# SAP CO-ABC
# Activity Based Costing

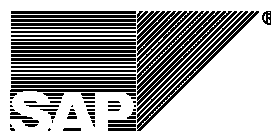**Overview**

**Structural Components**

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**Reporting**

**Conclusions**

**Glossary**

# SAP CO-ABC Activity Based Costing White Paper

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# Overview

The SAP R/3 system is a powerful data processing package.  It provides a comprehensive business software solution for every component of an organization.  The accounting portion of this system consists of a financial  module (FI), an asset management (AM), and a controlling module (CO).  The CO module contains sub-modules: cost center accounting (CO-CCA), and activity-based costing (CO-ABC).  This paper provides:

- insight into why CO-ABC is a valuable tool for your company
- a description of how CO-ABC is integrated with other SAP modules
- an overview of cost structures used in analysis
- examples of cost tracing mechanisms
- a discussion of reporting techniques

The target audience of this document is:

- decision-makers in firms and public authorities who wish to install a powerful data processing system to cover all controlling requirements
- staff involved in the installation and implementation of the software

Unlike the Implementation Guide, this text contains conceptual information discussing system organization.  Use the Implementation Guide as an aid for system implementation.

## Motivation

Controlling refers to all the accounting tasks that provide a basis for reliable and efficient decision making.  Some key functions of controlling include:

- determining product cost of manufacture
- analyzing and controlling overhead
- comparing revenues and costs for profitability analysis
- developing cost plans; analyzing variances from plans

Companies have traditionally accomplished controlling goals by allocating overhead to products on the basis of direct labor utilization.  Products with more direct labor received more overhead, regardless of how many overhead services they actually consumed.  All products were assumed to consume overhead in the same proportion -- a safe assumption when the majority of costs were direct labor and direct material.  The concept of analyzing individual groups of customers or distribution channels had not become a mainstream management activity.

The proportion of overhead cost to direct cost has increased dramatically in recent years as a result of increased product complexity and the application of industrial automation.  An increase in the service-related component of manufacturing has also driven increases in overhead.  Investment in technology continues to decrease the need for direct labor while increasing the overhead component of cost.  The distinction between direct and indirect labor is becoming blurred with the formation of flexible work teams.  As products become more complex, significant resources become necessary for engineering development, sales promotions, and after-market customer support.  Each product consumes these expensive overhead services in different quantities.  Because traditional accounting systems do not allocate overhead activities based on usage, costs become distorted.  Activity based costing provides operating managers with improved and analysis reporting capabilities (figure 1).  In

addition to improved product cost analysis, CO-ABC allows managers to view costs in other ways -- by customer, by distribution channel, etc.
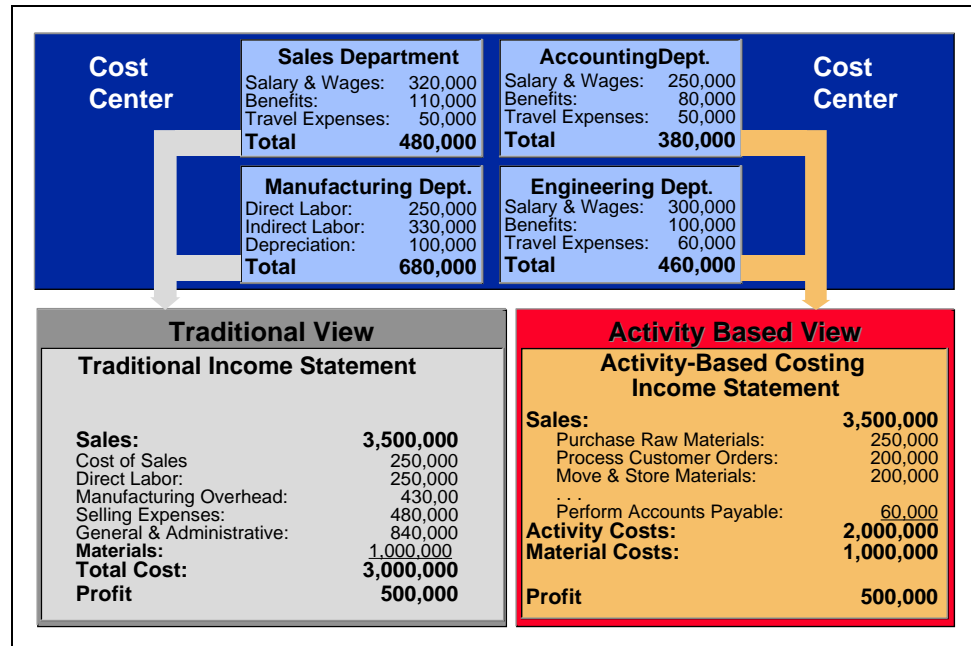


**Figure 1: New Depection of Costs**

The left side of figure 1 shows traditional cost accounting reporting. Four independent departments have conventional line items such as salaries, benefits, and travel expenses. These elements are combined to form a traditional income statement. What did the $300,000 of engineering wages accomplish? This information does little to support decision making.

The right side of figure 1 shows an activity based costing income statement. This reporting system reveals how much money was spent **and** what was accomplished. Although this summary only notes that $200,000 was spent on processing customer orders, a manager can easily request an analysis of the spending to learn how much was in engineering (custom design work), sales (explaining the options to customers), and accounting (developing cost estimates). Similar information could be easily obtained for "deliver product to the customer." Analysis often reveals opportunities for significant cost savings. This information can be aggregated at many levels -- for the entire corporation, for a subsidiary, for a group of products, or for just one product that is having difficulty in the marketplace and requires management attention.

Assumptions of allocating all indirect and fixed overhead cost based on direct labor are no longer accurate. Activity-based costing assigns costs to business processes based on their use of resources. Process costs are assigned to cost objects, (products, customer groups), based on utilization of processes.

CO-ABC supplements the analysis functionality found in standard cost center accounting. CO-ABC analysis of overhead costs creates a foundation for implementing new management techniques. Complex strategic decisions concerning investment, process improvement, marketing, and new products utilize a more accurate base of information. CO-ABC offers the following functionality:
- defining, maintaining, and planning process structure
- reconciling planned activity usage and resource availability
- calculating and analyzing variances

- tracing activity-dependent costs to business processes
- passing characteristics on to processes and cost objects

In Peter Drucker's article, "The Information that Managers Really Need," (January / February 1995 *Harvard Business Review*), the role of activity-based costing in the corporation is discussed. Some of the thoughts in the next three paragraphs are adapted from that article.

Conventional cost accounting assumes that a certain operation, such as heat treating a part, has to be performed, and it has to be performed where it is being performed now. Activity based costing asks: Does it have to be done? Can it be outsourced? ABC integrates what were once several analyses -- value analysis, process analysis, quality management, and costing -- into one discipline. Using this approach, activity based costing can lower costs.

ABC's greatest impact, however, is likely to be in services. In most manufacturing companies, cost accounting is inadequate. However, service industries such as banking, insurance, retail, distribution, healthcare, and utilities have less cost information than most manufacturers. Activity based costing shows us why traditional cost accounting has not worked for service companies. It is not because the techniques are wrong. It is because traditional cost accounting makes the wrong assumptions.

Service companies can not start with the cost of individual operations, as manufacturing companies have done with traditional cost accounting. They must start with the assumption that there is only one cost: that of the total system. This is a fixed cost for any given time period. The conventional assumptions concerning variable and fixed costs, on which cost accounting is based, do not make sense for service industries. Neither does the basic assumption of traditional cost accounting: that capital can be substituted for labor. In knowledge based work, additional capital investment often requires more, not less, labor. For example, a hospital that purchases a new diagnostic tool may have to add several people to operate it. The highly trained technicians who operate the new tool can not be quickly re-assigned to use a different tool. ABC discards the outdated assumptions of cost accounting to yield new insights, and better control techniques, for manufacturing **and** service companies.

## Methodology

Traditional cost accounting allocates overhead costs on the basis of direct labor or direct material utilization. Activity based costing assigns **overhead** to cost centers, then traces these costs to processes, and ultimately, to the cost objects that consumed the processes. **Direct costs** are traced from the general ledger to the cost objects as in traditional cost accounting. The analysis requires several accounting structures (figure 2).

**General ledger accounts** collect detailed costs. Wages for a drilling department, or operating supplies for a department, are examples.

