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The Association of Accountants and Financial Professionals in Business

Costing System Attributes that Support Good Decision Making

Statement on Management Accounting

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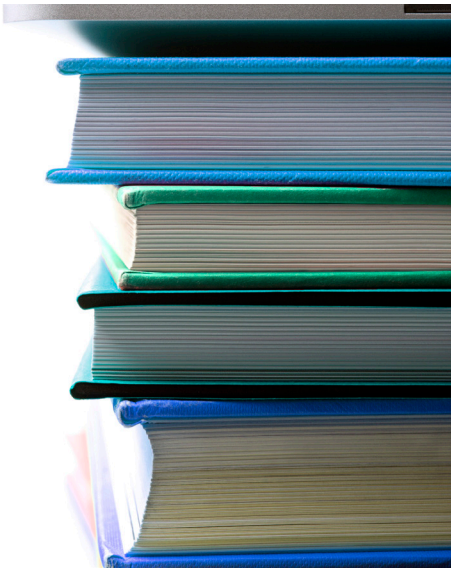

IMA, named the 2017 and 2018 Professional Body of the Year by *The Accountant/International Accounting Bulletin*, is one of the largest and most respected associations focused exclusively on advancing the management accounting profession. Globally, IMA supports the profession through research, the CMA® (Certified Management Accountant) and CSCA® (Certified in Strategy and Competitive Analysis) programs, continuing education, networking, and advocacy of the highest ethical business practices. IMA has a global network of more than 125,000 members in 150 countries and 300 professional and student chapters. Headquartered in Montvale, N.J., USA, IMA provides localized services through its four global regions: The Americas, Asia/Pacific, Europe, and Middle East/India. For more information about IMA, please visit www.imanet.org.

About the Authors

IMA's Managerial Costing Task Force is committed to (1) increase awareness that the costing practices of many organizations are deficient and (2) close the gap between the demand for, and the supply of, quality managerial costing models and solutions. To this end, the Task Force founded the Center for Managerial Costing Quality (www.thecmcq.org) to:

- Establish managerial costing as a specific function and discipline within the accounting profession with distinctly different principles and requirements from those used for external financial reporting;
- Develop tools to help organizations evaluate and improve their managerial costing systems;
- Serve as a resource for guidance on how to improve decision making in organizations using better costing systems; and
- Engage the broader business community to raise awareness of the need to design and implement better costing solutions.

The members of the task force are Raef Lawson (chair), Gary Cokins, Doug Hicks, Kip Krumwiede, Monte Swain, and Larry White.

Statements on Management Accounting

SMAs present IMA's position on best practices in management accounting. These authoritative monographs cover the broad range of issues encountered in practice.

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Executive Summary

This Statement on Management Accounting (SMA) provides insight and guidance into how management accountants can expand their role as business partners and strategic advisors in an increasing digital economy or Industry 4.0 environment that places a premium on extracting value from data and connectivity throughout the organization. Managerial cost modeling at a higher level can improve the visibility and connectivity of operational and financial data through causal modeling focused on decision support throughout the organization. It provides additional depth and practicality to the 10 cost modeling concepts presented in the IMA® (Institute of Management Accountants) Conceptual Framework for Managerial Costing (CFMC). This SMA provides a practical evaluation tool for assessing or developing managerial costing for internal decision support. The primary uses of this SMA are (in order of importance):

1. To assess the level of internal decision-support cost information needed from each of the 10 cost modeling concepts to enable managers to meet their organization's goals and objectives.
2. To evaluate an organization's current managerial costing capability and identify areas of cost modeling it should enhance to improve decision-support information.
3. To evaluate managerial costing solutions, such as software and methodologies, to see if they match an organization's information and decision-making needs.

> Cost modeling for internal decision support has long been an underserved function for the finance function.

Cost modeling for internal decision support has long been an underserved function for the finance function. Numerous costing approaches and methodologies have emerged and become victims of hype and over-promotion. This has happened because foundational principles for managerial costing (i.e., costing for internal decision support) were never established by the accounting profession. IMA is addressing and rectifying this situation by developing the CFMC (which establishes governing principles, concepts, and constraints for cost modeling for internal decision support) and related implementation guidance.

As you review this document, think about the information your organization lacks or the information that you need to assign an analyst to research in order to obtain. Think about the decisions managers throughout the organization need to make day to day and week to week to contribute to achieving organizational goals. How much more effective would your organization be if its costing system had an adequate level of sophistication for each of the concepts most critical to those decisions? By employing the concepts in this SMA, along with those in the companion SMAs, you will be able to develop an effective costing system for your organization.

Introduction

The purpose of this Statement on Management Accounting (SMA) is to enable management accountants and others to assess their organization's cost model for its capability to provide internal decision-support information based on the 10 modeling concepts presented in the IMA® (Institute of Management Accountants) Conceptual Framework for Managerial Costing (CFMC).[1] This assessment will guide management accountants and others as they:

1. Assess the level of internal decision-support cost information their organization needs from each of the 10 cost modeling concepts to enable managers to meet their organization's goals and objectives.
2. Evaluate an organization's current managerial costing capability and identify areas of cost modeling the organization should enhance in order to provide better decision-support information.
3. Evaluate managerial costing solutions, such as software and methodologies, to see if they satisfy an organization's information and decision-making needs.

A companion SMA, *Developing an Effective Managerial Costing Model*,[2] provides additional explanation and methodology for developing and implementing a managerial costing model that aligns with an organization's strategic goals.

Overview of the Conceptual Framework for Managerial Costing

Managerial costing is done purely for internal use to ensure that decision-support information reflects the characteristics of the organization's resources and operations and meets the needs of the organization's decision makers. Managerial cost modeling provides a monetary representation of the organization's resources, processes, and the products, service lines, channels, and customers that consume resources. IMA's CFMC outlines the principles, concepts, and constraints necessary for effective managerial cost modeling. This SMA focuses on the 10 modeling concepts contained in the CFMC.

The CFMC does not consider or address cost accounting in support of external financial reporting or Generally Accepted Accounting Principles (GAAP) used for regulatory and statutory compliance reporting for government agencies and the investment community. The Framework is not a specific costing approach. Rather, it provides a principle-based means for evaluating, comparing, selecting, implementing, or designing a costing solution to meet an organization's decision-support needs.

[1] Larry R. White and B. Douglas Clinton, *Conceptual Framework for Managerial Costing*, IMA, 2014, bit.ly/2W1iSzS.

[2] IMA Managerial Costing Task Force, *Developing an Effective Managerial Costing Model*, IMA, 2019, bit.ly/2Xam519.

The Critical Role of Causality

The guiding principle for modeling operations—and hence costs—for internal decision making is *causality*, the relationship between a cause and its effect. This principle is essential to designing and building a managerial costing model for decision support. The model designer must start with the resources required for performing operations and how those resources drive the incurrence of costs through the cause-and-effect relationships that exist within the business. Managers in an organization make decisions about the resources (for example, the uses of existing or new machines or people), which subsequently create a monetary impact, or they seek to adjust the level or type of resources to create a particular monetary outcome (for example, less resource use and lower costs for a process). Therefore, for internal decision making, costs must reflect the resources that cause those costs to be incurred.

> The guiding principle for modeling operations–and hence costs–for internal decision making is *causality.*

The CFMC identifies 10 key concepts that should be considered in creating a causal managerial costing model. This SMA uses these concepts to structure an assessment of the causal decision-support information provided by an organization's current cost model. The assessment is also useful for identifying areas for improvement and for gauging potential costing methodology and/or software solutions.

The concepts that support causality are listed in Table 1 along with their descriptions (see page 4). For a more detailed discussion of the concepts and their formal definitions, see the CFMC SMA.

Table 1: Modeling Concepts Supporting Causality	
Concept	**Description**
1. Resources	The Resources concept is defined to focus attention on the source of all costs for an organization–the resources it has acquired/employed and uses (or could use) to create value.
2. Managerial Objectives	A specific result or outcome that management plans to achieve. The goal is to have a managerial costing system that provides information on all the intermediate and final managerial objectives needed to achieve management's strategic objectives.
3. Cost	A monetary measure of (1) consuming a resource or its output to achieve a specific managerial objective, or (2) making a resource or its output available and not using it.
4. Homogeneity	A characteristic of one or more resources or inputs of similar technology or skill that allows for their costs to be governed by the same set of determinants in a nearly identical manner.
5. Traceability	A characteristic of an input unit that permits it to be identified in its entirety with a specific managerial objective on the basis of verifiable transaction records.
6. Capacity	The potential for a resource to do work. Capacity describes the limits and nature of a resource's contribution to achieving managerial objectives.
7. Work	A measure of the specific nature of units of resource output. The effective modeling of work requires the use of resource quantities to maintain traceability of the resource capacities throughout an enterprise model.
8. Responsiveness	Captures the nature of cause-and-effect relationships, which can be fixed, proportional, or a combination of both in relation to output. The cost model must reflect the responsiveness of inputs (and hence their costs) to outputs to enable accurate marginal cost information.
9. Attributability	Defines how weak causal relationships are modeled. Weak causal relationships and their costs can distort cost information and impair managerial decisions if they are allocated (mixed in with strong causal assignments).
10. Integrated Data Orientation	Operational and financial data is readily available to be accessed and aggregated to a variety of different views. A major advantage of this concept is the timeliness of relevant information.

Modeling Constraints

The application of these concepts supporting the principle of causality is subject to constraints that serve as boundaries to how diligently a concept can be applied. Table 2 identifies the constraints that apply to managerial cost modeling and the application of the principle of causality. Definitions are included, but for a more complete explanation, refer to the CFMC SMA.

Table 2: Modeling Constraints

• **Objectivity:** A characteristic of a cost model that shows it to be free of any biases.
• **Accuracy:** The degree to which managerial costing information reflects the concepts you intended to model.
• **Verifiability:** A characteristic of modeling information that leads independent reviewers to arrive at similar conclusions.
• **Measurability:** A characteristic of a causal relationship enabling it to be quantified with a reasonable amount of effort.
• **Materiality:** A characteristic of cost modeling that would allow for simplification without compromising managers' decision-making needs.

Levels of Decision Support

The level of decision support, reflected in the sophistication of cost modeling, necessary to support managerial costing and internal decision making in an organization needs to reflect the nature of the operations, the business environment, and the strategic goals of the organization. For example, a stand-alone retail outlet needs relatively low sophistication in its cost modeling. A vertically integrated retail business that operates warehouses, transportation equipment, and both business-to-business (B2B) and business-to-consumer (B2C) functions requires much more sophistication.

Numerous factors impact the level of decision support that an organization needs in its managerial cost modeling. For example:

- Types of decisions needed to execute company strategy.
- The complexity of its product portfolio (such as the number and variations of products or services).
- Gross profit margin on products, services, and/or customers.
- Complexity of its production or service delivery processes.
- Number and nature of customers and distribution channels.
- Size/complexity/nature of its capital investment.

These factors are explored in more detail in the IMA SMA *Developing an Effective Managerial Costing Model.*

A single sophistication level across all the concepts supporting cost modeling/causality is unlikely to fit most businesses. The sophistication level will normally vary by the individual concept. For example, it is obvious that capital-intensive businesses will need to focus on capacity management, but human resource-intensive businesses also need better capacity information to identify optimization and improvement opportunities by focusing on a flexible and fungible workforce.

