



## Calhoun: The NPS Institutional Archive

---

Faculty and Researcher Publications

Faculty and Researcher Publications

---

2007

# Enhancing the ABC Cross

Euske, K.J.

---

Management Accounting Quarterly, Summer 2007, Vol. 8, No. 4, pp. 48-61

<http://hdl.handle.net/10945/39554>



Calhoun is a project of the Dudley Knox Library at NPS, furthering the precepts and goals of open government and government transparency. All information contained herein has been approved for release by the NPS Public Affairs Officer.

**Dudley Knox Library / Naval Postgraduate School**  
**411 Dyer Road / 1 University Circle**  
**Monterey, California USA 93943**

<http://www.nps.edu/library>



# Enhancing the ABC Cross

BY K.J. EUSKE AND ALAN VERCIO

**DECISIONS NEED AN INTEGRATED FRAMEWORK TO ENSURE A COMMON FOCUS  
ON ORGANIZATIONAL OPTIMIZATION.**

**EXECUTIVE SUMMARY** The purpose of the ABC Cross was to portray both a cost and process view of an organization as simply as possible. Unfortunately, the model's simplified form does not capture the real value of activity-based costing (ABC) for cost accounting that emerged in the mid-1980s. Here we present several ABC models that can help functional and process managers make better decisions.

Since the early days of activity-based costing (ABC), the ABC Cross has provided a powerful image for ABC. The purpose of the ABC Cross was to capture as simply as possible both a cost and process view of an organization. Unfortunately, the model's simplified form does not capture the real value to cost accounting that emerged in the mid-1980s from the ABC discussion. We will provide an enhanced model of the ABC Cross that presents a more robust representation of the interaction of process and costing that is the core of ABC and most other cost-measurement systems.

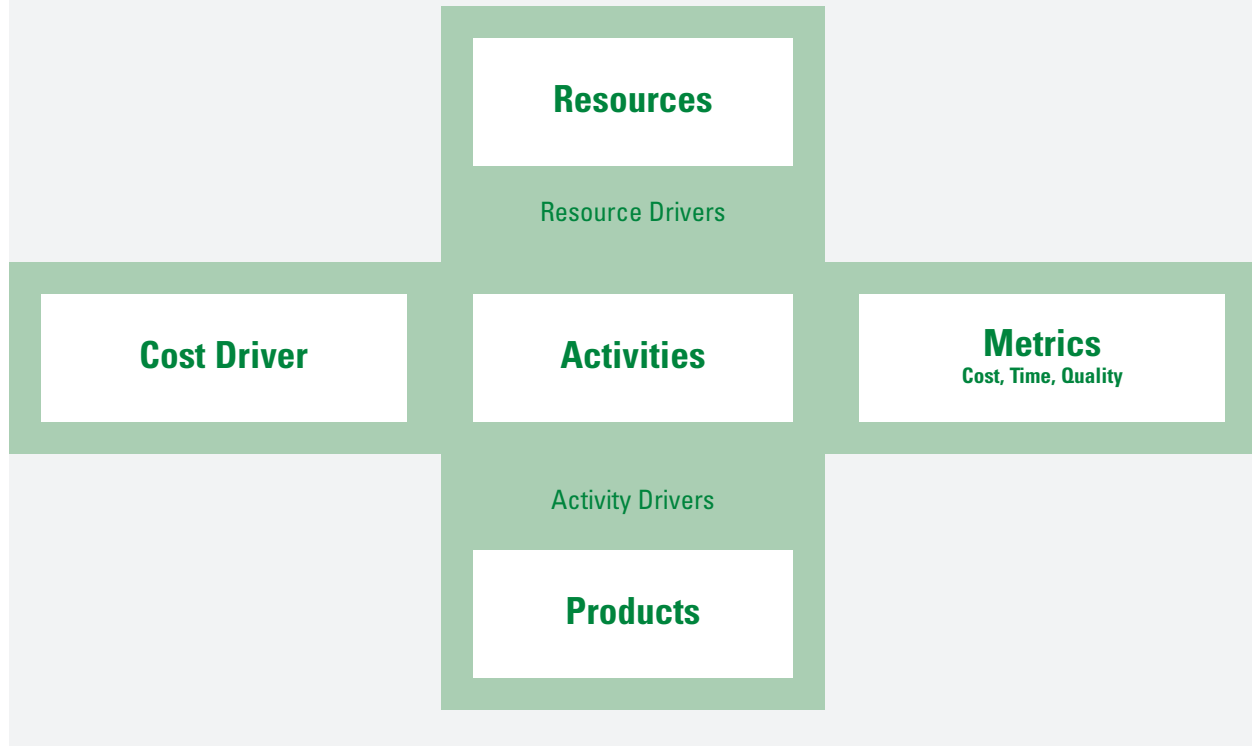
To some degree the ABC Cross (see Figure 1), based on the CAM-I Cross© (developed by the Consortium for Advanced Management-International), has come to exemplify the decision by management accountants in the latter part of the last century to address the mismatch of cost and management accounting systems

with production systems. Accounting systems, once reasonable representations of the production process, had in essence lost touch with reality and had become irrelevant.<sup>1</sup>

How did the traditional systems become misleading? Production processes evolved, but the cost accounting systems remained relatively stable. In the appropriate environments, traditional accounting systems were actually relatively sophisticated reporting systems delivering accurate and useful information to decision makers when used in the appropriate context. In our experience, it is the application of the systems in *inappropriate* environments that created the problem.

Unfortunately, the misapplication continues with the ABC Cross. We have witnessed numerous talks by consultants, software salespeople, academics, and practitioners who included the ABC Cross as a significant part of their presentation. When displaying an ABC

**Figure 1: THE ABC CROSS**



Cross, presenters often would put forth a form of cost accounting that is actually inferior to good traditional cost accounting. These presentations did not highlight or even capture some core concepts imbedded in the traditional systems (e.g., a time-based system differentiated by labor-intensive or equipment-intensive processes as well as feedback loops to identify variance from the standard). They also did not capture the insights uncovered in the work from which the term ABC was derived (e.g., the importance of distinguishing among unit, batch, and product-line-driven costs).<sup>2</sup>

Disregarding fundamental differences (i.e., labor or equipment intensive) in core processes and not providing feedback to measure against a standard is a step backward from traditional systems. Ignoring the different drivers very likely will lead to distorted customer profitability and product profitability reporting through subsidies the ABC system created. Based on these presentations, failed implementations, and personal experience, we have come to believe that the ABC Cross, like

most any tool, can be and has been misused, producing consequences the original designers never intended.