A **cost center** is an unit within a company distinguished by an area of responsibility, location, or accounting method. A cost center is a place where costs are incurred. One manager is responsible for the operations of a cost center. A drilling cost center might include wages, benefits, operating supplies, and utilities.
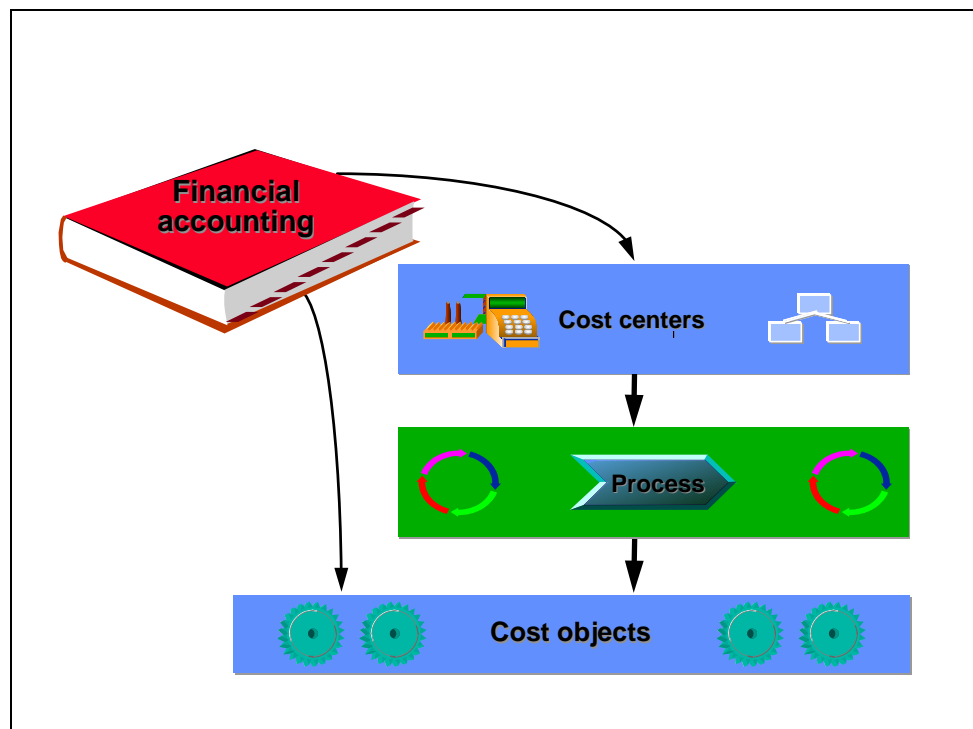


**Figure 2: Model of Activity Based Costing**

**Activity types** classify the outputs of a cost center. Activity types are a tool to trace costs to processes based on consumption quantities. Hours of drilling time is an example of an activity type. Activity types are different from processes in that a process may use activity types from many cost centers.

A **process** is what the corporation does with its people, machines, and other resources. Processes, such as developing products, cut across cost centers and functional areas, such as engineering, marketing, and finance. Examples might include drill a bicycle component, or assemble a part.

**Cost objects** are structures for which a separate measurement of costs is desired, and to which all costs incurred are traced. The cost object represents an internal unit of control, decision making, and responsibility. Examples include product lines, groups

of customers, or distribution channels. Indirect costs are traced to the cost object with CO-ABC. Direct costs are traced directly from the general ledger.

Since no one method of tracing costs from the general ledger to the final cost object is suitable for all cost structures in an organization, CO-ABC utilizes several tracing methods. These methods fall into two categories. The first category is assessment cost tracing methods. Costs are moved from sender to receiver cost structures in a lump sum. Total cost variances can be calculated, but a limited number of variance analyses are possible. The second category is activity based tracing methods. The costs of a process or activity type are calculated per unit of activity, then a certain number of activity units (such as hours of drilling time) are traced to receiver cost structures. The receiver has a number of units, a price per unit, and a total cost. This enables detailed variance calculation and analysis.

## Integration

Activity based costing is completely integrated into the Controlling module of the R/3 System. All master data and transaction data from cost center accounting are therefore available for a process-oriented examination without additional effort necessary. In the procedure for cost allocation, one can distinguish between two variants - see figure 3.
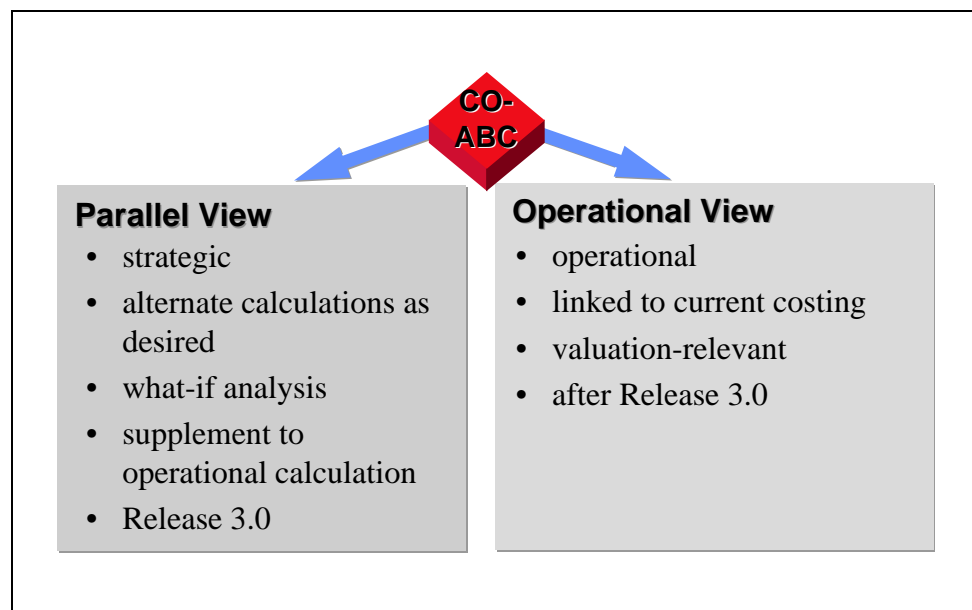


**Figure 3: Methods**

**Parallel View** offers the opportunity to carry out supplementary alternative cost accounting from a more strategic viewpoint. These extra cost accounting exist next to each other and can serve as different scenarios in playing out what-if analyses. The advantage of parallel cost accounting is that individual, particularly cost-intensive or critical (sub-)areas of a company can be directly examined. For a differentiated examination of the cost situation, individual allocation runs from the original cost center accounting can be replaced when needed by other allocations on and from processes. In this way a majority of the cost center data can be used unchanged in CO-ABC. For example, it is often enough to enter the primary costs once in the framework of cost center accounting. Alternative views in activity based costing then

automatically build upon the available data and need only be supplemented with the process-oriented aspects.

In contrast, **Operative View** represents the valuation-relevant cost flow, so that the results of activity based costing can flow into the product costing.

For Release 3.0 of the CO-ABC module, only parallel view is available. Activity based costing can therefore not supply (operative) product costing with information at the present time.
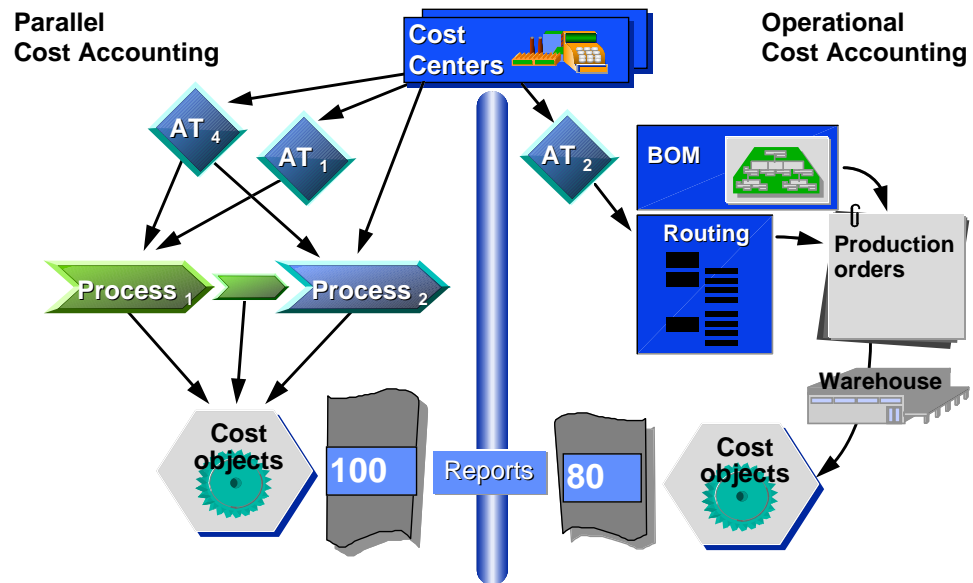
**Figure 4: Parallel View**

Figure 4 illustrates the possible procedures in activity based costing in Release 3.0. The goal of this example is to compare regular, operative allocation through production orders with an alternative assignment of costs to a cost object. On the basis of cost center accounting, the valuation-relevant calculation takes place on the right side of the illustration, where production orders are priced with the aid of parts lists and routing plans. While parts lists supply the material consumption of a product, the routing plans describe the resource consumption of activity types necessary for production. The compressed product costs are then sent further along through the warehouse on the respective cost objects.