Defining Levels of Decision Support

Each modeling concept describes an aspect or element necessary to create a cost model that seeks to incorporate the principle of causality. To define decision-support levels for each concept, the assessment is divided into six levels:

0. **Nonexistent:** The modeling concept is not addressed.
1. **External reporting only:** The organization employs the modeling concept solely focused on complying with GAAP for external financial reporting and regulatory compliance. The cost model is typically a simplistic traditional standard or normal costing application, which is often embedded in the general ledger (GL) accounting system.
2. **Simple:** The organization's use of the modeling concept still has a primary focus on complying with external financial reporting requirements, but the model is somewhat more focused on also providing senior management a sense of financial control over the organization's primary value-creating operations. The cost information is rarely used by operational managers and personnel.
3. **Low sophistication:** The modeling concept is integrated into the financial planning and analysis (FP&A) system in an effort to exercise more management control over operations. The cost model is still primarily a financial accounting view of operations and not widely accepted by operational personnel as valid or useful.
4. **Sophisticated:** The modeling concept is linked to the company's strategy and decision needs and diverges from a purely financial accounting reporting perspective. The organization's cost model uses more sophisticated standard costing or advanced costing methods such as homogeneous cost pools, activity-based costing, resource-based costing, and so on. Nonfinancial operational and financial cost information are somewhat integrated. Sophisticated cost modeling may be limited to high-cost areas of the organization.
5. **Highly sophisticated:** The modeling concept forms part of a strong quantity-based causal operational model comprising of the organization's resources and their consumption to intermediate and final cost objects/managerial objectives. It goes beyond costing to allow simulations and what-if scenarios to project and estimate

the level and types of resources and the total unit-level costs of the outputs (such as products). Operational and cost information are highly integrated and reflective of the quantitative cause-and-effect relationships that managers are required to change/influence when making decisions. These models do not use weak or noncausal relationships in a manner that distorts decision-support information.

Levels of Decision Support for Each of the Modeling Concepts

This section identifies the levels of decision support for each of the 10 concepts in full. The appendix at the end of the document provides an abbreviated tabular guide to the levels of sophistication for each of the concepts.

Elements of an Enterprise's Operational Model: Resources and Managerial Objectives

Concept 1—Resources: *The Resources concept is defined to focus attention on the source of all costs for an organization—the resources it has acquired and uses (or could use) to create value.*
Discussion: Resources include the people, machines, buildings, information technology, raw materials, and intellectual property developed internally. Most resources require inputs from other resources to function and create output, and these inputs and outputs must be measured and their consumption modeled initially in nonfinancial, operational quantities. The critical element to understand in evaluating the Resources concept is that operational quantities need to be modeled before they are represented in monetary terms (i.e., cost information). Only in this way can costs or any financial representation truly be reflections of an organization's resources and how they are consumed in its processes. The levels for this concept are based on the extent to which monetary information reflects a detailed causal operational resource quantity model of the organization.
Decision Support Levels for Resources:
Level 0. Nonexistent: Resources are not identified, grouped, or measured.
Level 1. External reporting only: GL accounts are equated with resources. These resource expenses are aggregated into broadly defined pools (for example, direct labor, direct material, overhead, and so forth). Resource quantities and capacities are not directly linked to these pools. The primary purpose of the cost model is complying with external financial reporting standards. Examples: • The use of customer service resources is not tracked. Costs of these resources are included as part of a large cost pool and treated as a period cost (for example, a customer service account).

- A robot acquired to manufacture products requires input from other resources such as a building, operators, maintenance services, maintenance parts, electricity, gas, consumables, and so on. Each of these resource costs is charged to general overhead cost accounts and allocated to products or service lines using a volume-based allocation metric such as direct labor or machine hours.

Level 2. Simple: Resources are grouped into functional cost pools (such as departments or processes) with the primary purpose of complying with GAAP and external financial reporting standards. The system provides basic information to operating managers by department. The operational quantity information used by the model is still basic but may use different allocation bases for different departments. Resource operational quantity information may be maintained for the largest resources but are not tied to the allocation of overhead costs.

Examples:

- The use of customer service resources is tracked (for example, the number of customers assisted and average call time). Costs of those resources are included as part of the customer service department cost pool and may be allocated for specific decision needs (such as allocating cost to customer segments based on the number of calls).
- The more significant robots and other required resources are grouped by department, the related costs are charged to those departments, and the related costs are then allocated to products or services using allocation bases chosen for each department (for example, the number of machine hours for the cutting department and the number of direct labor hours for the assembly department).

Level 3. Low sophistication: Managerial costing information has been refined to create a detailed level of resource costs in critical process areas for individual managers' and specific areas of responsibility. There is more detailed visibility in high-cost areas in the organization's processes (typically, production or service delivery operations) than in lower-cost areas (typically, administrative and support areas). The cost model is primarily a financial model that is not based on a model of the organization's quantitative consumption relationships. Special onetime cost-finding studies and analyses are required to obtain detailed resource cost and consumption information for some decisions. They may use a more advanced standard or normal costing system or some level of method-centric costing (such as activity-based costing, throughput accounting/Theory of Constraints, Lean accounting, and so on) in an effort to provide more information to operating managers. Resource quantities and capacities in critical process or bottleneck areas are linked to related cost pools.

Examples:

- The customer service department tracks call length and frequency by customer, customer categories, and problem categories. To determine the cost impact of any given scenario requires a special costing study, since costs are not collected or generated by the same categories. The customer service call is not able to be associated with follow-up repairs or returns.
- A manufacturer tracks direct labor, direct machine hours, direct material, and numerous categories of fixed and variable overhead to support product cost/inventory valuation. It provides variance reporting to operating managers, but the reports are not widely understood or used.

- A manufacturer has begun tracking the time associated with all activities for two large bottleneck machines in the cutting department and is conducting an activity-based costing analysis to understand utilization and costs, and to maximize productive time.

Level 4. Sophisticated: Level 5 (see below) is applied to high-cost areas of the organization (typically, service delivery or production) and supports many decisions for these areas, but not all parts of the organization are modeled.

Examples:

- A manufacturer maps out the detailed flow of inputs and outputs in operational quantities for detailed resources and resource pools on the factory floor and collects costs that reflect the operational quantities. But not all inputs from customer service and other nonproduction departments are included in the model.
- A consulting company rigorously tracks the time and generates the cost of managers and personnel assigned to customer projects and their use of company resources such as computers, software, specialist research, and so on. But organizational support resource costs are assigned to a single overhead pool and allocated by customer billings.

Level 5. Highly sophisticated: Resources are grouped to satisfy the Homogeneity concept (see the "Homogeneity" section of this SMA) consistently for individual managers' areas of responsibility. Each of these cost pools of grouped resources has a quantitative output measure and records all input quantities in order to generate an organization-wide network of planned outputs, the resources consumed in operational quantities, and their costs. Planned resource output quantities and capacities are used to determine resource cost rates that are then evaluated against actual performance based on the actual output generated and the actual input quantities consumed and their costs. This quantity-based approach to resource modeling is applied across the total organization—operational, support, and administrative—subject to the materiality constraint.

Examples:

- A company tracks how customer service representatives spend their time assisting individual customers and products. This information also includes the resource inputs that support the customer service representatives such as IT, floor space, utilities, etc. The customer service resource output information is connected with other resources such as sales personnel, repair personnel, returns, warranty repairs, and other resources used to resolve customer problems.
- A machine maintenance shop is defined as a resource pool with machine maintenance hours (both planned and actual) as its output. Resources such as the maintenance supervisor, technicians, and test equipment are included in that resource pool. Other inputs to the machine maintenance pool may be building space, utilities, procurement support, etc. The resources of and inputs to the machine maintenance pool are then connected to downstream consumers of the machine maintenance pool's output. The model for this resource is built based on historical (known) consumption relationships and resource supply (capacity). Once constructed, the model can be flexed for actual levels of output, and actual performance is then compared to flexed standards in both operational and financial terms.

Concept 2—Managerial Objectives: *A specific result or outcome that management plans to achieve. The goal is to have a managerial costing system that provides information on all the intermediate and final managerial objectives needed to achieve management's strategic objectives.*

Discussion: Achieving managerial objectives is the reason for employing resources that produce outputs. Managerial objectives can be an organization's final outputs and its many intermediate outputs. The goal is to have a managerial costing system that provides information needed to achieve management's strategic objectives. Advanced organizations define and track more granular levels of managerial objectives, which makes the information more relevant and useful for internal managers' use. The levels for this concept are based on the extent to which managerial objectives are defined and used. There are many levels of managerial objectives, such as intermediate, product/service line, customer-related, or business-sustaining.

- Intermediate managerial objectives range from keeping the building clean to producing a major component for a product.
- Salable (or deliverable for not-for-profit organizations) products and services are final managerial objectives as they represent the value the organization creates for use by others (for example, customers and citizens).
- Customer-related objectives capture delivery/service costs to specific customers or market segments (often called cost-to-serve).
- Business sustaining-level managerial objectives capture resource costs that have weak or no causal relationships to final salable or deliverable managerial objectives. Examples include the costs of the public relations office, possible environmental impact efforts, and possible social responsibility or charitable efforts. Weak and noncausal costs should not be traced to product, service, or customer costs, but need to be considered in establishing a target profit margin or markup.

Decision Support for Managerial Objectives:

Level 0. Nonexistent: No managerial objectives beyond "making money" at the legal-entity level are identified in the cost system.

Level 1. External reporting only: Managerial objectives are defined only in broad financial reporting terms such as product and service-line costs, selling, general and administrative (SG&A) costs, a plant or location, or a business unit. Organizational planning and budgeting is a top-down process. It relies entirely on traditional financial accounting and external reporting for management information. Managerial objectives are defined by income statement categories and some level of underlying GL detail that will reflect (1) product/service costs for external financial reporting or (2) an annual budget or forecast based on the major organizational components for budgetary purposes (usually as they can be facilitated in the GL structure). Level 1 organizations do not have flexible budgets and are at risk to miss growth opportunities due to fixed budget constraints.

Examples:

- A managerial objective may be a budget target for SG&A expenses broken down by major department such as marketing, sales, finance, human resources (HR), and so on.
- A managerial objective may be the budgeted product cost, service cost, or the cost of a project.

Level 2. Simple: Managerial objectives are still financial targets but are disaggregated into responsibility areas or cost centers for higher-cost areas only. There is no integration with planning/budgeting and no integrated performance management and reward system. The budget, if it exists at the managerial objective level, is dictated top-down.

Examples:

- In SG&A areas, the managerial objective is the same as Level 1; however, if marketing is a high-cost area, there may be an objective set for spending on each of the major products or services.
- In production operations, managerial objectives may be set for spending by major cost centers such as materials management, major production centers, packaging, distribution, and various production support cost centers.
- In service delivery, objectives may be cost targets for various labor categories, travel, subcontracted resources, and miscellaneous expenses.

Level 3. Low sophistication: Intermediate managerial objectives are established below the final product or service cost level. Managerial cost information has been refined and disaggregated to support intermediate managerial objectives. Support and administrative areas may be disaggregated to organizational elements and a few key managerial objectives by process. The level of detail is more sophisticated for high-cost areas of the organization. Organizational planning/budgeting is often not integrated into the costing system. Managerial objectives are defined with financial objectives that may not match the underlying resources used. There are attempts to integrate performance management and the reward system into planning/budgeting and managerial accounting, but the landscape is one of many moving parts rather than a well-integrated management model.

Examples:

- Level 3 organizations have developed responsibility centers and set financial objectives within their organization that encompass some intermediate managerial objectives in higher-cost areas (for example, a managerial objective for the cost of major subcomponents). These organizations may have a cost system that seeks to provide "management control" for operating or production managers that links to external financial reporting.
- Level 3 organizations may lack operational data systems and seek to control and evaluate operations using financial systems; alternatively, they may have sophisticated operational systems and be struggling with conflicting information (and decisions) between the operational and traditional financial accounting/reporting systems.

- Level 3 organizations may have a large FP&A function that does special studies and analyses to determine a "true" or "relevant" cost (i.e., a cost other than what is provided by the traditional cost system focused on financial statements) for many types of decisions about managerial objectives. Level 3 organizations have recognized their need for more and better decision-support information, but they are not able to consistently and cost-effectively meet that need.

Level 4. Sophisticated: Managerial objectives have been refined to be consistent with the primary strategic objectives in high-cost areas of the organization, typically service delivery and production. Those objectives are tied to traceable and causal-supporting resources in quantitative operational and monetary cost terms.

Examples:

- Level 4 manufacturing organizations typically have sophisticated manufacturing enterprise solutions that establish quantitative operational objectives for all elements of production. A managerial costing system is in place for production that collects cost information to monetize these operational objectives. This level of system sophistication is limited to production.
- A Level 4 consumer goods retailer would systematically track financial and nonfinancial objectives associated with each marketing campaign—consumer views, customer click-throughs, customer orders, advertising costs, revenue, sales personnel activity and cost, customer satisfaction analytics, research costs, and so on. It may not track the cost of customer billing and collections, customer support calls, or other non-sales or marketing costs.

