



DEPT. MANAGEMENT & LAW
BACHELOR DEGREE IN BUSINESS ADMINISTRATION & ECONOMICS

COURSE
Cost Analysis for Business Decisions

Cost Accumulation, Tracing, and Allocation

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Purposes of Cost Allocation



What does it cost?

- A. Provide Information for Decision Making
- B. Reduce Frivolous Use of Common Resources
- C. Encourage Evaluation of Services
- D. Provide “Full” Cost Information

Managers must have reliable cost estimates to:

- Price products.
- Evaluate performance.
- Control operations.
- Prepare financial statements.

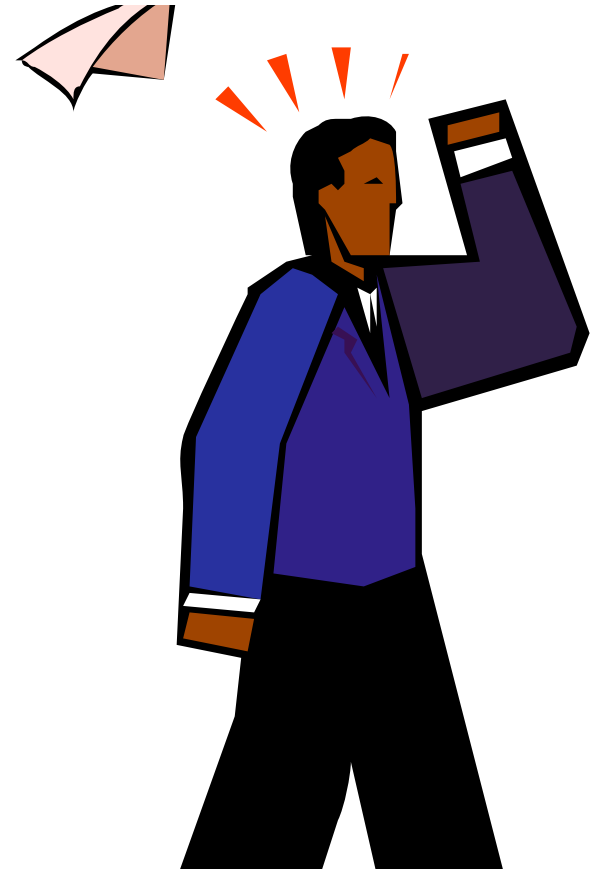
A. To Provide Information for Decision Making



From a decision making standpoint, the allocated cost should measure the opportunity cost of using a company resource.

B. To Reduce Frivolous Use of Common Costs

By not allocating costs, resources may appear “free” to users. However, resources never come with zero costs.



C. To Encourage Evaluation of Services



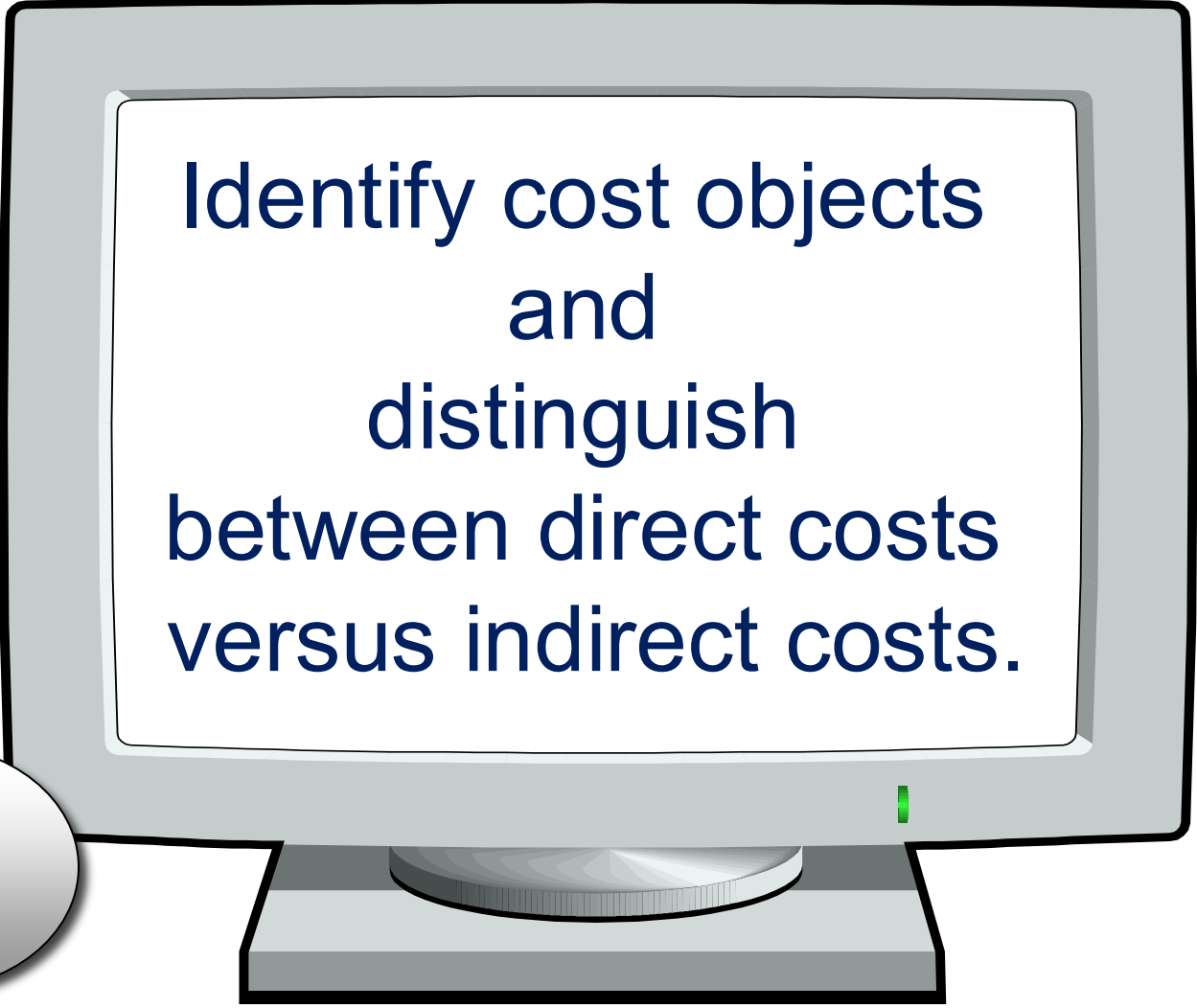
Users of services should consider the possibility of lower cost alternative. This is unlikely to be considered if costs are not allocated to the user.

D. To Provide “Full” Cost Information

- ❖ GAAP requires full-costing for external reporting purposes.
- ❖ In the long run, all costs must be covered.



Learning Objective

A stylized illustration of a computer monitor with a grey frame and a white screen. The screen displays the learning objective text in blue. The monitor has a small green light on the bottom right and sits on a grey base.

Identify cost objects
and
distinguish
between direct costs
versus indirect costs.

A circular badge with a grey gradient and a black outline, containing the text 'LO1' in blue.

LO1

The Steps of Cost Allocation

- 1. Determine the Cost Objective (Cost Object)**
- 2. Form Cost Pools**
- 3. Select an Allocation Base to Relate the Cost Pools to Cost Objects**

1. Identifying the Cost Objective (Cost Object)



Determine the product, service, department, etc., that is to receive the allocation.

1a. Determine the Cost of Cost Objects

A cost object is any activity, product, or service to which accountants wish to trace costs.

Cost accumulation begins with identifying:

1. Cost objects
2. Cost drivers



1b. Building-Block Concepts of Costing Systems



Cost object



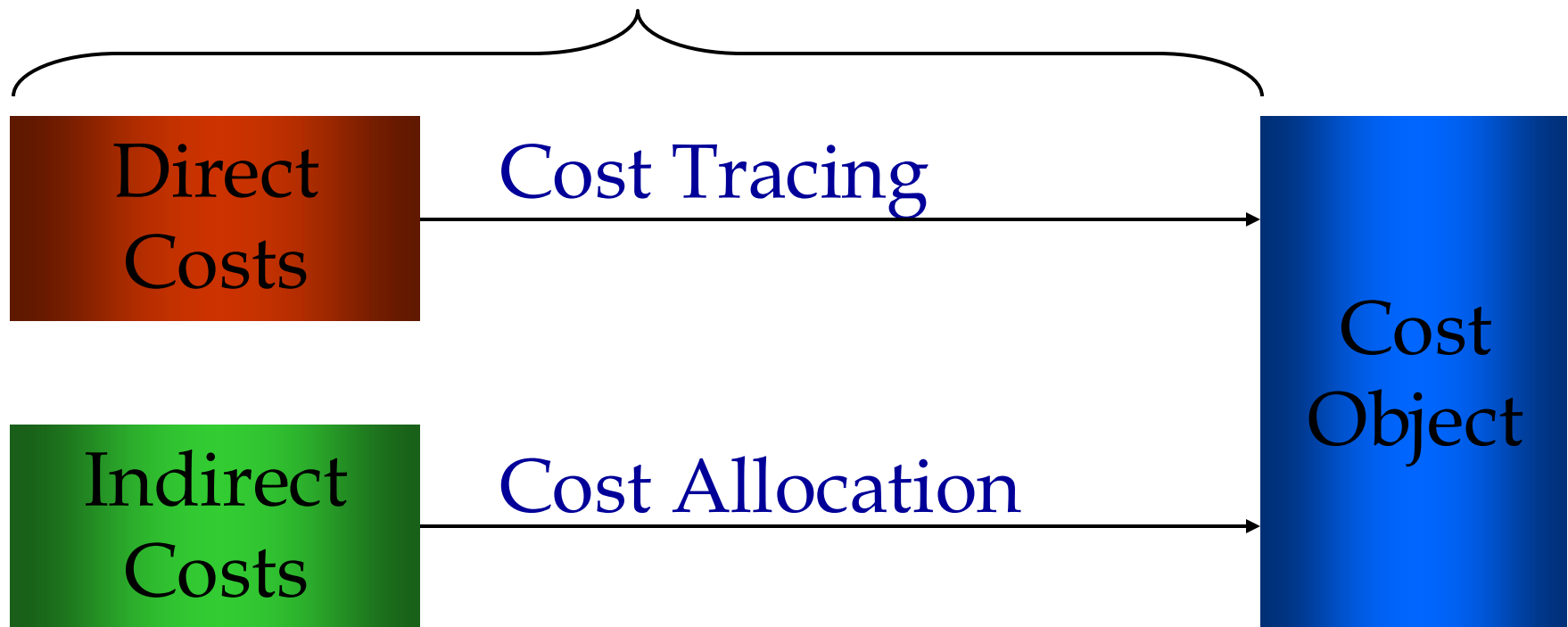
Direct costs
of a cost object



Indirect costs
of a cost object

1b. Building-Block Concepts of Costing Systems

Cost Assignment



2. Form Cost Pools

A cost pool is a grouping of individual costs, the sum of which is allocated using a single allocation base.