The original designers had two objectives in mind when they developed the ABC Cross. The first was to create a simple model that presented the relationship of cost and process. The second was to design a graphic the ABC team could use to sell the ABC concept effectively to top management. The designers expressly did not try to capture the true complexity of the input-transformation-output process and the related resource flows. They were seeking a basic representation of the underlying concept that would help a larger audience understand ABC.<sup>3</sup>

Given their goals, the original designers created a model that in some ways oversimplifies the underlying phenomena and, unfortunately, provides the user little, if any, direction. Put more bluntly, if the model is not used for its intended purpose, it can support the creation of costing methods that can be a step backward for cost management. For instance, all systems need

controls and feedback loops. We have seen ABC applications that do not include good control charts, such as volume variance and spending variance, to validate data relevance and help separate common-cause variation from special-cause variation. The result of misusing the model leads to a wide variety of cost accounting methods, many of which are inferior to good traditional cost accounting and do not incorporate the important contributions identified in the 1980s. Granted, Ashby's Law (The Law of Requisite Variety) speaks to the need for sufficient variety to capture nonuniform inputs.<sup>4</sup> Too much variability in any process, especially a key measurement of customer and product processes, drives cost up, drives quality down, and results in frustrated users of the data. Colleagues agree that unnecessary variety has been generated. It is our belief that a more explicit and mature ABC model would help reduce unnecessary variety and provide a backup to the original model that would help eliminate the misuse of that model. In the following sections, we develop the more complex model by addressing issues of simplification that helped make the original ABC Cross useful.

#### **UPSIDE-DOWN MODEL**

The usual explanation of the ABC Cross goes something like this: Products consume activities, and activities consume resources. The verbal presentation of the model begins with products. The diagram, however, begins with resources. Placing resources at the top helps depict the flow of resources to products through the activities. The depiction introduces the concept but can be misleading. The original model helps build a mental image of resources driving products—a variation of the “build it, and they will come.” It is more accurate to say that ABC begins with identifying what work is performed on the product, service, or other cost object. Placing products on top supports a more meaningful mental image of products driving the need for activities that require resources. Figure 2 presents the model with the products on top.

#### **THE MOST IMPORTANT COST OBJECT**

A business exists to attract and retain profitable customers. As Peter Drucker counsels, the organization's purpose is to create and maintain a (profitable) cus-

tomers.<sup>5</sup> The customer is the only source of revenue and, therefore, the only legitimate profit center. Products, channels, departments, and other organizational entities are all cost centers. If the objective of creating and keeping profitable customers is not met, all other business objectives (e.g., those relating to the shareholders, employees, community, environment, government) cannot be met. The customer is the number one cost object. Applying cost to customers, based on the products and services they use, enables the crucial customer profitability measurement. Additionally, the supplier is a significant element of the process to deliver products and services to a customer. Adding the supplier to the model improves it in that the revised ABC Cross would present a simple value chain from customer to supplier. Figure 3 includes the customers and suppliers in the model.

#### **BIDIRECTIONAL DATA AND DECISION FLOWS**

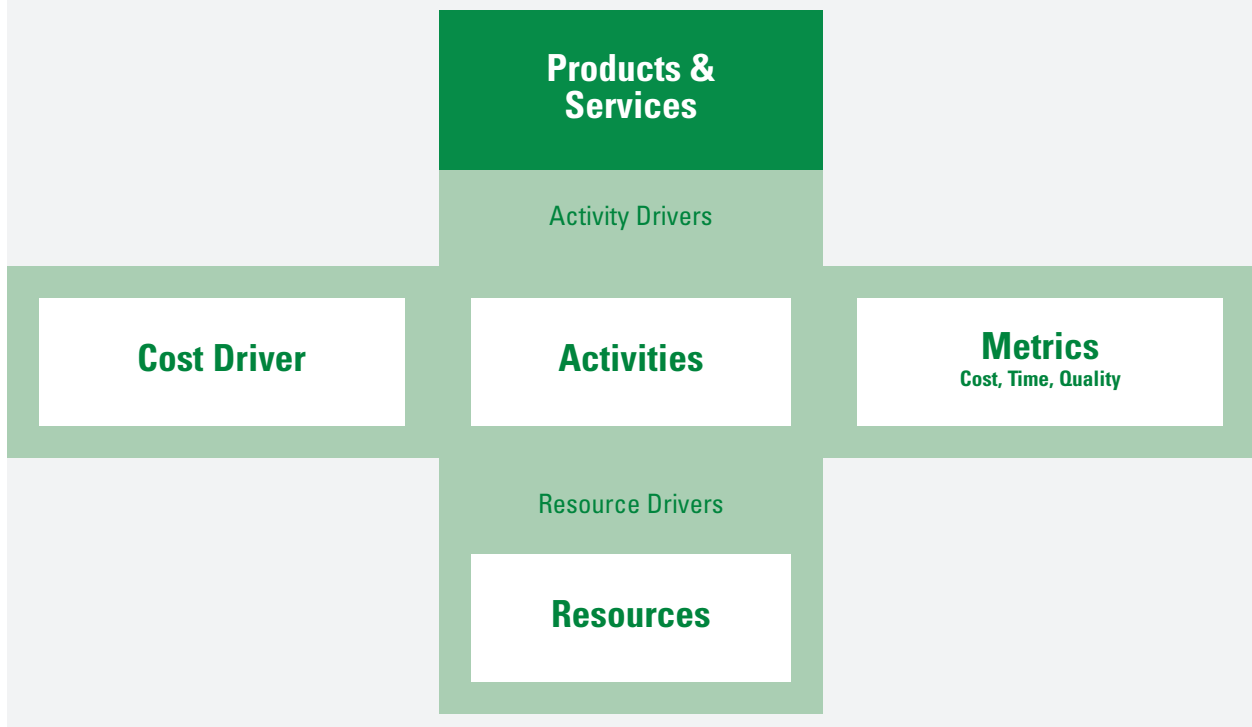
The most important business decisions begin with today's and tomorrow's customer and work their way through the organization to the supplier. These decisions, occurring in processes such as strategic planning and forecasting, focus on the demand side of balancing capacity as well as on resource demand and supply.

A second set of business decisions focuses on the supply side of balancing capacity and resource demand and supply. The balancing process begins with acquiring resources and eventually delivering a product or service to the customer. This includes the execution and control of management processes. This work builds the supply side of the demand and supply equation. Figure 4 captures the bidirectional flows.