The alternative, process-oriented viewpoint starts out from cost center accounting as well, but certain allocation steps (for example, inclusive transferal from service cost centers to production cost centers) are replaced through assignment of the costs to the processes. The origin-appropriate debiting of the cost object then follows in the second step. The results of both views can be compared to each other in reporting and thus allow an meticulous analysis of the cost situation in the company. The plans for a later Release include the furnishing of the CO-ABC module with an option for (operative) values in product costing.

**Figure 5: Operational view**

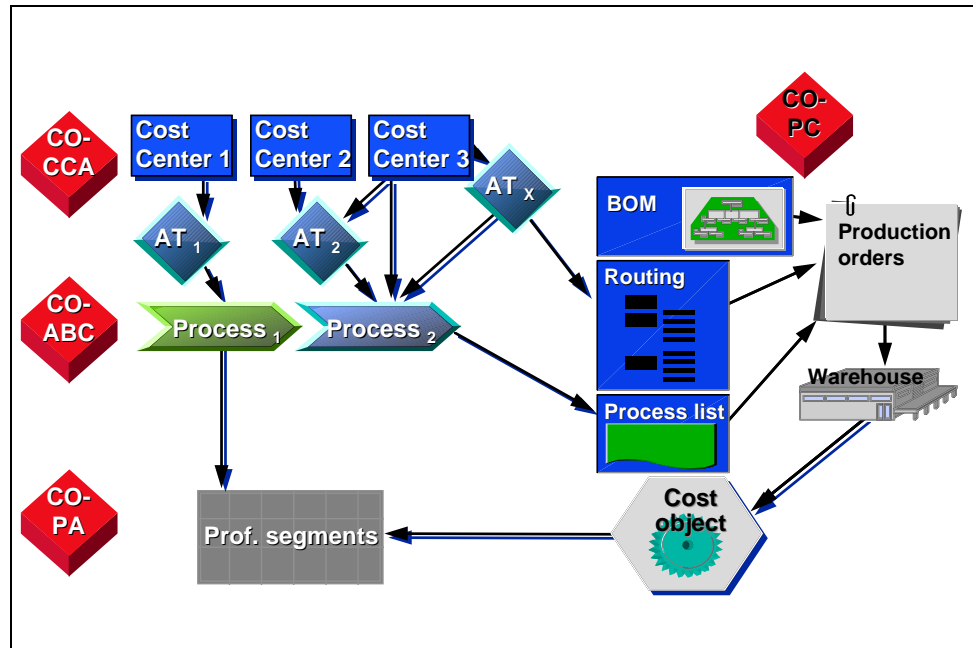Figure 5 shows the simultaneous use of cost center accounting and activity based costing as a common foundation for costing. Here, on the one hand, the activity types called upon according to the work plan go into costing. On the other hand, the use of valuation-relevant processes is taken into account with the help of a process list. This means that this origin-appropriate assignment of process costs can often replace the sometimes extreme overhead surcharge rates. Product costing is thus decisively improved. Moreover, costs of non-production-related processes, such as sales or administrative processes as well as cost objects, can be directly steered further to profitability analysis.

The difference between this and the now-available procedure described above is especially in that activity based costing need no longer be considered an alternative to, but as true expansion of cost center accounting. This means that cost center accounting no longer takes place separately from activity based costing, but that they are integrated together in a common environment.

## Implementation

The analysis tools offered by activity based costing do not exist independently from the rest of the SAP system. Rather, activity based costing begins with the information collected and processed by financial and control modules. CO-ABC then adds new perspectives to understanding the cost structure of the organization. New analysis and reporting tools enhance managerial ability to control operations.

The financial system contains the fundamental accounting information. Specifically, the chart of accounts and general ledger must be operational before installation of the controlling module. The cost center accounting module of the controlling system is the link between FI and activity based costing. The user defines CO-ABC processes and develops tracing mechanisms after FI and cost center accounting development is complete.

CO-ABC can be selectively implemented to control and analyze critical components of the company. The user does not have to perform detailed activity based costing

analyses for every part of the company. Less detailed analyses are available for minor business processes. SAP's flexibility allows the user to structure the functionality of CO system to exactly meet the requirements of the company's overall controlling strategy without wasted effort when installing the software.

# Structural Components

SAP's flexibility ensures compatibility with any industry or organization. The first step is to define a clear organizational structure of the company. The accounting and control applications consider this structure when analyzing data and developing reports. SAP has several tools to assist the user in defining the organizational structure quickly and accurately. These software structures represent the exchange of internal goods and services between plants, business areas and companies. The CO-ABC module enables the user to analyze cost by managerial area of responsibility. The cost center accounting documentation has more information concerning organizational structures.

## Cost Structures

**Cost elements** classify all costs incurred by the organization and document the value flows within the company. There are two types of cost elements. Every non-balance sheet general ledger account has a corresponding primary cost element in the control module. Financial information is automatically transferred between the systems. Examples of primary cost elements include employee wages, benefits, overtime, rent, operating supplies, electricity, etc. Secondary cost elements result from internal value flows arising from cost tracing. CO-ABC maintains this information.
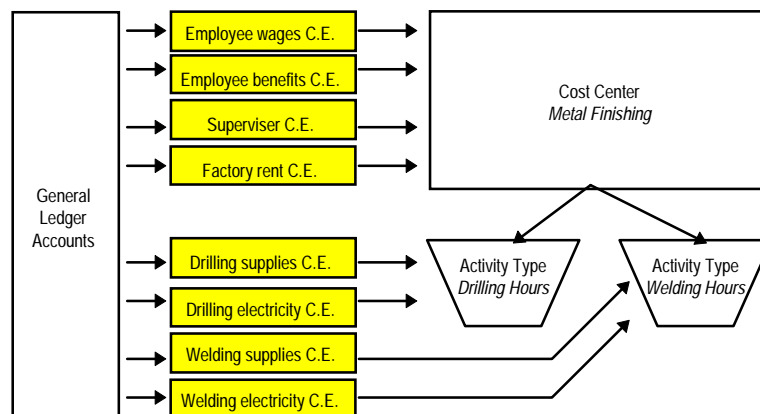


C.E. stands for Cost Element

Cost elements can exhibit two types of behavior -- fixed or variable. Activity independent cost elements are fixed costs. For example, the factory's rent expense is the same if a cost center produces 100 units or 200 units. Typical examples of activity independent costs include wages (non-overtime), employee benefits, and rent. Activity independent (fixed) are associated only with cost centers. Other costs are variable, or activity dependent. Examples might include electricity consumed, overtime wages, and operating supplies consumed. A department with 200 units of production might consume twice as much electricity as a department with only 100 units of production. Activity dependent (variable) costs must be associated with both cost centers and activity types. The fixed, activity-independent costs planned on the cost center can be divided among the activity types by using a tracing tool called activity splitting (discussed later). Fixed, activity-independent costs can be planned on activity types if desired.