Cost pools include:

- ❖ Departments (i.e., maintenance or personnel departments)**
- ❖ Major Activities (i.e., equipment setups)**

2a. Building-Block Concepts of Costing Systems

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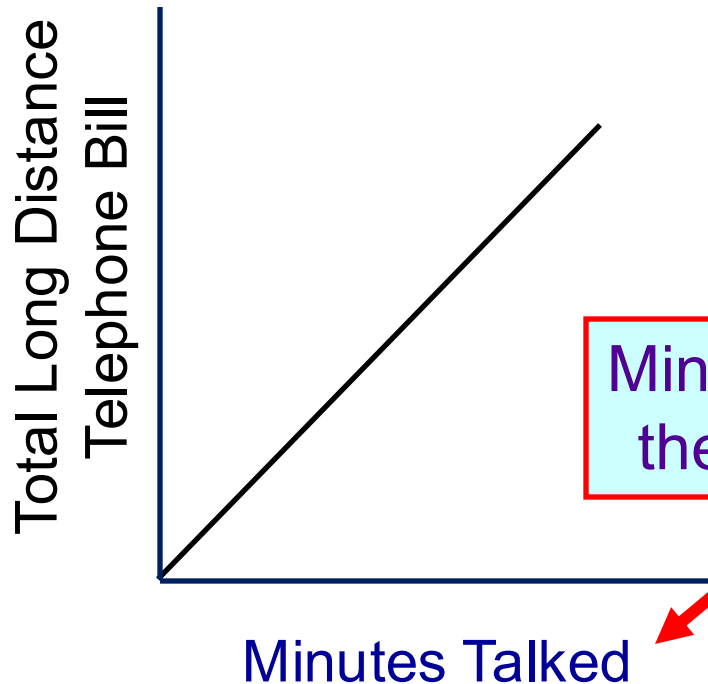
Cost pool

A green 3D rectangular box with a slight shadow on the bottom and right sides.

Cost allocation base

2b. Use of Cost Drivers to Accumulate Costs

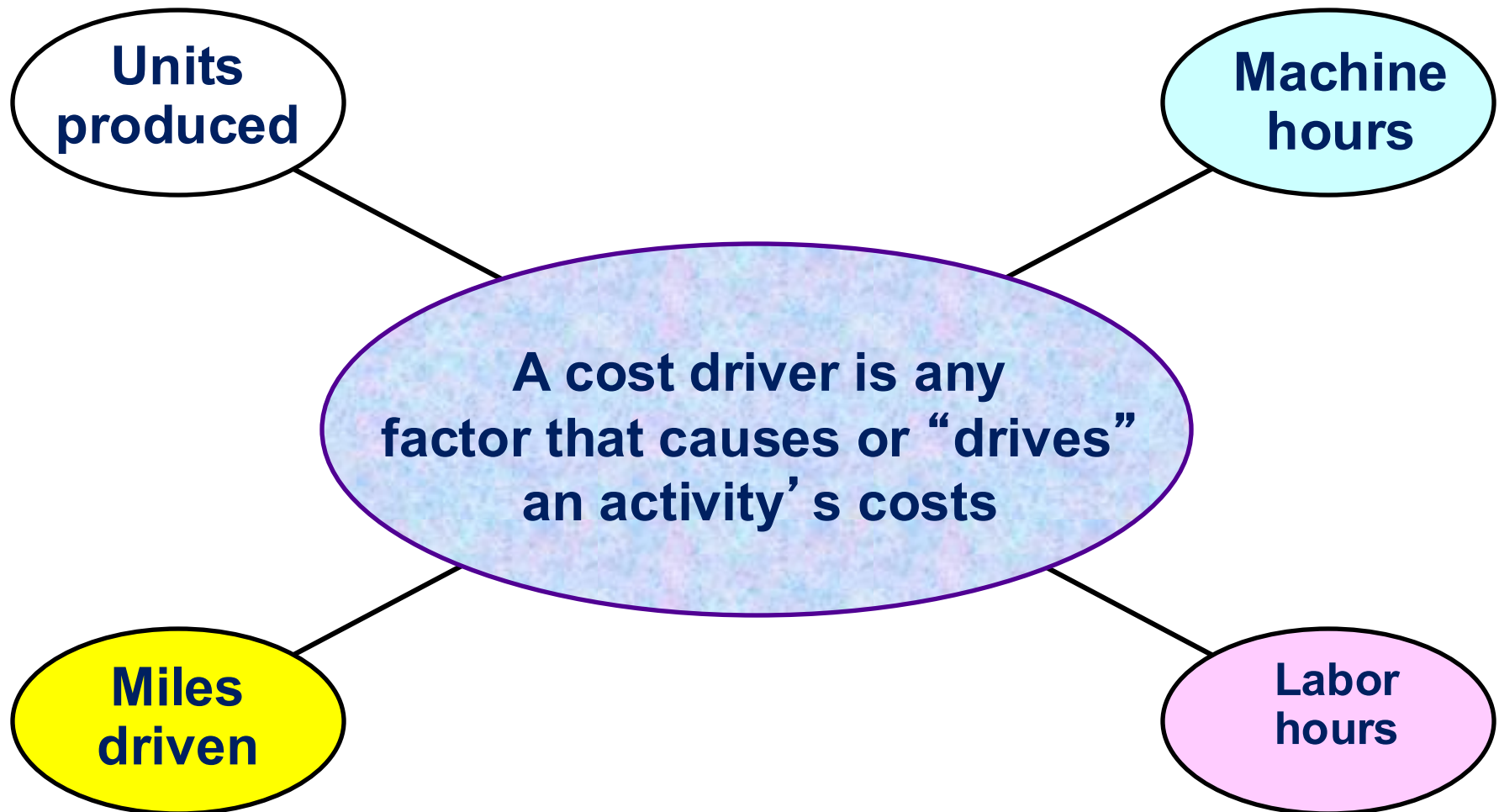
$$\text{Accumulated Cost} = \text{Minutes Talked} \times \text{Rate per Minute}$$



Minutes talked is the **cost driver**.



3a. Use of Cost Drivers to Accumulate Costs



3. Select an Allocation Base to Relate the Cost Pools to Cost Objects

- ❖ It is very important that the allocation base relates the cost pool to the cost object.**
- ❖ Allocation should be based on a cause and effect relationship between costs and cost objects.**
- ❖ If cause and effect cannot be established, other approaches are used.**

Traditional Costing Systems:

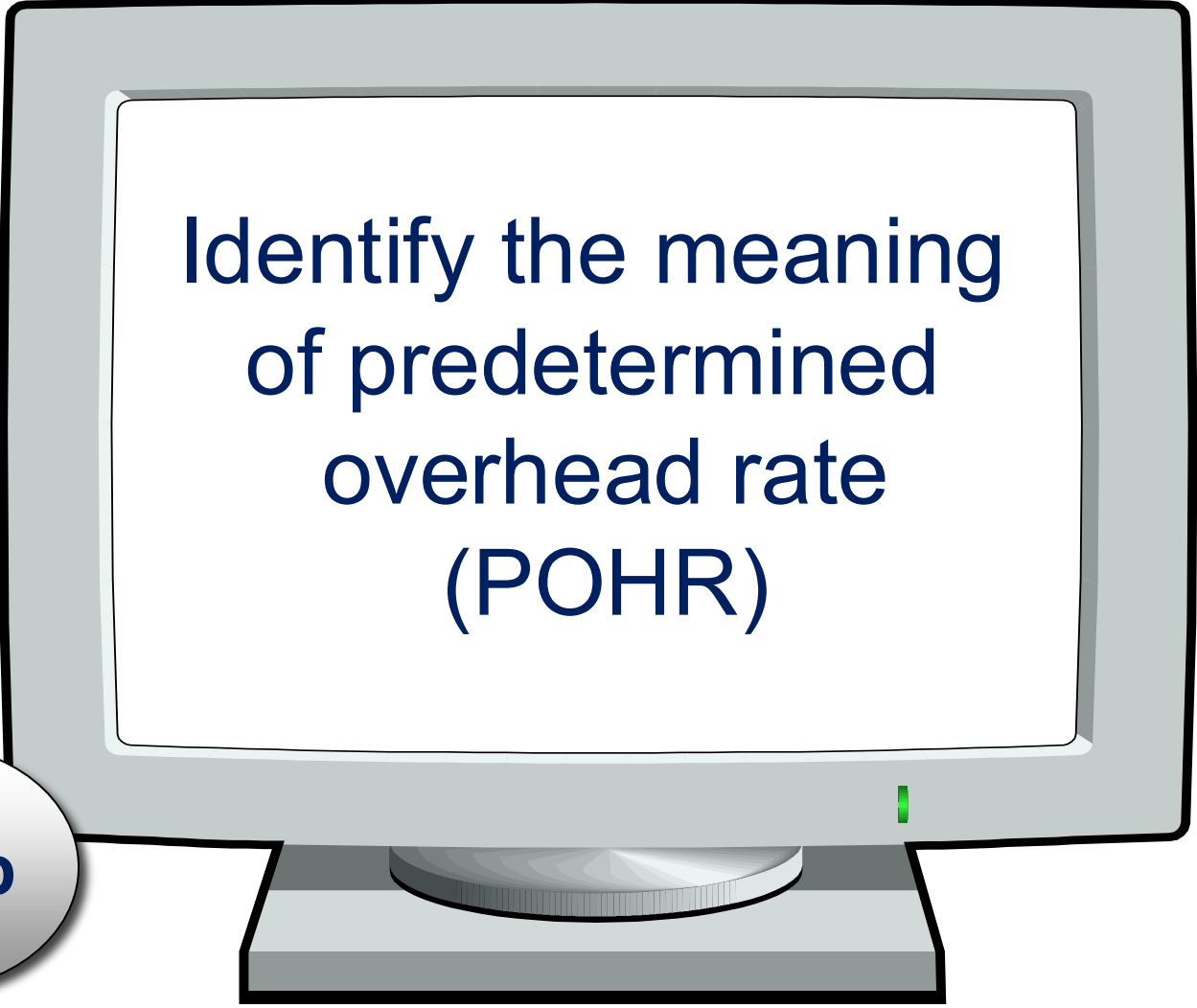
FOCUS on DIRECT LABOR HOURS

When overhead cost allocation systems were first developed, direct labor made up a large part of total manufacturing cost. It was widely accepted that there was a high correlation between direct labor and the incurrence of overhead cost. As a result, direct labor became the most popular basis for overhead allocation.