Level 5. Highly sophisticated: Managerial objectives are defined consistent with the organization's strategic objectives, its management model, the performance management and reward systems, and individual managers' responsibility areas across the organization. The model employs resources and processes-level managerial objectives, intermediate managerial objectives, final product/service managerial objectives, business sustaining-level managerial objectives, and market segmentation objectives. All managerial objectives are clearly tied to traceable and causal supporting resources in quantitative operational and monetary cost terms.

Examples:

- Level 5 organizations have defined managerial objectives for all levels of managers and supervisors, and these managerial objectives are expressed in both nonfinancial and financial terms. They are clearly identified in the managerial cost system and form an integral part of organizational planning and control. Managerial objectives are shown to consume causal operational quantities, which are valued with costs. The performance targets for each managerial objective can be flexed based on the level of actual output generated. For performance measurement purposes, the plan or budget continually adjusts (i.e., flexes) to eliminate volume variances based on the actual outputs generated.
- In Level 5 organizations, managers have clear insight into the quantities of resources applied to their managerial objectives, the capacities of their resources and supporting resources, and the fixed and proportional costs of those resources.

Characteristics of Resources and Managerial Objectives: Cost, Homogeneity, Traceability, Capacity, and Work

Concept 3—Cost: *monetary measure of (1) consuming a resource or its output to achieve a specific managerial objective, or (2) making a resource or its output available and not using it.*

Discussion: The Cost concept is fairly straightforward. Costs should be recognized as resources are used for the purpose for which they were hired or acquired. Costs should also be recognized when resources are not in use (idle or excess) or used for purposes other than what they were hired or acquired to do (training, maintenance, and so on). All costs should be represented clearly for decision making. Costs should be connected in quantitative cause-and-effect relationships to resources, processes, and products/services. This means the costs of not using resources (idle and excess capacity) should be recognized specifically and should not be allocated in a manner that distorts the causal costs of managerial objectives. The levels for this concept are based on the degree of quantitative cause-and-effect relationships of costs to resources, processes, and products/services that are measured and modeled.

Decision Support Levels for Cost:

Level 0. Nonexistent: Costs are highly aggregated in GL accounts and do not relate to specific resource capacity and outputs.

Level 1. External reporting only: Costs are still highly aggregated in GL accounts and are difficult to relate to specific resource capacity and outputs. Production and service delivery costs are fully absorbed to salable products or services. Other costs are collected by department and assigned to income statement categories. Causal operational and quantitative relationships are defined only to the extent required for financial reporting compliance, typically as general allocation drivers that do not represent strong causal relationships. There is no separation of costs into direct and indirect.

Examples:

- Level 1 organizations have cost systems that collect costs in large cost pools and use a highly generalized allocation metric to spread the costs to a limited number of managerial objectives—typically, salable products or services and income statement SG&A categories. Cost classification follows GAAP and meets the minimum requirements for external financial reporting. The cost model is focused purely on financial reporting with GL accounts representing large pools of resource expenses. An accurate causal reflection of resource usage is not incorporated into the model. Variance analysis, if done at all, is simplistic.
- Accounting department costs are collected in the GL account and assigned to the income statement SG&A account. The head count, computer resources, and work processes are not modeled or represented in any way.

Level 2. Simple: Costs are separated into direct and indirect categories for high-cost areas, typically production or service operations. Other costs are categorized by departments and assigned to income statement categories. Indirect expenses are allocated to products

or services using a single overhead rate (often referred to as a "burden rate") based on a single volume-based metric only (such as number of direct labor hours, machine hours, or units produced). The denominator used to compute the overhead rate is based on expected usage, not capacity. Therefore, the cost of unused resources (idle and excess capacity) is allocated to products. Variance analysis is done on production and service delivery costs, but it is not used at an organizational level due to its weak reflection of operations.

Examples:

- Accounting department costs are divided into three GL accounts—CFO discretionary, financial reporting and control branch, and accounting operations branch. The head count, computer resources, and work processes are not identified except as part of the total cost. The three GL accounts are consolidated into SG&A on the income statement.
- Production collects direct labor and materials cost that includes all labor costs designated as direct labor and all material entering the plant. Indirect costs are collected in a large pool and allocated based on direct labor to various products. Basic variance analysis is done.

Level 3. Low sophistication: In high-cost areas of the organization, normally production or service delivery, GL accounts are constructed to correspond to resource groupings with similar outputs. As a result, the allocation drivers reflect the output measures more closely, and the costs more accurately reflect resource use and the work resources perform. Yet the cost of not using resources (idle and excess capacity) is not reported as a separate line item. A greater level of causality and resource information is captured by a Level 3 cost model, but the emphasis is still on financial reporting requirements, and causality is not the guiding principle for cost information. The benefits from the creation of excess capacity through efficiency improvements are often apparent in operational systems, but not in financial systems. In low-cost areas, typically administrative or sales areas, budgets may be controlled at the supervisory level that approximate resources, outputs, or processes. These low-cost areas are generally evaluated only at the department level.

Examples:

- The accounting and finance department's accounting operations branch expenses are collected by four cost centers: accounts payable, accounts receivable/invoicing, collections, and travel. Operational quantities and performance metrics on outputs are occasionally collected and evaluated. The department's costs are consolidated into SG&A on the income statement.
- The production department collects direct labor by five production process teams, collects machine time from each of the five teams, breaks down indirect labor by four support teams, and collects other expenses from each production and support team. Operational quantities and performance metrics are collected and in place for each team, but the product costing model (which is also used for financial reporting) does not reflect or easily match the operational information collected.

Level 4. Sophisticated: Costs more clearly reflect resource use and the work performed by each resource. Both volume and nonvolume cost drivers are used in a simple activity-based costing model. Aggregated estimates of the cost of idle capacity are captured and reported for major resource pools as a separate line item.

Example:

- Most operational departments of the business have identified their key outputs and constructed quantitative operational and cost models to identify the quantity of resources applied and the cost of those outputs. Idle and excess capacity are identified in most components of these models. The cost models focus on the higher-cost, operational elements of the organization that do not extend resource quantity tracing throughout the organization. For example, the finance and accounting department's collection costs are not modeled as part of a comprehensive product or customer cost.

Level 5. Highly sophisticated: Costs clearly reflect resource capacity use and nonuse and are identifiable to specific resources and managerial objectives. In organizations with this level of sophistication, causality of the underlying resource quantities and relationships governs cost modeling. Quantitative causal relationships underlie all strong causal cost assignments. Idle capacity costs and other weak causal costs are identified in all areas of the organization and are assigned to appropriate and actionable managerial objectives in a manner that does not distort or negatively impact decision making.

Examples:

- Level 5 organizations have systems in place that track the use of resources to specific consumers of their output (other resource pools, products, external customers, and so on) and to specific managerial objectives. Cost data is logically connected to resources, processes, and products/services so managers and employees are continuously aware of how their performance is impacting the organization's value-creation abilities. The primary purpose of the costing system is to support the organization's internal decision making through cause-and-effect insights into required quantities of resources and their costs. Excess and idle capacity, including in support areas, is readily identifiable and does not distort decision making.
- The accounting operations branch of the accounting and finance division tracks the resource quantities and costs for each team. It has established standard resource quantities and costs for each key output that are regularly evaluated against actual performance. Accounts payable and travel processing are causally assigned to consuming internal resource pools by payment. Accounts receivable and collections are tracked as a customer-specific resource use and cost; they are integrated with sales resources and costs and some distribution resources and costs that are also categorized and collected by customer. Excess/idle capacity is assigned to business-sustaining costs identified with the organizational element.

Concept 4—Homogeneity: *A characteristic of one or more resources or inputs of similar technology or skill that allows for their costs to be governed by the same set of determinants and in an identical manner.*

Discussion: The critical aspect of homogeneity is grouping resources in a manner that maximizes managerial information, simplifies the cost model, and minimizes distortion to the cost of intermediate and final outputs. The ideal way to model resources is individually; however, this is usually impractical to maintain and results in a highly complex cost model. Resources can be grouped by characteristics such as output, capacity, level of technology, and other appropriate characteristics without losing or distorting capacity management information, causal consumption insights, and related cost information. Achieving this is not an exact science but can be attained through thoughtful and logical analysis with an understanding of an organization's strategic goals and common managerial decisions throughout the organization.

Decision Support Levels for Homogeneity:

Level 0. Nonexistent: Resources are not categorized or grouped except as expenses or capitalized assets in the GL.

Level 1. External reporting only: Resources (production or support) are modeled into large cost pools based on very general categorizations such as organizational elements with direct or indirect costs that have the primary aim of regulated financial reporting compliance. This can involve collecting a wide range of production support costs into a single or limited number of overhead cost pools, and selecting a commonly accepted measure such as direct labor hours or production volume to allocate the overhead costs to products. Other organizational costs are treated as SG&A.

Examples:

- A manufacturing company has three labor GL accounts: administrative, direct production, and production support. All administrative labor goes to SG&A, direct production is allocated to products based on production hours for each product, and production support is allocated to production based on the percentage of each product's sales for a period.
- An air-conditioning installation and repair service-providing organization has three resource pools: administrative, service technicians and expenses, and job materials.

Level 2. Simple: Resources and costs are disaggregated into department or responsibility area cost pools for higher-cost areas only, such as production or service generation. The overall cost model is not based on an operational quantitative model of resources and operations.

Examples:

- A manufacturing company has established several cost centers in production and production support; for example, material movement, stamping, finishing, assembly, quality control, machine maintenance, packaging, and so on. Each cost center contains both labor and equipment costs. Stamping has a variety of equipment lines, some with old manual operation and some with new, automated equipment. Costs from each center are assigned to products with a single allocation driver defined for that center.

- An organization providing air-conditioning installation and repair services has cost centers for sales and marketing, administrative, service technician labor, service technician expenses, and job materials.

Level 3. Low sophistication: Resource and cost pools are more focused on a specific output or managerial objective. The model is limited to high-cost, resource-intensive areas in the supply chain of the organization, such as production or service generation. The overall cost model is not based on an operational quantitative model of resources and operations.

Examples:

- Building on the manufacturing example in Level 2, cost centers are established for each stamping line and each line contains equipment of the same age and technology. Labor cost is included in each stamping line machine cost center. Costs are assigned based on labor hours or machine hours consumed by each product. Other production and support cost centers are handled in the same way.
- Building on the air-conditioning installation and repair service-providing organization example, the organization has divided all of its cost centers, except administration, into an installation cost center and a repair/maintenance cost center.

Level 4. Sophisticated: There is a detailed level of resource cost pools for most areas of responsibility. Groupings are relatively homogeneous and generally driven by the same volume or nonvolume-based output measures. The overall cost model is based on an operational quantitative model for higher-cost resources and operations.

Examples:

- Building on the manufacturing example in Level 2, each step or cell in the production process has separate resource pools for labor and one or more resource pools for machinery based on the age, technology, or other critical characteristics. Each resource pool is tied to an organizational cost center and each resource pool is causally assigned to a product based on its output measure. Idle and excess time is not assigned to a product, but to a business level. Production support resource pools are defined in the same way but are assigned to the production (or other organizational) resource pools they causally support.
- Continuing this example for other areas of the manufacturing company, sales and marketing have a few resource pools: labor expenses and advertising contracts. The cost of labor expenses may be assigned to products or customers based on historical judgment about labor use. Advertising contracts are assigned to products based on the product family that benefited from the advertising. Other areas of the organization are grouped into organizational cost centers and treated as SG&A.
- Building on the air-conditioning installation and repair service-providing organization example, the company has begun to track administrative resources between the installation business and the repair business for functions like billing, collections, hiring actions, and purchasing.

Level 5. Highly sophisticated: Resource pools comprise resources grouped by their similarity in cost structure, capabilities (including level of technology), capacity, and outputs or managerial objectives (whether intermediate and/or final outputs). The homogeneity concept is consistently applied to all managerial objectives subject to the materiality constraint.