A **cost center** is a unit within a company distinguished by area of responsibility, location, or accounting method. Cost centers originate activity, incur costs, and

represent individual company accounting units. Related cost elements can be assigned to a cost center.
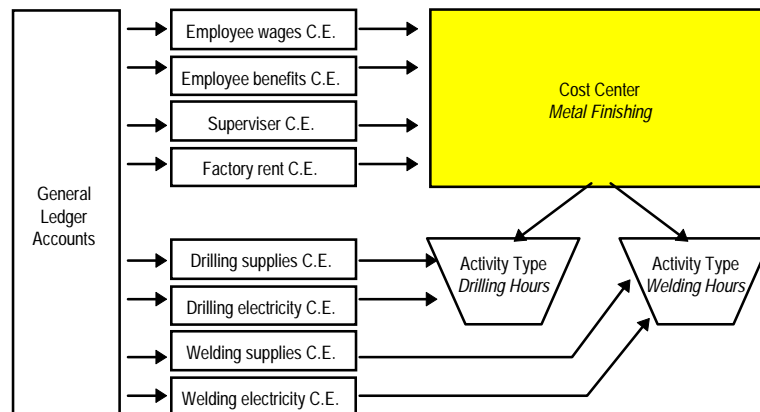


Activity independent (fixed) costs are planned on the cost center, since their total cost is unrelated to the amount of production.

The **activity type** classifies and measures the output of the cost center. Each cost center is responsible for a portion of the total activity cost in the enterprise. This portion can be quantified into one or more activity types depending on what the cost center does. For example, a metal finishing cost center manufactures semi-finished parts. The activity types are drilling hours and welding hours. A different price can be calculated for each activity type.
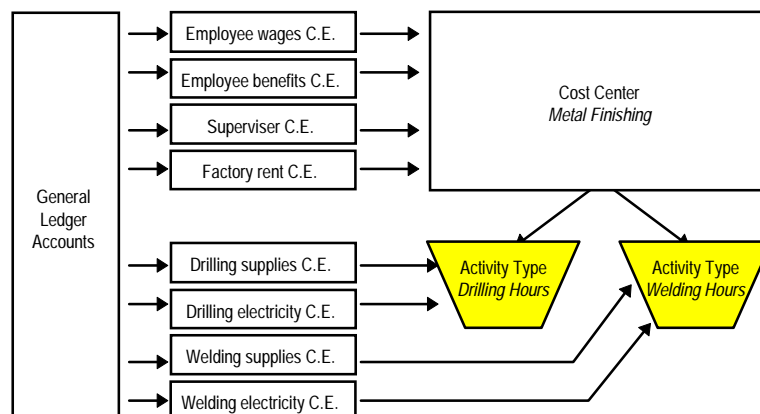


These activity types can be quantified and measured in many different ways. Every semi-finished part could be drilled for 3 hours and welded for 5 hours. However, if the number of hours of welding and drilling time was unavailable, the number of part processed could be used as a substitute. SAP's flexibility enables the user to use the most accurate and economical information available. Sample activity types for different types of cost centers:

- **Production**: drilling hours, welding hours, or units assembled.
- **Service**: machines maintained, parts inspected, or goods received.
- **Administration**: customer calls answered, invoices processed or marketing phone calls completed.

Activity dependent cost elements are planned on the activity type, since their total cost is related to output. The cost center's activity-dependent expenses divided by the planned level of output of the activity type calculates the variable activity price. The fixed, activity-independent costs planned on the cost center can be divided among the activity types by using a tracing tool called activity splitting (discussed later). The final activity price includes variable and fixed costs.

## Tracing Factors

Most cost tracing techniques use **tracing factors** to move costs from senders to receivers. A tracing factor is a quantifiable, repeatable, and identifiable mechanism to trace costs from one cost structure to another. Tracing factors link resource costs to processes and/or cost objects. Tracing factors produce cost tracing results that are more accurate than arbitrary overhead allocations. The high level of integration of the SAP system provides a wealth of information to properly trace costs. The figure illustrates the origins of tracing factor information. In the present release, information in the Logistics Information System (LIS) can be shared with CO-ABC. Other links are in development for future release.
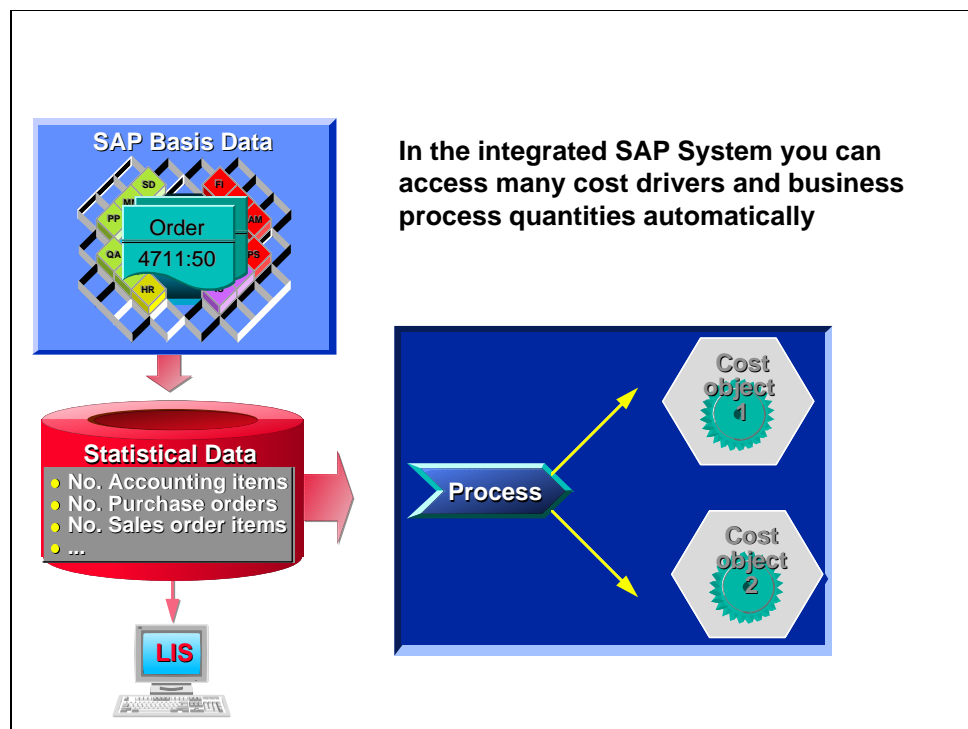


**Figure 6: Automatic Determination of Tracing**

There are many types of tracing factors. The information available in a given situation usually makes one type preferable to another. The output of an activity type is an **activity quantity**. An activity type describes what a cost center does -- for example, machines calibrated; the activity quantity is the number of times the activity type was performed. For example, a maintenance cost center may have labor costs of $8,000. If the department produced 160 work hours of maintenance services, the price per hour of maintenance is $50. This activity quantity could be used to trace labor costs from the maintenance cost center to processes that consumed the services. If the assembly process consumed 40 hours of maintenance services, $2,000 of the maintenance labor cost would be traced to the assembly process. Alternatively, if the maintenance cost center routinely performs only one service (for example, machine calibration), it may be simpler to collect the number of calibrations performed.

**Statistical key figures** can be used as a basis to trace internal costs. A common example is using square feet or square meters to trace the rental cost of a warehouse. Another example is tracing company cafeteria costs based on the number of employees in each department. Full integration of ABC enables other SAP modules to automatically update statistical key figures (the LIS interface). For example, entering a new invoice automatically updates relevant ABC ratios.

**Weighted activity quantities** trace costs when units of activity are not comparable. For example, a cost center may utilize two different activity types -- number of items drilled and department work hours. Weighting factors can adapt the factors so they can be compared. Thus, weighted activity quantities might define 100 items drilled as equivalent to 1 hour of welding.

# Business Processes

**Business processes** create a model of activities flowing across cost centers. Processes describe the operations of the corporation. CO-ABC traces costs consumed by processes to cost objects. Examining how processes accumulate costs reveals cost structure insights. Examples of business processes include accepting customer orders, inspecting raw materials, developing an engineering design, or designing a new product.

Processes have a defined relationship to one another within your corporation. SAP can replicate these relationships in three ways. The first technique is to use process hierarchies. A number of smaller processes can be grouped together for analysis and reporting purposes. For example, the "inspecting raw materials," "moving raw materials to production," and "loading finished goods" processes can be grouped into a "material handling" process group. The second technique is to define the relationships between processes with cost tracing (allocation) relationships. The costs incurred by one process, such as the "moving raw materials to production" process, can be allocated to the "produce bicycle frame" process. The final technique, the task catalog, is in development. A task catalog will contain essential data concerning resource consumption. The user will be able to define new processes by specifying which tasks comprise the process. Future releases will make it possible to trace costs to cost objects by using tasks.

