

Information Paper

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Professional Accountants in Business Committee

Evaluating the Costing Journey: A Costing Levels Continuum Maturity Framework 2.0

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The Professional Accountants in Business (PAIB) Committee serves IFAC member bodies and professional accountants worldwide who work in commerce, industry, financial services, education, and the public and not-for-profit sectors. Its aim is to promote and contribute to the value of professional accountants in business. To achieve this objective, its activities focus on:

- increasing awareness of the important roles professional accountants play in creating, enabling, preserving, and reporting value for organizations and their stakeholders; and
- supporting member organizations in enhancing the competence of their members through development and sharing of good practices and ideas.

The approved text of this guidance is published in the English language. The PAIB Committee welcomes translation of its publications in other languages. Please contact permissions@ifac.org.

Foreword

The Costing Levels Continuum Maturity Framework (the Framework) provides a complementary resource to the International Good Practice Guidance on [Evaluating and Improving Costing in Organizations](#) for both IFAC member bodies and their members working in commerce, industry, financial services, education, and the public and not-for-profit sectors. Issuing this separately is an opportunity for IFAC to provide additional practical support without adding to the length of the original guidance document.

The Framework is intended to be used as a self-assessment tool to help an organization (a) determine its current capability, and (b) decide what level in the Framework it might justify aspiring to. Specifically, it further supports how to think about applying principle D in the guidance, which highlights the importance of implementing costing systems that are “fit for purpose”. Principle D states that:

The design, implementation, and continuous improvement of costing methods, data collection, and systems should reflect a balance between the required level of accuracy and cost of measurement (i.e., cost-benefit tradeoff) based on the competitive situation of the organization.

Therefore, the Framework aims to help accountants apply professional judgment and objectivity in determining where an organization’s capability is for supporting internal managerial analysis and decisions. The Framework can also help organizations decide what maturity level to aspire to, given organizational requirements and the decision needs of employees. As a self-assessment tool, it can be used by professional accountants to evaluate their organization’s current practice, and to consider appropriate action for improving performance evaluation and analysis (i.e., interpretative and diagnostic capability), and planning and decision support (i.e., analytical and predictive capability).

The maturity approach usefully recognizes that there will be a maturity level in the Framework for any organization beyond which additional analysis will fail to improve decision making enough to justify the incremental effort and associated cost to improve cost management. In making this judgment call, the same principles apply as to the business decisions that an improvement to costing is intended to support. The resources that need to be devoted to the improvement need to be identified and evaluated. As well as the outlay in systems design, development, and implementation, the resource requirement of operating any new data collection system, and keeping cost models and IT systems up-to-date, needs to be considered. An apparent gain in system sophistication can easily be negated by a later inability to maintain, update, and operate the system effectively.

We thank Gary Cokins, founder of Analytics-Based Performance Management LLC (www.garycokins.com), an advisory firm in Cary, North Carolina, for working with IFAC to develop this cost maturity framework and author this document. This is version 2.0 and the feedback from IFAC’s member bodies, professional accountants, and others interested in this field, will enable us to continually improve it.

**EVALUATING THE COSTING JOURNEY:
A COSTING LEVELS CONTINUUM MATURITY FRAMEWORK:**

VERSION 2.0

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An Introduction to A Costing Maturity Framework

As a minimum, organizations typically report expenses to comply with legal and regulatory requirements. Many organizations also calculate costs that consume resources (e.g., product costs), and their associated expenses. Successively more sophisticated levels of costing tools and techniques also exist, along a continuum of complexity, where each next higher level can provide organizations with greater accuracy, visibility, and insights for analysis and decision making.

This Framework complements the International Good Practice Guidance (IGPG), [Evaluating and Improving Costing in Organizations](#) by describing two cost maturity (continuum) paths:

1. A path for improving historical and descriptive performance insights; and
2. A path for improving forward-looking and predictive performance insights.

The descriptive path covers eight levels for calculating spending, and obligations to spend, incurred in past periods. The historical and descriptive path helps to achieve cost reporting and analysis, and adherence to financial reporting standards.

Covering five levels, the predictive path is important for planning and decision support, and is needed to support customer profit and loss reporting. This path covers projected expenses and costs that help an organization become better able to predict future outcomes. The forward-looking path has dependencies on information produced at various levels along the descriptive path.

Although the Framework is represented in two parts, with eight and five separate levels, the complexity of the real world is that some organizations may find themselves in-between levels or at various places on the journey in both maturity paths.

The significance of these two maturity paths is to highlight that cost management and supporting systems should reflect the underlying reality of the way the organization works, as far as affordability and materiality allow, and within the context of the required business decisions. Progression to a higher level should be based on internal decision-making requirements, and should satisfy professional accountants in business, decision makers, and other stakeholders, which will include customers, employees, and shareholders or funding bodies.

The two cost maturity paths can also help professional accountants to play a central role in educating users, including advising, for example, on the selection of costing methods, and cost measurement and classification.

The quality of internally reported cost information strongly influences the quality (e.g., usefulness, scope, or accuracy) of the managerial accounting information used for planning, cost estimating, budgeting, and rolling financial forecasts.

The Framework considers two key capabilities of costing systems: (a) the modeling capabilities of an approach, including the calculation of historical costs and projections of some future ones (e.g., through using budgets), and (b) the robustness of the marginal/incremental information an approach provides.¹

¹ The terms marginal and incremental are to be assumed synonymous in this Framework. Both are popularly used and interchangeable. Their context involves the pervasive nature of decision making in companies (i.e., the vast majority of decisions involve an incremental change to the status quo). Their use in this document refers to the ability of a management accounting approach to provide insight into the impact of a change in demand volume, and hence resource consumption and resulting costs, of the resource that supplies capacity to satisfy demand—see principle B of [Evaluating and Improving Costing in Organizations](#).

This latter aspect is a feature of a forward-looking path and is important because many decisions in an organization have incremental impacts on resource expenses.

There are some dependencies with the two maturity paths. The information from some of the higher levels of the descriptive continuum become enablers for analysis and decisions in the predictive continuum, such as target costing for new product development, investment decision making, and variance analysis of actual versus planned or expected costs. Higher levels of the predictive path are not attainable without the organization being at relatively higher levels of the descriptive path.

As an organization progresses through the levels of maturity, the value of benefits can potentially compound. As the organization progresses, the administrative effort, and, therefore, costs, to attain the next higher level increases. Therefore each next level should be justified. One can test each level by asking, "Is the climb worth the view?" That is, will the incremental accuracy, visibility, and insights gained exceed the extra effort to model and calculate the costs?

Each level on the two continuums expands on the prior one, which means that the effort to attain the previous level and its cost modeling design and capabilities can be retained, modified, or removed. More benefits accumulate as the organization improves its capabilities.

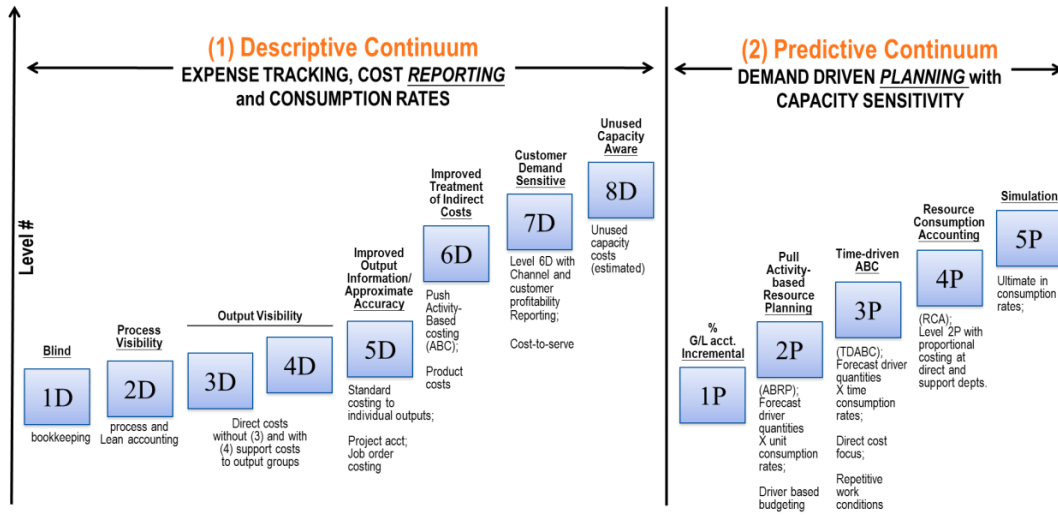
The Framework is not prescriptive and does not address how to use cost information, concentrating instead on attaining a high quality of cost data for a range of purposes. However, by knowing what level an organization is on, the organization can evaluate the potential benefits, if justified by the extra effort, to advance to one or more higher levels.