- A simplified (one-stage) traditional costing system relying on direct labor to assign overhead is displayed below:



Learning Objective

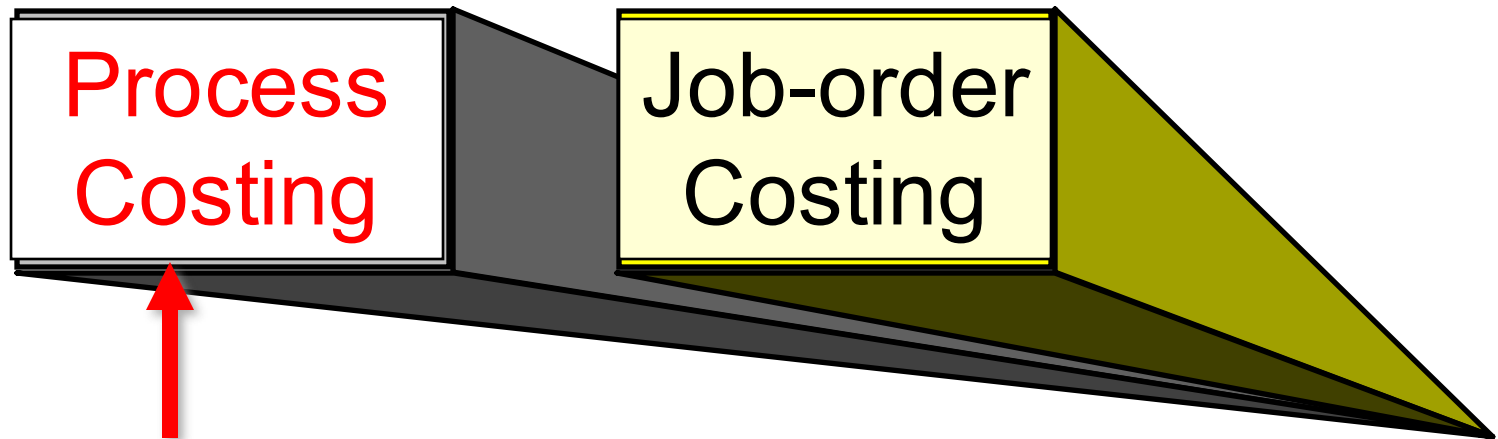
A stylized illustration of a computer monitor with a grey frame and a white screen. The screen displays the learning objective text in blue. The monitor has a small green light on the bottom right and sits on a grey base.

Identify the meaning
of predetermined
overhead rate
(POHR)

A circular label with a grey gradient and a black border, containing the text 'LO1b' in blue.

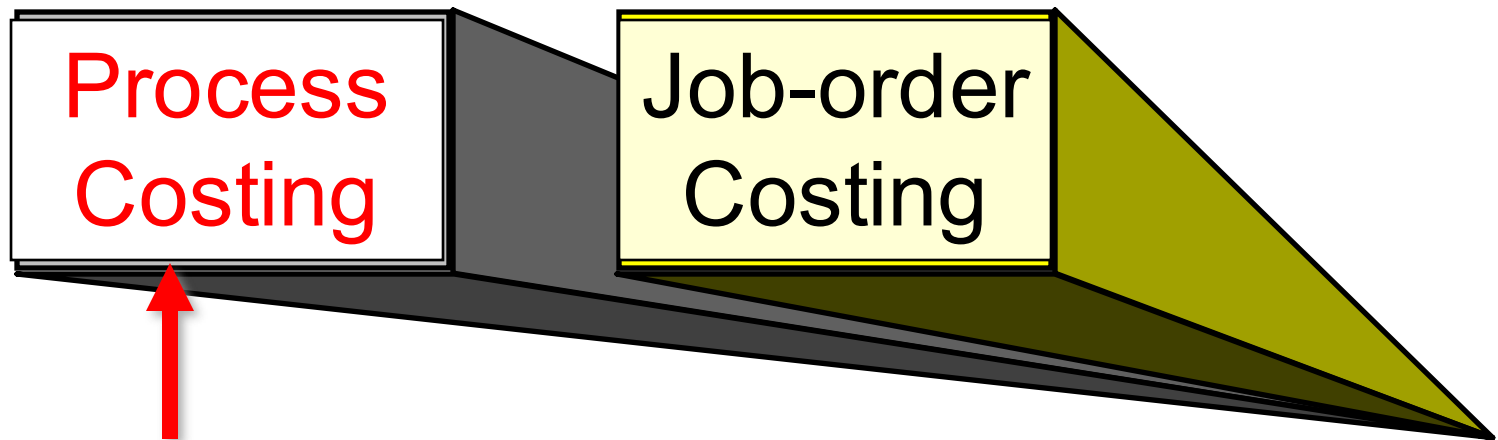
LO1b

Types of Product Costing Systems



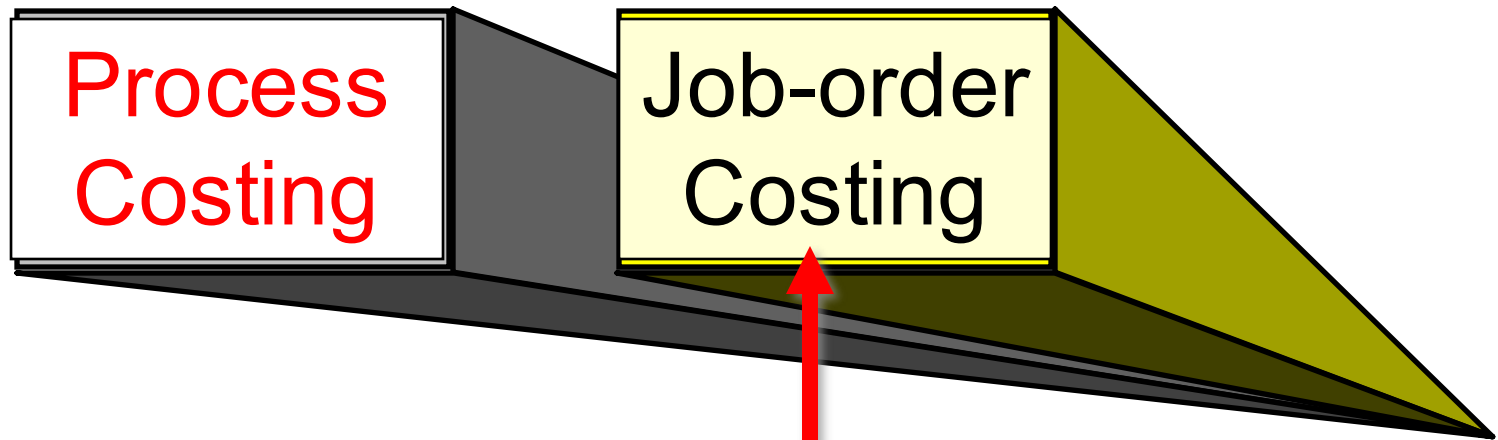
- ❖ A company produces many units of a single product.
- ❖ One unit of product is indistinguishable from other units of product.
- ❖ The identical nature of each unit of product enables assigning the same average cost per unit.

Types of Product Costing Systems



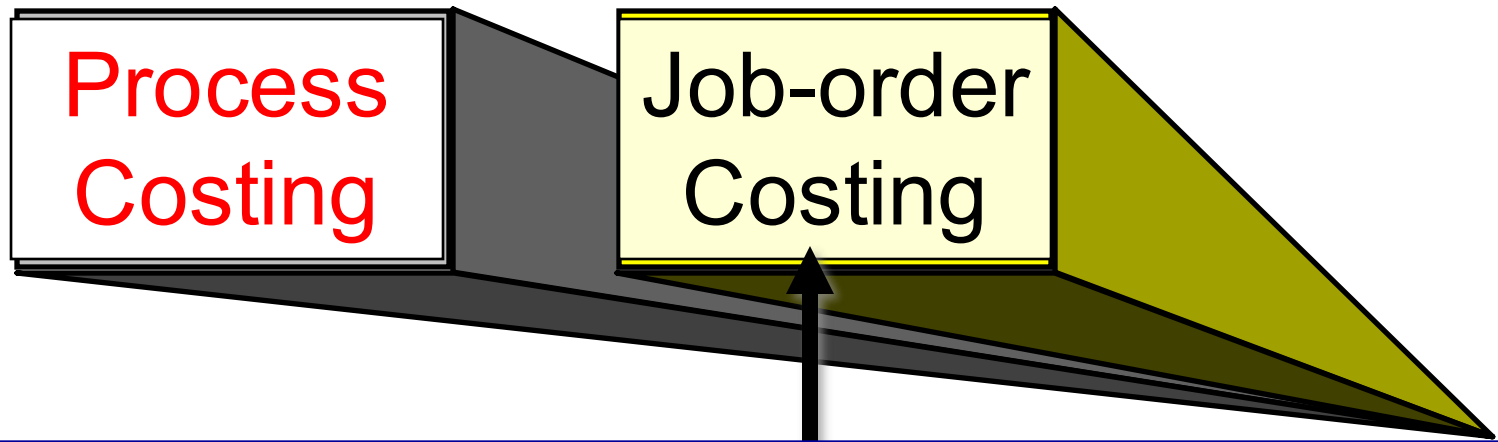
- ❖ **A company produces many units of a single**
- Example companies:**
 - ❖ 1. Weyerhaeuser (paper manufacturing)
 - ❖ 2. Reynolds Aluminum (refining aluminum ingots)
 - ❖ 3. Coca-Cola (mixing and bottling beverages)
- assigning the same average cost per unit.**

Types of Product Costing Systems



- ❖ Many different products are produced each period.
- ❖ Products are manufactured to order.
- ❖ The unique nature of each order requires tracing or allocating costs to each job, and maintaining cost records for each job.