**Tasks** are smaller actions occurring during a process that can not be segmented into smaller meaningful units. A future release of CO-ABC will support tasks. At that time, a user will be able to define a new process by specifying which tasks comprise the process. Tasks can be structured with the same techniques described for business processes.

**Cost objects** aggregate costs, on the basis of the consumption. Cost objects are an internal unit of control, decision-making and responsibility. They are useful when different views of cost are needed. Examples of cost objects include products, customers, or distribution channels. Cost objects can be defined in many ways to support client analysis needs.

A **characteristic** (sometimes called an attribute) is a property that describes a process. Processes pass their assigned characteristics with costs as they are traced from a sending cost structure to a receiving cost structure. Thus, it is possible to obtain different cost perspectives on cost objects. The use of characteristics is optional, but recommended for the insights it can provide. Sample characteristics:

- rating external value added: low, medium, high
- rating internal value added: low, medium, high
- classifying business process: sales, development, production

```
┌─────────────────────────────────┐
│  Process:  Develop quote         │
│                                   │
│ Cost:        $300                 │
│ Value added:  high                │
│ Company area:sales                │
└─────────────────────────────────┘

┌─────────────────────────────────┐
│  Process:  Check parts availability│
│                                   │
│ Cost:        $700                 │
│ Value added:  high                │
│ Company area:production           │
└─────────────────────────────────┘

┌─────────────────────────────────┐
│  Process:  Order technical check  │
│                                   │
│ Cost:        $1500                │
│ Value added:  low                 │
│ Company area:production           │
└─────────────────────────────────┘

┌─────────────────────────────────┐
│  Process:  Release sales order    │
│                                   │
│ Cost:        $500                 │
│ Value added:  low                 │
│ Company area:sales                │
└─────────────────────────────────┘
```

Cost Tracing

Cost object: Blue Bicycle

| Total costs | | $3000 |
|---|---|---|
| External value analysis | high | $1000 |
| | low | $2000 |
| Company Area analysis | Production | $2200 |
| | Sales | $800 |

**Figure 7: Processes pass characteristics to receiving processes or cost objects, adding insight to cost analysis.**

The figure illustrates four processes that pass on their costs to a cost object. Both processes have the characteristic "external value added." Drawing up a quotation provides "high" value added, but order verification provides "low" value added. As the process costs are traced to the cost object, totals of high and low value are available for analysis.

# Cost Tracing

Tracing is the transfer of costs from a sending cost structure to a receiving cost structure.  A common example is tracing from a cost center (such as purchasing) to a process (such as assembly).  Figure 8 examines which sender/receiver combinations are possible.

| | | Sender | | | |
|---|---|---|---|---|---|
| | | **Cost Center** | **Activity Type** | **Process** | **Cost Object** |
| **Receiver** | **Cost Center** | Resource Assmt | Activity Tracing[*] | N/A | N/A |
| | **Activity type** | Splitting | Activity Tracing[*] | N/A | N/A |
| | **Process** | Resource Assmt | Activity Tracing[*] | Process Assmt | N/A |
| | **Cost Object** | Resource Assmt | Activity Tracing[*] | Process Assmt | N/A |

[*]Activity Tracing includes Direct Tracing (CCA), and Indirect Tracing (CCA and ABC).

**Figure 8 :  Since different industries have differing information and analysis needs, SAP supports many types of cost tracing.**

Figure 9 examines how cost structures and tracing techniques can be linked together.  There are two fundamental approaches -- assessment tracing and activity tracing.



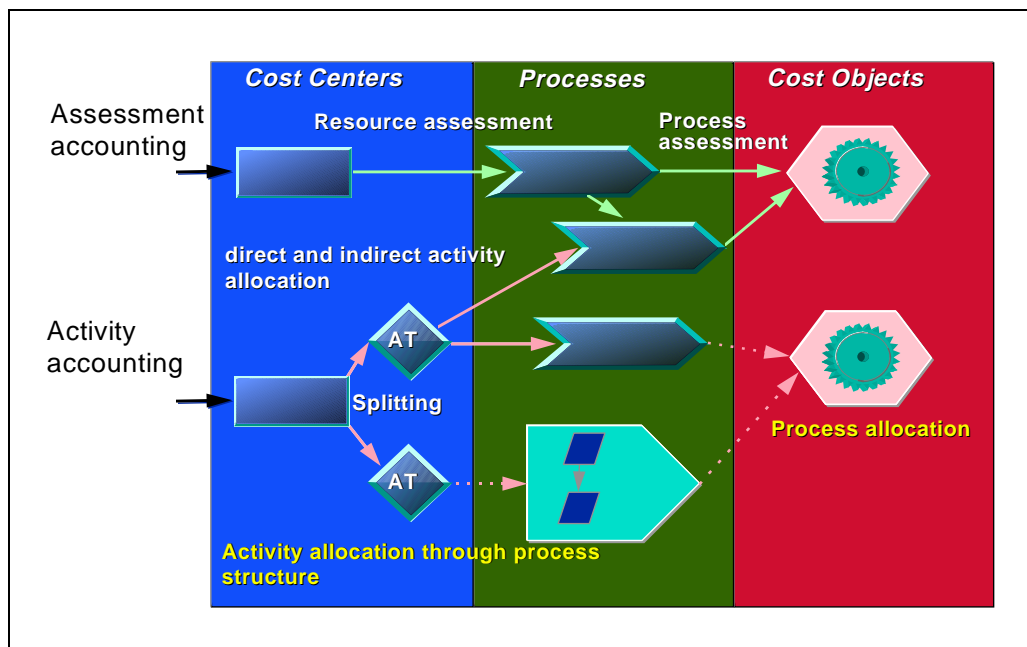**Figure 9:  SAP offers several types of cost tracing. Selection of a method depends on the information available and desired level of analysis.**

The assessment cost tracing approach is less complex than activity cost tracing (see figure 9).  A pool of cost is moved from one cost structure to the next, on the basis of fixed percentages or tracing factors.  No activities types are defined, and no quantities

are consumed.  While total variances can be analyzed, price and quantity variance analysis is not possible.

In activity cost tracing, cost centers (such as metal fabrication) are divided into activity types (such as welding and drilling).  A process (such as assembly) can consume activity types (for example, 5 hours of drilling time from the metal fabrication cost center).  CO-ABC can calculate the cost of an hour of welding time. Planned and actual activity costs can be compared with variance analysis.  Similarly, the number of hours of welding time required to assemble a product can be analyzed with quantity variances.
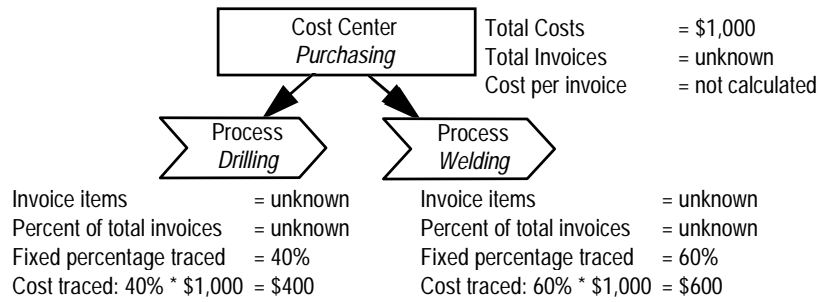
Most companies will use a mixture of these approaches.  Costs that are critical for competitiveness require thorough analysis.  Other cost centers will not need detailed analysis.  The CO-ABC module offers you this flexibility.  There are four categories of cost tracing:  resource assessment, process assessment, activity splitting, and activity tracing.  Resource and process assessment only move costs in lump sums. Activity splitting divides the expenses of a cost center between two or more activity types.  Finally, activity tracing (which includes direct tracing and indirect tracing) moves quantities of activities that can be valued with activity prices.