Example:

- Continuing the Level 4 example, sales and marketing have logically defined resource pools that may include labor grouped by their output to a product family or perhaps customer categories, travel by product family or customer categories, or advertising/marketing contracts grouped based on outputs to product families. These resources and costs are assigned to products, product groups, customers, or customer families. Additionally, the costs of resources in accounting and finance, HR, IT, and every other area of the company are divided into resource pools based on their outputs that are then mapped to the resource pools they support when a strong causal relationship exists. Where a causal relationship does not exist, they are assigned to an organization level as business-sustaining costs.

Concept 5—Traceability: *A characteristic of an input unit that permits it to be identified in its entirety with a specific managerial objective on the basis of verifiable transaction records.*

Discussion: The levels for this concept are based on the ability to assign costs based on a causal relationship. The Traceability concept focuses on a modeler's ability to track the flow of resource quantities as they move through processes as outputs and inputs. Traceability is evidenced by documented consumption transactions or operationally verifiable quantity flows. Traceability is first building an operational quantity-based model, then collecting and applying the cost data of those operational quantities and their flows. Traceability is evidence of a strong causal relationship, and such relationships should be represented whenever they are material and economically practical to represent. Satisfying the Traceability concept results in (1) a quantity-based causal model and (2) a high level of quantitative data integration between the costing system and operational systems. Cost models that are primarily for financial reporting purposes collect costs and allocate dollars based on generalized metrics. The main reason for this is that in the GL, dollars have been separated from their resource quantities, which were posted in the logistics or operations systems in the quantities purchased, warehoused, or consumed. Traditional practice by default indicates a low level of sophistication in utilizing traceability as a concept. See the sidebar "Traceability vs. Allocation."

Decision Support Levels for Traceability:

Level 0. Nonexistent: Costs are not traced to products or services at all.

Level 1. External reporting only: Most direct production or service delivery resource use is traced to products or services, and costs are assigned accordingly. Maintenance and support resource use and costs that can be traced are pooled, and the costs are allocated to final products and services. Other organizational costs are classified to broad income statement

Traceability vs. Allocation

The difference between *traceability* and *allocation* is important because, while these terms are often used interchangeably, they are at opposite ends of a scale from a cost modeling perspective. Traceable means the ability to assign costs based on a clear and verifiable quantitative causal relationship. Thus, it becomes a direct cost relative to what can be traceable. In contrast, allocation is an arbitrary or generalized spreading of costs when the link between resource quantities and their dollars have been lost, no traceable causal relationship exists, or a causal relationship is ignored. Under the CFMC, allocations are always viewed as creating distorted information. Pooling and allocating traceable costs using a general metric provides less causal insight than tracing. Allocating costs with weak or noncausal relationships to a managerial objective also distorts the quality of decision-support information.

Note that resources and costs with weak or noncausal relationships are handled by the Attributability concept.

categories such as SG&A, marketing, R&D, and so on. The cost model is essentially a GL-dominated financial model with limited nonfinancial or nonquantitative resource inputs. Level 1 organizations also normally have limited operational information systems supporting their value-creating activities.

Examples:

- A manufacturing organization collects only direct labor, direct material, other direct costs, and production overhead costs. Direct labor, direct material, and other direct costs are assigned based on traceable use. Production overhead is grouped as one large cost pool and assigned based on direct labor hours, even though traceable operational transactions may exist. All other organizational costs are collected as SG&A or another general category of period cost.
- A large customer service department of a telecommunications company keeps extensive records of the customers assisted, the service inquired about, the times of the calls, the resolutions, and so forth. Yet the information is never costed or used in evaluating customer or service pricing.

Level 2. Simple: Some indirect production or service resource costs are traced to products or services and the rest are traced to processes or departments and allocated to final products and services. Level 2 organizations have a significant gap in communications between finance and operations with each focusing on their own needs in relative isolation. This level of organization may have effective operational systems, but there is no integration with financial systems.

Examples:

- A manufacturing organization collects indirect production costs in numerous cost pools based on the organizational design (work teams) and functions (building maintenance, utilities, maintenance department, safety department, and so forth). Each cost pool is allocated to products based on a driver selected for that pool. Traceable information does exist for many teams and functions to support modeling a causal relationship from the indirect cost pools to direct cost pools, but causal relationships are not modeled.
- The large customer service department from Level 1 has its department cost allocated to major salable service categories based only on the call volumes for the service.

Level 3. Low sophistication: Traceability is increased for support resources (i.e., indirect expenses) closely involved in production or service delivery, and costs are assigned accordingly. High-cost SG&A resources may use some cost pools with specific output measures. The focus is still on final managerial objectives such as products or services. Intermediate managerial objective modeling is limited to financial statement or regulated requirements such as inventory valuation. Tracing resource use to business-sustaining managerial objectives is rudimentary or nonexistent. Operational system integration with the costing system for purposes of enhancing traceability is limited. The cost model does not achieve wide acceptance or use by nonfinancial managers. A Level 3 organization may have advanced operational control and information systems. Nevertheless, there may be tension between operational and financial systems and their respective users due to disparate information as perceived by operational areas.

Examples:

- Continuing the manufacturing example from Level 2, the indirect production resource and cost pools are assigned to direct production resource pools, and in some cases, directly to products, where there is a traceable causal relationship. Differences between operational system data and cost system data is starting to be explored and discussed. Sales and marketing have begun to collect resource use and cost data by product or customer to reflect traceable causal transactions, but the effort has not been formalized into a routine process or system. Administrative areas of the organization have not begun to examine traceable relationships, and all nonproduction expenses are still treated as a period cost and general income statement category.
- The large customer service department from Level 2 has its department cost allocated to major salable service categories. These categories are divided into two customer categories, business and individuals, based only on the call volumes for the service.

Level 4. Sophisticated: A fairly high level of indirect resources and expenses are traced causally using transaction data through the value chain from resource pool to intermediate outputs, and are assigned to final managerial objectives. Resource use that is not traceable due to weaker causal relationships is often simply allocated with the primary driver for a resource pool, particularly in administrative and sales/marketing areas. Excess/idle capacity in high-cost operational areas is being identified for analysis and decision making. In operational areas of the organization, alignment between the managerial costing information and operational systems is significantly improved.

Examples:

- In a manufacturing company, production, production support, distribution, sales, and marketing areas have established operational models and the vast majority of resources and costs are traced causally. Initial efforts to model finance, HR, and executive support areas are under way. Excess/idle capacity is identified in direct production resource cost pools and is assigned to the appropriate level of the organization clearly identified for evaluation. In other areas, weak or noncausal costs are "pushed" or allocated as burden rates.

- The large customer service department from Level 3 uses the operational data collected to divide its resource use into six categories of business customers, eight categories of individual customers, and 20 different salable service categories. Actual call time is compared to the capacity to take calls to evaluate capacity use and sufficiency. Each of these categories' costs are based on actual call lengths. Other operational statistics are kept on resolution success, customer satisfaction, call length trends, hold times, trends for calls for each service, and so on.

Level 5. Highly sophisticated: Resource use is traced using verifiable transaction data, and costs are then assigned accordingly to managerial objectives in the value chain—production/service, support, marketing, R&D, administrative, management, and so forth. Resource use that is not traceable due to weaker causal relationships is assigned using the Attributability concept. Level 5 organizations have a strong operational model of their resources and quantity flows that is based on cause-and-effect relationships. Traceability is applied where it exists to all material resource quantities. There is a high level of integration of traceable operational data into the costing system in Level 5 organizations. In fact, the costing system is often embedded in the operational systems.

Examples:

- In the manufacturing company example from Level 4, essentially all significant resource use is traced based on transaction data to products or other cost objectives. Excess/idle capacity is traced to the appropriate level of the organization clearly identified for evaluation. In other areas, weak or noncausal costs are assigned to general and administrative expenses.
- In the large customer service department, essentially all resource use is traced to the appropriate individual customer, customer segment, or service category based on actual call lengths or other more causal transaction data. Unused service capacity and other resource use that cannot be traced causally are assigned to noncustomer service costs.

Concept 6—Capacity: *The potential for a resource to do work. Capacity describes the limits and nature of a resource's contribution to achieving managerial objectives.*

Discussion: Evaluating capacity focuses on tracking capacity use (used or applied capacity) and nonuse (idle or excess capacity), first in terms of resource output quantities and then with monetary measures. Costs are applied using a capacity costing approach that does not significantly distort cost information. The CFMC recommends adopting a two-denominator model for capacity modeling:

- Theoretical capacity is used as the denominator to calculate fixed cost rates (capacity costs).
- Planned output is used as the denominator to calculate proportional (variable) cost rates.

The costs of unapplied capacity are assigned in accordance with the Attributability concept.

The rationale for using theoretical capacity in this two-denominator approach is that resources are available to the organization 24 hours a day or for the full period they are leased or contracted. During that time, resources are either productive, nonproductive, or idle. Resources are acquired or engaged for a productive purpose that achieves or contributes to the achievement of a managerial objective. A resource is productive when it is used for the managerial object for which it was acquired (or has been reassigned to achieve). Resources also require some level of maintenance, training, or other required nonproductive time to maintain productivity in the long run. Only productive time serves to apply capacity. Nonproductive time such as training or cleaning the shop reduces productive time and results in more expensive productive time or in costs being assigned to a business-sustaining managerial objective (such as corporate-directed training for broad social objectives). Nonproductive time should be optimized. Idle/excess time is unapplied capacity and occurs when a period of time is placed off-limits or there is no demand for output. Idle/excess capacity should be widely identified because it represents an opportunity to create more value with the same resources or potentially save some costs. Idle/excess capacity expenses cannot be validly traced to individual products or services, but they must be "covered" from the revenue of all products and services for the company to earn a profit.

It is important to recognize that the Responsiveness concept is a prerequisite for mature levels of capacity management.

Decision Support Levels for Capacity:

Level 0. Nonexistent: Resource capacity and utilization is not tracked at all and not considered in costing.

Level 1. External reporting only: Capacity is not considered in costing except to the extent required by financial reporting standards. All costs associated with resource capacities (including nonproductive and idle/excess) are pushed to final cost objects using a single denominator such as budgeted or planned output—that is, full absorption costing is practiced. Product or service unit costs fluctuate with production volume and product mix changes. Resource utilization is minimally tracked for external financial reporting needs. Nonfinancial data on resource capacities are ad hoc and not used by senior management. Level 1 organizations address capacity issues as they become obvious impediments to operations. The financial impact of including excess or idle capacity costs in product costs may cause managers to make bad competitive pricing and optimization decisions.

Examples:

- A manufacturing company has built a new plant that runs two shifts. It occasionally uses part of the third shift for expedited orders on overtime, but the third shift is normally used for cleaning and maintenance. All depreciation on the building and equipment and all utility expenses for the third shift is applied to overhead on the products the plant produces.
- A service-providing organization calculates its pricing by collecting all the organization's costs—direct, support, and administrative—then dividing it by an estimate of the number of service hours it expects to sell in the forthcoming period in order to achieve a desired profit.

Level 2. Simple: Level 2 organizations are beginning to implement capacity metrics by operational personnel and equipment. However, these metrics are not supported or recognized as important by the finance function, which still pushes all capacity costs to products and services through full absorption costing. Unused capacity costs are generally only computed by special studies when needed.

Examples:

- The same situation as Level 1 exists, but manufacturing managers are starting to track capacity utilization of manufacturing equipment as part of an effort to improve processes, minimize downtime, and improve maintenance efficiency and effectiveness. The finance function may not be aware of the initiative.
- A service organization is starting to look at how the capacity and use of its more highly trained and skilled technicians are employed vs. its average technicians. These metrics are used by operations to suggest differing pricing for some categories of service.

Level 3. Low Sophistication: The organization has a capacity management system but uses a single capacity denominator such as practical capacity, planned capacity, or normal capacity that does not fully recognize all excess and idle capacity. Full absorption costing is still employed, and product/service unit cost fluctuations are accepted as normal. Operational measures provide insight on equipment utilization in various productive and nonproductive states for use by operations managers. Typically, costs for these capacity uses are generated by special studies when needed.