This Framework can apply to any enterprise-wide organization, internal department, or sub-contractor that:

- provides products and services to users, commercial customers, or public sector or not-for-profit recipients;
- needs an appropriate level of resources (i.e., neither wastefully excessive nor dangerously deficient) to meet its customers' typically price-sensitive needs; and
- requires revenues or appropriated funds to sustain long-term payment for its resources and make investments in its future.

Costing Continuum / Levels of Maturity

(most companies are Level 4D and 1P)



The Costing Maturity Principles

Two basic principles apply to all levels of the Framework. The first is relating the resource capacities (both types and amounts) to the outputs, products, or services, and the end-users that consume the resources (e.g., customers). It is the principle of matching and balancing the relationships of demand with supply. The second principle is reflecting the nature of cost as resources are consumed in these relationships. Therefore, some inputs, and, hence their costs, change with any change in output demand, while other inputs, and their costs, remain constant regardless of changes in output demand—at least until a next discrete unit of resource is needed to expand or contract capacity.

Each costing level is distinguished by how more effectively the organization incorporates the two principles. The more cost information helps an organization understand how demand relates to supply, and how cost behaves through consumption relationships, the better the organization’s visibility, analysis, planning, budgeting, and decision making will be.

The Historical/Descriptive Costing Path (Levels 1D to 8D)

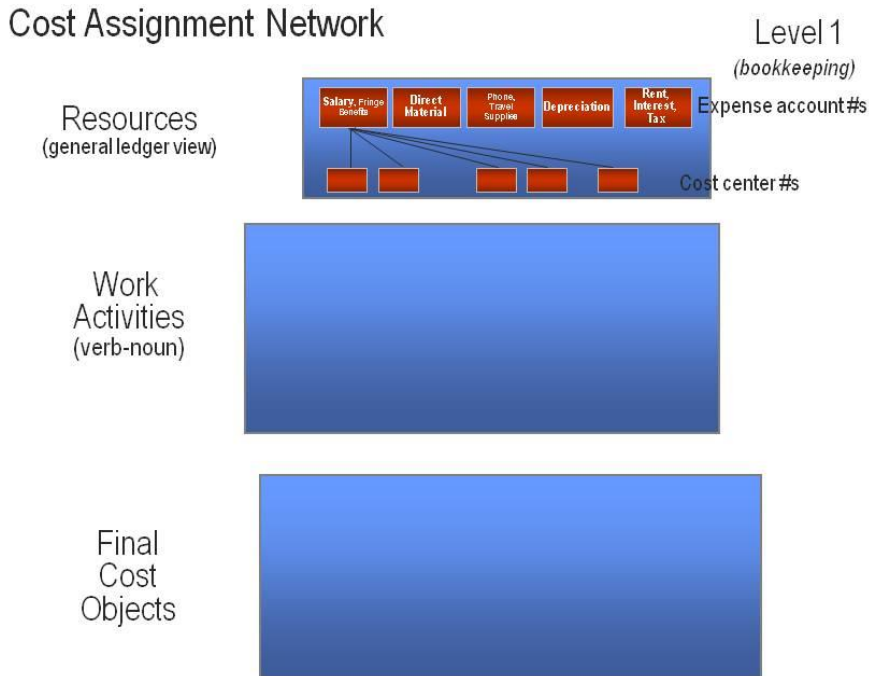
Level 1D—Blind

Bookkeeping

Level 1D is exclusively financial accounting and reporting at its most fundamental level. Expenses from the two basic transactional systems, payroll and purchasing, are accumulated in a general ledger accounting system. Some accrual accounting bookkeeping entries produce adjustments, such as to bad debt reserves, to report period-end income and balance sheet statements. Cost centers are few and aggregated at high levels, for example, by function: operations, sales, marketing, or administration. Costs are not calculated, and no information that will provide insight into the effects of incremental changes (e.g., on the level of resources and costs) is provided. Expenses are captured and accumulated from transactions.

Example:

An organization at this level would be primitive, perhaps with only a few employees. They would confirm they are making a profit if their bank account balance is increasing with time.



Level 2D—Process Visibility

Process costing, lean accounting

Level 2D links and accumulates primary cost centers in time sequence and by value streams rather than by functional departments. Sometimes referred to as process costing or lean accounting, process visibility is needed to support process improvement, sometimes used in conjunction with a method called value stream mapping. A value stream includes all the value-added activities involved in providing specific products and services to customers. Typically, the value stream’s process steps (e.g., work activities) for which costs are measured are also tagged with attributes denoting value (e.g., value-added versus non value-added) or amount of importance (e.g., much, some, little). This information brings focus to where opportunity for process improvement may lie. Optionally, if a value stream’s product cost is calculated, all products of a process are presumed to be homogenous (i.e., only an aggregated single average cost). The definition of cost behavior characteristics in Level 2D is overly simplistic, and insight into incremental changes is not supported.

A variation of Level 2D is called *throughput accounting*, derived from the theory of constraints (TOC) methodology. The TOC method states that any product cost is meaningless and irrelevant. Its assumption is all expenses excluding input purchased raw materials and components (i.e., where input volume will vary with output volume) are fixed and not easily adjustable in the short-term. Throughput accounting can help with short-term product mix prioritization. For example throughput accounting applies under the special condition where a 24-hour and 365-days per year physical constraint governs the flow for all

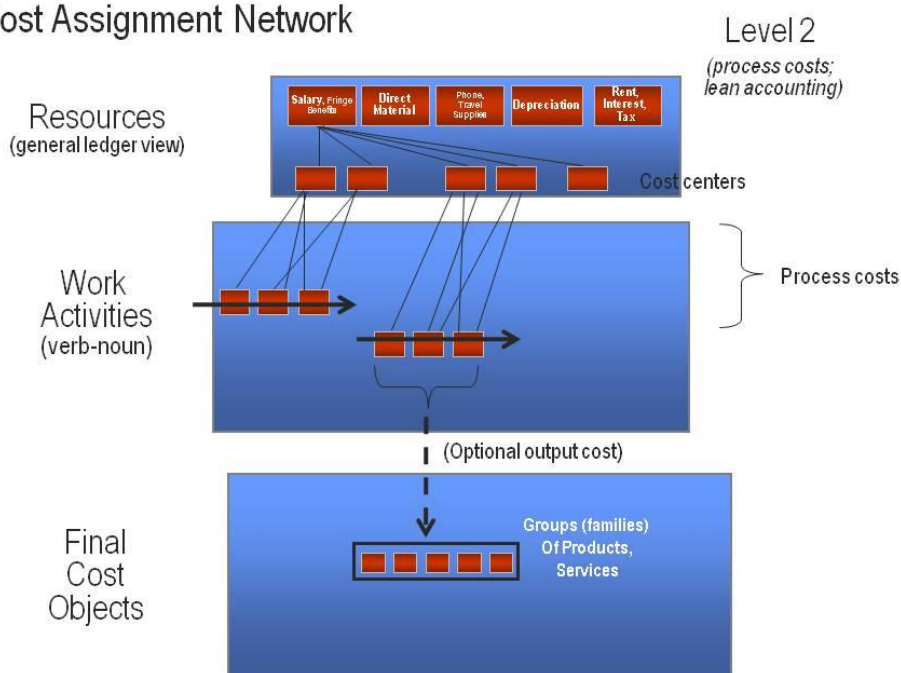
product throughputs. Without that special condition, traditional marginal revenue versus marginal cost analysis (see in [Level 7D](#)) applies.

Example:

An organization creates end-to-end flow process charts (often with “swim lanes”) comprised of the work-step activities. They are typically seeking to quantify the non-value added costs within each process. An example is Watlow Electric, which identified the main types of value streams and appropriate measurements, and value stream financial statements are based on a chart of accounts structure focused on a few value stream groups rather than functional departments.