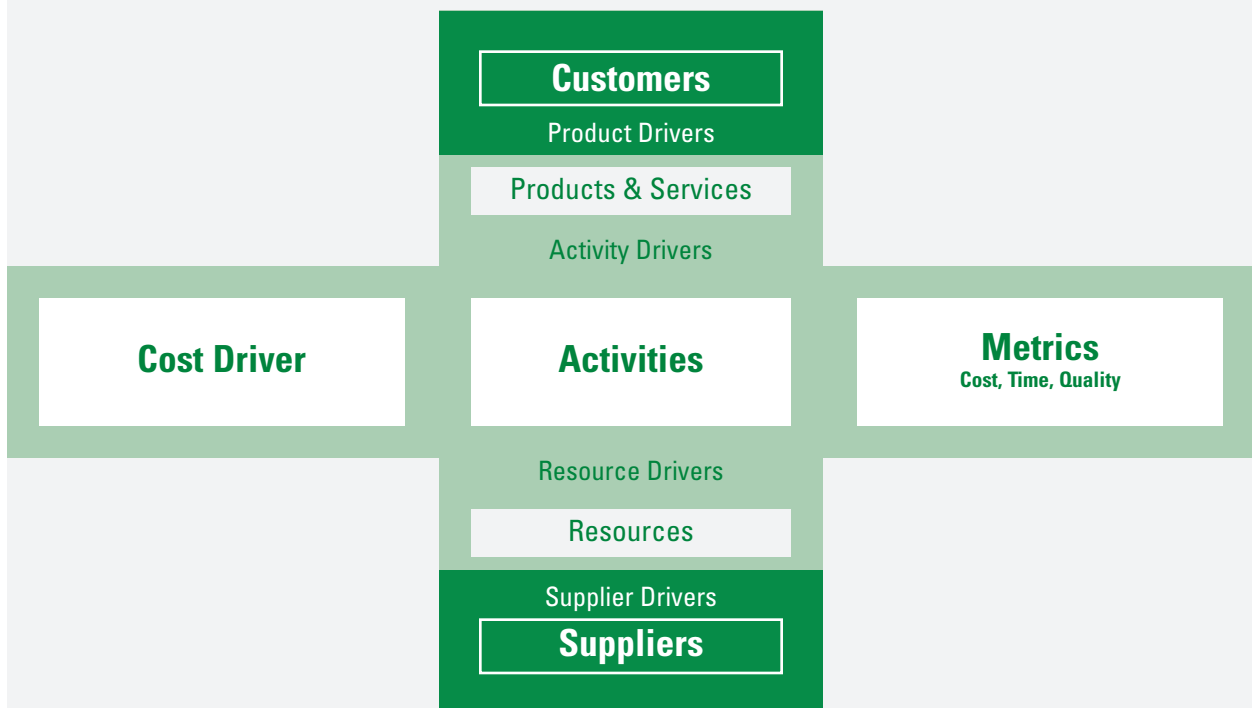
#### **CONTEXT OF ONE ACTIVITY IN THE END-TO-END PROCESS**

As stated previously, the primary reason to do cost measurement is to comprehend customer profitability, which requires an understanding of costs associated with processes that generate products or services for the customer. Products and services should be defined in a way that best describes the customer experience. In other words, do not restrict the product definition to the tangible product, but include channel, response time, and other attributes that are important to the customer.

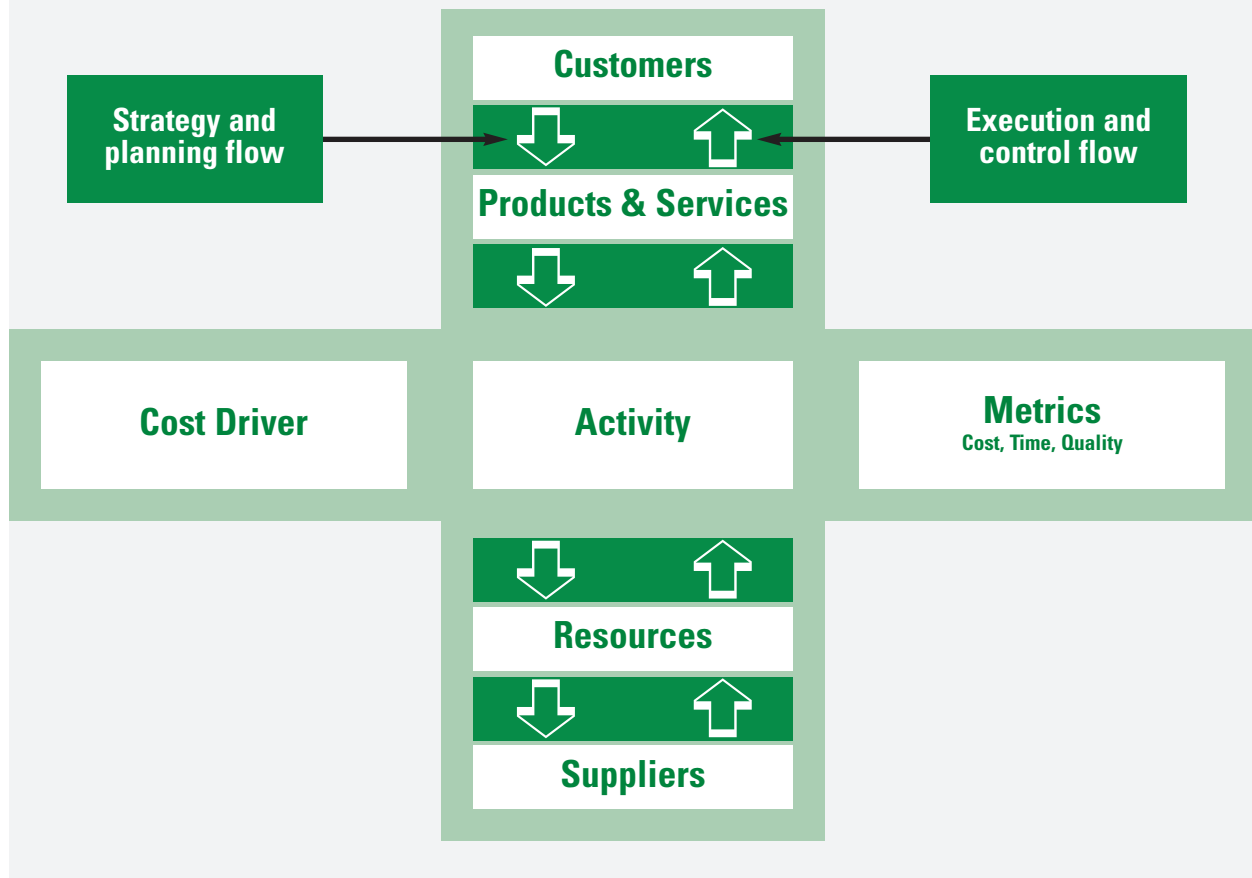
**Figure 2: PRODUCTS AND SERVICES DRIVE ACTIVITIES**



**Figure 3: CUSTOMERS AND SUPPLIERS FORM A COMPLETE VALUE CHAIN**



**Figure 4: BIDIRECTIONAL FLOW OF INFORMATION AND DECISIONS**



This complete product definition may require different end-to-end processes and/or different levels of activity for what may appear to be the same process. Most of these business processes are found in product development, sales, fulfillment, and service processes.