Examples:

- Continuing the Level 1 and 2 example, manufacturing managers are now looking at capacity on a 24 hours-a-day, 365 days-a-year basis (theoretical capacity). However, the finance function still applies depreciation and other fixed capacity costs to all products under the theory that normal capacity is two shifts. As a result, all depreciation is loaded onto the product from the two shifts. The finance department has participated in some special studies with operations to try to put a value on improvements to efficiency; the results have not been satisfactory as far as operations is concerned because product unit costs fluctuate based on volume and mix changes.
- A service organization has three categories of technician skill levels and uses those technicians to service differentiated categories of jobs, and, in some cases, for specific customers. The rate for service is calculated based on a technician hourly labor rate calculated for the category plus a standard organization-wide overhead. This underprices the work of high-skill technicians and overprices lower-skilled technicians. The company is experiencing very high demand for skilled technician services and little for lower-skilled technicians.

Level 4. Sophisticated: The organization uses two volume denominators to calculate cost rates (theoretical capacity for fixed and planned output for proportional) for higher-cost resource groups. The Responsiveness concept has been implemented for key (or expensive) resources. Unused capacity costs may be segmented on internal reports.

Examples:

- Continuing the manufacturing example, for managerial costing and decision support information, the finance department is now assigning fixed capacity costs such as depreciation using theoretical capacity. Hence, only the depreciation for the two production shifts is assigned to products. Depreciation and fixed costs associated with the idle/excess time are identified as a business-level cost. The finance department is also examining how manufacturing operations management and systems look at their capacity. Finance has begun a trial project in the IT division to look at capacity costing and is considering projects in sales, marketing, and administrative areas.
- A service organization has begun to look at the categories of jobs and customers and resource time by areas of the organization other than the servicing technician needed to support those categories. It has discovered that HR, collections, procurement, operations supervisors, and executive management spend much more time on more complex categories of jobs, customers, and hiring. It has implemented weekly time reporting for these areas and is adjusting overhead rates and pricing to reflect the information.

Level 5. Highly sophisticated: The organization uses two volume denominators to calculate cost rates (theoretical capacity for fixed cost rates and planned output for proportional cost rates) for all resource groups throughout the organization. The Responsiveness concept is consistently implemented throughout the organization. It has also selected a capacity management model that is highly integrated with cost information. Idle/excess capacity is clearly identified in operational output quantities and monetary terms, and explicitly highlighted on internal reports. Excess/idle capacity costs are assigned to a business sustaining-level managerial objective with the requisite level of authority to address them. Product and service unit costs remain stable regardless of changes in output levels or product/service mix because excess/idle costs are not allocated to product or service costs.

Examples:

- Continuing the manufacturing example, for managerial costing and decision-support information, the finance department is now assigning all fixed capacity costs using theoretical capacity. Only the fixed costs applied in producing outputs are assigned to consumers. Depreciation and fixed costs associated with the idle/excess time is identified as a business-level cost. The finance department is examining how all areas of the business evaluate and manage their capacity.
- A service organization looks at the categories of jobs and customers and resource time by all material parts of the organization. It understands how customer-facing and support-resource capacities are impacted by changes in service volumes and mix, and is able to predict resource needs and investments based on service forecasts. Service pricing is market-driven with a clear understanding of the margin gains based on the resources employed and the choices management has in service delivery, such as using a less-expensive resource for a onetime order instead of tying up an expensive technician who could be working on a high-margin job.

Concept 7—Work: *A measure of the specific nature of units of resource output. The effective modeling of work requires the use of resource quantities to maintain traceability of the resource capacities throughout an enterprise model.*

Discussion: The Work concept is about measuring what a resource does with its applied capacity. Effective measurement of work means that capacity information is preserved and assigned along with cost information. Sometimes it is not enough to know that a particular resource or resource pool output is consumed by other resource pools and managerial objectives. It becomes important to know what types of activities the output is being applied to. For example, a machine maintenance shop may do scheduled setups, routine schedule maintenance, emergency repairs, and so on for a variety of machines. During process improvement efforts, this information can contribute to determining how to focus improvement resources and evaluate if improvement efforts are adequately working as planned. The Work concept is a useful, but not central, concept for model building in many circumstances. Including all work or activities in an organization can create a very complicated cost model. It is important to understand that no method of cost assignment is simpler or more accurate than direct tracing. The Work concept adds another step (another activity) into the cost assignment equation.

Employing the Work concept is justified in two instances:

(1) when additional analytical insight is required, and
(2) when the use of an activity is more cost-effective.

An example of the latter is the use of the number of purchase orders to assign purchasing costs instead of implementing a time-tracking system for purchasing clerks in an attempt to trace their time spent processing purchase orders for products and other departments. Cost models can range from not using the Work concept, the judicial use of the concept as described above, or making it a central focus of a cost model.

Decision Support Levels for Work:

Level 0. Nonexistent: The type of work a resource does is not measured or considered at all.

Level 1. External reporting only: The costing system does not measure the type of work or activities done by resources. These organizations use minimal standard costing to comply with external financial costing requirements. They do not normally have robust operational data collections systems; or if they do, costing is not well-integrated with them. Process improvement efforts require collecting and creating data from scratch.

Examples:

- A manufacturing organization collects production costs by direct labor, direct materials, other direct expenses, and overhead. Overhead is allocated based on direct labor.
- A service organization charges a standard rate for all technician repair hours. It does not differentiate or track their use by job type or complexity. Yet the supervisor dispatches technicians based on her knowledge of their capabilities to handle various types of jobs.

Level 2. Simple: Work is measured in basic terms such as by GL account, department, or process. All costs are assigned as variable or proportional costs ("pushing" all costs toward cost objects) using volume-based allocation bases or interview-derived fixed percentages. Level 2 organizations are beginning to measure the type of work performed by each resource by operational personnel, but this effort is not supported or recognized as important by the finance department. Costs are fully absorbed.

Examples:

- A manufacturing organization collects indirect production costs in numerous GL cost pools based on the organizational design (such as work teams) and functions (building maintenance, utilities, maintenance department, safety department, and so forth). Each cost pool is allocated to products based on a driver selected for that pool.
- A service organization lumps all costs associated with technicians—pay, benefits, vehicles, tools, training, and the supervisor—into the technician cost pool. The only information captured on this work is the number of hours technicians are paid for and the number of hours that are billed.

Level 3. Low sophistication: Work is measured in terms of basic activities to assign costs from resources that are normally general expense accounts to cost objects. All costs are assigned as variable or proportional costs, which results in "pushing" all costs toward cost objects. All or most costs, once allocated to activities, are assigned or allocated by means of work activities using an activity driver. These may vary from a simple activity analysis to gain basic insights for managers to more sophisticated activity-based costing models. A few challenges that are typical with this type of activity-based costing include the following.

(1) The fixed-cost death spiral is manifested when the elimination of a marginally profitable or unprofitable product/service causes other products/services to appear to be less profitable or unprofitable because fixed costs are not eliminated as the model predicts.
(2) A huge amount of effort (for example, through interviews) and complexity is required to connect GL information to activity measures, which causes the activity cost information to be static and become outdated as soon as consumption relationships change.
(3) Activity-based costing models that include activity-to-activity mappings that make tracing the capacity cost of resources become impossible.

Examples:

- The finance division has established a basic activity-based costing model for manufacturing, sales, marketing, and distribution. GL accounts reflect organizational resources. Activity drivers are established that assign the full cost of resources to the various activities or products that consume these resources. Some resource pools have a great many activities. The data supporting the assignments are based on periodic interviews with personnel. All costs of resources are assigned as variable or proportional to the activity driver. The company produces several products. After the initial run of the activity-based costing model, one product was shown to be unprofitable and two were barely profitable. The unprofitable product was eliminated. In the next run (the following quarter), the two barely profitable products are being reported as unprofitable and two more products are now barely profitable. The finance division continues to investigate the cause (and will eventually discover that the cause is fixed costs being assigned as variable and treated as an avoidable cost.)

- The same example would apply to the service organization if there were several specific types of service.

Level 4. Sophisticated: Work activities are pulled through to cost objects based on a predefined activity quantity assignment for both line and support activities, but the model still focuses on monetary relationships rather than quantitative resource relationships. These models attempt to recognize excess capacity, but the lack of a proper resource model structure, the lack of applying the Responsiveness concept (Concept 8) sufficiently, and the lack of managerial objectives to capture capacity measures means the cost information does not provide good capacity management insights. The model remains primarily a financial rather than operational model for process management.

Examples:

- The organization from Level 3 has the same model; however, it now tracks fixed and variable or proportional costs when they are assigned by an activity driver. In direct production and production support, excess/idle capacity costs are collected as a final cost object, but not in sales, marketing, or distribution. Because running the model is a substantially manual effort and the fixed vs. variable cost dimension has added to the complexity, the model is now scheduled to be computed three times per year (although twice per year is looking more realistic). Some operational and marketing data has been automated into the costing system.
- The same situation would apply to a service organization.

Level 5. Highly sophisticated: Instead of using activities as a central focus for costing, Level 5 organizations focus on modeling quantitative resource relationships and the nature of those relationships (fixed and variable) at the detailed resource level. The Work concept is employed prudently and in a way that maintains operational quantities, cause-and-effect relationships, and resource capacity insights. Work (i.e., activity) is only measured where needed for analytical insight into a process or when more cost-effective as a modeling method. The Work concept is applied consistently with the Responsiveness concept.

Examples:

- A manufacturing organization created an operational quantitative model of how resources are consumed as they support the organization and its intermediate and final managerial objectives. Resource pools are established using the Homogeneity concept, and an operational and cost model is created that demonstrates linkages. Activity measures are still in place for some administrative resource pools that are not yet doing direct tracing, though there is pressure to use direct tracing whenever possible. Activity measures are established when a resource pool engages in process improvement to assess the current performance and evaluate the improvement. Activity measures are eliminated when a process improvement is considered stable. A few activity measures are in place where a process between two resource pools has proven highly variable and requires constant monitoring. All activity measures ensure resource capacity is transmitted through the model.
- This same evolution can be demonstrated in the service organization.

Concept 8—Responsiveness: *Captures the nature of cause-and-effect relationships, which can be fixed, proportional, or a combination of both in relation to output. The cost model must reflect the responsiveness of inputs (and hence their costs) to outputs to enable accurate marginal cost information.*

Discussion: The Responsiveness concept requires modeling not only the consumption of resource quantities by intermediate and final managerial objectives, but also reflecting the nature of the consumption relationships as proportional (input quantities that change with the level of output) or fixed (input quantities that do not change with the level of output). For example, for direct labor cost, the hours of vacation time and mandatory training time will be reflected as fixed hours resulting in fixed costs, while the cost for production or service hours worked are considered proportional. Additionally, responsiveness requires the model to show how consumption relationships change as consumption occurs through the value chain. For example, electricity is a proportional input when purchased from the power company. However, when molten metal in conversion must be stored at a certain temperature during an inactive third shift, the electricity becomes a fixed input (and hence a fixed cost) to that conversion process and to the intermediate output that results. (Note that a proportional cost can become fixed, but a fixed cost cannot become proportional.) The key result of effectively applying the Responsiveness concept in cost modeling is that accurate marginal and incremental information is readily available throughout the organization to improve decision making about initiating improvements and pursing new and onetime opportunities.

Responsiveness and Variability

Responsiveness replaces the conventional concept of variability. Variability is defined in terms of the relationship between total volume and total cost. Variability's focus on final output provides little insight into the consumption and cost relationships between resources that interact in a process. Because causality is concerned with the relationship between a specific output and the inputs required to produce it, the principle of causality demands more specificity in cause-and-effect expressions than variability's aggregate assumption is able to provide. The term "proportional" is substituted for "variable" for costs to reinforce this shift in thinking.

Decision Support Levels for Responsiveness:

Level 0. Nonexistent: Nature of resource consumption and costs are not tracked at all.