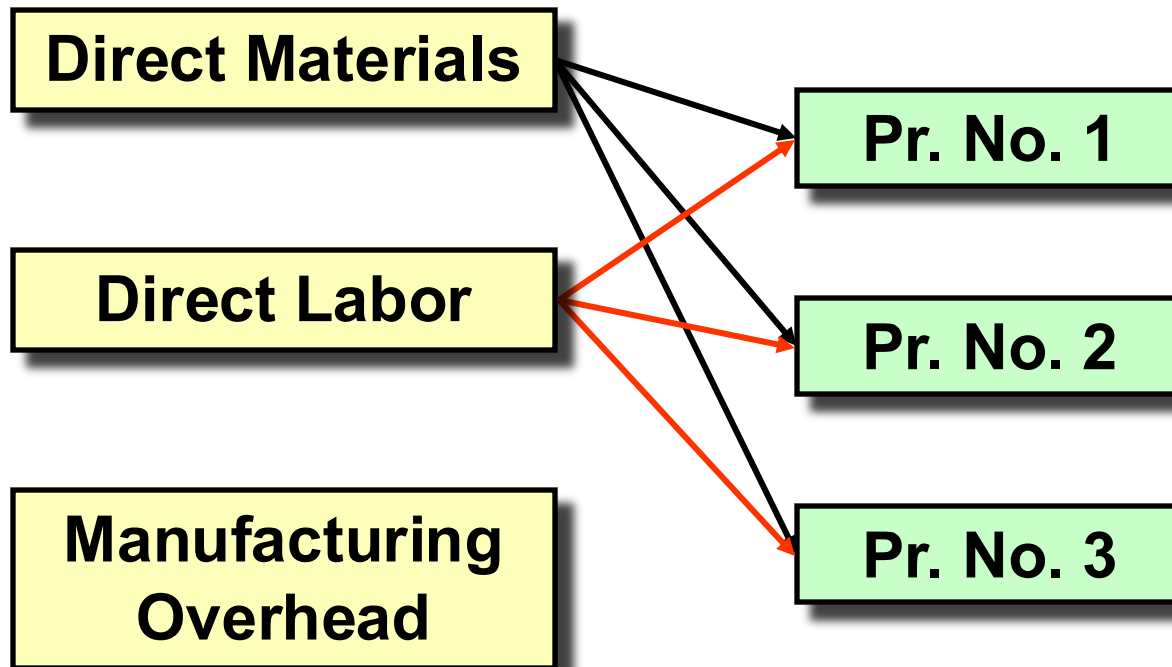
Types of Product Costing Systems



Example companies:

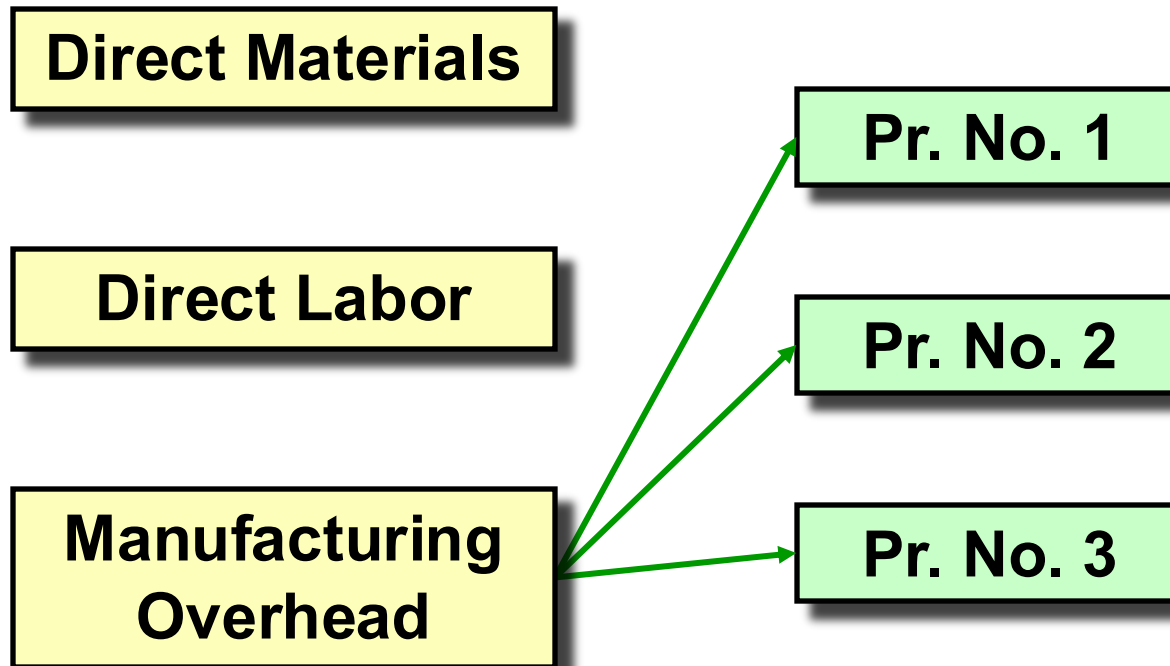
1. Boeing (aircraft manufacturing)
2. Bechtel International (large scale construction)
3. Walt Disney Studios (movie production)

Cost tracing and allocation – An Overview



Charge direct material and direct labor costs to each finished good / job as work is performed.

Problem of Manufacturing Overhead



Manufacturing Overhead, including *indirect materials* and *indirect labor*, are allocated to all goods / jobs rather than directly traced to each finish good / job.

Why Use an Allocation Base?

Manufacturing overhead is applied to product lines / jobs that are in process. An allocation base, such as direct labor hours, direct labor dollars, or machine hours, is used to assign manufacturing overhead to individual jobs.

We use an allocation base because:

1. It is impossible or difficult to trace overhead costs to particular products or jobs.
2. Manufacturing overhead consists of many different items ranging from the grease used in machines to production manager's salary.
3. Many types of manufacturing overhead costs are fixed even though output fluctuates during the period.

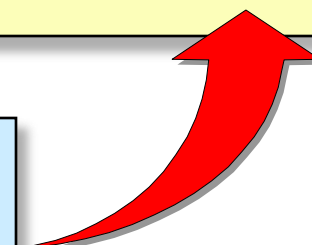
Manufacturing Overhead Application

The **predetermined** overhead rate (**POHR**) used to apply overhead to each product lines is determined before the period and/or manufacturing process begins.

(e.g. in case of **Price Quotation**)

$$\text{POHR} = \frac{\text{Estimated total manufacturing overhead cost for the coming period}}{\text{Estimated total units in the allocation base for the coming period}}$$

Ideally, the allocation base is a cost driver that causes overhead.



The Need for a POHR

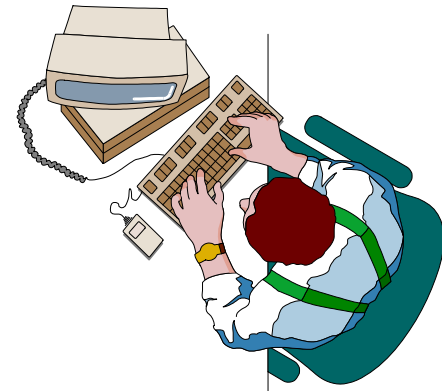
Using a predetermined rate makes it possible to estimate total job costs sooner.



Actual overhead for the period is not known until the end of the period.

Application of Manufacturing Overhead

Based on *estimates*, and determined before the period begins.



$$\text{Overhead applied} = \text{POHR} \times \text{Actual activity}$$

Actual amount of the allocation based upon the actual level of activity.

Overhead Application Rate

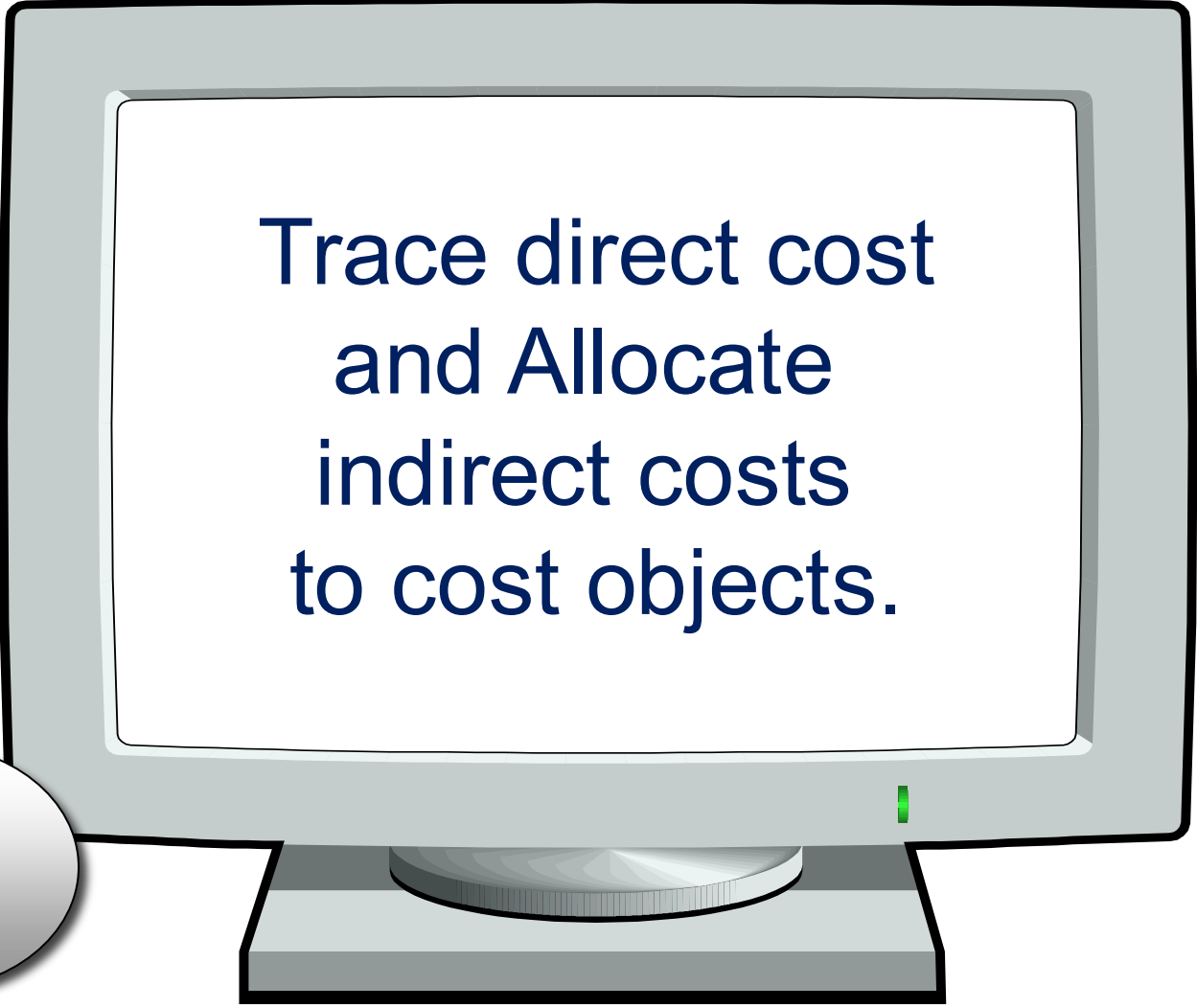
$$\text{POHR} = \frac{\text{Estimated total manufacturing overhead cost for the coming period}}{\text{Estimated total units in the allocation base for the coming period}}$$

$$\text{POHR} = \frac{\$640,000}{160,000 \text{ direct labor hours (DLH)}}$$

$$\text{POHR} = \$4.00 \text{ per DLH}$$

For each direct labor hour worked on a particular job, \$4.00 of factory overhead will be applied to that job.

Learning Objective

A stylized illustration of a computer monitor with a grey frame and a white screen. The screen displays the learning objective text in blue. The monitor has a small green light on the bottom right and sits on a grey base.

Trace direct cost
and Allocate
indirect costs
to cost objects.

