout the pilot not only

ensures that the ABC system accurately represents the organization's processes and activities but also provides useful information.

A pilot is a good way to find out if your organization can benefit from an ABC system. While it still takes a considerable amount of time, effort and resources, it is not as disruptive as attempting a full-scale implementation from the start. The pilot allows management and personnel to consider the pros and cons of the ABC system incrementally. If the pilot proves unsuccessful, it is much easier to discontinue.

If you don't have in-house expertise, hire an unbiased professional. The consultant can not only provide theoretical guidance but also advise on techniques and software as well as facilitate meetings. In addition, the consultant can offer an unbiased evaluation of the problems encountered and offer possible solutions. Organizations must take care, however, not to hand over control of the project to the consultant. You need a system that works for your particular organization not a canned system. This is particularly true for government organizations.

The personnel selected for the ABC pilot should have considerable knowledge about the organizational activities and outputs and should understand all the major processes and customers. They should also have experience with, or be trained in, the concepts of ABC and the software that will be used to develop the model and analyze the data. The ABC team will need to be dedicated full-time to the project, and the project must have full support and frequent reviews by upper-level management. There must be "buy-in" at every level of the organization.

## **MODEL**

Before identifying and describing activities, spend some time understanding the organization. What do we do? Who are our customers? What are our products or services? How do we add value for the customer? In the case of the PSBA, considerable time was spent examining the difference between product support and supply management, since these are two closely related processes of Air Force weapon system life-cycle management.

To make sure the model is complete, select the pilot participants so that all aspects of the organization are represented.

Care must be taken, however, not to confuse functions with activities. Often, functional experts fail to recognize that

**"A pilot is a good way to find out if your organization can benefit from an ABC system."**

their activities are part of a process that involves several different functional areas. The AFMC taxonomy and the ABC dictionary were very useful in helping to understand how different functions fit into the organization's value chain.

To be a useful management tool, the activities must be standardized across the organization. Without standardization, the cost information has limited value for upper-level decision making. When the COO of the PSBA wants to analyze and manage costs, he or she must be able to compare and contrast the costs of the various program offices under the PSBA. This is impossible unless the program offices are using the same definitions of activities and collecting costs in the same categories. To do this, the PSBA allowed each program office to tailor, but not

change, the ABC dictionary for its own use. In other words, each program office could add subcategories that further defined specialized tasks within an established activity. These tasks may be unique to each program office, but the costs roll up to standardized activities within the PSBA.

It should be noted that the ABC dictionary evolved with the pilot, with new activities being added to the dictionary based on the pilot experiences. In fact, the ABC dictionary is a living document that can be expected to change over time but nevertheless requires configuration control in order to ensure standardization. One of

**“Labor represents the majority of the PSBA cost, since the PSBA is a service organization.”**

the more difficult aspects of managing the ABC dictionary was deciding to what level the activities should be

standardized. If only the highest levels are standardized, there is too much ambiguity; and different interpretations will lead to the same activities being placed in different categories by different program offices, which makes the results useless. On the other hand, standardizing to a very low level limits the flexibility of the model and forces program offices to collect costs in activities or tasks that may not truly represent what they actually do.

Defining product-sustaining and organization-sustaining activities (categories A4 through A6 in Figure 1) can be a difficult task. These activities must be clearly separated from the direct activities (represented by categories A1 through A3 in Figure 1), and care must be taken not to let organizational and management

boundaries define the activities. For example, while product-sustaining activities may be done primarily by the product line headquarters staff (such as HQ Aeronautical Systems Center), they may also be performed at the program office level or at the HQ AFMC level. More important, organization-sustaining activities are not the exclusive domain of headquarters staff but are activities that are performed at every level of the organization. Finally, organization-sustaining activities must be well defined and not too general in scope; otherwise, they will become a “catch-all” for all kinds of undefined tasks. For example, using the term “general management” to define an activity will likely result in far too many hours being dumped into that category without much thought being given to the actual purpose of the activities performed.

### **COSTS**

Labor represents the majority of the PSBA cost, since the PSBA is a service organization. Thus it made sense to focus on labor hours for the pilot projects under the assumption that this would capture most of the costs. The pilot programs collected this data manually based on surveys. This only provides a fuzzy snapshot of current cost distribution based on employee estimates. While such information provides some insight, it seems inadequate to manage the organization’s activities. Managers need to know actual hours on a timely basis to manage resources, identify opportunities or problems, establish goals, and evaluate performance.