Level 1. External reporting only: Level 1 organizations have cost systems that satisfy the minimal requirements needed to meet external financial reporting standards. They still implement the traditional concept of variability. Direct and indirect production costs are assigned directly to final products or services. Other organizational costs are applied to income statement categories (i.e., SG&A). The fixed and proportional nature of resource consumption relationships and costs are not tracked. Calculating marginal and incremental costs requires special studies and numerous assumptions. Level 1 organizations define the fixed and variable nature of large cost pools as they relate in a general way to final product or service volume.

Examples:

- A manufacturing organization collects production costs by direct labor, direct materials, other direct expenses, and overhead. Overhead is allocated to products based on direct labor. All other organizational costs are regarded as SG&A or other categories of period costs and treated as fixed costs. The finance department is generally unaware of the resource quantities represented by these costs.
- An accounting transaction processing center estimates its costs by dividing the planned or actual full cost of the operation by the number of accountants and accounting technicians who process transactions, and then uses that ratio as the basis for planning and pricing.

Level 2. Simple: Level 2 organizations track fixed and variable costs, but only for limited types of consumption. The traditional concept of variability is still used as the guide to define cost and consumption behavior.

Examples:

- A manufacturing organization collects production costs by direct labor, direct materials, other direct expenses, and overhead. Overhead is placed in two pools, fixed and variable (in relation to production volume). Fixed overhead is allocated to products based on direct labor. Variable overhead is allocated to products by product volume. All other organizational costs are regarded as SG&A or other categories of period costs.
- An accounting transaction processing center estimates its costs for new work by estimating the number of new personnel that will be required to do the work. It estimates onetime costs such as additional cubicles, new space build-out, new computers, and so on. Then it adds an overhead rate per new employee calculated by dividing the full cost of the operation by the number of accountants and accounting technicians who currently process transactions.
- Consider a wind tunnel where the utility consumption differs based on the product being produced or tested. A wind tunnel requires exponentially more energy the higher its speed. A Level 2 company might only track the consumption and cost of energy but not relate it back to the speed of the wind tunnel or other cost drivers. The company would have to improve measurement technology to capture actual consumption quantities needed to reflect these operational relationships.

Level 3. Low sophistication: Fixed and variable costs in high-cost areas of the company are tracked by their relationship to a final output such as a salable product or service. Cost tracking is based on a GAAP-driven financial model (i.e., variability) rather than an operational model of resource quantities. Insights into the nature of costs for intermediate outputs and process improvements require special studies or analyses. Level 3 organizations have put some effort into making their costing system more usable by managers in nonfinancial areas. They may use more complex standard costing with variances, fixed and variable costs, activity-based costing, or other cost methodologies. Overhead and other cost pools may be divided into fixed and variable pools based on the traditional concept of variability (i.e. the pool's relationship to a final managerial objective—normally a product or service).

Examples:

- A manufacturing organization has numerous production and production support cost centers in its GL for production resources that are labeled as fixed or variable. Each cost center is assigned using a logical driver to assign it to products. The organization has extensive standards set for these cost centers, extensive reports on variances, and reviews the standards against actuals quarterly. Everything ties to the numbers reported on the regulated financial statements. All other organizational costs are compared to an annual budget for that organizational component. They are regarded as SG&A or other category of period cost and not further identified to products or other strategic objectives except for specific projects or inquiries.
- An IT department of an accounting processing center has studied its operations and classified its operational resources and costs as fixed, those that vary with the number of personnel supported, and those that vary with the volume of accounting transactions. This analysis is repeated each year during the budget cycle. The analysis does not include any support from other organizational elements.
- In the wind tunnel example, a Level 3 company might divide the cost of energy into fixed and variable pools. Variable pools are assigned based on use time by specific products, and fixed costs are assigned to all products based on product volumes.

Level 4. Sophisticated: The fixed or proportional nature of resource consumption is tracked more accurately for other levels of the value chain besides the final output. Organizations at Level 4 may measure responsiveness by the unit, batch, or product levels.

Examples:

- A manufacturing company analyzes its production and particularly production support costs. It creates an activity-based costing model that collects fixed and variable costs at the unit, batch, product group, product family, and manufacturing division level. The finance division now works with sales and marketing to establish the same sort of model. Other areas of the organization are managed by budget and considered SG&A expenses. Special studies are employed as needed.
- The accounting processing center has divided all its organizational support resources into fixed costs, resources and costs that are proportional to personnel, and resources and costs that are proportional to transaction volume (several categories are considered). These calculations are rebuilt each year.
- In the wind tunnel example, a Level 4 company might assign fixed costs (depreciation and maintenance) to the product family level and the cost of energy at the individual product level (for the products tested).

Level 5. Highly sophisticated: The fixed or proportional nature of resource consumption is identified for all levels of managerial objectives (for resources, intermediate levels through final products and services, and other final organizational objectives) in the value chain in accordance with the responsiveness concept and subject to the accuracy, materiality, and measurability constraints. Level 5 systems that employ the work concept also recognize that activities and processes cannot consume input quantities in a fixed manner. Marginal and incremental costs are readily available. Changes in the nature of costs—as they become more fixed—are apparent as resources are consumed through the value chain.

Examples:

- Strong causal resource consumption is traced throughout the organization in its fixed and proportional components both for operational quantities and costs through intermediate managerial objectives to final managerial objectives. The marginal cost of any managerial objective (intermediate or final) is available.
- The accounting transaction processing center has created an automated model that evaluates the cost per person and of various categories of transaction volume of fixed and proportional resources and costs continuously.
- The wind tunnel example would be the same as Level 4.

Concept 9—Attributability: *Defines how weak causal relationships are modeled. Weak causal relationships and their costs can distort cost information and impair managerial decisions if they are allocated (mixed in with strong causal assignments).*

Discussion: The Attributability concept defines how weak causal or noncausal relationships are modeled. Previous concepts of traceability, work, and responsiveness address the assignment modeling of strong causal relationships. Weak causal relationships and their costs distort decision-support information under traditional and GAAP practices and impair managerial decisions if they are allocated (mixed in with strong causal assignments). Weak causal costs should be assigned to a managerial objective, usually a business sustaining-level managerial objective, where the manager has the authority to take strategically appropriate action to address these resources and their costs.

Decision Support Levels for Attributability:

Level 0. Nonexistent: The strength of causal relationships is not considered.

Level 1. External reporting only: Large, highly generalized cost pools (for example, on the GL) are allocated to product or service costs using generic measures like production volume, sales volume, or revenue dollars. The strength of causality is not considered, and conversion cost is fully absorbed to product and service costs, leading to distorted decision-support information.

Examples:

- A manufacturing company has the capability to produce product A and B or a service organization has a service capability that can offer service A or B. The capability has 15% excess capacity during a period. The costs associated with the excess capacity are allocated based on direct labor hours worked A and B. Excess capacity has no causal relationship with direct labor hours or with A or B. Instead, the capacity might be used for a newly developed product or service C.
- A manufacturing organization collects production costs by direct labor, direct materials, other direct expenses, and overhead. Overhead is allocated to products based on direct labor that has a weak or no causal relationship to most of the overhead costs. All other organizational costs are regarded as SG&A or other period costs.

- A consulting company subscribes to an expensive license for a software application that is essential for service category A, the most important of its three primary consulting service categories. At most, 40% of the potential users are ever signed on to the software application (so there is lots of excess capacity). The software application could be used by the other two primary consulting service categories B and C to improve quality, but the manager of A wants the manager of B to absorb 50% of the cost of the software application. As a result, the manager of B is not using the technology.

Level 2. Simple: Again, strength of causality is not considered by Level 2 organizations. Costs may be assigned to slightly more detailed cost pools such as department or process cost pools. These costs are allocated to product or service costs supported by that department or process using generic drivers like production volume, sales volume, or revenue dollars. Product and service costs are still distorted.

Examples:

- The manufacturing organization from Level 1 would have more detailed production overhead cost pools, but would still allocate all costs, both causal and noncausal, to products.
- The consulting company CEO said the staff of B consulting services could use the software application until the next budget cycle without cost (since A has to have the application). Then the usage and value added to each of B's customers would be evaluated in allocating the cost of the software license between A and B.

Level 3. Low sophistication: These organizations assign weak causal relationships in a manner that reduces the distortion to decision-support information in comparison to generalized allocations. Causality and attributability are not evaluated or modeled for lower-cost areas of the organization, so some of these resources and costs that may have causal relationships will not be accurately assigned. Significant distortions still exist due to an external financial statement focus in handling fixed costs such as depreciation and the use of normal or practical capacity as denominators to calculate excess/idle capacity, especially for capital-intensive businesses.

Examples:

- Some categories of weak causal relationships, such as excess/idle time, may be tracked in some areas of the business, normally production or service delivery. The administrative parts of the organization are treated as having a weak causal relationship with products or service delivery processes for decision-making purposes.
- Continuing the consulting company example, service category A is using 70% and B is using 30% of the software application time used. At most only 60% of the maximum potential users are ever signed on, and the application is typically unused for more than 16 hours per day. The CEO allocates 70% of the software cost to A and 30% to B. This is very expensive for B and so this service category manager begins to scale back its use of the software.

Level 4. Sophisticated: Level 4 organizations consider the strength of causality for most consumption relationships, including some nonoperating costs such as customer service and marketing. Unused capacity and any associated depreciation are not allocated to final managerial objectives (products or services). Most cost areas with weak causal relationships

are not allocated arbitrarily and are instead assigned to a business sustaining-level managerial objective.

Examples:

- In a manufacturing company, production, production support, distribution, sales, and marketing areas have established operational models, and the vast majority of resources and costs are traced causally to intermediate or final managerial objectives. In those areas, weak causal or noncausal costs are assigned to a level of the business that can manage such costs. Initial efforts to model finance, HR, and executive support areas are under way, but they are still all treated as having weak causal relationships.
- Continuing the consulting company example, the excess capacity of the software application is identified as a corporate opportunity. A business opportunity is identified where service category C can process requests for small consulting firms that can use the output of the software to specific inquiries the next day. The manager for C sets up three people to process this business from 6 p.m. to midnight when no one from A or B is using the application. The cost of the application is carried by A, since it is essential to that business, and excess capacity is reported weekly; and B and C use the excess capacity for incremental value and profit.

Level 5. Highly sophisticated: Resource quantities and cost are assigned at Level 5 organizations to managerial objectives based on strong causal relationships in the value chain. These costs are never arbitrarily allocated, and therefore, product/service unit costs do not fluctuate when volume or mix changes occur. A causal depreciation schedule based on useful economic life and replacement value is used rather than a noncausal schedule dictated by accounting rules. Resource quantities and costs with weak causal relationships are assigned to a business sustaining-level managerial objective with the authority and responsibility to manage or change the resources and take appropriate optimization actions. Managers in these organizations see very few distortions in the costs of resources, processes, and products/services. Operating improvements, resource changes, and process changes are clearly reflected in the cost system.

Example:

- In a Level 5 entity, the use of causal modeling concepts is maximized subject to the accuracy, measurability, and materiality constraints. Final managerial objectives contain attributable cost assignments at various levels where they are relevant to decision support and actionable. For example, excess/idle capacity cost of a machine dedicated to a product group is shown before the final product group margin. Other attributable costs such as an advertising campaign for a product family are shown further down as part of the product family margin.

The Nature of the Data Needed for the Model: Integrated Data Orientation

Concept 10—Integrated Data Orientation: *Operational and financial data is readily available to be accessed and aggregated to a variety of different views. A major advantage of this concept is the timeliness of relevant information.*

Discussion: Integrated data orientation means that operational and financial data is readily available to be accessed and aggregated to a variety of different views. Most GL systems are highly oriented toward financial reporting requirements, and cost data requires a lot of rework and reconnection to nonfinancial operational data to be useful for detailed internal decision support. Organizations need to be aware of the limitations of the financial reporting standards, GAAP, and the associated models. It is important to understand that other views of the organization are critical to many types of decisions and to effective value creation. An organization with an integrated data orientation will often maintain multiple views of the organization, using both financial and operational data, and be able to configure additional views rapidly and with great dexterity. Such organizations would normally have a managerial costing view based on internal decision support that is separate and different from a financial reporting view. These views are reconciled at a summary level. The timeliness of relevant information is, therefore, a major advantage of the integrated data orientation concept. The levels for this concept are based on the extent of integration of operational and financial data.