If more than one tracing structure will work with the information that is available, it does not matter which method is utilized -- all will calculate the same answer.  Only the level of detail will vary.  In most circumstances, only one tracing method will be appropriate.  The following text examines these cost tracing mechanisms in more detail.
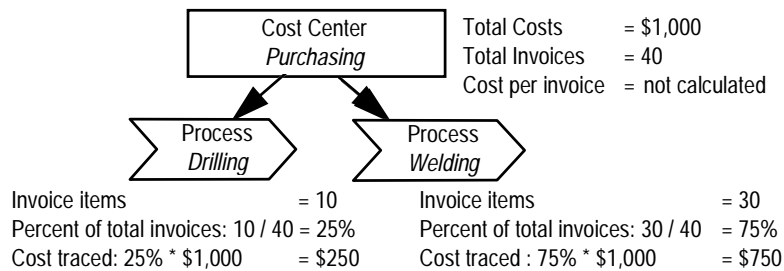
## Resource Assessment

Resource assessment can be performed in CO-CCA or CO-ABC.  The CO-CCA options are distribution and assessment; they trace costs from cost centers to cost centers or from cost centers to cost objects.  Distribution maintains all of the original cost element detail, while assessment summarizes all of the information into one cost element.  The CO-ABC option is called resource assessment; it traces costs from cost centers to business processes or from cost centers to cost objects.  Both CO-CCA and CO-ABC can trace from a cost center to a cost object.  The procedure of how the cost tracing mechanisms work is the same in CO-ABC and CO-CCA.

For example, assume the purchasing cost center contains $1,000 of expenses.  Two processes consumed the purchasing cost center output in this time period -- the drilling process and the welding process.  The basis for tracing costs is flexible.  You can send a fixed percentage or a fixed amount of cost each month.  For example, you might perform a study and learn that the drilling process consumes 40% of the purchasing cost center output.  Or, you may determine the welding process should always receive $300 of the cost, with the balance sent to the drilling process.  You can combine these techniques, as required by your individual situation.  Although not continuously updated, resource assessment with fixed percentages or amounts is the most economical and efficient way to trace costs for some cost centers.

```
                    ┌─────────────────┐    Total Costs        = $1,000
                    │  Cost Center    │    Total Invoices     = unknown
                    │  Purchasing     │    Cost per invoice   = not calculated
                    └─────────────────┘
                       ↙         ↘
              Process              Process
              Drilling             Welding

Invoice items          = unknown    Invoice items          = unknown
Percent of total invoices = unknown Percent of total invoices = unknown
Fixed percentage traced  = 40%      Fixed percentage traced  = 60%
Cost traced: 40% * $1,000 = $400    Cost traced: 60% * $1,000 = $600
```
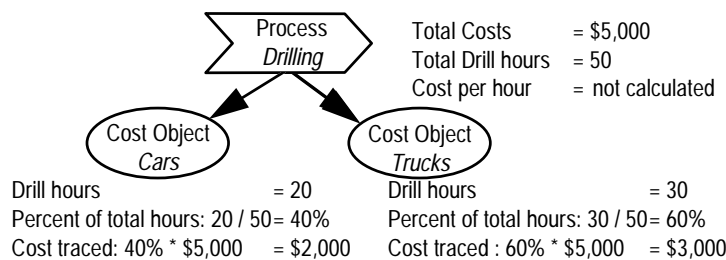
Alternatively, the costs can be allocated on the basis of a tracing factor such as the number of invoices. If the drilling process required 10 invoices and the welding process needed 30, $250 will be traced to the drilling process.



```
                    ┌─────────────────┐    Total Costs      = $1,000
                    │  Cost Center    │    Total Invoices   = 40
                    │  Purchasing     │    Cost per invoice = not calculated
                    └─────────────────┘
                       ↙         ↘
              Process              Process
              Drilling             Welding

Invoice items             = 10      Invoice items             = 30
Percent of total invoices: 10 / 40 = 25%  Percent of total invoices: 30 / 40 = 75%
Cost traced: 25% * $1,000  = $250   Cost traced : 75% * $1,000  = $750
```

Tracing factors can be continuously updated. Resource assessment with tracing factors is a simple and accurate method of cost tracing.

## Process Assessment

Process assessment is only available in the CO-ABC. Process assessment traces costs from a process to another process or from a process to a cost object. It utilizes the same tracing mechanism as resource assessment.



```
                    Process           Total Costs     = $5,000
                    Drilling          Total Drill hours = 50
                                      Cost per hour    = not calculated
                       ↙         ↘
              Cost Object          Cost Object
                 Cars                Trucks

Drill hours              = 20       Drill hours              = 30
Percent of total hours: 20 / 50 = 40%  Percent of total hours: 30 / 50 = 60%
Cost traced: 40% * $5,000  = $2,000 Cost traced : 60% * $5,000  = $3,000
```

## Activity Splitting

For user convenience, activity splitting is offered in CO-CCA and CO-ABC; the methodology is identical in both modules. Activity splitting is used to divide the activity-independent (fixed) expenses of a cost center among several activity types. Depending on your analysis needs, you can divide all of the cost elements in the cost center with one splitting rule, or you can define certain groups of cost elements with rules specifically developed for them. The following example distributes costs from the customer accounting cost center to three activity types according to the work hours tracing factor.
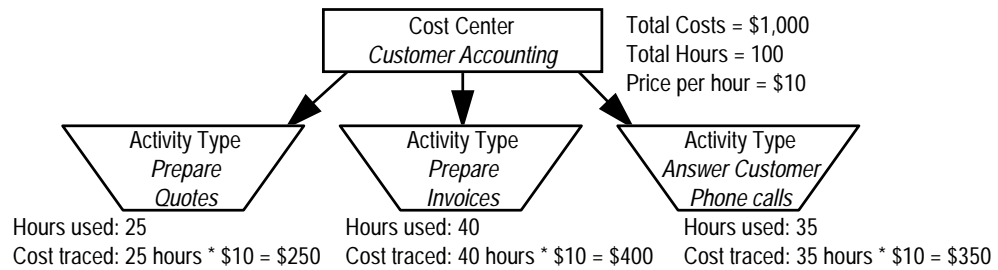
Activity price calculation determines the cost of the activity type (such as prepare invoices) by totaling its expenses, then divides by the number of times the activity was performed to develop an average price per activity.

## Activity Tracing

Activity tracing includes two types of cost tracing methodologies -- direct tracing and indirect tracing. Both methods can move quantities of an activity (such as hours of welding time), and a price per activity ($50 per welding hour), from an activity type to a receiving cost structure. If you know how many hours of welding time were used by each receiving cost structure, you can directly trace costs. For example, if production used 10 hours of welding, and assembly used 40 hours of welding, direct cost tracing would be an appropriate tracing methodology to utilize. Direct tracing can be performed in CO-CCA. In the current release, direct tracing can move costs from an activity type to a cost center, or from an activity type to a cost object.

Sometimes the number of hours of welding time consumed by the receiving cost structures will not be available. Indirect cost tracing allows you to use a substitute tracing factor, such as the number of bicycles produced and assembled, to **estimate** the required tracing factor, hours of welding time consumed. Indirect tracing can be performed in CO-CCA or CO-ABC. The two modules use the same methodology, but have different sender and receiver options. The CO-CCA menu traces from activity types to cost centers or from activity type to other activity types. CO-ABC moves costs from activity types to processes or from activity types to cost objects.
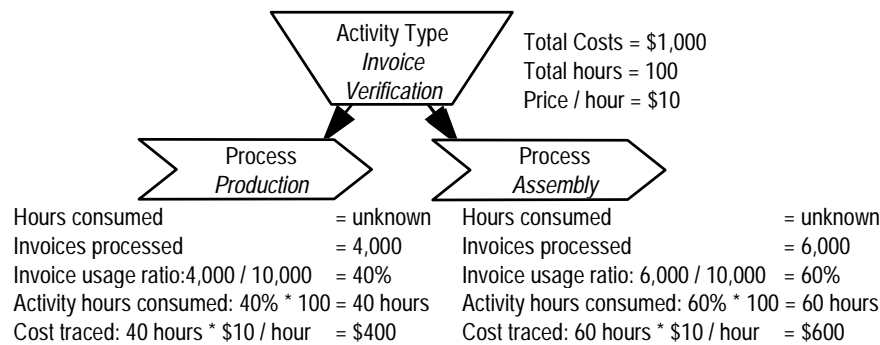
The activity tracing methods, direct and indirect tracing, look similar to resource assessment. In most cases, both techniques would allocate the same cost amount. The difference is that resource assessment does not post the quantity of activity consumed or a price per activity unit on the receiver. Resource assessment does not use activity types and only moves cost in a lump sum. Direct and indirect tracing use activity types, and makes price and quantity postings.