Not all costs can be easily identified. Even something as straightforward as labor costs can be confusing. For example,

due to the close interaction between Product Support and Supply Management, some personnel, working for and paid by Supply Management, perform Product Support activities. Where should their hours be counted? What about costs paid by other organizations such as maintenance, security, and personnel services? Transfer prices need to be established in order to capture the true cost of PSBA outputs. Some costs were unknown. For example, the cost of assets used by the PSBA is not captured in the accounting system, so there was no way to allocate these costs to outputs.

#### **DATA COLLECTION**

Data has to be checked for validity. Did the people reporting the hours understand the activities? This is a learning process and may require several tries before management is comfortable that the hours are properly classified. Are the reported hours accurate? Did personnel realistically estimate how the time was spent? Are all the hours reported? These questions must be answered to management's satisfaction before the data can be used to make decisions.

Be suspicious of large numbers of hours in vague categories such as "general support." Often these categories are overused because they fit a myriad of tasks and activities. The problem is that they provide no visibility into what was actually done or why. It may be necessary to ask employees to reevaluate their estimates and trace their hours to better-defined activities. As mentioned earlier, this problem can be avoided by the careful definition of organization-supporting activities and adequate initial training.

Data collection should be automated. While surveys may be adequate for a pilot, they would not be practical for managing costs on a real-time basis. They are too time consuming and lack the accuracy of actual hours. Automation is the key to implementing a more detailed costing system such as ABC. Unfortunately, there are some serious problems to resolve in collecting and integrating the data from the various government systems used to collect the required information.

#### **AFTER THE PILOT**

---

Once management has a snapshot of operations and is familiar with the kind of information provided by an ABC system, the next step would be to institutionalize the ABC system. This means refining the model and automating data collection. It is not unusual for an organization to create an overly detailed ABC model in its first attempt to define activi-

**"Be suspicious of large number of hours in vague categories such as 'general support.'"**

ties. This results in a large number of activities that are seldom used and are in essence "noise" compared to the major activities that consume most of the resources (and should be the focus of management attention). To increase the usefulness of the model, these smaller activities should be consolidated into higher-level activities. This model simplification will also reduce the record-keeping requirements on the workforce by reducing the number of activities that must be considered when charging hours.

Because labor costs represent 75–80 percent of total program office costs, it is essential to trace them accurately. Without an automatic labor-hour collection system, the impact on program office personnel (in terms of time and effort required for record keeping) would be significant and, in the opinion of the pilot program offices, unacceptable. Although some organizations are comfortable updating their ABC models on a periodic basis (quarterly or annually) based on surveys, such a system provides limited information. AFMC has left it to each center to choose what data collection system they want to use as long as it is capable of interfacing with the ABC software.

During the implementation of automated data collection, the ABC team will be spending a considerable amount of time validating the system. (Just as in the pilot, initial results will probably contain significant errors.) This phase will also require that all program office personnel are trained on the proper use of the automated system and on the revised activity definitions to insure correct charging of hours.

In addition to automated labor-hour collection, the program office will need to establish procedures to trace other costs to activities and cost objects. For example, travel can be coded to indicate the activity and cost object it relates to. Likewise, other costs can be coded to facilitate tracing, or they may be allocated based on a logical-resource driver. How much effort is dedicated to these other costs will depend on their relative size, the desired visibility, and resource consumption patterns.

This is a trade-off between accuracy (which is directly related to the usefulness of cost data) and the cost of collection

and tracing required to achieve a given level of accuracy. The questions become: “If we don’t accurately trace some costs to activities and cost objects and, instead, just allocate them based on a common cost driver, such as labor hours, how distorted will the cost information be? Will it still be useful? Is it good enough to make decisions?” These are decisions that must be made by management.

To capture the true cost of doing business, the model should include facilities and equipment costs (including depreciation or rent, utilities, security, maintenance, etc.), as well as a portion of other costs normally paid by other organizations from separate budgets (such as base operations and maintenance). To allocate the cost of real assets (land, buildings, and equipment), it is necessary first to identify the assets used by the program office, estimate their current value, and develop a method to match the cost to the benefits over time (also known as depreciation). As part of this effort, the B-1B Bomber program office is conducting a capital assets pilot to determine the property, plant, and equipment (PP&E) owned by the program office. Other costs (utilities, security, depreciation) will be captured by other business areas. They may eventually be allocated to the program offices but are outside the scope of the PSBA effort.