Decision Support Levels for Integrated Data Orientation:

Level 0. Nonexistent: Completely separate data systems are maintained for financial, operating, sales, service, purchasing, and so on.

Level 1. External reporting only: The GL is used as the source of all cost and financial data. Nonfinancial operational data is not used for managerial costing analytics beyond the required inputs to the financial system. Organizational budgets come closest to integrating some operational information with financial data, but budgets are static and normally prepared once each year.

Level 2. Simple: Level 2 is characterized by unsophisticated financial and operational system solutions that are not integrated and often work at cross purposes and result in conflicting data and decision recommendations. Operational analysts collect their own financial data, and financial analysts rely on the financial system and must request operational data for special studies. Each side has trouble understanding each other's needs.

Level 3. Low sophistication: Effective operational data systems are in place but are used primarily by operations management. They may have fairly advanced nonfinancial, operational control systems, but they are not linked or integrated with the accounting system. Accounting uses the GL as the source of all cost and financial data. There is little or no integration on a systems level. Special studies and analyses use both operational and financial accounting data. Operational and financial analysts are aware of significant gaps between the two sources of information. Analyses and study results are often at odds between the finance department and operations.

Level 4. Sophisticated: The managerial cost system is mostly integrated with operational systems to provide a reasonable monetary reflection of resource capacity, resource use, and related costs. Monetary and operational data used for modeling are generally not impaired by financial reporting principles. Most operational data used for the model are readily available to be aggregated for a variety of different views.

Level 5. Highly sophisticated: The tracking of managerial costing data is not constrained by GL and financial accounting principles. Managerial costing data is fully integrated with operational data. The system can track and reconcile the differences between managerial costing results and financial accounting data for managerial objectives. Managerial costing information is not compromised by financial accounting conventions. Level 5 organizations understand the differences between internal management decision-support information and information needed for external financial reporting.

How Can This Cost Model Sophistication Framework Be Used?

The primary purpose of this SMA is to assist management accountants in assessing and improving their organization's costing information for optimal internal decision support. A common issue that companies face today is that operational analysts collect or develop their own financial data, while financial analysts rely on the financial system and only request operational data for special studies. Neither group really understands why there cannot be "one version of the truth" that meets every financial and operational decision need. The core of managerial costing is based on causally modeling operations in the organization, and then mapping cost relationships to reflect those models. The goal is to achieve the CFMC's objective of an "operational model costed." This approach establishes a consistent understanding of costs to support decision making in finance and operations functions.

A common issue that companies face today is that operational analysts collect or develop their own financial data, while financial analysts rely on the financial system.

Previous studies by IMA and others indicate that current costing practices at most organizations are not providing adequate decision-useful information for all areas of the business. There is typically a high level of dissatisfaction with the current costing systems due to a variety of factors, including focus on meeting financial accounting and regulatory reporting requirements, uncertainty about how to create decision-useful cost information for its many uses, little integration between operational and costing systems, and lack of communication between the finance department and other departments about what constitutes useful decision support-focused cost information. This disconnect represents a fundamental disparity in what the operations staff understands regarding production and service processes (i.e., the flow of resources to create output) and the very different picture portrayed in the cost information provided by the finance department.

To address these issues, both users and suppliers of management accounting can use the levels of sophistication from 10 different perspectives in this SMA to evaluate current cost modeling practices and how closely they are aligned with the operations of the business. Managerial cost modeling should provide a materially correct monetary reflection of the organization's resources, processes, products, service lines, sales and distribution channels, and customers' consumption of resources. The optimal level of sophistication depends on the context and decision needs of each individual business. The 10 modeling concepts provide a guide for a business to determine which concepts are most important to creating the managerial cost information to achieve its strategic goals. There is no "one-size-fits-all" costing model for every organization.

The decision-support assessment levels in this SMA enable managers and management accountants to:

- Identify their organization's cost modeling level of sophistication based on 10 application characteristics:

    1. Level to which resource detail is measured and modeled.
    2. Level of managerial objectives defined.
    3. Level of quantitative cause-and-effect relationships of resources, processes, and products/services reflected in the cost model.
    4. Level of homogeneity incorporated in resource cost pools.
    5. Ability to track the flow of resource quantities as they move through consumption relationships as outputs and inputs.
    6. Extent to which capacity use and nonuse are identified, measured, and costed.
    7. How it measures the type of work or activity being done by each resource.
    8. To what degree it tracks resource consumption relationships as proportional or fixed.
    9. How weak causal relationships are modeled.
    10. Level of integration of operational and financial data.

- For each of the 10 application concepts, compare the level of cost model sophistication with the level of causality needed by the organization.

- Assess potential costing software and methodologies for cost modeling solutions to ensure they meet the needs of their organization in the application of the 10 concepts.

Getting Started

With a thorough understanding of the 10 modeling concepts, your organization's current status of incorporating the concepts, and your company's need to apply the concepts, you are ready to commence improving your managerial costing system.

The IMA SMA *Developing an Effective Managerial Costing Model* provides a six-step process to develop and implement an effective managerial costing system.

Online Survey to Assess Your Current Application of the 10 Concepts

IMA has created an online survey you can use to assess how well your organization is currently applying the 10 modeling concepts to support good decision making. By completing the online survey, you will be able to assess where your organization stands regarding the decision-support levels of each of the 10 modeling concepts.

After taking the survey, you will be able to access a report that enables you to compare the results from your organization with those from similar organizations, based on seven demographic questions contained in the online survey.

All survey responses will be added to a survey database. As this database grows, IMA will update its report in order to provide updated and more detailed results. Please note responses to the survey are confidential. Results from organizations will only be identified in the aggregate and never individually.

The survey questions are shown in Appendix 1. The link to the online survey is www.surveymonkey.com/r/CostingSystem.

Appendix 1: Rubric for Identifying the Level of Sophistication for Each of the 10 Concepts

		Level of Cost System Sophistication					
CFMC Concept	**Characteristic**	**0. Nonexistent**	**1. External Reporting Only**	**2. Simple**	**3. Low Sophistication**	**4. Sophisticated**	**5. Highly Sophisticated**
1. Resources	Level to which resource detail is measured and modeled.	Resources are not measured.	Resources are grouped by GL accounts. Very broadly defined cost pools are not all useful for decision making.	Resources are grouped into functional cost pools (for example, departments or processes).	Detailed levels of resource costs are available in critical process areas of the organization (for example, high-cost areas).	Detailed levels of resource groups are available for most areas of the organization with relatively homogeneous groupings that have a quantitative output measure.	Resources are grouped in homogeneous pools for all areas of the organization. These pools each have a quantitative output measure and record all input quantities to generate an organization-wide network of planned outputs and their costs.
2. Managerial Objectives	Level of managerial objectives defined.	Virtually no managerial objectives are served.	Objectives are defined only in broad financial terms (for example, product, SG&A, and business unit).	Objectives are disaggregated into responsibility areas or cost centers for higher cost areas only– no integration with planning or budgeting.	Objectives are disaggregated into responsibility areas or cost centers, with only general integration with planning or budgeting.	Primary strategic objectives are tied to causal supporting resources in quantitative and monetary terms. Lower-level objectives are not fully developed.	Objectives are defined consistent with all strategic objectives. Managerial objectives are clearly tied to traceable and causal supporting resources in quantitative and monetary terms.
3. Cost	Correlation of quantitative cause-and-effect relationships of resources, processes, and products or services to monetary measures.	Costs are highly aggregated in GL accounts and are not related to specific resource capacity and outputs.	Costs are allocated only to the extent required for financial reporting compliance with little to no separation of direct and indirect costs..	Costs are separated into direct and indirect categories, with indirect costs allocated using single overhead rate and volume-based drivers.	There is better causality modeling in high-cost areas. Volume-based department allocation rates are used. Costs of idle capacity are not reported as a separate line item.	Volume and non-volume drivers are used with simple assignment rates that aggregate the reported cost measures of the cost of idle capacity.	Quantitative causal relationships underlie all cost assignments. Activity-based or resource-based output measures are used. Idle capacity is tracked and reported.
4. Homogeneity	Level of homogeneity of resource cost pools.	Resources are not categorized or grouped except as expenses or capitalized assets.	Large cost pools are based on very general categories primarily for external reporting.	Costs are disaggregated into department or responsibility areas for higher cost areas only.	There is detailed categorization of resource pools in critical process areas for specific areas of responsibility.	There is detailed categorization of resource pools for most areas of responsibility with relatively homogeneous groupings that are driven generally by the same driver.	There is detailed categorization of resource pools for most areas of responsibility with relatively homogeneous groupings that are driven generally by the same driver.

		Level of Cost System Sophistication					
CFMC Concept	**Characteristic**	**0. Nonexistent**	**1. External Reporting Only**	**2. Simple**	**3. Low Sophistication**	**4. Sophisticated**	**5. Highly Sophisticated**
5. Traceability	Ability to track the flow of resource quantities as they move through processes as outputs and inputs.	Costs are not at all traced to products or services.	Most direct production or service costs are traced to products or services. Indirect costs are pooled by firm or value stream and allocated to products or services.	Some indirect production or service costs are traced to products or services while other costs are traced to processes or departments.	Indirect production or service costs are traced to products or services for higher cost areas; the rest are pooled by process or department. Some selling and administrative costs are traced to products or services.	Most indirect expenses are traced using transaction data and then assigned to key managerial objectives. Resource use that is not traceable is either allocated or assigned to general business-sustaining objectives.	Resource use is traced using transaction data. Costs are assigned according to managerial objectives. Resource use that is not traceable due to weaker causal relationships is assigned to relevant business sustaining objectives.
6. Capacity	Extent to which capacity use and nonuse are identified, measured, and costed.	Resource utilization is not tracked at all and is not considered in costing.	Resource use is minimally tracked but not considered in costing products or services, leading to full absorption costing based on a single capacity measure.	Some capacity metrics are used, but finance still pushes full capacity costs to products and services through full absorption costing.	Operational measures provide some insight on resource utilization. Excess or idle capacity may be reported with respect to normal capacity.	Two denominators are used to calculate resource cost rates (theoretical capacity and planned output). Unused capacity costs may be segmented on internal reports.	Two volume denominators are used to calculate cost rates (theoretical capacity and planned output). Unused capacity is clearly identified in operational and monetary terms and is highlighted internally.
7. Work	Measure the type of work or activity being done by a resource.	Work is not measured at all.	Type of work or activities is not measured by a resource. Minimal standard costing is used for financial reporting requirements.	There is some measurement of specific work performed by resources by operational personnel, but not used by finance.	Work is measured in terms of basic activities but not by resource. All activity costs are assigned as variable or proportional costs from the GL using activity drivers.	Work is measured at more detailed activity levels (both fixed and proportional) and costs are pulled through to cost objects for both line and support activities.	It is possible to measure work at the detailed resource level. The work concept is employed in a manner that maintains operational quantities, cause-and-effect relationships, responsiveness, and resource capacity insights.
8. Responsiveness	Track the nature of resource consumption relationships as proportional or fixed.	The nature of resource consumption is not tracked.	Aggregated cost pools are assigned to final products or services as a variable cost, but the nature of consumption is not considered.	Some tracking of fixed and variable costs, but only for limited types of consumption.	Fixed and variable costs are tracked by their relationship to final output. Indirect costs are grouped into fixed and variable cost pools.	The fixed or proportional nature of resource consumption is tracked more accurately for intermediate outputs in the value chain. Consumption may be measured at the activity level.	The fixed or proportional nature of resource consumption is measured accurately throughout the value chain for each resource's inputs and outputs, resulting in an ability to provide multilevel contribution margins for decisions at any point in the value chain.