A circular badge with a grey gradient and a black outline, containing the text 'LO2' in blue.

LO2

Identifying Direct and Indirect Costs

In Style, Inc. Department Store pays a bonus to each department manager based on a percentage of departmental sales. The incentive has increased departmental sales, but departmental profits have not increased accordingly.

Management has decided to base future bonuses on department profitability.

Sales

| Department | | | |
|------------|------------|------------|------------|
| Women's | Men's | Children's | Total |
| \$ 190,000 | \$ 110,000 | \$ 60,000 | \$ 360,000 |

Identifying Direct and Indirect Costs

The first step in the development of the new bonus strategy is to determine the costs of each department.

Costs that **can** be traced to departments in a *cost-effective* manner are called **direct costs**.

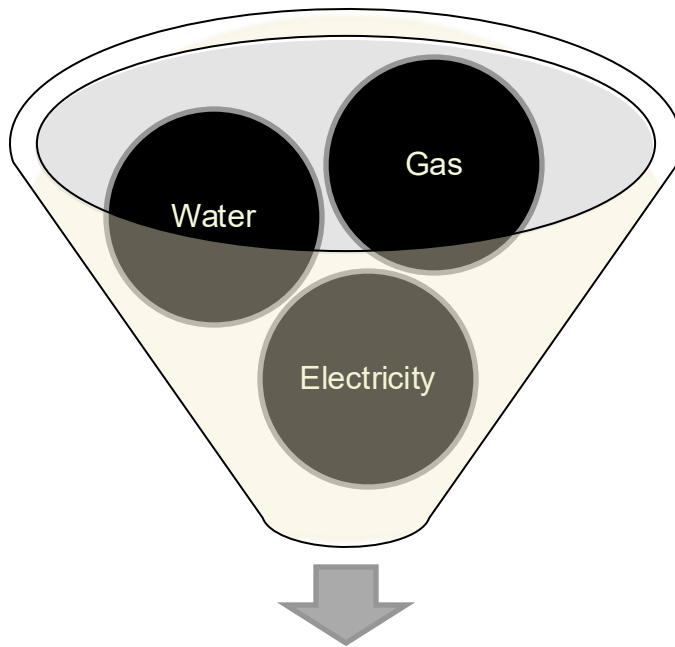
Costs that **cannot** be traced to departments in a *cost-effective* manner are called **indirect costs**.

| | Department | | | |
|---------------------|-------------------|------------------|------------------|-------------------|
| | Women's | Men's | Children's | Total |
| | \$ 190.000 | \$ 110.000 | \$ 60.000 | \$ 360.000 |
| Sales | | | | |
| SQm occupied | 12.000 sqm | 7.000 sqm | 4.000 sqm | 23.000 sqm |

Identifying Direct and Indirect Costs

| | Department | | | Indirect Costs |
|------------------------|-------------------|------------------|------------------|------------------|
| | Women's | Men's | Children's | |
| Direct Costs: | | | | |
| Cost of Goods Sold | \$ 120,000 | \$ 58,000 | \$ 38,000 | |
| Sales Commissions | 9,500 | 5,500 | 3,000 | |
| Supervisors' Salary | 5,000 | 4,200 | 2,800 | |
| Depreciation | 7,000 | 5,000 | 4,000 | |
| Indirect Costs: | | | | |
| Store Manager Salary | | | | \$ 9,360 |
| Store Rental | | | | 18,400 |
| Utilities | | | | 2,300 |
| Advertising | | | | 7,200 |
| Supplies | | | | 900 |
| Totals | \$ 141,500 | \$ 72,700 | \$ 47,800 | \$ 38,160 |

Aggregating and Disaggregating Individual Costs into Cost Pools

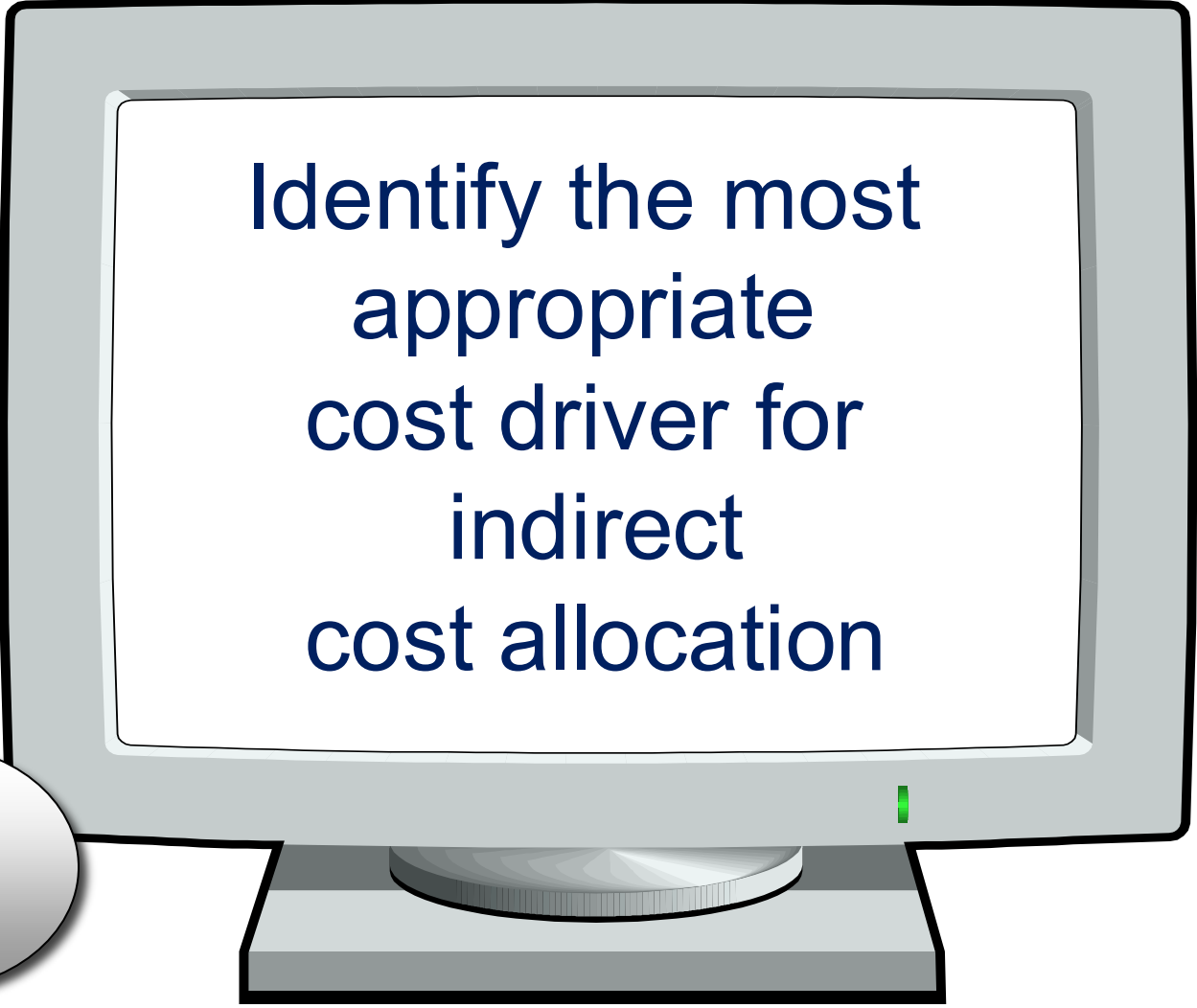


Utilities Cost Pool

Frequently, companies accumulate many individual costs into a single cost pool.

Pooling should be limited to costs with common cost drivers.

Learning Objective

A stylized illustration of a computer monitor with a grey frame and a white screen. The screen displays the learning objective text in blue. The monitor has a small green light on the bottom right and sits on a grey base.

Identify the most
appropriate
cost driver for
indirect
cost allocation

A circular badge with a grey gradient and a black outline, containing the text 'LO3' in blue.

LO3

Selecting the Best Cost Driver

Judgment and reasoning are necessary.

Considerations

Relationship between cost driver activity and use of resources.

Availability of information.

So which volume measure should I use?



Remember you have two main different cost objects:

- 1) Department**
- 2) Product lines / Products**

1) Allocating Indirect Costs to Departments

Identify the most appropriate cost driver for each indirect cost.

Indirect costs should be allocated to reflect how the departments consume resources.

The cost drivers of In Style, Inc. are:



| Indirect Costs | | |
|----------------------|--|----------|
| Store Manager Salary | | \$ 9,360 |
| Store Rental | | 18,400 |
| Utilities | | 2,300 |
| Advertising | | 7,200 |
| Supplies | | 900 |

1) Allocating Indirect Costs to Departments

Use a two-step process to allocate indirect costs:

- ① Allocation rate = total cost \div cost driver activity.
- ② Allocated cost = allocation rate \times weight of the cost driver activity.

Store Manager Salary

Equal Portion

\$ 9,360

Store Rental

Floor Space Occupied

18,400

Utilities

Floor Space Occupied

2,300

Advertising

Sales Volume

7,200

Supplies

Sales Volume

900

1) Allocating Indirect Costs to Departments

① $\$9,360 \div 3 \text{ departments} = \$3,120 \text{ per department}$

② $\$3,120 \times 1 \text{ department} = \$3,120$

Indirect Costs

Store Manager Salary

Store Rental

Utilities

Advertising

Supplies

| Department | | | |
|------------|-------|------------|----------|
| Women's | Men's | Children's | Total |
| | | | \$ 9,360 |
| | | | 18,400 |
| | | | 2,300 |
| | | | 7,200 |
| | | | 900 |

1) Allocating Indirect Costs to Departments

① $\$18,400 \div 23,000 \text{ square feet} = \$0.80 \text{ per square foot}$

② $\$0.80 \times 12,000 \text{ Women's square feet} = \$9,600$

$\$0.80 \times 7,000 \text{ Men's square feet} = \$5,600$

$\$0.80 \times 4,000 \text{ Children's square feet} = \$3,200$

Indirect Costs

Store Manager Salary

Store Rental

Utilities

Advertising

Supplies

| Department | | | |
|------------|----------|------------|----------|
| Women's | Men's | Children's | Total |
| \$ 3,120 | \$ 3,120 | \$ 3,120 | \$ 9,360 |
| | | | 18,400 |
| | | | 2,300 |
| | | | 7,200 |
| | | | 900 |

1) Allocating Indirect Costs to Departments

① $\$2,300 \div 23,000 \text{ square feet} = \$0.10 \text{ per square foot}$

② $\$0.10 \times 12,000 \text{ Women's square feet} = \$1,200$

$\$0.10 \times 7,000 \text{ Men's square feet} = \700

$\$0.10 \times 4,000 \text{ Children's square feet} = \400

Indirect Costs

Store Manager Salary

Store Rental

Utilities

Advertising

Supplies

| Department | | | |
|------------|----------|------------|----------|
| Women's | Men's | Children's | Total |
| \$ 3,120 | \$ 3,120 | \$ 3,120 | \$ 9,360 |
| 9,600 | 5,600 | 3,200 | 18,400 |
| | | | 2,300 |
| | | | 7,200 |
| | | | 900 |