—J.P. Brosnahan, “Unleash the Power of Lean Accounting,” *Journal of Accounting* (July 2008), 60-66. <http://maaw.info/ArticleSummaries/ArtSumBrosnahan2008.htm>

Cost Assignment Network



Level 3D—Partial Visibility (excluding internal support)

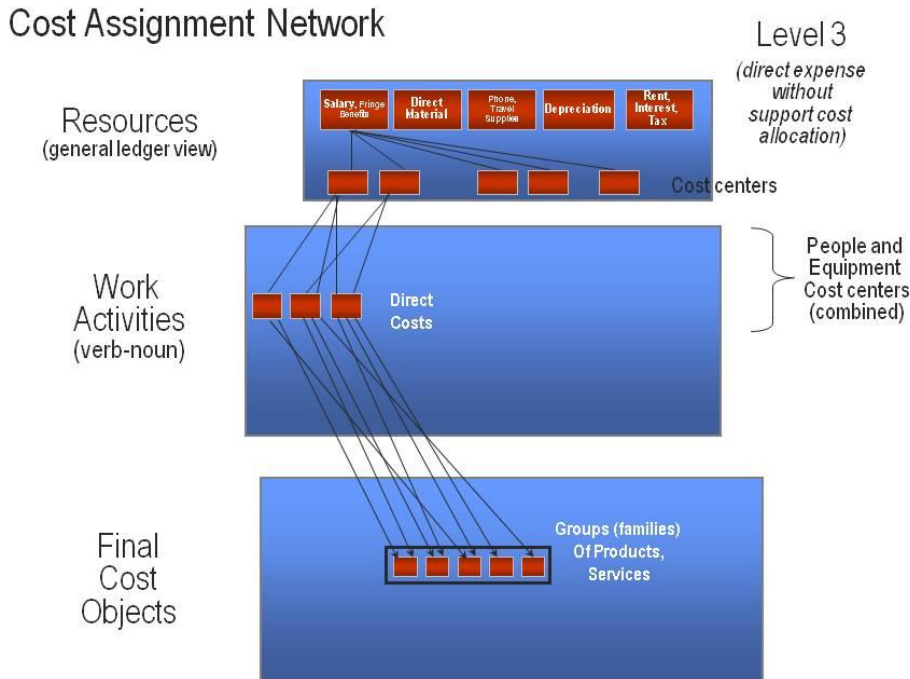
Levels 3D and 4D create output visibility and at highly aggregated level. Level 3D includes the costs of processes that consume resources in the costs of outputs (e.g., products).²

² Examples of resources are an employee, electrical power, or an asset of equipment that possess capacity. From a financial perspective, examples of each resource’s “expenses” would be wages for employees, kilowatt rate for electrical power, or depreciation for assets. These expense s become costs of work activities after resources are consumed, and ultimately end up as the costs of outputs, outcomes, products, services, channels, and customers.

Direct costing without overhead

Level 3D begins to calculate costs for different output groupings (e.g., product or standard service-line³ families). Calculated costs are restricted to the direct production costs that can be directly associated with the output groups, such as their direct material and direct labor cost.

For Level 3D, non-product making costs are not included. These types of costs include distribution, selling, marketing, accounting, and administration. The types of costs (e.g., by channel or by customer) for these activities that are reported here as below-the-gross-profit-margin line do not feature until Level 7D.



Level 4D—Visibility (with internal and external support); Cumulative Output Consumption

Direct expenses plus one, or few, indirect expense pool allocation

Level 4D is the first level that “allocates” indirect and shared costs to cost-objects.

The total cost of an indirect support department is assigned and added to the direct cost centers (from Level 3D) using a single allocation factor, for example, by the number of output group units produced by the direct cost center. These shared costs are added to the direct material and labor costs that were previously assigned to the output groups. Cost behavior definitions in Level 3D and 4D are simplistic and limited to final cost-objects. Therefore, insight into the effects of incremental changes in output is limited.

An argument can be made that the sequence of Level 3D and 4D could be reversed because at Level 4D, by introducing flawed and misleading indirect expense allocations, users now have worse information

³ For service organizations, such as banks, telecommunications, and hospitals, where their products may not be tangible or physical (e.g., a bank’s completed automobile loans), simply substitute the term “standard service-line” for “product” and the meaning will be the same. Non-standard services are calculated as “cost-to-serve” and traced directly to channel and customer costs.

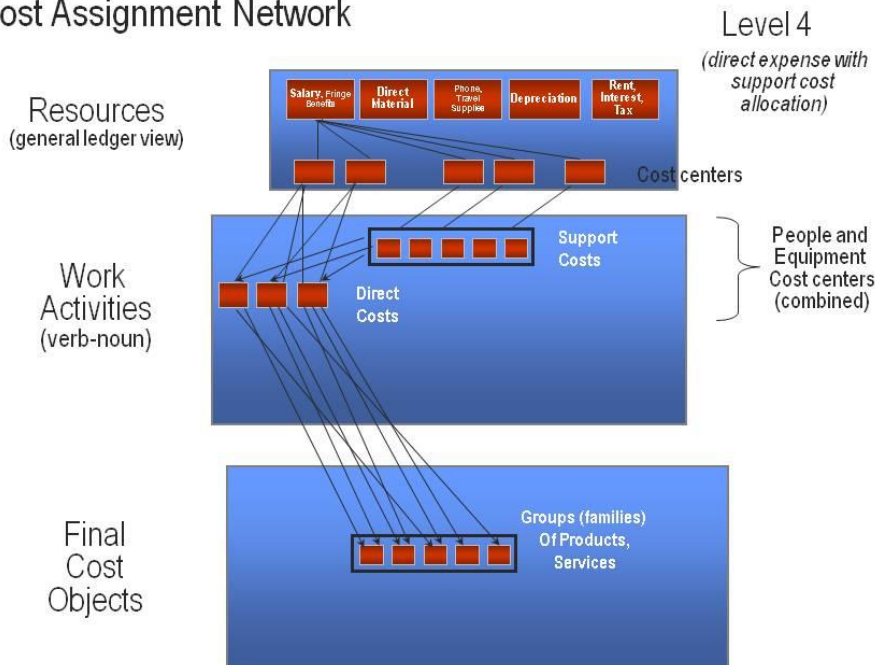
compared to Level 3D where the direct costs were more useful, but excluded other related, and potentially traceable, costs.

A modest improvement to increase cost accuracy applies the “step-down” allocation method, where one or more support departments receive allocated indirect expense from a higher (more indirect) level support department (e.g., the training department to the housekeeping department, and then to the primary cost center). But only a single factor (cost driver) is used from each support department. In Level 6Db multiple activity cost drivers are used.

Example:

This level is appropriate for a relatively small organization with little diversity or variety in its products or service lines. Hence, it will have minimal indirect expenses and receives sufficient insight into its costs from its direct expenses alone, or by allocating its indirect expenses based on averages without concern for any cause-and-effect relationship.

Cost Assignment Network



Level 5D—Improving Output Information with Approximate Accuracy

Level 5D calculates costs in relatively greater detail for individual outputs, not just their groups.

Level 5Da—Resource-to-Processes Consumption Relationships to Individual Outputs

Traditional standard costing

Level 5Da more accurately traces (direct) and allocates (indirect) costs to *individual* outputs and products, in contrast to the aggregated and grouped output costs in Levels 3D and 4D (e.g., product families).

In Level 5Da, work centers (e.g., a machine or processing desk) within a cost center are individually tracked. Then, each work center’s accumulated costs are directly associated with a single unit of output to produce the individual output and its cost. For example, in discrete manufacturing with assembled

components (in contrast to fluid process manufacturing, such as paint), for each product, (a) material quantities are captured in the “bill of material (BOM),” and (b) direct labor is captured in a “routing” based on time units. The quantities are drawn from predetermined standards that often reflect historical averages, and are valued in financial terms with standard or actual rates (e.g. \$ per minute) in the costing system.

The use of operational quantities results in reasonably accurate costs (assuming adequate data integrity) and standard metrics (defined as “average under normal operating conditions”), because they are direct. However, the allocated indirect and shared costs introduce inaccuracy, because they are combined with the direct costs using a BOM or routing factor, thus partially violating the “causality principle” (see principle C of [Evaluating and Improving Costing in Organizations](#)). The greater the relative amount of indirect costs and their drivers’ deviation from the direct standard cost driver assignment, then the larger the magnitude of the error of the output’s cost.

In Level 6D, these indirect costs are directly traced to outputs using their own unique cost driver(s) and quantities, thus better satisfying the “causality principle.” Level 5D systems provide more detailed insight into incremental information (i.e., for specific outputs), but there is no gain in the quality of marginal information itself.

Example:

A manufacturing organization or a service with highly repeatable processes, such as a credit card processing company, where an understanding of unit-level volume is needed. The purposes are (a) to calculate a product’s direct costs and (b) to report actual-to-standard cost variances. These are typically volume and rate/price variances. Caution with cost variance reporting is needed since they do not reflect performance related to time (e.g., due date delivery performance) or quality.