A process can be identified as end-to-end if it starts and ends with the customer. If the overriding reason that an organization remains in existence is that it responds to today's and tomorrow's customers effectively and efficiently, one could argue that all of the enterprise's resources should be engaged in these processes either directly or indirectly. Computing a relevant cost for the business processes that are directly part of an end-to-end process to serve the customer is a basic step in building an ABC mirror of operations and identifying

cost by customer.

Support or enabling processes (e.g., finance services, human resources services, technology services, supply chain management, and business sustaining) are indirectly related to the end-to-end customer processes. They provide the necessary infrastructure that allows the direct customer support processes to operate. These enabling processes do not touch the product or service directly, but, without them, delivering products and services to the customer would come to a halt. Support and enabling services are provided through end-to-end processes. When the costs of such services are material or if there is a direct connection to the mission-critical processes, they should receive the same rigor in cost measurement as direct customer support processes

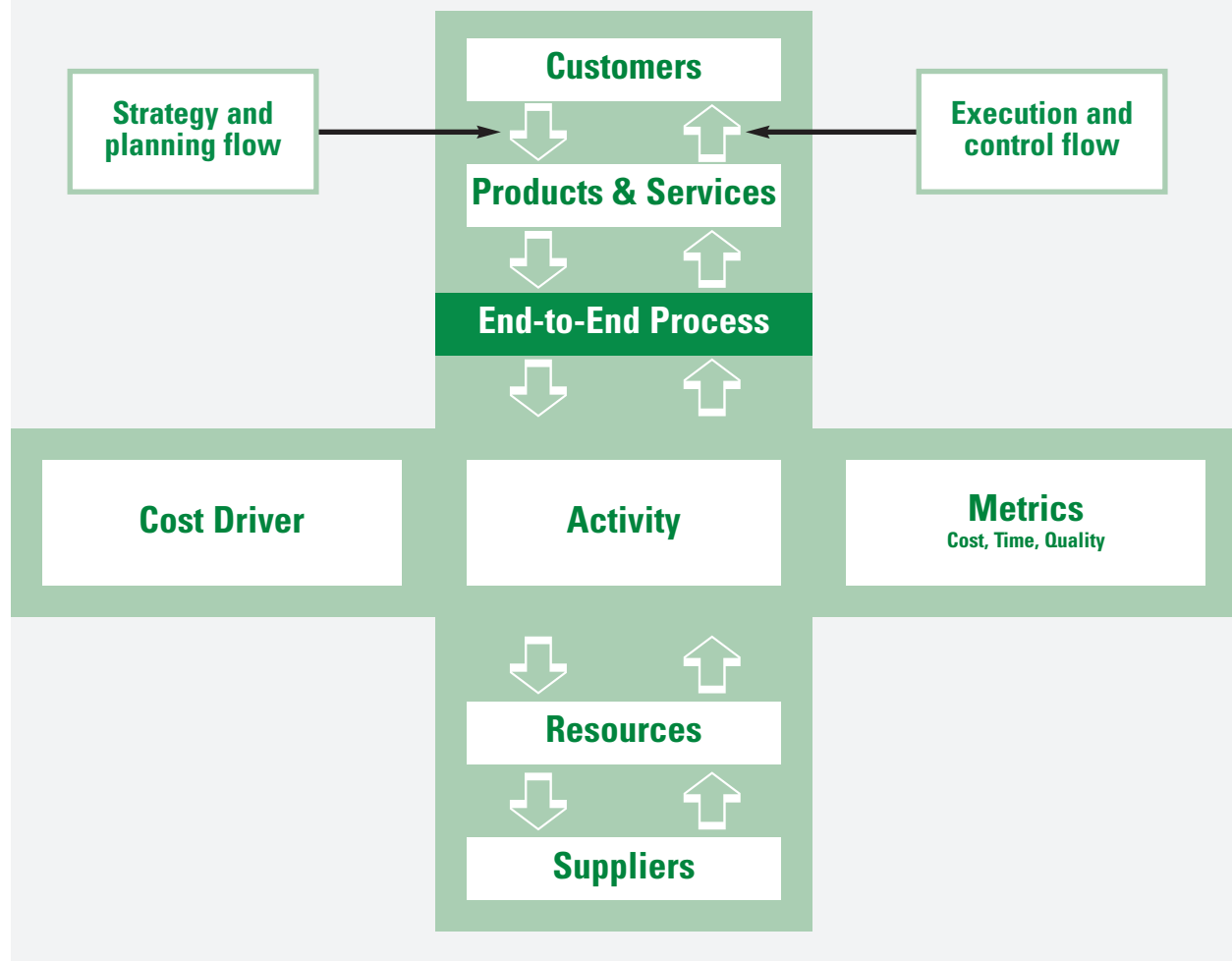
receive. Other authors provide a more detailed discussion of why it is important to understand the structure of support and enabling services.<sup>6</sup>

Including the end-to-end process flow in the model also adds value to the model in that dimensions such as end-to-end cycle time (elapsed time), process-time-to-cycle-time ratio, and constraint identification and management can be associated with the related process costs. Possibly the most important point is that adding the end-to-end process discourages the silo or functionally oriented approach to activity costing. The model in Figure 5 captures the activities in an end-to-end process.

**CAPACITY MEASUREMENT IS A PREREQUISITE TO RELEVANT COST MEASUREMENT**

The two most important contributions of a good cost-measurement method are providing only relevant cost data to the right decision maker and providing that cost data by driver (e.g., unit, batch, product, customer, idle). Providing cost data by driver requires it to be based on data used to manage capacity and resource demand and supply. Capacity measurement requires measurements of resources, activities, and end-to-end processes. The resource by type—furnace, salesperson, teller, instructor—will have a defined amount of capacity, which lies dormant until it is associated with