		Level of Cost System Sophistication					
CFMC Concept	**Characteristic**	**0. Nonexistent**	**1. External Reporting Only**	**2. Simple**	**3. Low Sophistication**	**4. Sophisticated**	**5. Highly Sophisticated**
9. Attributability	How weak causal relationships are modeled.	Costs are highly aggregated in GL accounts. Causality is not addressed.	Highly generalized cost pools are allocated only to the extent required for financial reporting. Causality is not assessed.	Indirect operating costs are assigned to departments or process cost pools and allocated using departmental rates. Causality is not assessed.	Weak causal relationships are assigned in a way to reduce distortions, though distortions still remain due to depreciation methodology and excess capacity costs.	Causality is considered for most costs, including non-operating costs such as customer service and marketing. Unused capacity and replacement cost depreciation are not allocated to products.	Strong causal relationships underlie all cost assignments, leading to very few distortions with no arbitrary cost allocations. Operating improvements are clearly reflected in the cost system. Replacement cost depreciation or capital replacement allowance is used.
10. Integrated Data Orientation	Level of integration of operational and financial data.	Very limited, uncoordinated systems are used for finance, operations, sales, customer service, purchasing, and so on.	The GL is the source of all cost and financial data. Operational data is not used for costing beyond financial reporting requirements.	Simple financial and operational systems are not integrated. Operational data are collected by finance only for special studies.	Effective operational data systems are used primarily by operations management. There is little or no integration with GL data on a systems level.	The managerial cost system is largely integrated with operational systems. Decision-support data is readily available.	Managerial costing data are fully integrated with operational data and are not limited by financial reporting needs. Operational data used in the cost model are the same as that used for management decision making.

Appendix 2: Survey to Assess Your Current Application of the 10 Concepts

1. Regarding resources, which statement best describes how well your costing system reflects the physical resources (e.g., people, equipment, materials, supplies, buildings) that managers use to conduct business operations?
   A. I don't know enough about how resources are handled in our cost system to answer this question.
   B. Resources are not identifiable in our cost system.
   C. Resources are included in general ledger (GL) accounts based on very broadly defined cost pools that are not useful for decision making.
   D. Resources are grouped into functional cost pools (e.g., departments).
   E. The use of resources is modeled for critical process areas of the organization only (e.g., high-cost areas).
   F. Detailed resource groupings are relatively homogeneous, and most have a quantitative output measure.
   G. Resources are grouped into homogeneous pools for all areas of the organization, each with a quantitative output measure.

2. Managerial objectives are specific results or outcomes that management plans to achieve. Ideally, a managerial costing system provides information on all the intermediate and final managerial objectives needed to achieve higher-level strategic objectives. To what extent does your costing system support the achievement of these managerial objectives?
   A. I don't know enough about how managerial objectives are reflected in our cost system to answer this question.
   B. Virtually no managerial objectives are reflected.
   C. Managerial objectives are represented only in broad financial terms (e.g., product, SG&A, business unit).
   D. Our managerial objectives are financial targets reflected in responsibility areas or cost centers for higher-cost areas only; there is no integration with planning or budgeting.
   E. Managerial objectives are reflected in responsibility areas or cost centers throughout the organization. Intermediate managerial objectives are reflected for high-cost areas only. There is general integration with planning or budgeting.
   F. Managerial objectives and intermediate-level objectives are reflected consistently with some strategic objectives in the costing system.
   G. Managerial objectives and intermediate-level objectives are reflected consistently with all the organization's strategic objectives in both operational and monetary terms.

3. To what extent does your costing system reflect actual resource usage?
   A. I don't know enough about how resource usage is reflected in my organization's cost model to answer this question.
   B. Costs are highly aggregated in GL accounts and do not relate to specific resource capacity or outputs.
   C. Costs are highly aggregated and allocated only to the extent required for external financial reporting compliance; there is no separation of direct and indirect costs.
   D. Costs are separated into direct and indirect categories; indirect costs are allocated using a single overhead rate based on volume (e.g., labor hours, sales volume).
   E. Costs are separated into direct and indirect categories; indirect costs are allocated using departmental volume-based allocation rates.
   F. Both volume and nonvolume measures are used to compute simple cost assignment rates.
   G. Quantitative causal relationships underlie all cost assignments; output and event-based measures are used to assign costs.

4. Homogeneity refers to the similarity in cost structure, capabilities, capacity, or outputs of one or more resources being grouped together. How homogeneous are the cost pools in your costing system?
   A. I don't know enough about the cost pools in our costing system to answer this question.
   B. Resources are not categorized or grouped except as expenses or capitalized assets in the GL.

C. Large cost pools are based on very general categorizations such as direct or indirect costs and used primarily for external financial reporting.
D. Costs are separated into department or responsibility areas for higher-cost areas only.
E. Cost pools are focused on a specific output or managerial objective for critical process areas only.
F. Cost pools are relatively homogeneous and generally assigned by appropriate volume- or nonvolume-based output measures.
G. Resource-based pools are highly homogeneous, containing only costs that are similar in structure, capabilities, capacity or outputs, and each assigned by an appropriate volume- or nonvolume-based output measure.

5. Traceability is the ability to connect the cost of an input resource (e.g., supplies, power, materials, labor, equipment, etc.) with a specific managerial objective. To what extent is your cost system able to trace the cost of inputs to products, services, or other managerial objectives based on verifiable transaction records?
A. I don't know enough about how we assign costs in our cost system to answer this question.
B. Costs are not traced to products or services at all.
C. Most direct production or service costs are traceable. Indirect costs are pooled and allocated to products or services with low concern for causality.
D. Most direct production or service costs are traceable. Some indirect production or service costs are traced to products or services and the rest are traced only to processes or departments and allocated to final products and services.
E. Direct production or service costs are traceable. Higher-cost indirect production or service costs and some selling and administrative costs are traced to products or services. The rest are pooled by process or department.
F. Most costs are traced using transaction data and then assigned to key intermediate and final managerial objectives. Resource use that is not traceable is either allocated or assigned to general business-sustaining objectives.
G. Resource use is traced using transaction data and costs are then assigned accordingly to managerial objectives in the value chain. Resource use that is not traceable due to weaker causal relationships is assigned to relevant business-sustaining objectives.

6. Capacity describes the limits and nature of a resource's contribution to achieving managerial objectives. To what extent are capacity use and non-use identified, measured, and costed?
A. I don't know enough about how we track capacity use in my organization to answer this question.
B. Resource utilization is not tracked at all and not considered in costing.

C. Resource use is minimally tracked but not considered in costing products or services except to the extent required for external financial reporting; we use full absorption costing based on a single capacity measure.
D. There are some capacity metrics for operational use, but full capacity costs are allocated to products and services through full absorption costing based on a single capacity measure.
E. There are operational measures that provide insight on resource utilization, but the company still uses full absorption costing based on a single capacity measure.
F. Two capacity volume denominators are used to calculate resource cost rates (theoretical capacity for fixed costs and planned output for variable costs); unused capacity costs may be segmented on internal reports.
G. Two capacity volume denominators are used to calculate resource cost rates (theoretical capacity and planned output); unused capacity is clearly identified in operational and monetary terms and explicitly highlighted on internal reports.

7. How does your cost system measure the type of work or activity being done by a resource (i.e., the nature of its output)?
A. I don't know enough about how we measure the type of work done by resources in our cost system to answer this question.
B. The type of work is not measured at all in our cost system.
C. The type of work or activities done by a resource is not measured; minimal standard costing is used to comply with external financial costing requirements.
D. Work is measured in basic terms such as by GL account, department, or process; there is some measurement of the type of work by operational personnel, but this information is not used to assign appropriate costs.
E. Work is measured in terms of basic activities to assign costs from general expense accounts to cost objects. All activity costs are assigned or "pushed" as variable or proportional costs using activity drivers.
F. Work activities and the associated costs are "pulled" through to cost objects based on some actual operational quantities.
G. Work is measured where needed for process insights and the associated costs are "pulled" through to cost objects based on actual operational quantities, cause-and-effect relationships, and resource capacities.

8. Responsiveness is about how well the costing system captures the nature of cause-and-effect relationships to output, such as fixed, proportional, or mixed. How well does your cost system reflect responsiveness?
A. I don't know enough about how we track resource consumption in our cost system to answer this question.
B. The nature of resource consumption is not tracked in our cost system.

C. Aggregated cost pools are assigned to final products or services as variable costs; the nature of consumption is not identified.
D. There is some tracking of fixed and variable costs but only for some types of consumption (e.g., overhead) based on final output.
E. Fixed and variable costs are tracked by their relationship to final output; indirect costs are grouped into fixed and variable cost pools.
F. The fixed or proportional nature of resource consumption is tracked more accurately for intermediate outputs in the value chain; consumption may be measured using units, batches, products, or activities.
G. The fixed or proportional nature of resource consumption is reflected accurately for all consumption relationships throughout the value chain for both operational quantities and cost.

9. Attributability defines how weak causal relationships (e.g., indirect costs) are modeled. Weak causal relationships and their costs can distort cost information if they are allocated (mixed in with strong causal assignments). How are weak and noncausal relationships handled in your cost system?

A. I don't know enough about we handle weaker causal relationships in our cost system to answer this question.
B. The strength of causal relationships is not considered in our cost system.
C. Large, highly generalized (e.g., general ledger) cost pools are allocated to product or service costs using generic measures like production volume, sales volume, or revenue dollars.
D. Indirect operating costs are assigned to department or process cost pools and allocated using departmental or process rates.
E. We attempt to allocate weak and noncausal costs to reduce distortions, but there are still some distortions due to the use of financial depreciation and not isolating excess capacity costs.
F. The strength of causal relationships is considered for most resource relationships and their costs, including nonoperating costs like customer service and marketing; unused capacity and associated depreciation are not allocated to saleable products and services.
G. The strength of causal relationships is assessed for all resource and cost assignments leading to very few distortions and no arbitrary cost allocations; replacement cost depreciation or capital replacement allowance is used.

10. Integrated data orientation means operational and financial data is readily available to be accessed and aggregated to a variety of different views. Which of the following best describes the level of integration of operational and financial data in your costing system?

A. I don't know enough about the level of integration in our cost system to answer this question.
B. Separate, simple data systems are used for financial, operating, sales, service, purchasing, etc.
C. The GL is the source of all cost and financial data; operational data is not used for costing beyond external financial reporting requirements.
D. There are simple financial, cost, and operational systems that are not integrated at all; operational data is collected only for special studies by finance.
E. Effective operational data systems are in place but used primarily by operations management; there is little or no integration with GL data on a systems level.
F. The managerial cost system is mostly integrated with operational systems, and the data needed is readily available.
G. Managerial costing data is fully integrated with operational data and not limited by financial reporting data. Operational data used in the cost model is the same as that used for operations management.

11. Downstream costs include distribution, warranty, and support service costs. Does your costing system recognize downstream costs from finished goods or primary service delivery as product or service costs for purposes of decision support? (Select the best answer.)

A. I don't know enough about how downstream costs are handled in our cost system to answer this question.
B. Our cost system does not recognize any downstream costs.
C. Our cost system does recognize a few downstream costs.
D. Our cost system recognizes most downstream costs.
E. Our cost system recognizes all downstream costs.

12. For what levels of cost objects does your costing system recognize and provide specific cost information? **(Select all that apply)**

A. I don't know enough about the cost objects in our costing system to answer this question.
B. Final product or service costs.
C. Various steps in the production or primary service line process.
D. Organizational, such as division or department, entity costs.
E. An IT support function or similar support service.
F. Costs that are downstream costs from finished goods or primary service lines and include such items as warranty or customer support costs.

13. For what levels of cost objects does your costing system recognize and provide specific cost information? **(Select all that apply)**

A. I don't know enough about the cost objects in our costing system to answer this question.
B. Final product or service costs.
C. Various steps in the production or primary service line process.
D. Organizational, such as division or department, entity costs.
E. An IT support function or similar support service.
F. Costs that are downstream costs from finished goods or primary service lines and include such items as warranty or customer support costs.

14. On a scale of 1 to 10, where 0 = completely ineffective and 10 = absolutely effective, how effectively does your organization's costing system support critical management decision making taking place within the organization? _____

15. What next investment could your organization make to improve the effectiveness of costing information used to support internal management decision making?

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