### **ACTIVITY-BASED MANAGEMENT**

---

Establishing an ABC system that provides reliable cost data is a major effort, but it is of little value if the information is not used to manage resources. Long after the process improvement opportunities have been explored and the “low-hanging



Official DoD Photo

**The B-1B**

fruit” have been picked, management must continue to use the system to manage cost and performance. This means establishing reporting, analysis, and reviewing procedures to highlight problems, identify trends, and establish goals—in other words, implementing activity-based management.

The first step is to create reports that present the data in a clear, concise, and useful manner. What is useful depends on the level of the organization, so the ABC system should be flexible enough to allow different users to present the data in different ways. The software currently used by the PSBA has the option of using a database manipulation program (Power Play) for this purpose.

At each level, managers will want to look at the unit cost of activities and products within their organization and how they contribute to higher-level unit costs. Recall that to calculate unit cost, we must first define the units (considering

differences in complexity and timing) and figure out how to count them (manually, automatically, or some combination of the two). To ensure comparability between organizations (essential for upper-level cost management), standard units will have to be established for the PSBA. Units used by the program offices will have to be compatible with these standards.

Given standardized unit costs, managers can benchmark these costs against other organizations (that have similar activities) to identify possible process improvements. They will want to look at how costs are distributed across the organization and across products or services and examine the efficiency of different activities and processes. They will also need to monitor how costs vary over time and establish control ranges to identify trends and outliers. It is important for management to recognize that unit cost is an average and that it makes no sense to use a point estimate to establish performance

goals. Instead they should understand the variability of the process and establish range goals.

In addition to looking at the unit cost of their processes, managers simultaneously will have to consider effectiveness in order to make intelligent decisions. This means establishing a system that records performance (quality, timeliness, output rate, etc.) as well as cost for each activity or at least for each cost object (product or service). To do this, the metrics systems currently used by the program office will have to interface with the cost system either manually or automatically (the later being highly desirable for large organizations). Only when cost and effectiveness are tied together can management begin to make informed cost-benefit-risk decisions.

Performance metrics allow management to measure organizational effectiveness against established goals and to compare results to other organizations doing similar work. This is rather meaningless without the associated cost information. As noted earlier, it's not hard to achieve excellence in quality, timeliness, and readiness if you have an unlimited budget. But can you do it efficiently? How well can you do it with limited resources? As General Babbitt has pointed out, AFMC needs to measure not only how well a particular mission is performed, but also what its true costs are.

AFMC has already begun asking for efficiency and effectiveness information

in the form of business process indicators (BPI). The BPIs are organized in accordance with the PSBA value chain, with an efficiency and effectiveness indicator defined for each category (except general support). Thus we see how establishing an ABC system is the first step in collecting the data needed to compute the BPIs that will be used by upper-level management for resource allocation decisions and budgeting.

## **CONCLUSION**

---

By examining the ABC pilots used to develop a cost measurement system in AFMC, we can understand how best to implement such systems and what should be done to maximize their usefulness. We have suggested how the information provided by these systems can be used to manage cost within an activity-based management framework. To do this successfully, the cost information must be tied directly to performance measurement systems in order to facilitate cost-benefit analysis. Although the scope of the AFMC pilots was limited to demonstrating the feasibility of an ABC system, management recognized the need to implement a system that measures and traces cost to activities and outputs. Top-level management also recognizes and is driving the requirement to analyze cost in terms of performance to facilitate informed resource management.



**Diana I. Angelis** is an assistant professor at the Naval Postgraduate School in Monterey, CA, assigned to the Defense Resources Management Institute. She completed her Ph.D. degree in industrial and systems engineering at the University of Florida in 1996. She served as a program engineer in the U.S. Air Force from 1984 to 1989. Angelis is a certified public accountant and a major in the U.S. Air Force Reserve. Her current research interests include the application of activity-based management to government organizations.

(E-mail address: diangeli@nps.navy.mil)

#### **ACKNOWLEDGMENTS**

The author wishes to express her appreciation to Greg Colbert and Anthony Braswell of ASC/XP for their helpful comments and suggestions.

**REFERENCES**

---

- Babbitt, G.T. (1998). War fighters are priority one. *AFMC Leading Edge*, 40(9), 3–4.
- Babbitt, G.T. (1998). Briefing to the American Society of Military Comptrollers & Society of Cost Estimating and Analysis.
- Ely, R. (1997). Accounting and accountability. *AFMC Leading Edge*, 39(7), 4–9.
- Little, A. D. Inc. (1999, April 9). *Air Force Materiel Command activity-based costing management deployment recommendations, observations and lessons learned*. Briefing to HQ AFMC.
- Stidham, G. (1998). *Product support business area activity-based costing (ABC) program pilots*. Briefing presented at the Economic Analysis Conference.