Level 5Db—Resource-to-Processes Consumption Relationships to Individual Outputs

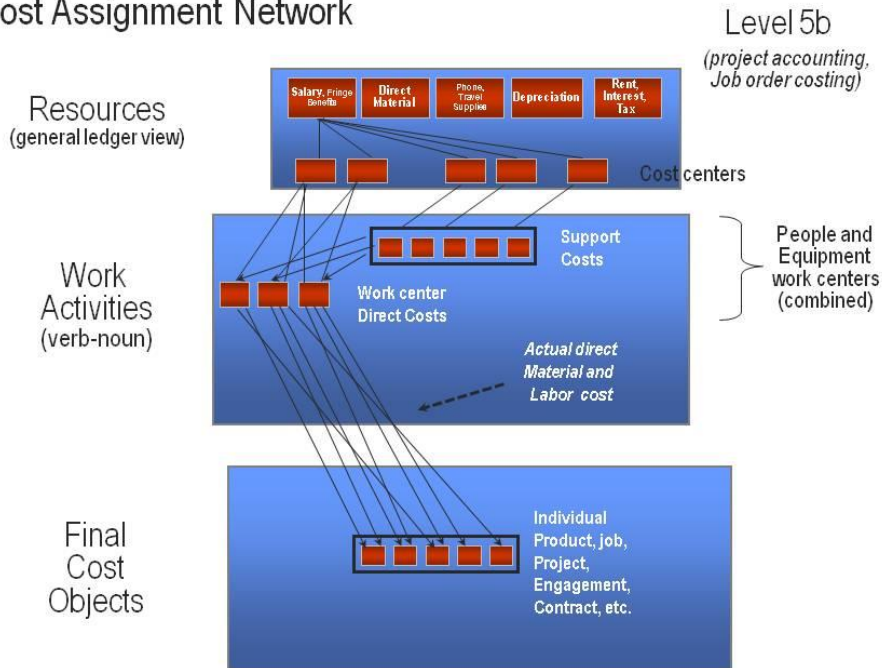
Project accounting and job-order costing

Level 5Db applies to organizations with special conditions where the organization’s work and processes are typically not repetitive or recurring, and its purpose is usually unique for the end user or customer.

Example:

Professional services firms, such as a law firm (delivering a legal case), a management consulting firm (consulting on a project), or a made-to-order manufacturing shop (delivering a special product). In the first example, the cost data needed is typically integrated with a billing system to invoice customers. Similarly, in the second example, the costs (and an added profit margin) may be used to charge customers to refrain from making similar special products.

Cost Assignment Network



Level 6D—Improved Treatment of Indirect Costs to Increase Accuracy

The “ground floor” for measured push [top-down] activity-based-costing

Level 6D substantially increases the accuracy of output, product, and standard service-line costs by tracing indirect expenses to outputs in a way that is more consistent with the causality principle. This cost tracing contrasts with allocating the indirect costs based on broad averages, with no consumption relationship to the behavior of indirect resources and their costs (used in Level 3D to 5D).

The primary way the causality principle can be complied with for indirect costs is by disaggregating the cost centers used in the prior Levels 3D to 5D into what some accounting textbooks refer to as “cost pools.” Today, cost pools are more commonly labeled as “activity costs”—the foundation for activity-based-costing (ABC). This level is where ABC principles are first applied. There are three mini-levels of ABC—6Da, 6Db, and 6Dc. In each one, resource expenses are “pushed” (top-down) through activity costs, and eventually re-assigned to final cost-objects, contrasting with a quantitative “demand pull” (bottom-up) costing that begins in Level 1D of the predictive/future costing continuum path.

In Levels 6D through 8D, general ledger expenses are traced directly to activity cost pools, or, alternatively, can be traced to those pools from payroll or accounts payable systems. These expenses are in monetary units. There is not yet an explicit connection of resources and their cost characteristics with a dedicated resource cost-object. This leads to incomplete resource information, as is evident from the common practice at this level of allocating activity costs to other activities that consume them and not to the resource that causes and consumes a particular indirect activity. This results in a quality of incremental information that is similar to Level 5D—albeit assigned in a more detailed way, as was discussed with Level 5D.

Level 6Da—Resource-to-Activities Consumption Relationships to Individual Outputs*Activity-based costing*

Level 6Da represents a major step up from Level 5D in terms of cost accuracy, visibility, and understanding. In Level 6Da, two or more work activities for each cost center, or their work centers, are defined. General ledger expenses (e.g., salaries, supplies, etc.) are traced directly to these work activities using various means, called “resource drivers.” For wage-related expenses, time can be apportioned (e.g., percentages, minutes) using estimates from a few knowledgeable employees or from time-sheet collection systems. For non-wage-related expenses, each expense type’s consumption will have quantified driver measures (e.g., electricity cost of a number of machine hours).

In Level 6Da, what most influences cost accuracy compared to Level 5D is that each indirect work activity is associated (i.e., connected with a cost assignment path) with only those specific outputs that consume each indirect work activity’s cost (to the extent that this can be estimated), and an activity cost is not connected to any outputs deemed not to consume the activity.

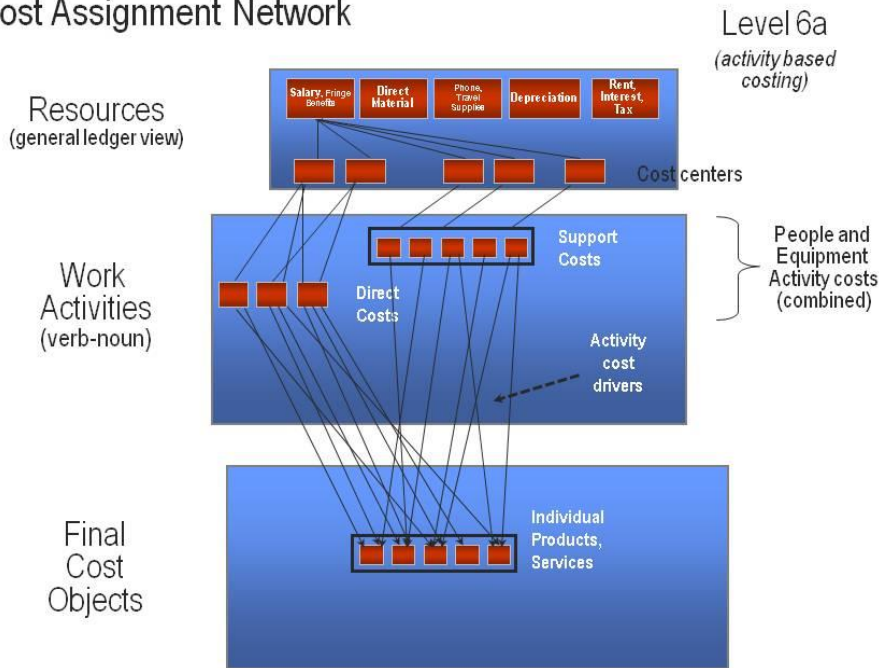
The vast majority of the additional accuracy created in this level relative to Level 5D is derived from the cost assignment consumption relationships. For this level, estimates, or measured quantities, of the activity driver proportions are secondary to the cost model’s assignment structure in enhancing accuracy over Level 5D.

The activity driver quantities that trace the activity costs to the outputs (for some or all of the activity costs) can be either estimated by knowledgeable employees or extracted from data previously captured in an operating system (a 100 percent distribution estimate may even be acceptable). All activities normalize to 100 percent from their source to their destination. The vast majority of the additional accuracy created in Level 6D (ABC) relative to Level 5D is derived from the cost assignment consumption relationships. For Level 6D, estimates, or measured quantities, of the activity driver proportions are secondary to the cost model’s assignment structure in enhancing accuracy over Level 5D.

Example:

A manufacturer, distributor, or service company with sufficient diversity and variety of products and service-lines to cause relatively large indirect and shared expenses to manage the complexity, and some products and service lines disproportionately consume the indirect and shared expenses.

Cost Assignment Network



Level 6Db—People and Equipment Expenses-to-Activities Consumption Relationships to Outputs

Multiple-stage activity-based costing

In Level 6Db, “multi-levels” of activity costs are added in two ways:

- people activities are isolated from asset (e.g., equipment) activities; and
- activities that are relatively more indirect are traced to activities that are relatively less indirect.

People Versus Equipment Activities

Separating people activities from equipment activities becomes more relevant the more capital-intensive an organization’s resource expense structure is. Level 6Db acknowledges this cost consumption behavior—that “workers operate equipment, and the equipment produces outputs.” That is, a work activity consumes another activity. The worker activity is therefore assigned to the equipment activity for only the time the worker is operating the equipment (the worker’s remaining time is assigned to other activity costs). The equipment becomes the costing focus, and the worker’s portion of wages is combined with several types of non-wage-related resource expenses (e.g., power, maintenance, depreciation) the equipment consumes to perform the equipment activity.

Multiple (4D or more) Stage Costing

By disaggregating Level 3D to 5D cost centers (or processes) into work activities in Level 6Da, one discovers that some secondary processes may have their *own* secondary activities.⁴ Costing is a linkage of *multiple-stage* consumption relationships, with some so-called indirect activities being relatively less indirect and others relatively more indirect in relation to the primary activities. Level 6Db recognizes that

⁴ Primary activities directly make a product or deliver a service. Their output is consumed by a final cost-object. Secondary work activities support primary work activities.

with indirect activity costs some sending activities revealed in Level 6Da can be assigned to other receiving activities.

Multiple cost stages means:

resources → *multiple* intra-indirect activities → primary processes → outputs.

Each stage is linked with cost drivers.