To clarify the indirect tracing concept, assume the purchasing cost center has used activity splitting (to move fixed costs from cost center to activity type) to calculate the price of two activity types -- request proposals and verify invoices. You would like to trace the costs of the invoice verification activity type to the production process and the assembly process.
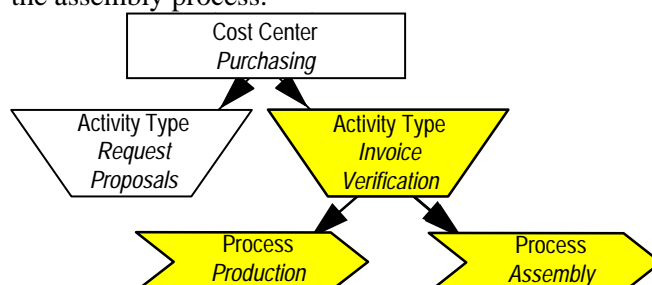
Assume the purchasing cost center spent $1,000 and 100 hours of time to verify invoices in the last period. The price per hour is $10. However, the number of hours consumed by the production and assembly processes is unknown. Indirect tracing uses a substitute tracing factor defined by the user to complete the calculation. There are two ways to do this, depending on the substitute information that is available.
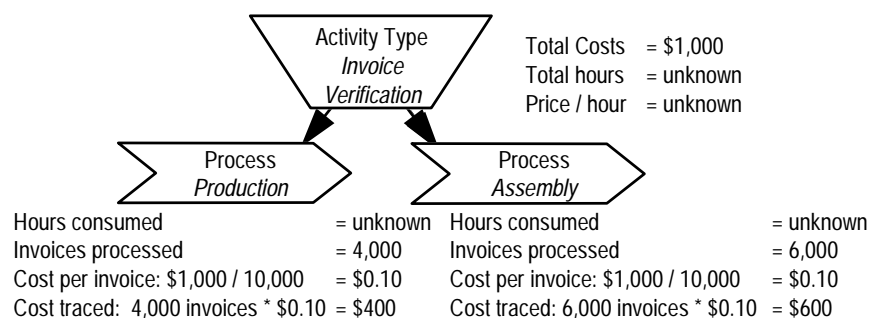
**Known output**. Although the number of hours consumed by the processes is unknown, the logistics modules can provide the number of invoices utilized by production and assembly processes. This information can serve as a substitute for the number of invoice verification hours used by the production and assembly teams.



| | | | |
|---|---|---|---|
| **Process** *Production* | | **Process** *Assembly* | |
| Hours consumed | = unknown | Hours consumed | = unknown |
| Invoices processed | = 4,000 | Invoices processed | = 6,000 |
| Invoice usage ratio:4,000 / 10,000 | = 40% | Invoice usage ratio: 6,000 / 10,000 | = 60% |
| Activity hours consumed: 40% * 100 | = 40 hours | Activity hours consumed: 60% * 100 | = 60 hours |
| Cost traced: 40 hours * $10 / hour | = $400 | Cost traced: 60 hours * $10 / hour | = $600 |

The number of hours consumed in the production process is indirectly or 'inversely' calculated: 4,000 invoices is 40% (4,000 divided by 10,000) of the total invoices processed. SAP then calculates that the production process used 40% of the total invoice verification hours, or 40 hours. 40 hours, at $10 per hour, determines the cost traced, $400.

**Inverse calculation**. Only the total sender cost is available. Sender output quantities and activity prices can not be specified or determined directly. In other words, the number of clerical hours verifying invoices is unknown, therefore the price per hour is unknown as well. Other modules can provide a substitute tracing factor.

Specify a substitute tracing factor that will approximate the needed value. The total activity quantity of the sender (the invoice verification activity type) is calculated from the total of all indirect tracing factor values of the receivers (the production and assembly processes). The activity quantity used by a receiver is derived from a substitute tracing factor value. A price for a unit of the sender tracing factor is calculated, and costs are traced to the receivers.



| | | | |
|---|---|---|---|
| **Process** *Production* | | **Process** *Assembly* | |
| Hours consumed | = unknown | Hours consumed | = unknown |
| Invoices processed | = 4,000 | Invoices processed | = 6,000 |
| Cost per invoice: $1,000 / 10,000 | = $0.10 | Cost per invoice: $1,000 / 10,000 | = $0.10 |
| Cost traced: 4,000 invoices * $0.10 | = $400 | Cost traced: 6,000 invoices * $0.10 | = $600 |

A receiving tracing factor (such as the number of invoices processed), substitutes for the sender tracing factor (hours of invoice verification). The total of all the receiver tracing factors is 10,000 invoices. The system calculates a price per invoice; $1,000

divided by 10,000 invoices is $0.10 per invoice.  Multiplying the price by the number of invoices in the production process, 4,000, determines the traced cost of $400.

# Reporting

Complete, concise, and insightful reporting is a critical component of the total controlling system. The objectives of reporting include:

- monitoring costs -- plan to actual comparisons with variance analysis
- displaying multiple period cost and trend analysis
- comparing cost objects to other comparable cost objects
- comparing cost objects of different time periods
- supporting the development and maintenance of the controlling system

CO-ABC offers two categories of reporting. The first is pre-defined reports that will address the information needs common to most industries. CO-ABC reporting is centered around processes and cost objects. Some examples:

- cost center contribution to process(es)
- total cost of process(es)
- process(es) allocation among cost object(s)
- total cost of cost object(s)
- analysis of characteristic(s), such as total amount of external value added

The other category of reports are custom made reports that are designed by the user. Quick, simple ad-hoc inquiries can be easily designed by using the Report Painter tool. More advanced and elaborate custom reports, often produced on a regular basis, can be designed once with the Report Writer tool, and then, if desired, set up to run automatically at specified time periods.

The reporting features of activity based costing support business process re-engineering efforts. After defining the processes used to perform a job, such as processing a customer order, you can assign characteristics to each process. For example, as shown in figure 10, checking an order does not add any value to the customer, while developing product quotes and shipping do add value.
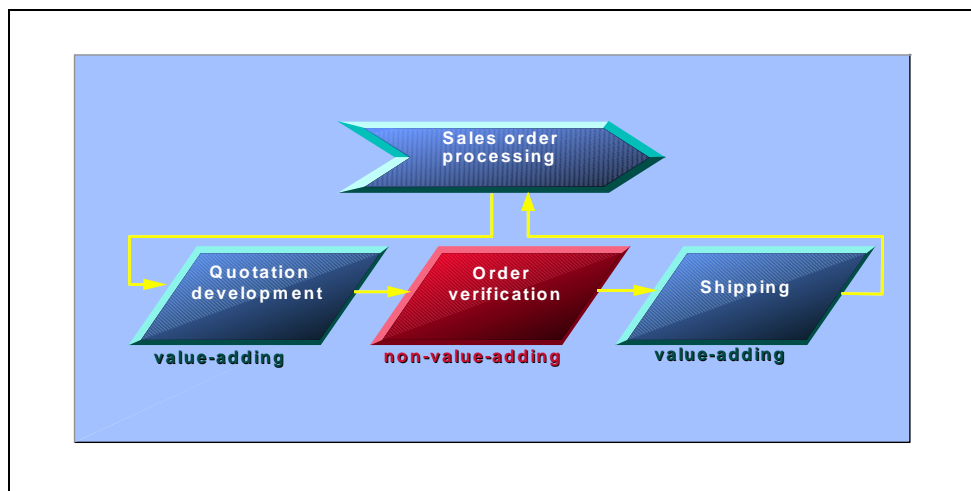