1) Allocating Indirect Costs to Departments

① $\$7,200 \div \$360,000 \text{ sales} = \$0.02 \text{ per sales dollar}$

② $\$0.02 \times \$190,000 \text{ Women's sales} = \$3,800$

$\$0.02 \times \$110,000 \text{ Men's sales} = \$2,200$

$\$0.02 \times \$60,000 \text{ Children's sales} = \$1,200$

Indirect Costs

Store Manager Salary

Store Rental

Utilities

Advertising

Supplies

| Department | | | | |
|----------------------|----------|----------|------------|----------|
| | Women's | Men's | Children's | Total |
| Store Manager Salary | \$ 3,120 | \$ 3,120 | \$ 3,120 | \$ 9,360 |
| Store Rental | 9,600 | 5,600 | 3,200 | 18,400 |
| Utilities | 1,200 | 700 | 400 | 2,300 |
| Advertising | | | | 7,200 |
| Supplies | | | | 900 |

1) Allocating Indirect Costs to Departments

① $\$900 \div \$360,000 \text{ sales} = \$0.0025 \text{ per sales dollar}$

② $\$0.0025 \times \$190,000 \text{ Women's sales} = \475

$\$0.0025 \times \$110,000 \text{ Men's sales} = \275

$\$0.0025 \times \$60,000 \text{ Children's sales} = \150

Indirect Costs

Store Manager Salary

Store Rental

Utilities

Advertising

Supplies

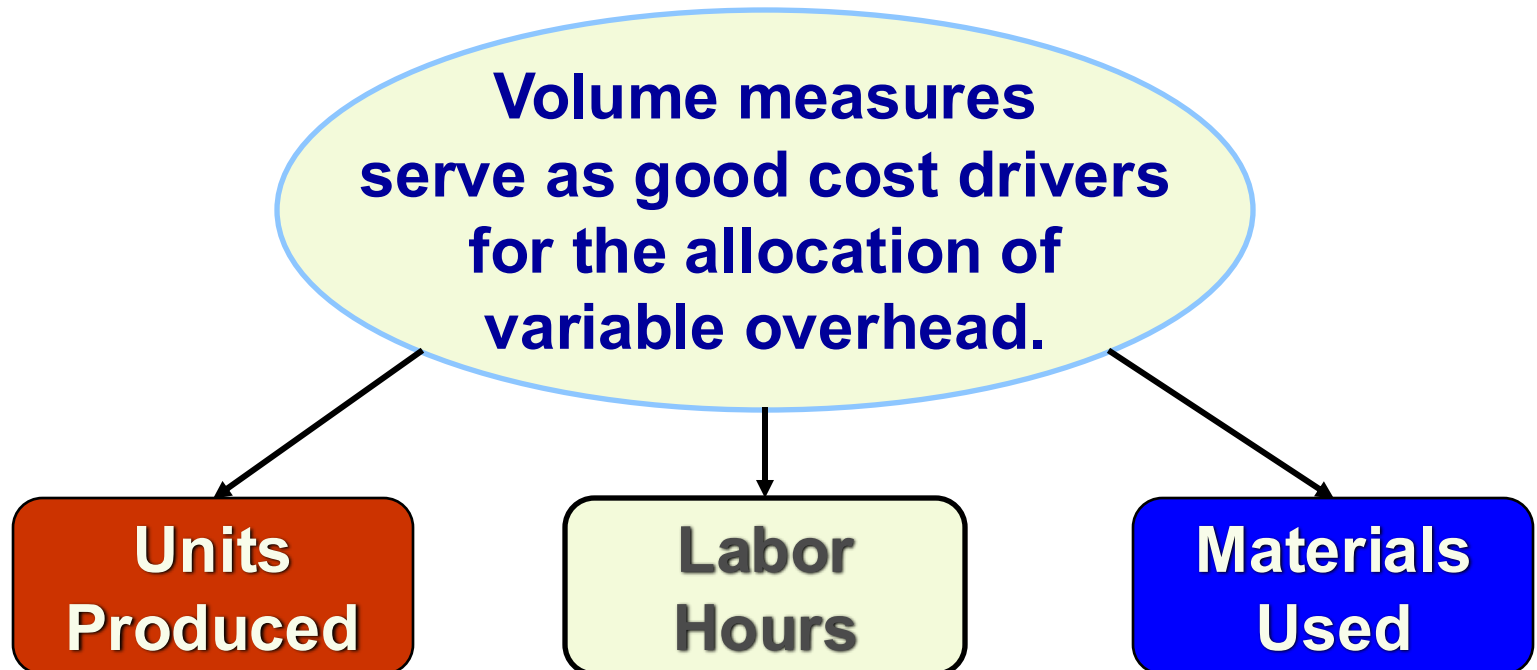
| Department | | | |
|------------|----------|------------|----------|
| Women's | Men's | Children's | Total |
| \$ 3,120 | \$ 3,120 | \$ 3,120 | \$ 9,360 |
| 9,600 | 5,600 | 3,200 | 18,400 |
| 1,200 | 700 | 400 | 2,300 |
| 3,800 | 2,200 | 1,200 | 7,200 |
| | | | 900 |

1) Allocating Indirect Costs to Departments

| | Department | | | |
|----------------------------|------------|------------|------------|------------|
| | Women's | Men's | Children's | Total |
| Sales | \$ 190,000 | \$ 110,000 | \$ 60,000 | \$ 360,000 |
| Direct Costs | | | | |
| Cost of Goods Sold | 120,000 | 58,000 | 38,000 | 216,000 |
| Sales Commissions | 9,500 | 5,500 | 3,000 | 18,000 |
| Supervisors' Salary | 5,000 | 4,200 | 2,800 | 12,000 |
| Depreciation | 7,000 | 5,000 | 4,000 | 16,000 |
| Indirect costs | | | | |
| Store Manager Salary | 3,120 | 3,120 | 3,120 | 9,360 |
| Store Rental | 9,600 | 5,600 | 3,200 | 18,400 |
| Utilities | 1,200 | 700 | 400 | 2,300 |
| Advertising | 3,800 | 2,200 | 1,200 | 7,200 |
| Supplies | 475 | 275 | 150 | 900 |
| Departmental Profit | \$ 30,305 | \$ 25,405 | \$ 4,130 | \$ 59,840 |

2) Using Volume Measures to Allocate Variable Overhead Costs to Products

Increases in the volume of production will cause variable overhead costs to increase.



2) Using Volume Measures to Allocate Variable Overhead Costs to Products

| | Product | | |
|-------------------------|------------|--------------|--------------|
| | Chairs | Desks | Total |
| Units of Production | 4,000 | 1,000 | 5,000 |
| Direct Labor Hours | 2,500 | 3,500 | 6,000 |
| Direct Materials Cost | \$ 500,000 | \$ 1,000,000 | \$ 1,500,000 |
| Indirect Materials Cost | | | \$ 60,000 |

Filmier Furniture Company Production and Cost Information

Use the two-step process to allocate indirect materials cost using the three volume measures as cost drivers.

2) Using Volume Measures to Allocate Variable Overhead Costs to Products

① $\$60,000 \div 5,000 \text{ units} = \12 per unit

② $\$12 \text{ per unit} \times 4,000 \text{ chairs} = \$48,000$

$\$12 \text{ per unit} \times 1,000 \text{ desks} = \$12,000$

| Indirect Materials Cost | Chairs | Desks | \$ 60,000 |
|---|--------|-------|-----------|
| Allocation of Indirect Materials Cost Based on: | | | |
| Units of Production | | | \$ 60,000 |
| Direct Labor Hours | | | |
| Direct Materials Cost | | | |

2) Using Volume Measures to Allocate Variable Overhead Costs to Products

① $\$60,000 \div 6,000 \text{ hours} = \10 per hour

② $\$10 \text{ per hour} \times 2,500 \text{ hours} = \$25,000$

$\$10 \text{ per hour} \times 3,500 \text{ hours} = \$35,000$

| Indirect Materials Cost | Chairs | Desks | \$ 60,000 |
|---|-----------|-----------|-----------|
| Allocation of Indirect Materials Cost Based on: | | | |
| Units of Production | \$ 48.000 | \$ 12.000 | \$ 60,000 |
| Direct Labor Hours | | | 60,000 |
| Direct Materials Cost | | | |

2) Using Volume Measures to Allocate Variable Overhead Costs to Products

① $\$60,000 \div \$1,500,000$ of direct material = \$0.04 per dollar of direct material

② $\$0.04 \text{ per } \$ \times \$500,000 = \$20,000$

$\$0.04 \text{ per } \$ \times \$1,000,000 = \$40,000$

| Indirect Materials Cost | Chairs | Desks | \$ 60,000 |
|---|-----------|-----------|-----------|
| Allocation of Indirect Materials Cost Based on: | | | |
| Units of Production | \$ 48,000 | \$ 12,000 | \$ 60,000 |
| Direct Labor Hours | 25,000 | 35,000 | 60,000 |
| Direct Materials Cost | 20,000 | 40,000 | 60,000 |

3) Allocating Fixed Overhead Costs to Products

Objective

Distribute a fair share of the overhead cost to each product.

There are no volume based cost drivers for fixed overhead.

3) Allocating Fixed Overhead Costs to Products

Lednicky Bottling Company Information

| | |
|----------------------------------|------------------|
| Units Produced | 2,000,000 |
| Units Sold | 1,800,000 |
| Units in Ending Inventory | 200,000 |
| Fixed Rental Cost | \$ 28,000 |

Use the two-step process to allocate the fixed rental cost to units sold and to units in ending inventory.

3) Allocating Fixed Overhead Costs to Products

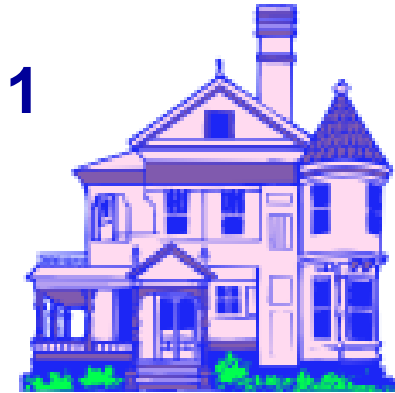
| | |
|---------------------------|-----------|
| Units Produced | 2,000,000 |
| Units Sold | 1,800,000 |
| Units in Ending Inventory | 200,000 |
| Fixed Rental Cost | \$ 28,000 |

① $\$28,000 \div 2,000,000 \text{ units} = \0.014 per unit

② $\$0.014 \text{ per unit} \times 1,800,000 \text{ units} = \$25,200$

$\$0.014 \text{ per unit} \times 200,000 \text{ units} = \$2,800$

Exercise D.P. 4-1: My House/ Your House



| | House 1 | House 2 | House 3 |
|------------------|-----------|-----------|----------|
| Direct Materials | \$140,000 | \$ 70,000 | \$90,000 |
| Direct Labor | 210,000 | 130,000 | 60,000 |
| Overhead* | ? | ? | ? |

*The building contractor's total indirect costs (such as supervisory salaries and indirect materials) amount to \$84,000.