**Figure 5: ACTIVITIES INTEGRATE TO CREATE AN END-TO-END PROCESS**

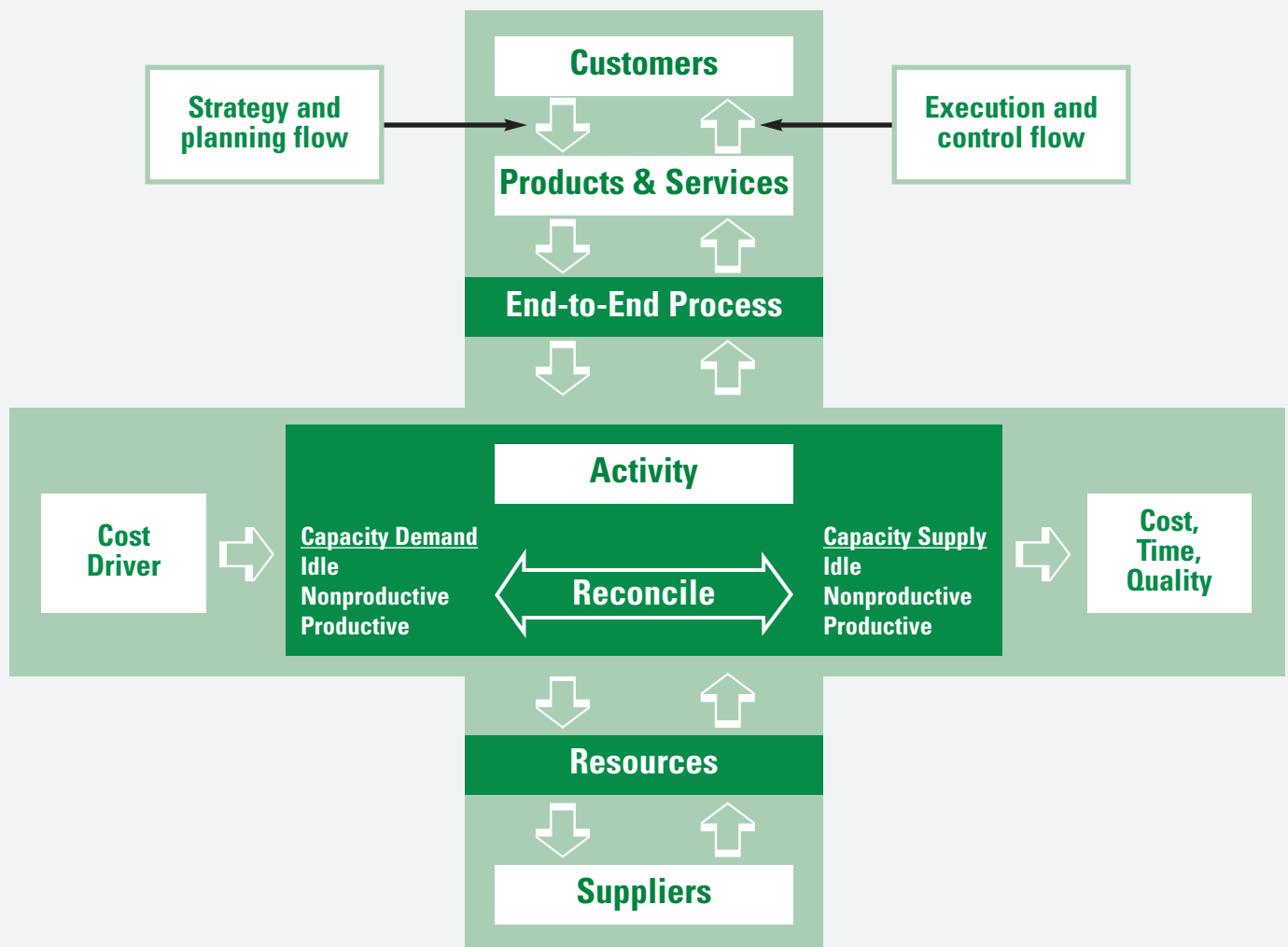


other resources in the activity.

In other words, the teller has capacity but cannot turn that capacity into productive use until a banking center, equipment, technology, training, and manager are available to him/her. The activity manager, not the resource manager, owns the capacity model for managing the demand and supply of the resource and for scheduling the resource. The activity manager ensures that the correct amount of each resource is balanced to meet demand in an efficient combination. The activity manager, however, may not be in the best position to

know whether the activity should be managed as a constraint or buffer to the constraint. The end-to-end process manager identifies the constraint and tells the activity manager whether the activity is a constraint or not. If the activity is a constraint, the activity manager should prepare to run the activity at maximum demand-driven output. If the activity is not a constraint, the activity manager should include idle-process balance capacity to ensure that the activity that is a constraint does not sit idle. Figure 6 includes capacity in the model.

**Figure 6: CAPACITY IS A PRIMARY ACTIVITY MEASURE**





## **ALL ACTIVITIES ARE NOT UNIT-LEVEL ACTIVITIES**

The major design flaw in traditional cost accounting models is the focus on the unit. When companies made only one product, this was appropriate cost accounting. Introduce product and customer diversity, and the unit-based cost accounting begins to distort costs. This distortion usually results in high-volume products and customers subsidizing low-volume products and customers for an equivalent product and service. Including these subsidies in the cost measurements is a barrier to providing only relevant cost data to the right decision maker and providing that cost data by driver.

Consider some of the activities required to maintain a product in a menu:

- ◆ Routing data management,
- ◆ Bill-of-material data management,
- ◆ Engineering specification management,
- ◆ Program management testing,
- ◆ Internal training material management,
- ◆ External training material management, and
- ◆ Maintenance of software applications.

These activities are not proportional to the number of units produced—they are related to the number of products in the menu. For example, assume the cost to execute the above product-level activities is \$1,000,000, and there are 10 products that require equal time for these product-level activities. In traditional cost accounting, we would assign \$100,000 to each of the 10 products. If we overlooked these product-level activities and assigned the cost of these activities to the units, each product would be assigned \$100,000 only if volumes for each product were the same. If the volume for product one accounted for 80% of the total volume, product one would be assigned \$800,000 of product-level cost and not the \$100,000 that it should have been assigned.

The ABC hierarchy of cost drivers is central to minimizing cost distortions. Recognizing the impact of costs driven by units of product, the number and type of batch requirements, the product itself, the customer, and the organization's administration is probably one of the most important contributions Robin Cooper has made to management accounting.<sup>7</sup> If the ABC Cross does not *explicitly* present the ABC hierarchy of cost

drivers, it is our experience that the ABC team will remain focused on the unit-level touch work. Such ABC teams will add unit-level activities and drivers to the cost-measurement system, and the end result will not be materially different from the traditional unit-based cost-measurement system. Figure 7 includes the hierarchy of cost variability in the model.

## **FOCUSING ON WORK, WORKER, AND WORKING**

A cost driver has been defined as “anything that causes cost.” Using this definition, we find that every thing is a cost driver, and the primary cost driver is the customer. This is not very useful to the ABC team. The three requirements for productivity management—work, working, and worker—are a better source of cost drivers.<sup>8</sup> Work is the product or service. Working is the end-to-end process. Worker is the worker. Managing all three in the correct order—work, working, and worker—is required to manage productivity and the resulting process improvement.

Business strategy begins with identifying products and services required to attract and retain profitable customers. Once product and service requirements are defined, a process can be designed to deliver those products and services subject to quality, cost, and time constraints. After the process has been designed, the skills required to execute each step in the process can be defined and engaged. As a general rule, 85% of a worker's ability to do quality work is determined by how the process is designed.<sup>9</sup> Figure 8 includes work, working, and worker in the model.