**Figure 10: Using characteristics with processes to study value added and support re-engineering efforts.**

All of the processes with a certain characteristic can be aggregated, and a chart such as figure 10 is the result.  Here, we can see that non value adding processes are diminishing over time, as newly-designed business processes are introduced to the company.
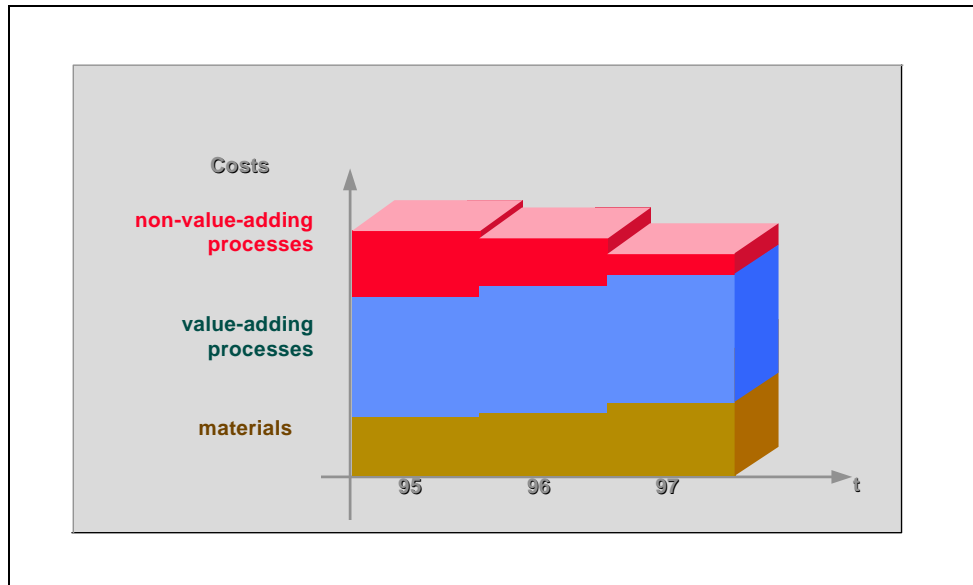
**Figure 11:  Example of cost object analysis utilizing characteristics.**

# Conclusions

## Summary

Companies have traditionally accomplished controlling goals by allocating overhead to products on the basis of direct labor or direct material utilization.  For example, products with more direct labor received more overhead, regardless of how many overhead services they actually consumed.  As the proportion of overhead cost to direct cost has increased, product costs have become distorted.  Managers can have difficulty understanding and controlling overhead costs using conventional cost accounting information because:

- costs classified by account do not provide insight into the activities being performed that consume the resources
- financial information is not meaningfully linked to operations to measure performance and to support cost improvement decisions
- many business processes are cross-functional, while accounting information is not
- traditional allocation bases (e.g.: direct labor) have become less meaningful and tend to distort product cost

CO-ABC addresses these problems by assigning costs to business processes based on their use of resources.  Process costs are assigned to cost objects, such as products or customer groups, based on their process utilization.  CO-ABC:

- Ties management decision making to operational information
- Provides better insight into total costs for products and other cost objects
- Provides insightful analysis capabilities into resource and cost drivers
- Provides tangible data for process analysis

## The Future

Release 3.0 of the activity-based costing module is a sophisticated tool for modeling business processes and controlling costs.  Many new features are in development for future release:

**Business process structure.**  Processes describe the operations of the corporation.  The importance of a process determines the amount of detail required.  Establishing the required level of detail before modeling business processes streamlines development efforts.  Complicated business transactions may require a complete structure of subprocesses and tasks.  Conversely, simple processes do not require an underlying structure.  Depending on information needs, three types of structuring will exist:

- **Processes without inherent structuring**. These processes do not contain any structural information from tasks or subprocesses.  General process information defines their structure.  This is an abstract process definition.  This level of detail is currently available.
- **Processes with inherent structuring**. Building a structured definition of a process requires explicitly assigning sub-processes and tasks to the process.  These subcomponents provide descriptions and characteristics. Detailed cost analysis is possible at any level of detail.  This is a structured process definition, which enables additional levels of analysis.  This option will be available in future

releases.  This transaction-based perspective will be supported by an interface to the work flow management system.

- **Tasks.**  Developing the task catalog to structure new business processes.

**Interfaces.**  New interfaces to other SAP modules are in development. Future versions will integrate CO-ABC into the product costing module (operational view), instead of utilizing CO-ABC as a separate, strategic analysis (parallel view).  It will be possible to analyze common overhead cost pools (such as material overhead) in greater detail.

# Glossary

### Activity-based costing

Activity-based costing is a method of measuring the cost and performance of activities and cost objects. ABC assigns costs to business processes (also called activities) based on their use of resources.

The costs incurred by business processes are assigned to cost objects (such as products, services, customers, orders, etc.) based on their utilization of these processes.

### Activity-based management

Activity-based management is a discipline that focuses on the management of activities as a route to continuously improving customer value. Activity-based management draws heavily on ABC for information.

### Activity splitting

Activity splitting is a method of tracing costs from sending cost centers to receiving activity types. Some cost centers have more than one activity type. Activity splitting enables the user to calculate the costs of each activity type by splitting the costs of the cost centers by cost element, then tracing costs to activity types. You can split all of the cost elements at once or one group of cost elements at a time.

### Activity type

Classifies the activities of a cost center according to type of goods or service. Activity types enable the performance of internal cost tracing by describing the output of the cost center. Explains the basis of variability of the account. Activity types are a tool to trace costs driven by consumption quantities. Examples of activity types include: number of units produced, hours, machine hours, production times.

### Assessment

Assessment is a simple method of apportioning costs using suitable tracing factors. The tracing factors act as allocation bases. However, assessment does not calculate or post internal prices or activity quantities to receivers -- it only traces costs. Assessment does not monitor activity flows.

### Attribute (Characteristic)

An attribute is a property that describes a process. Process characteristics may include items such as external value added.

### Business process

Business processes describe the operations of the corporation. They are what the corporation does with its resources (people, machines, etc.) to conduct its business. Business processes create a model of activities flowing across cost centers.

One goal of activity-based costing is to properly allocate costs, generated by cost centers and activity types, to cost objects. Business processes enable the user to perform this type of analysis. Examples of business processes include: creating a customer order, designing a new product, or developing a blueprint for a customized order.

### Conventional cost system

Cost systems which use direct labor and material consumed as the primary means for apportioning overhead. This was acceptable when total overhead was a small percentage of total cost of sales. As industries have evolved, the proportion of indirect overhead costs has grown tremendously. As a result, traditional cost systems incorrectly calculate the cost of products.

### Cost center

A cost center is a unit within a company distinguished by area of responsibility, location, or accounting method. A place where costs are incurred. Cost centers originate activity, incur costs, and represent individual company accounting units.

### Cost element

Criteria for classifying all of the costs arising in a company code. Whenever costs are posted, they must be assigned to a primary or secondary cost element. Primary cost elements

are maintained as part of the general ledger account master. Secondary cost elements have no counterpart in the financial accounts. They are maintained exclusively in cost accounting.

## Cost object

Cost objects collect costs, on the basis of the consumption of the cost. Cost objects are an internal unit of control, decision and responsibility. Cost objects are useful when certain activities require multiple measurement and reporting of costs. Examples of cost objects include: customer groups, product groups, and distribution channels.

## Direct activity tracing

Direct activity tracing is a way of moving costs from senders to receivers. It traces costs from the activity type to the receiver object according to the number of activity units consumed by the receiver.

## Distribution

Distribution is an cost tracing mechanism used to apportion costs. It is useful when it is difficult to clearly define individual activity types in a cost center, or if it is too complicated to enter all of the activity types present in the cost center. Distribution uses fixed percentages, fixed amounts, statistical key figures, or posted amounts to allocate costs.

## Indirect tracing

Indirect activity tracing is a way to move costs from senders to receivers. Organizational factors link cost objects and activities. Unfortunately, the quantity of activity consumed by the receiver is often unknown. In these cases it is impossible to use activity quantities as tracing factors. Indirect tracing mechanisms allow the user to move costs when this information is not available.

## Tracing

Tracing is the movement of costs from a sending cost structure to a receiving cost structure. Internal cost allocations usually bring along details of where the costs were originated. Tracing can be performed in many ways: Resource Assessment, Process Assessment, Activity Splitting, and Activity Tracing. Within the SAP system menus, "tracing" is called "allocation."

## Tracing Factor

A tracing factor is quantifiable, repeatable, and identifiable mechanism to trace costs from one cost structure to another. They link (sender) resource costs to receiver cost structures. In addition to allocating cost distributions, tracing factors may describe the activity quantity posted to the receiver.

## Value added activity

An process that is perceived to contribute to customer value or satisfy an internal organizational need. The attribute "value-added" reflects a belief that the activity cannot be eliminated without reducing the quantity, responsiveness, or quality of output required by a customer or organization.

## Version

A collection of control parameters for planning data by controlling area. If more than one set of data is needed for comparative analyses, each set is stored in the system as a plan version.

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