My new house is house number one. I believe distributing the contractor's overhead costs equally among the three houses is a fair way to allocate them. My specific recommendation is:

\$84,000 overhead / 3 houses = \$28,000 per house. Your new house is house number three. Do you agree with this assignment of cost?

Exercise D.P. 4-1: My House/ Your House




Assume a builder is building three houses simultaneously. The direct materials and direct labor costs for each house are those shown in the previous slide. The total indirect costs (such as supervisory salaries and indirect materials) are \$84,000.

Required

- Assume the builder allocates overhead (indirect) costs equally among the three houses. Determine the amount of overhead cost allocated to each house. Comment on whether this allocation scheme is reasonable. Explain why it may be inappropriate to use number of units as the allocation base.
- Assume instead that the builder allocates overhead costs based on total direct costs. Determine the amount of overhead cost allocated to each house. Compare the allocations determined in **requirement a** with the allocations determined in **requirement b**. Identify who will benefit and who will suffer if the builder uses the **requirement b** allocation method instead of allocating overhead equally.
- Assume that the \$84,000 of total overhead cost consists of \$63,000 of indirect materials and \$21,000 of fringe benefits. Decide what you believe is the most rational allocation scheme and use that scheme to allocate the overhead cost to the three houses.

Learning Objective

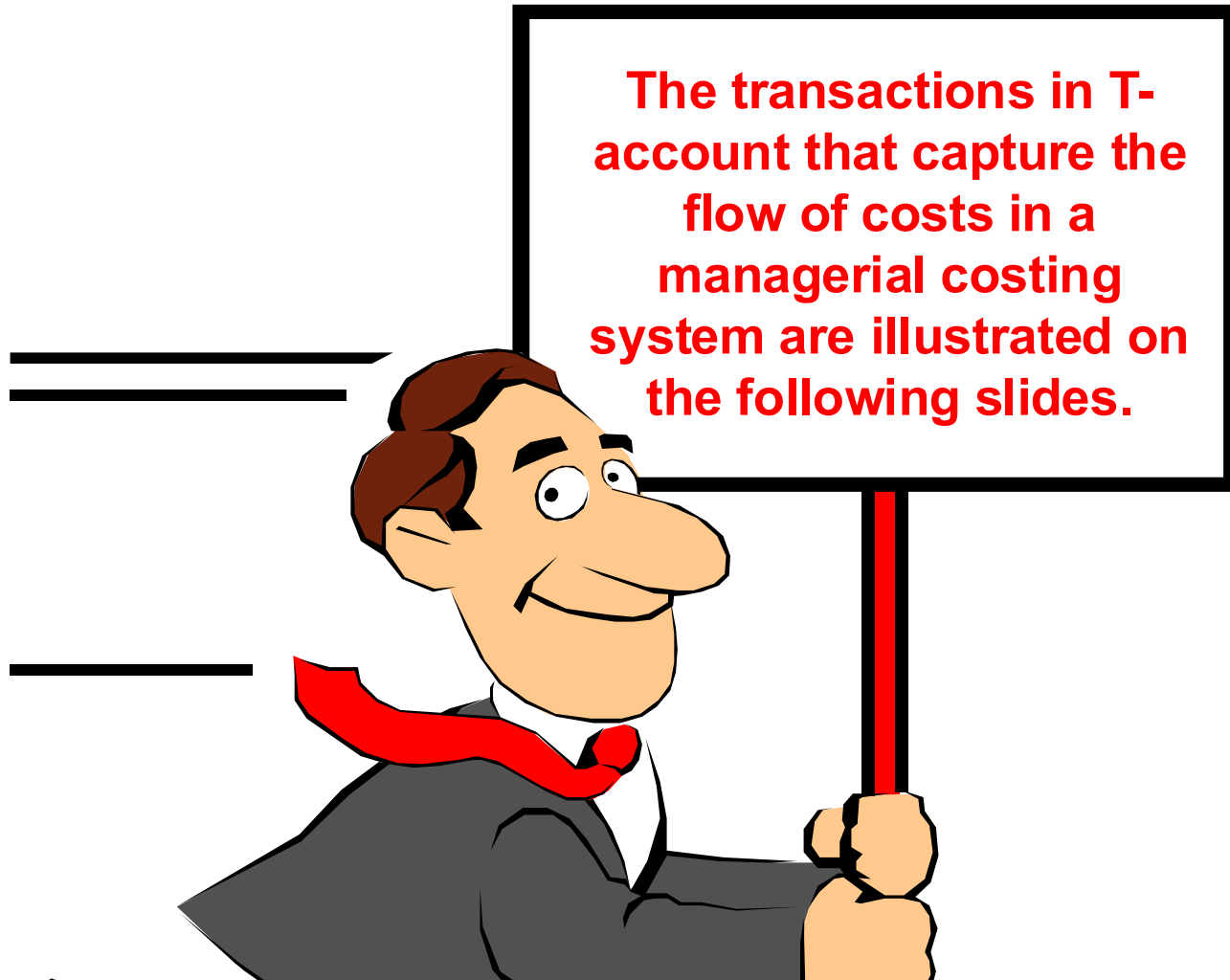
A stylized illustration of a computer monitor with a grey frame and a white screen. The screen displays the learning objective text in blue. The monitor has a small green light on the bottom right and sits on a grey base.

Identify and manage
Overapplied and
Underapplied
Overhead costs

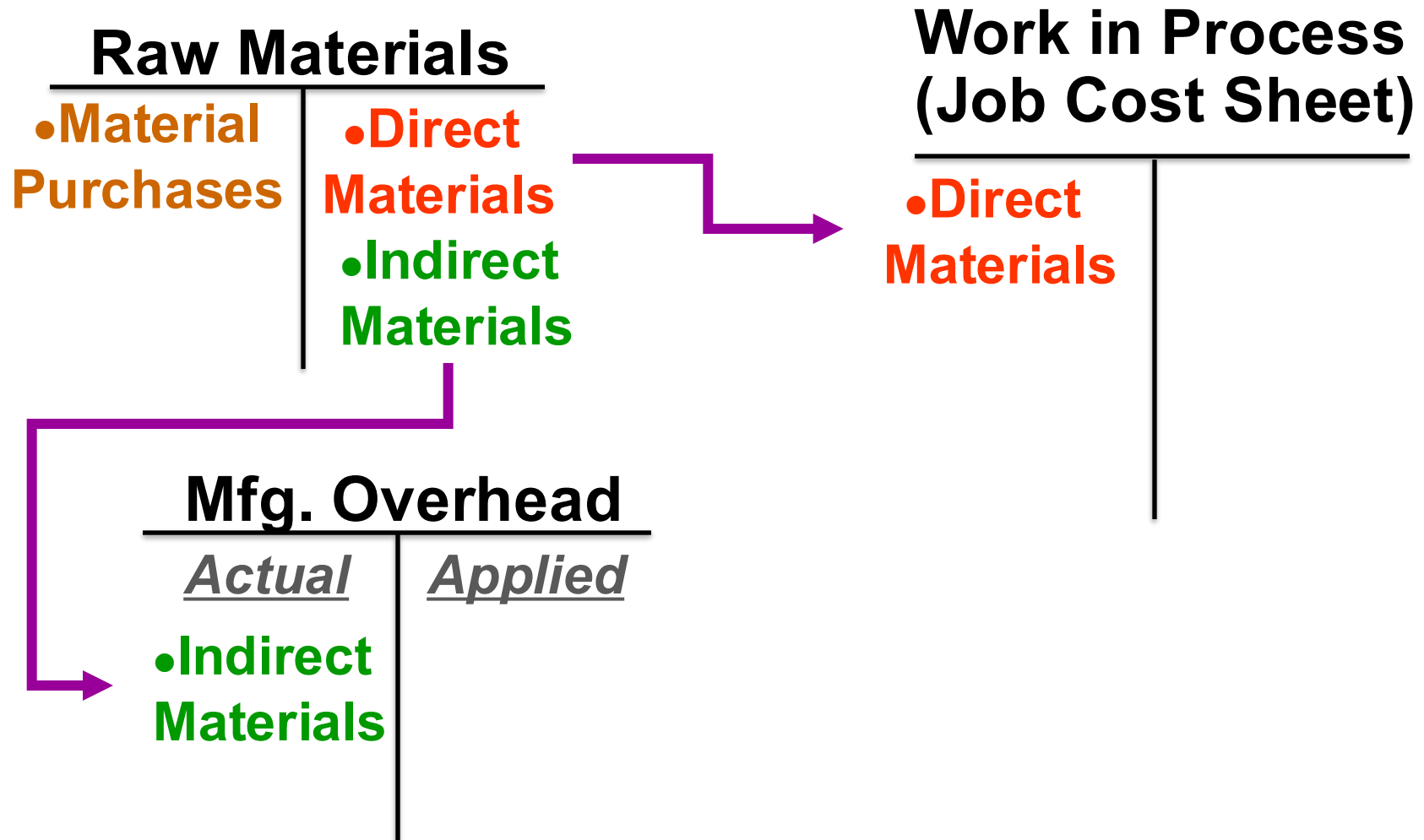
A circular badge with a grey gradient and a black border, containing the text 'LO3b' in blue.