## **THE IMPORTANCE OF TIME**

Balancing the demand for and the supply of capacity requires a common measurement for both. Time is such a measure.<sup>10</sup> It is typical for a well-designed, traditional cost accounting system to assign all related resources to a production center (equipment intensive) or a workbench (people intensive). The primary cost driver is likely to be time—machine time or labor time. In a single product activity, using time as a driver helps to ensure integration with staffing and capacity models as well as productivity management. In a complex environment, such as a semiconductor manufacturing facili-

Figure 7: ABC HIERARCHY OF ACTIVITY DRIVERS

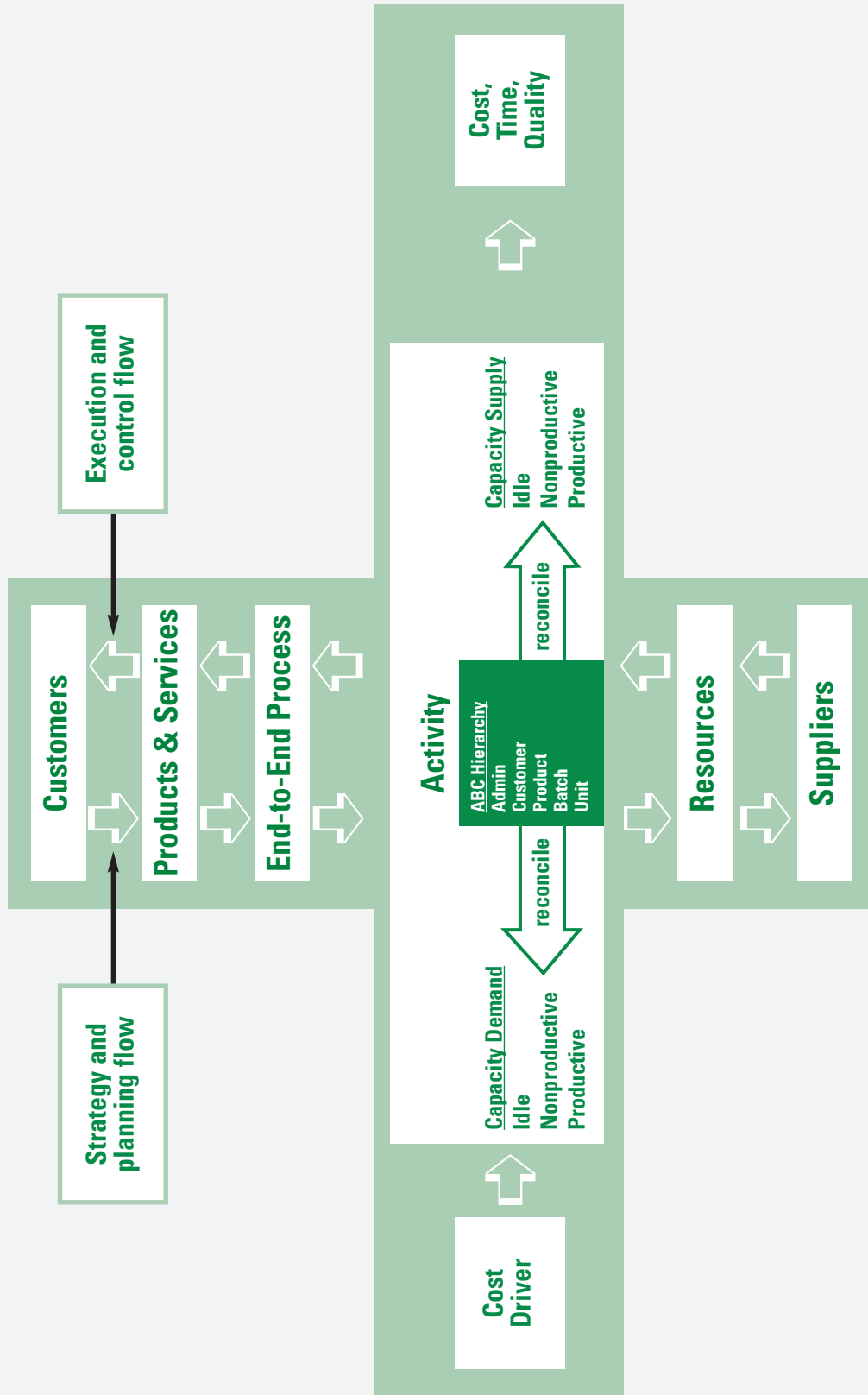


Figure 8: WORK, WORKING, AND WORKER

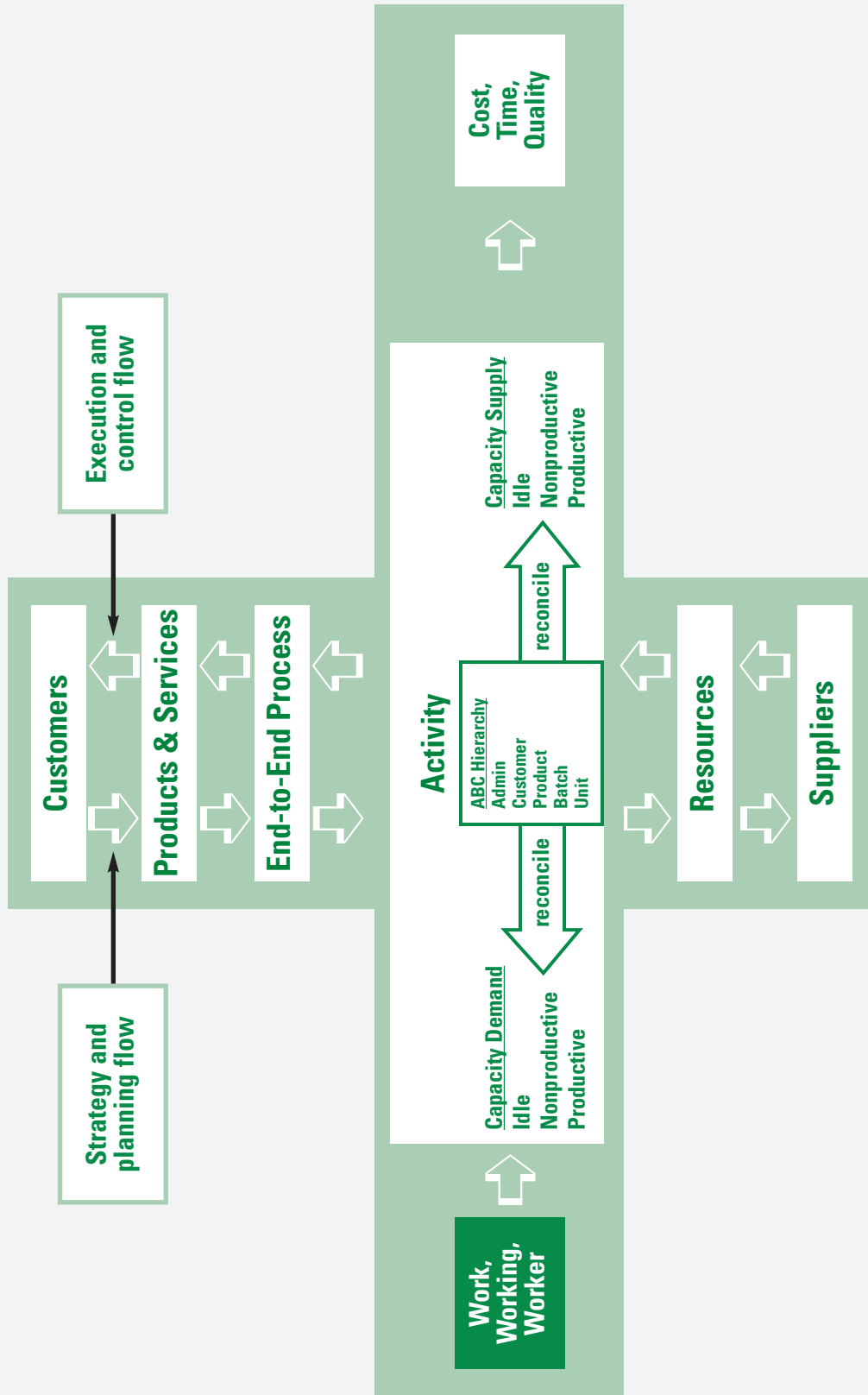


Figure 9: TIME IS THE COMMON DRIVER

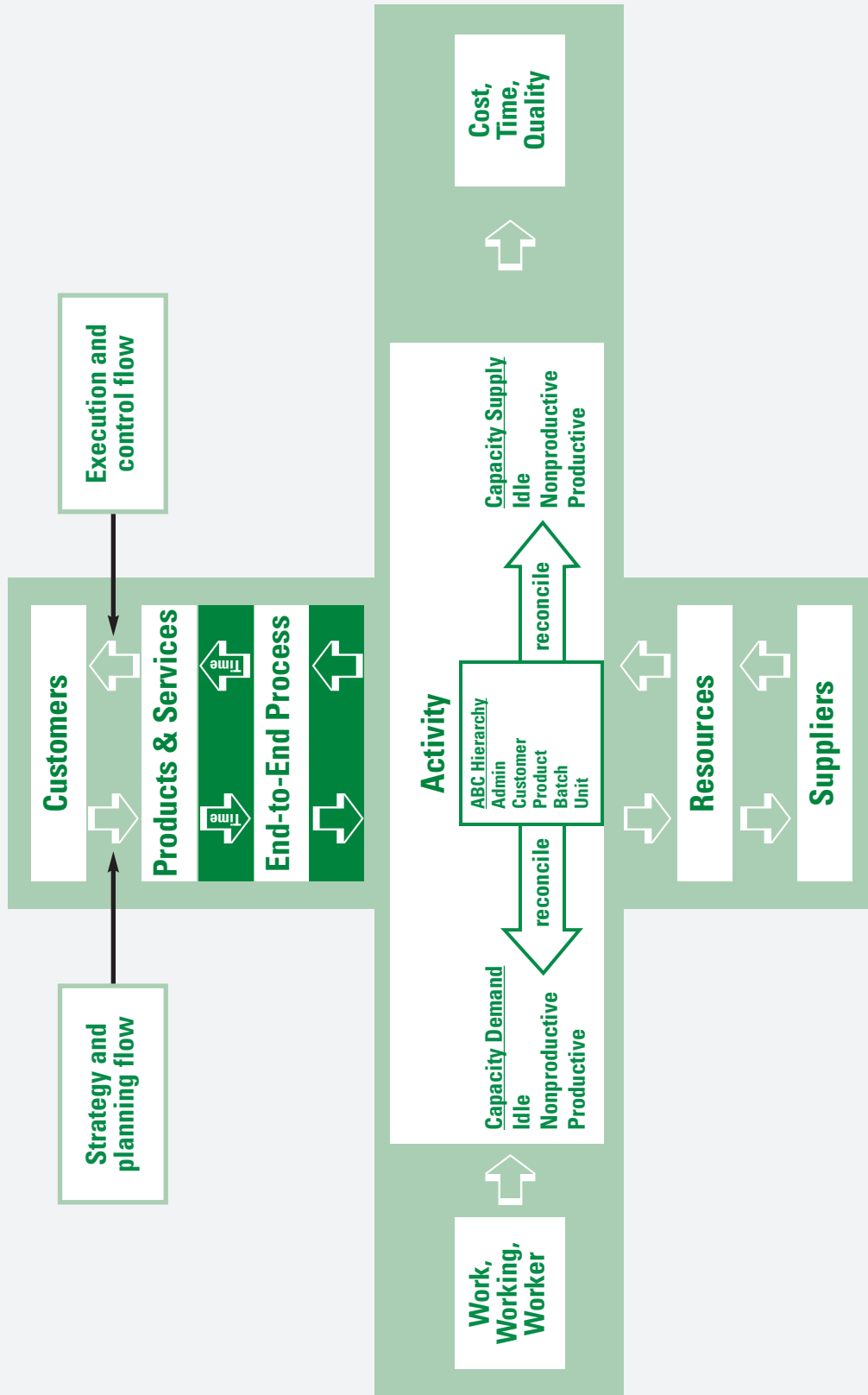
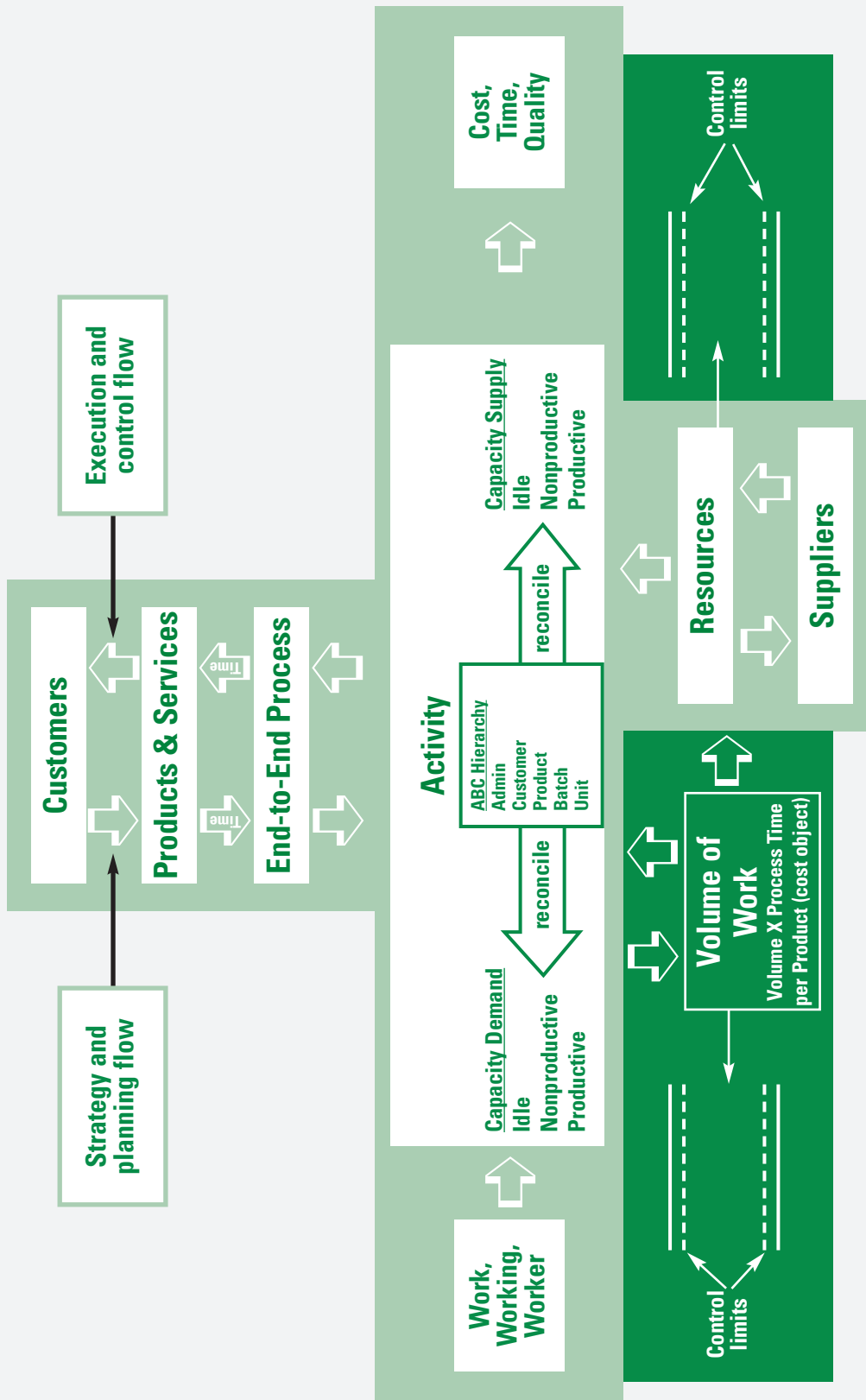