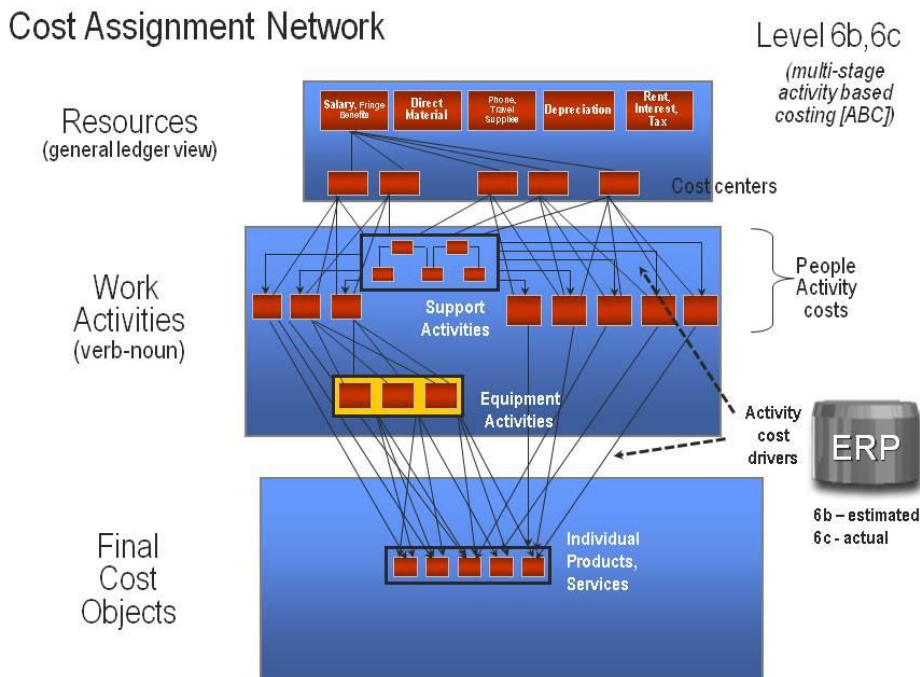
Example:

Organizations that are equipment (capital) intensive rather than manual labor intensive, where the equipment is producing the product or delivering the service. This would include internal (and possibly external) “charge-back” invoices from an information technology department. Having multiple stages of cost assignments are important to maintain compliance with the cost causality principle. For IT charge-backs, typically for internal full cost recovery of IT department expenses, these intermediate costs become inputs to other activity costs associated with making products or servicing customers.

Level 6Dc—People and Equipment Resource-to-Activities Measured Consumption Relationships to Outputs

Automated multiple-level activity-based costing

In Level 6Dc, estimates of activity driver quantities, provided by knowledgeable employees, are replaced with actual measured quantities extracted from transactional operating systems, for example, from an enterprise resource planning (ERP) system.



Level 7D—Customer Demand Sensitive, the Foundation to Quote New Orders

Level 7D introduces resource-to-activities measured consumption relationships to both outputs and customers.

Customer profitability reporting

In Level 7D, customers become the ultimate final cost-objects in the cost assignment network. Their existence ultimately creates the need for resources and for an organization's cost structure in the first place. The volume and mix of products and services are traced to each customer cost-object.

"Cost-object cost drivers" trace the volume and mix quantities of product, and other final cost-objects, to customers. Some final cost-objects, such as a product and service-line cost, are the end-of-the-line for product-related costs. The same applies for a customer final cost-object that consumes cost-to-serve activities (e.g., making sales calls). When the amount of product-costs purchased by a customer is traced to the customer, this cost transfer cannot be made with an activity cost driver, because there is no activity source. The source is a cost-object. Hence the generic descriptor is a "cost-object cost driver".

Level 7D accomplishes this by adding calculated costs attributable to channels (e.g., distribution, sales) and customers that were not included in Level 6D. In contrast to product and standard service-line costs, these costs are typically referred to as "costs-to-serve." Level 7D final cost-objects also include the associated revenues (i.e., price x volume) from priced products and services, or fees for public sector government agencies. By adding prices, profit contribution margins can be compared amongst products, channels, and customers for analysis and potential actions.

Level 7D also assigns non-product and non-customer caused costs (e.g., the legal department) to business sustaining final cost-objects (see [Business Sustaining Activity](#)), such as senior management or regulatory agencies. This prevents over-costing products and customers with costs with which they have no causal relationship.

Business Sustaining Activity

Such costs are activity costs not caused by making products or delivering services to external customers. The consumption of these costs cannot be logically traced to products, standard service-lines, channels, or customers, unless arbitrarily allocated to them in Level 7D but not without a causal relationship. Examples include the month-end accounting close activity of the accounting staff and the "file government regulatory papers" activity of the legal staff. In Level 7D, the cost of these activities would be traced to senior management or a regulatory agency, respectively, as business-sustaining cost-objects. Although it is true that the business must recover these costs from its revenues or funding, the point is that allocating them to products or customers is misleading and would overstate their costs, sending the wrong signals to employees who use output, product, or service cost information for decision-making purposes or determining cost rates.

The major difference between organizations at Level 7D from those at Level 6D is that Level 7D organizations trace non-product and non-standard-service costs (i.e., costs-to-serve), such as distribution, marketing, and selling costs, to (a) groups or segments and, subsequently, to (b) the individual channels and customers. They do not allocate these costs to products, because no causal relationships exist. Level 7D also supports transaction based costing (see [Transaction-Based Costing](#)).

In Level 7D, the predictive view of future customer demands is not yet projected and forecast. This level continues to be descriptive and reports only about what happened. However, unit-level consumption cost rates (ratios) calculated start becoming valid for quoting and bidding one-time opportunities. As a simple example, an order for 1,000 units with USD \$10 labor and material cost (assuming both the material and temporary laborers are variable expenses) would cost USD \$10,000. These rates would be applied in Level 1D of the predictive framework.

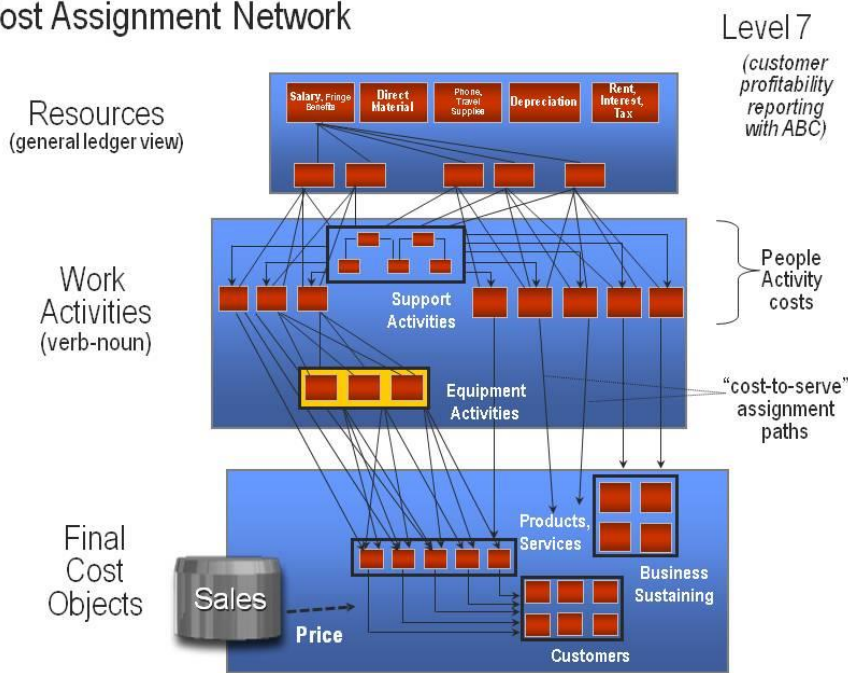
Example:

Many organizations are shifting from being product-centric to customer-centric. This means they need to better understand the costs of satisfying the unique preferences of their customers to retain, grow, win-back, and acquire them. These levels are needed by organizations of all types where their products and service lines are increasingly viewed by their customers as commodities, their competitors typically have comparable product and service-line costs (hence, minimal competitive advantage), and look to differentiate services (e.g., cost-to-serve) for different types of customers.

Transaction-Based Costing

A variation of Level 7D is transaction-based costing. This technique leverages today's computer power, and it applies in business-to-customer (B2C) industries, such as banking, that require highly scalable cost and profit calculations to hundreds of thousands customers on a near real-time frequency (e.g., daily). This technique begins with measuring all unit cost rates of transactional events (e.g., cost per each bank wire transfer). For each customer, this technique multiplies the recorded quantity of their transaction with each rate, and then sums the total transaction costs, and accumulates them with each customer's prior costs. In effect, it allows reporting a daily profit and loss for every customer. The rationale for such high computing intensity is that customer relationship management (CRM) and marketing relationship management (MRM) systems used for offering tailored deals or discounts, typically utilized by call center or customer account representatives, must be aware of each customer's past actions and their new potential economic value in order to sell more products and services.

Cost Assignment Network



Level 8D—Unused Capacity Awareness

Level 8D introduces resource-to-activities measured consumption relationships to customers, and segmented estimated unused capacity.