Figure 10: REQUIREMENT FOR CONTROL



ty, where there can be many different parts and many different recipes with many different process times, using time is probably the only way to minimize cost subsidies. In a managed process, the time demanded for each activity will be available in work standards and machine activities. The supply of time to do work will be available in staffing or capacity data that will also include time unavailable for work such as meetings and training as well as idle time. Figure 9 includes time as a dimension in the model.

### CONTROL AND FEEDBACK

A plan without follow-up is no plan at all. A standard without comparing actual to the standard is not very useful. Therefore, control charts should be created to monitor monthly volumes, related process time, and resources compared to the strategic values in the ABC computations. These control charts are the ABC versions of volume and spending variances. If constructed correctly, the control charts can assist the ABC team to do the following: avoid chasing normal month-to-month variation, identify variances that do require investigation, and provide early-warning signs that the ABC cost used in decisions may need an update in the near future. An important design requirement for control is that data in the control charts should be input and *not* output data. Figure 10 includes the data control charts aligned with the input data.

### INFORM THE DECISION MAKERS

The different activity-based costing models we have presented could help both process and functional managers across the organization. Built upon the original ABC Cross, the different versions of the comprehensive ABC model can help managers understand how their decisions influence the model and, in turn, how the model is likely to influence their decisions.

If the models are a subset of an integrated ABC model, the related decisions will have a higher probability of working in concert. For example, Figure 10 provides a model for the cost-measurement design team to help them focus on the necessary elements to create a controlled cost model based on operational data that will reveal customer and product profitability. The model in Figure 3 is useful in depicting the relevance of the cost-

measurement model to supply chain management. This model highlights the relationship between suppliers and customers. Figures 4, 6, 8, and 9 are useful from an industrial engineering perspective. Figure 4 provides an instrument to discuss the information needs for operational planning, control, and execution. Figure 6 focuses on capacity. Figure 8 illustrates a relationship between operational components of productivity and the cost model. Figure 9 highlights time as an element in the use of capacity utilization. If the emphasis is on cost relationships for volume pricing strategies, Figure 7 is particularly useful. For an organization that manages from a process perspective, Figure 5 captures the importance of processes in the cost-measurement model. Figures 2 and 3 are representations that could be useful in depicting the value of an ABC cost-measurement model to senior management. Figure 1 provides historical context. The model was an important catalyst for cost-measurement teams to increase their awareness of the activity and the need for activity optimization.

Different decisions need different data. Decisions also need an integrated framework to ensure a common focus on organizational optimization. The models we presented here help give the decision makers important information and provide a common structure for decision making. ■

*K. J. Euske is professor of management control and accounting at the Naval Postgraduate School in Monterey, Calif. You can reach Ken at (831) 656-2860 and [euske@nps.edu](mailto:euske@nps.edu).*

*Alan Vercio works at Bank of America in Charlotte, N.C., where he is responsible for building operational data requirements and processes in support of cost and profit measurement. You can reach Alan at (704) 388-4712 and [alan.vercio@bankofamerica.com](mailto:alan.vercio@bankofamerica.com).*

### ENDNOTES

- 1 K. J. Euske, "Activity Costing: A Historical Perspective," in *Implementing Activity-Based Costing* by Frank Collins, Executive Enterprises Publications Co., Inc., New York, N.Y., 1991; H. Thomas Johnson and Robert S. Kaplan, *Relevance Lost: The Rise and Fall of Management Accounting*, Harvard University Press, Boston, Mass., 1986.
- 2 Robin Cooper, "Cost Classification in Unit-Based and Activity-Based Manufacturing Cost Systems," *Journal of Cost Management*, Fall 1990, pp. 4-14.
- 3 Norman Raffish, interview, March 6, 2006.

- 4 W. Ross Ashby, "Principles of the Self-Organizing System," in *Principles of Self-Organization*, Heinz von Foerster and George W. Zopf (eds.), Pergamon Press, New York, N.Y., 1962, pp. 255-278.
- 5 Peter F. Drucker, *Management: Tasks, Responsibilities, Practices*, Harper Business, New York, N.Y., 1974.
- 6 Paul Sharman, "ABC Systems Architecture," *CMA*, May 1998, pp.15-19.
- 7 Robin Cooper, pp. 4-14.
- 8 Peter Drucker, p. 180.
- 9 W. Edwards Deming, "On Some Statistical Aids toward Economic Production," *Interfaces*, 5 (4), pp. 1-15.
- 10 CAM-I Capacity Interest Group, *Capacity Measurement & Improvement, A Manager's Guide to Evaluating and Optimizing Capacity Productivity*, Irwin, Chicago, Ill., 1996.

Copyright of *Management Accounting Quarterly* is the property of Institute of Management Accountants and its content may not be copied or emailed to multiple sites or posted to a listserv without the copyright holder's express written permission. However, users may print, download, or email articles for individual use.