Standard costing with estimated unused capacity

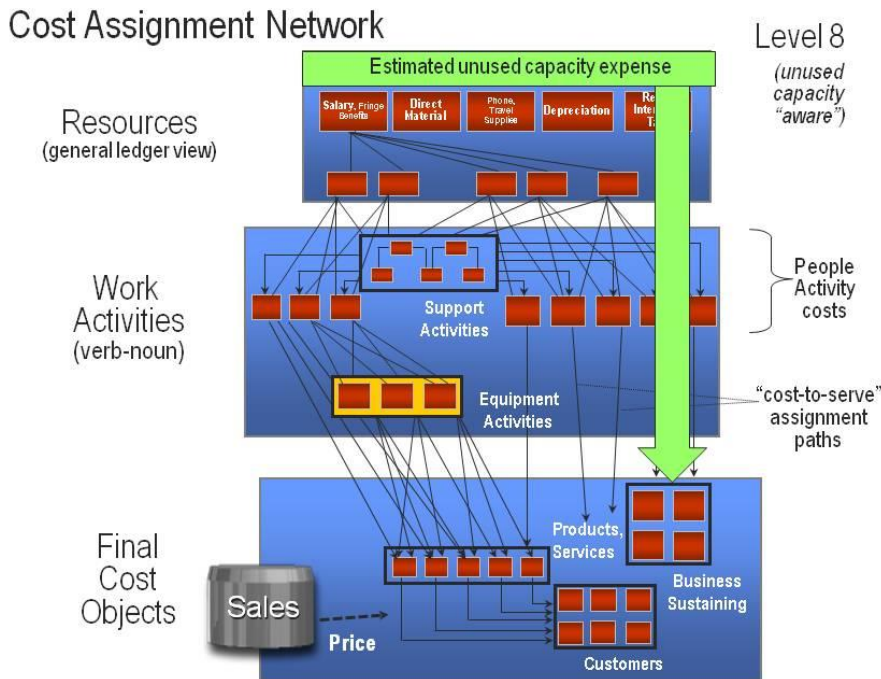
Organizations that plan at Level 8D have already attained Level 6D or 7D. Organizations at Level 8D determine, usually by estimating, the amount of each resource’s idle or unused capacity amount or time (if any), and assign these costs to a business sustaining cost-object called unused or idle capacity.

Resources supply capacity for work and production. Customers create demand for that capacity, giving rise to the need for products and services with channels to receive them. Resources are either used or not used. Those that are used are traced and assigned in all of the levels. But including a resources idle capacity expense in the cost assignments (to the degree that it does) overstates all of the process/activity costs as well as the output costs. It will also overstate cost rates used for projections.

As far as marginal or incremental information is concerned, Level 8D is a marked improvement over lower levels. At this level, the cost of resources and cost behavior characteristics begin to be emphasized. This lays the groundwork for a better quality of marginal information than appear in the predictive framework levels. In turn, when making optimization decisions, this supports development of insights into the incremental gain that result from changes in output.

Example:

Organizations that have seasonal fluctuations, such as with agricultural harvesting or gift flowers (e.g., Mother’s Day and Valentine’s Day) or have volatile order volumes where some safety capacity is needed and/or trade-off analysis of full-time versus temporary employees needs to be studied.



The Future/Predictive Costing Path (Levels 1P to 5P)

Demand-Driven Planning with Capacity Sensitivity

Levels 1P to 4P shift from the descriptive view of cost measurement to the predictive view of managerial economics for decision making (e.g., customer quotes, driver-based budgeting). These five levels leverage the information from historic Levels 6D to 8D to project resource requirements, and their associated costs, so as to match forecasted demand quantities with supplied capacity. Each successive level also strives for better resource and marginal information insights.

Levels 1P to 5P balance the emphasis on final cost-objects with the resources that are consumed by them. These five levels reverse the maturity path from historic Levels 1D to 8D, where the focus was on outputs resulting from the consumption of work activities. In Levels 1P to 5P, the predictive capabilities require the ability to run the cost model backward (from final cost-objects to resources). Level 4P aligns with a resource consumption accounting (RCA) approach. RCA stresses resources and their cost characteristics as the starting point for all cost flows through the model (i.e., an accurate product or customer contribution margin starts with a true reflection of resources and their cost characteristics).

As resources are the source of all costs in an organization, investment in resources also determines the cost structure managers are faced with, which will affect strategic decisions. For example, consider the cost structure of an airport with a fully automated baggage handling system compared to an airport that relies entirely on manual labor. The explicit inclusion of resources, their cost, and cost characteristics are essential for three reasons: (a) to facilitate predictive capabilities, (b) to produce accurate marginal information throughout the cost model, and (c) to isolate excess/idle capacity information.

Levels 1P to 5P replace “estimated” unused capacity costs by shifting from a cost “push” (top-down) model to a quantitative demand “pull” (bottom-up) model. Thus, each level empirically deduces (i.e., derives with calculation) the amount of each resource’s unused idle capacity expense that remains (i.e., is subtracted from how much capacity expense was used).

Level 1P—General Ledger expense account adjusting

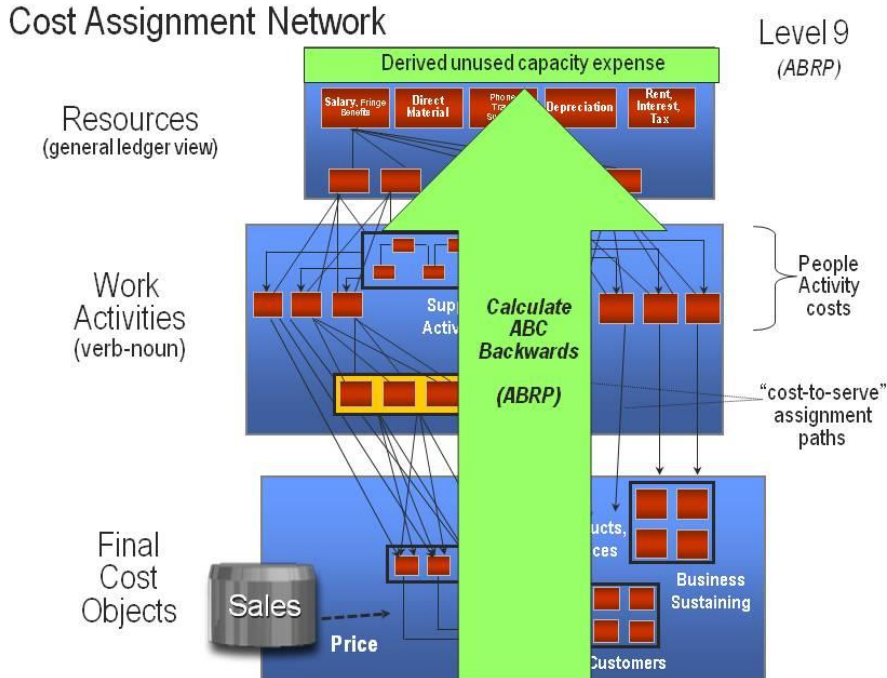
Incremental/decremental cost center expense account projecting

Organizations that project future expenses at Level 1P do not calculate a cost model backward. They typically adjust the prior year’s expense account balances within each cost center by a percentage increase or decrease (or hold it constant). Percentage increases for an estimated inflation rate are common to a time-series index of the months within the prior year.

This is the most primitive form of budgeting or rolling financial forecasts. Modest improvements may include increase or decrease adjustments for expense accounts that vary with the cost center’s output volume based on forecasts of the output volume. Since each cost center is processed independent of other cost centers, there are no cause-and-effect relationships between the cost centers that place demand workloads on themselves. They are guesstimated. The next subsequent levels resolve this weakness.

Example:

Organizations that have relatively stable demand volume and minimal interdependencies between direct cost centers and the support departments (i.e., indirect and shared expenses). Headcount and spending increases and decreases can be projected for each cost center in isolation of other cost centers.



Level 2Pa—One-Time Customer Orders with Consumption Relationships to Resources; “Relevant Range” Sensitive

Activity-based resource planning

Organizations that plan at the predictive Level 2Pa have attained the historic Level 8D. However, Level 2Pa organizations begin to calculate their models backward to determine the expected impact on resources from a one-time customer order, or a process change. This method uses the quantitative demand “pull” (bottom-up) method as opposed to the alternative costing technique to “push” costs (top-down) through the model.

For ABC systems, level 2Pa represents the beginning of activity-based resource planning (ABRP). With ABRP, organizations leverage the resource and activity consumption relationships to calculate resource capacity requirements.

An essential advance from the historic Levels 6D to 8D is found in the classification of individual resource expenses depending on their correlation with changes in output (usually activities). Each resource expense is classified as fixed (unaffected) or variable, depending on how adjustable it is within a specified time horizon because of incremental changes in the volume of demand unit output quantities. This approach to defining cost behavior to provide incremental information is an improvement on previous levels. The amount of incremental improvement increases relative to how extensively groups of resources are disaggregated to discrete ones that comprise a homogeneous group. However, this approach does not fully support the concept of a resource as a discrete entity (e.g., a machine, a person, or a building).

An example of a non-ABC approach that has developed sophisticated predictive capabilities is the German cost accounting approach called *Grenzplankostenrechnung* (GPK), described in [Evaluating and Improving Costing in Organizations](#).

Example:

Organizations with substantial diversity and variety of their mix of products and services lines resulting in complexity, and the need for indirect and shared expenses to manage the resulting complexity. These might involve customized pricing of one-time orders.

Level 2Pb—Aggregate Customer Orders with Consumption Relationships to Resources

Activity-Based Resource Planning

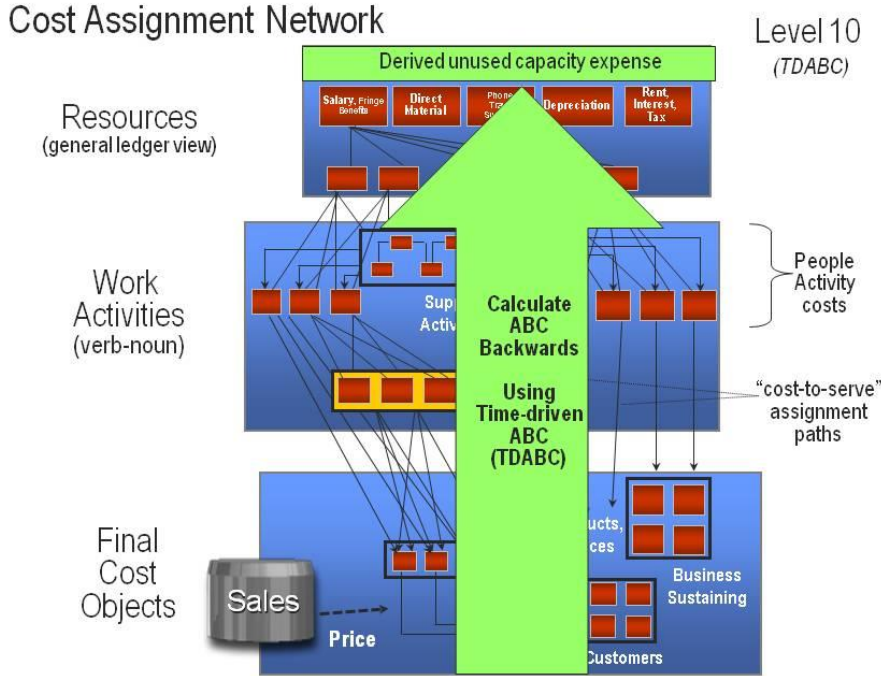
Organizations that plan at Level 2Pb have already attained Level 2Pa. Organizations at Level 2Pb determine the expected impact on *all* resources of *all* forecast customer orders or process changes. Level 2Pb organizations leverage consumption relationships to calculate resource capacity requirements.

Level 2Pb organizations first compare the projected requirement for resource capacity types and amounts to their existing ones. They then determine if resource types and quantities should be added, or removed as might be the case if new operating efficiencies and productivity improvements can reduce the consumption rates, thus lessening the impact on resource capacities.

An extension of ABRP is its application for measuring customer lifetime value (CLV). CLV is essentially a discounted cash flow equation that calculates the future potential value of individual customers. It generally applies to B2C companies because the past level of customer profitability is not fully adequate for insights since customers pass through life cycle stages (e.g., teenagers become young adults with more spending power). CLV's purpose is to aid the marketing and sales functions with better targeting on which customers to retain, grow, win-back, and acquire, as well as how to optimally spend on deals, discounts, and offers to gain the highest incremental profit lift. It requires shift to view customers as an investment in a portfolio of customers.

Example:

Similar to Level 2Pb, organizations with substantial indirect and shared expenses.



Level 3P—Aggregate Customer Orders with Time-Based Consumption Relationships to Resources

Time-driven activity-based costing

Level 3P organizations exclusively use time-based activity drivers as standards. In contrast to the “pull” (bottom-up) ABC-based ABRP of Level 2P, where activity consumption rates are re-calibrated after determining past period resource costs, Level 3P’s time-driven activity-based costing (TDABC) freezes each output’s activity time rate as a standard rate, and calculates each activity cost as a “standard cost.”

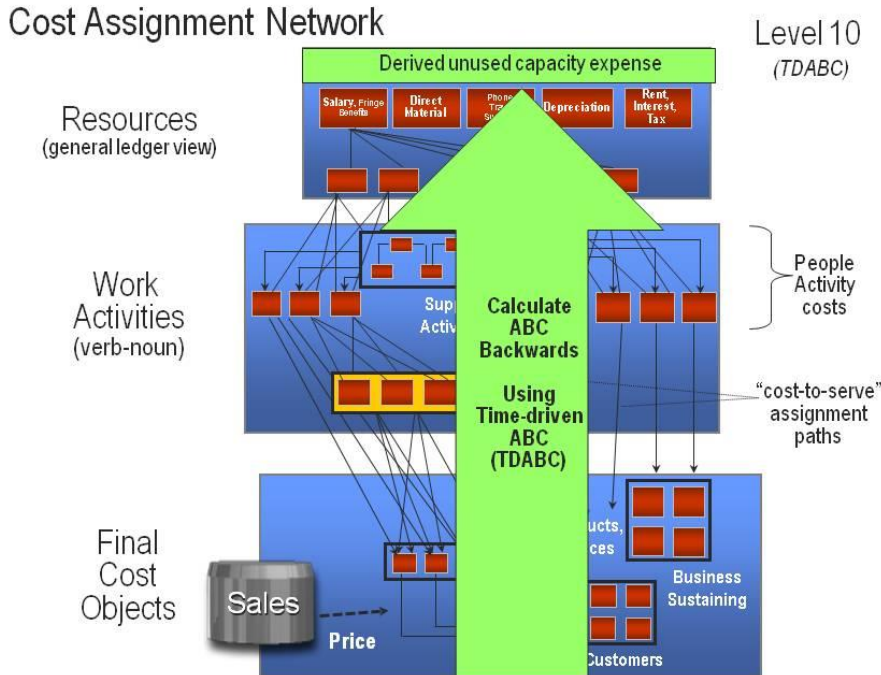
Since all of TDABC’s activity costs are calculated “at standard cost,” the net difference between the *actual* resource costs and the aggregate *standard* activity costs can be calculated. This difference can be a substitute for unused or deficient capacity.

In cases where actual output is higher than planned, the excess/idle capacity variance will be calculated as a negative number (i.e., over-absorption). An accurate unused capacity number is only possible with the use of a supply-based denominator rate calculation. Level 3P TDABC primarily focuses on direct costs, as in historic Level 5Da. It is therefore more applicable to organizations with highly repetitive events (i.e., transactions) that are characterized by relatively less indirect-to-direct relationships as compared to organizations with substantial indirect costs.

Time-based costing for direct labor expenses has existed in US manufacturing companies since the early 1900s. It was primarily used for product costing using routings or labor sheets at the product’s single unit-level. Gradually and with time, it was recognized that this traditional standard costing method can also be applied to non-manufacturing service environments. TDABC is an example of the gradual recognition where time-based activity drivers apply to the direct labor costing described in the historic Level 5Da.

Example:

Organizations with highly repeatable processes and modest diversity (in terms of products and services), and that have relatively low indirect and shared expenses (e.g., a travel agency) where continuous productivity increases are important to remain competitive.



Level 4P—Aggregate Customer Orders with Flexed Consumption Relationships to Resources

Resource consumption accounting

Organizations that plan at Level 4P are similar to those at Level 3P, in that they have also attained Level 2P. However, Level 4P replaces activity-to-activity relationships in the multiple-stage cost assignment network with resource-to-resource or activity-to-resource relationships, where understanding these relationships is essential to properly reflect resource costs and their characteristics.

Therefore, in Level 4P, resources are no longer viewed as equal to a general ledger expense account. Instead, resources are discrete entities (e.g., a machine, a group of technicians) that managers deploy, commit, manage, and influence to effect change and achieve enterprise objectives (i.e., every decision managers make is a decision to apply resources). Level 4P also introduces a resource-specific cost-object—called a resource pool—that serves to manage capacity and capture the cost characteristics unique to a set of homogenous resources.

In reality, capacity only physically resides in a resource, not in activities or final outputs; resources are the starting point for managing capacity and costs. For the marginal information it provides, this method—referred to as resource consumption accounting (RCA)—draws on core economic principles from GPK. Level 4P provides highly divisible marginal and absorption costing information on all cost-objects/resource pools, which are compiled with a singular emphasis on adhering to the causality principle, both its strong and weak forms. For more on these two aspects of the principle of causality, refer respectively to paragraphs C.1 and C.6 of [Evaluating and Improving Costing in Organizations](#). Similar to Level 3P, Level

4P determines the expected impact on all resources from all the forecast customer orders or process changes.

Organizations adopting RCA can integrate both *descriptive* cost control feedback for corrective actions and *predictive* resource planning into a *single* model. In addition to projecting future resource capacity requirements, and their costs, level 4P provides past period feedback of cost variances based on “flexing” for actual produced volume, as opposed to a static plan. A supply-based denominator is used in rate calculations, resulting in an accurate valued cost variance for unused or deficient capacity.

Flexed Cost Feedback to Operational Managers

In addition to projecting future resource capacity requirements, and their costs, Level 4P provides past period feedback of cost variances based on “flexing” for actual produced volume (as opposed to a static plan). A supply-based denominator is used in rate calculations, resulting in an accurate valued cost variance for unused or deficient capacity.

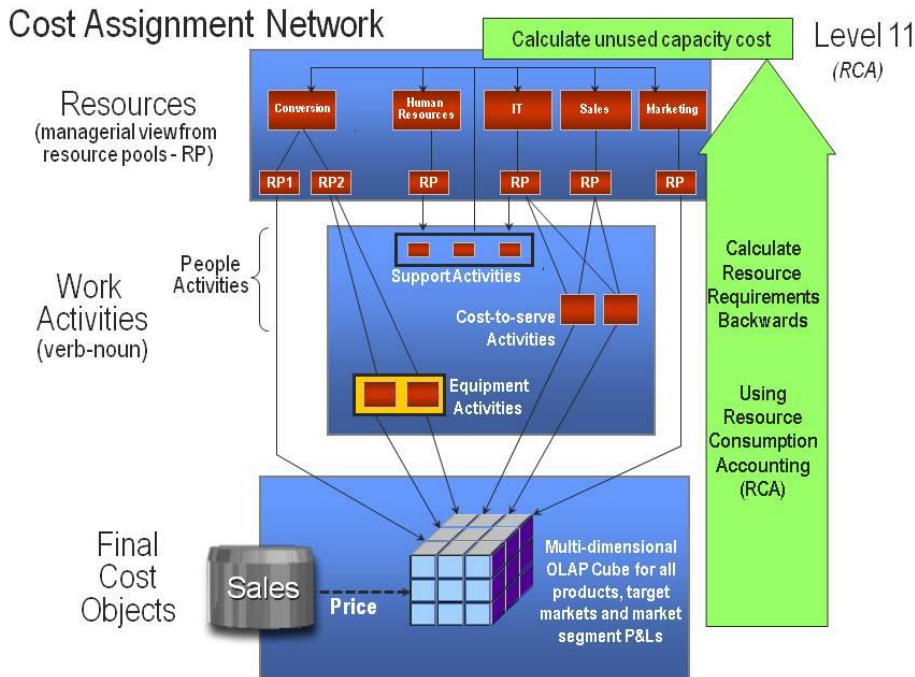
Direct and Indirect Capacity Resource Planning

In contrast to Level 3P, organizations that mainly highlight direct expenses, Level 4 organizations report and plan on significant direct and all indirect support departments.

In summary, Level 4P RCA organizations integrate both *descriptive* cost control feedback for corrective actions and *predictive* resource planning into a *single* model.

Example:

Complex organizations with layers of organizational support departments with interdependencies from the primary demand volume and mix and where indirect and shared expense levels require monitoring and control.



Level 5P—Simulation: A Future Vision

Organizations that plan at Level 5P have arguably attained the highest level of cost planning. Simulation can come in many flavors and degrees of sophistication leading to optimization (see [Optimization](#)). To some extent, simulation can also be applied in a limited way at other levels on the predictive path. However, simulation is a complex form of modeling, where modeling represents physical operations. One example of its application is called systems dynamics, which in simplistic terms reflects the simultaneous interdependencies of factors and influences on any entity or organization.

Level 5P simulations embrace finite forward capacity planning, a term used by production schedulers who plan and schedule the manufacture of a diverse mix of products using a broad set of different equipment. This type of simulated planning includes the reality of processing and wait times, product positions, resource capacity consumption rates, and capacity constraints.

In contrast to the infinite capacity assumption in historic levels 1D to 8D and predictive levels 1P-4P (e.g., two products being simultaneously manufactured on the same machine at the same time rather than in sequence), simulation models calculate the time delays resulting from the variability of processing times and periodic process flow bottlenecks. Service organizations, like banks and hospitals, experience similar issues with uneven wait times in queues at banks for bank tellers and surgery operating rooms respectively. These time delays result in temporary idle time of a resource (e.g., worker and/or equipment) that has an opportunity cost. In historic levels 1D-8D and predictive levels 1P-4P, this cost is averaged rather than precisely calculated.

Level 5P simulations can project and estimate (a) the level of resource expenses, and (b) the total and unit costs of the processes and outputs that consume the resources. It can do this at frequent intervals as the new and current conditions are updated with dynamic updating, approaching near real-time as its ultimate goal, if justified by decision making and control requirements.

Although enterprise resource planning (ERP) software systems contribute transactional data, they are not a cure-all for supporting a predictive view at this level. The management actions of planning, simulating, defining and analyzing alternatives, and selecting an optimum outcome via decisions that managers are responsible for support a predictive view more broadly. These management actions can only be taken by integrating the various methodologies of the performance management framework and embedding business analytics, especially predictive analytics, within each methodology.

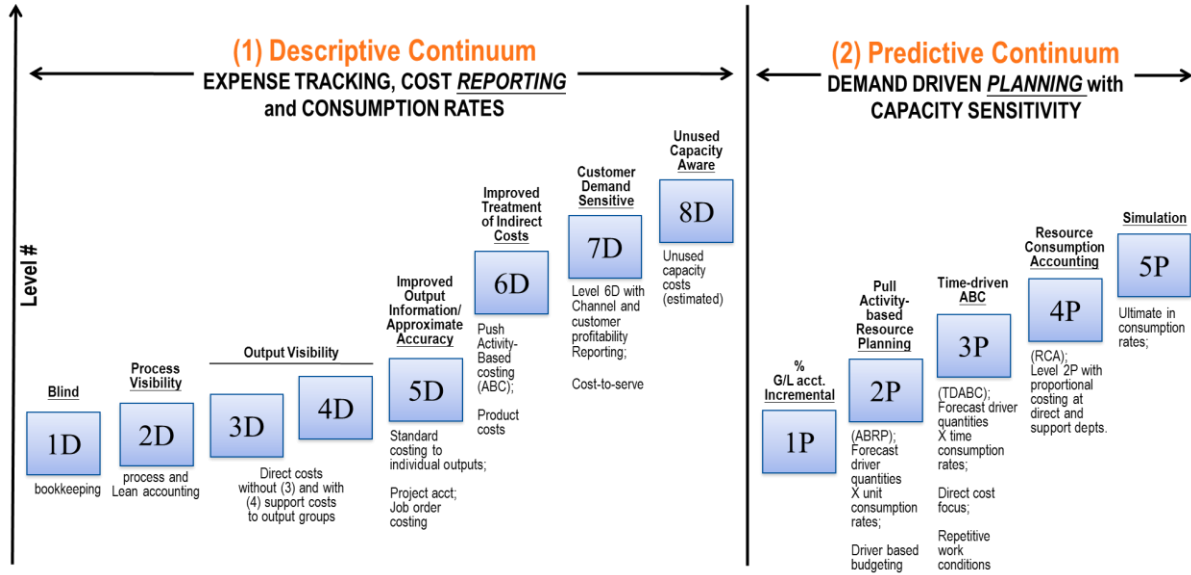
Optimization

Optimization can be difficult to realize. Enterprise optimization can be described as the pursuit and achievement of an organization's strategic objectives with the least amount of total resources in an ever-changing environment. This pursuit maximizes long-term shareholder wealth creation through a deep understanding of customers.

Optimization is about determining the best level of resources (e.g., human capital or equipment) to produce the highest yield and desired outcomes. Optimization includes managing that same best level of resources—and aligning their behavior and priorities with the strategic objectives of the executive team. Optimization cannot be realized without business analytics. Modeling is fundamental to achieving effective enterprise performance management, and business analytics is at the heart of modeling.

Appendix: Costing Stages of Maturity

Costing Continuum / Levels of Maturity (most companies are Level 4D and 1P)



Appendix: Additional IFAC International Good Practice Guidance

- [Preface to IFAC's International Good Practice Guidance](#)
- [Defining and Developing an Effective Code of Conduct for Organizations](#)
- [Evaluating and Improving Costing in Organizations](#)
- [Evaluating and Improving Governance in Organizations](#)
- [Evaluating and Improving Internal Control in Organizations](#)
- [Predictive Business Analytics: Improving Business Performance with Forward-Looking Measures](#)
- [Principles for Effective Business Reporting Processes](#)
- [Project and Investment Appraisal for Sustainable Value](#)

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