LO3b

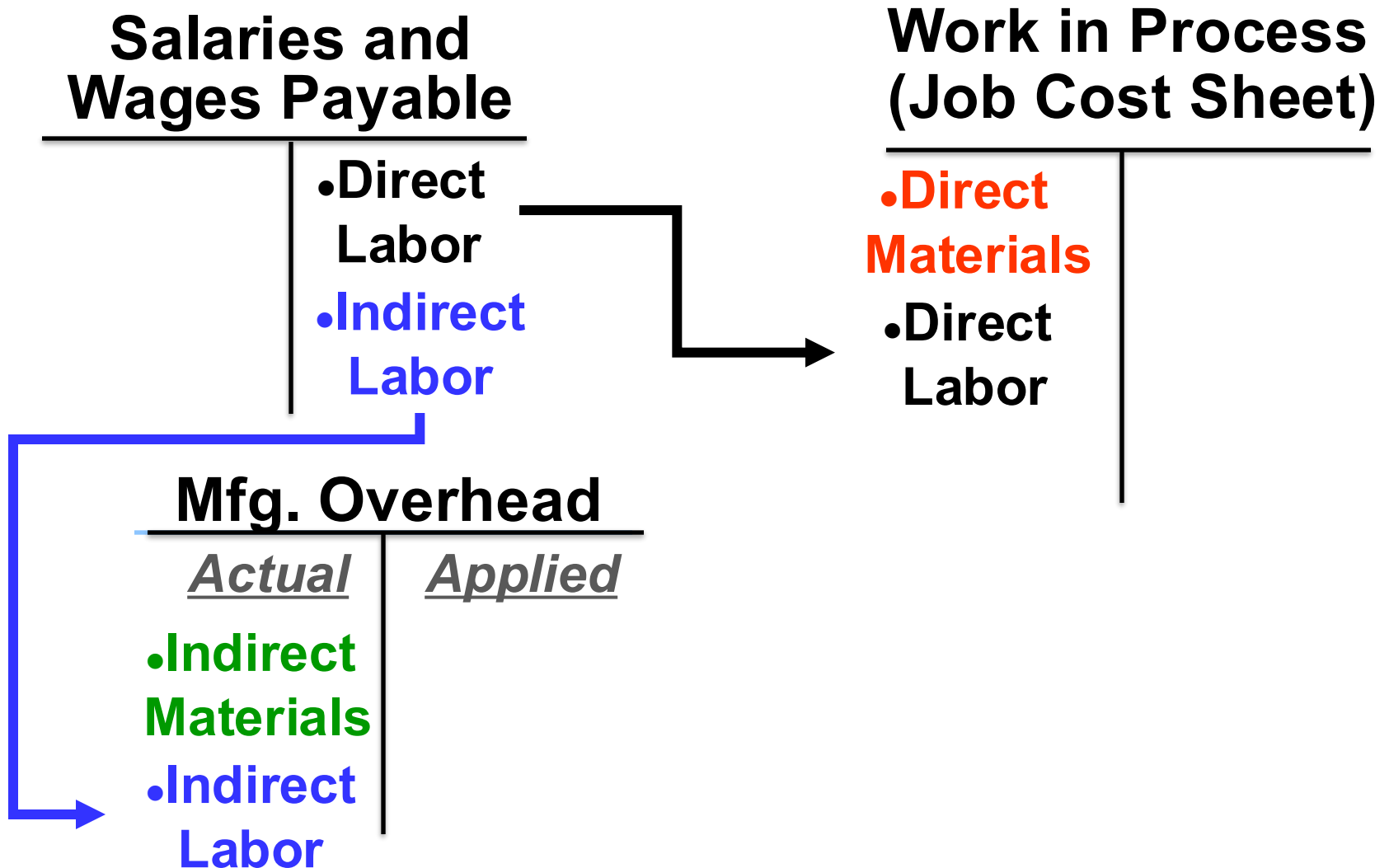
The Flow of Costs



The Purchase and Issue of Raw Materials



The Recording of Labor Costs



Recording Actual Manufacturing Overhead

Salaries and Wages Payable

- Direct Labor
- Indirect Labor

Mfg. Overhead

- Actual
- Indirect Materials
 - Indirect Labor

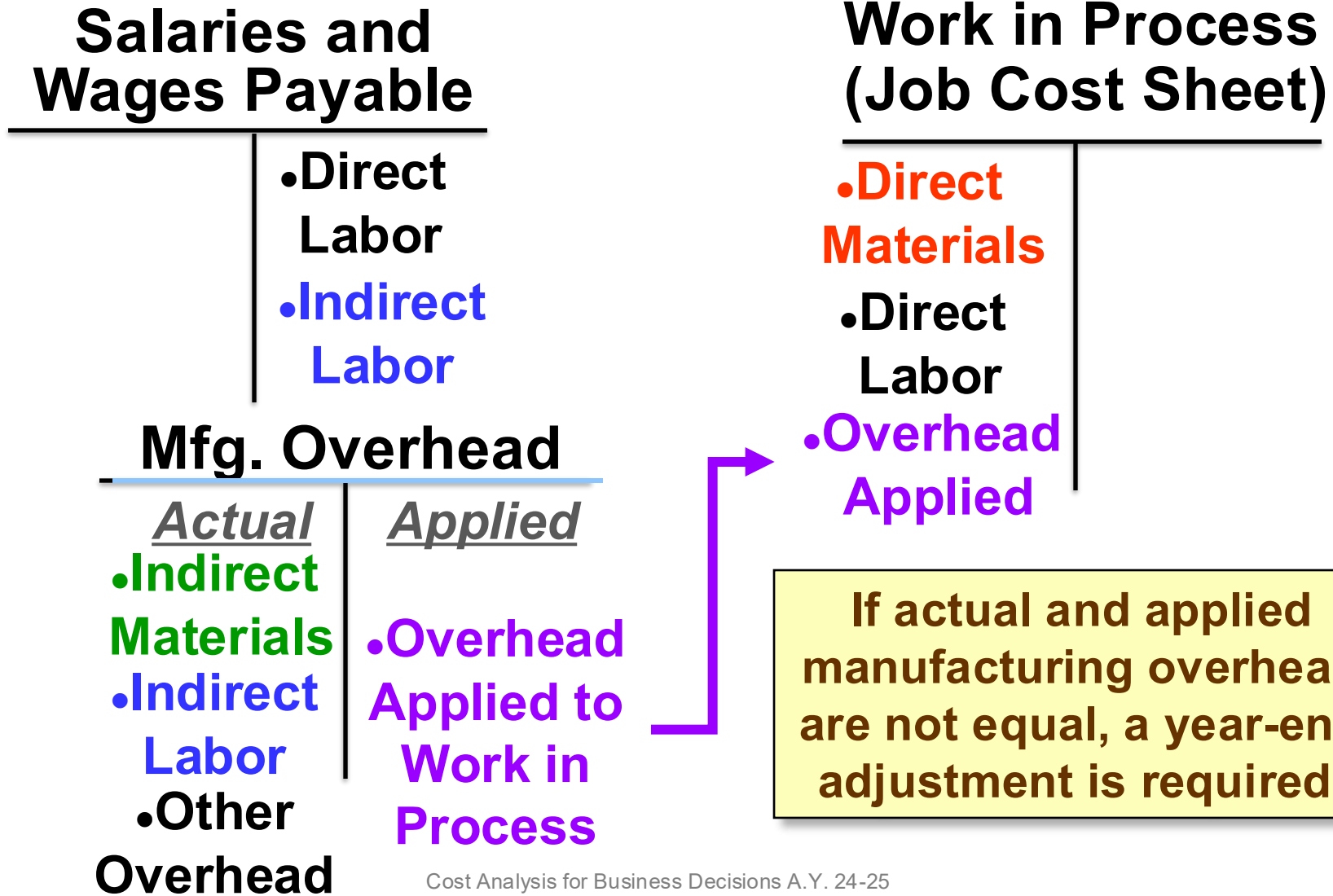
•Other Overhead

Applied

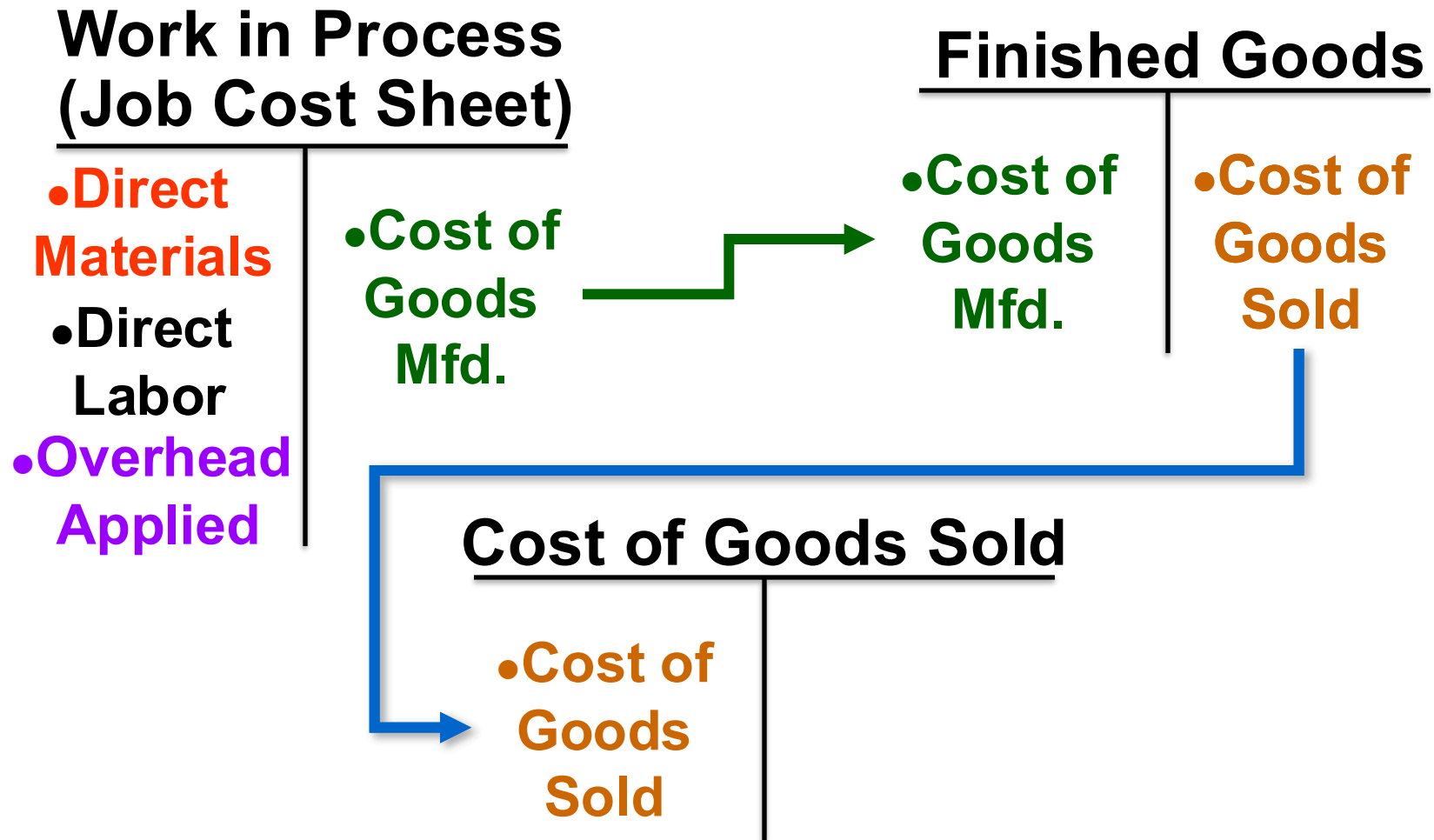
Work in Process (Job Cost Sheet)

- Direct Materials
- Direct Labor

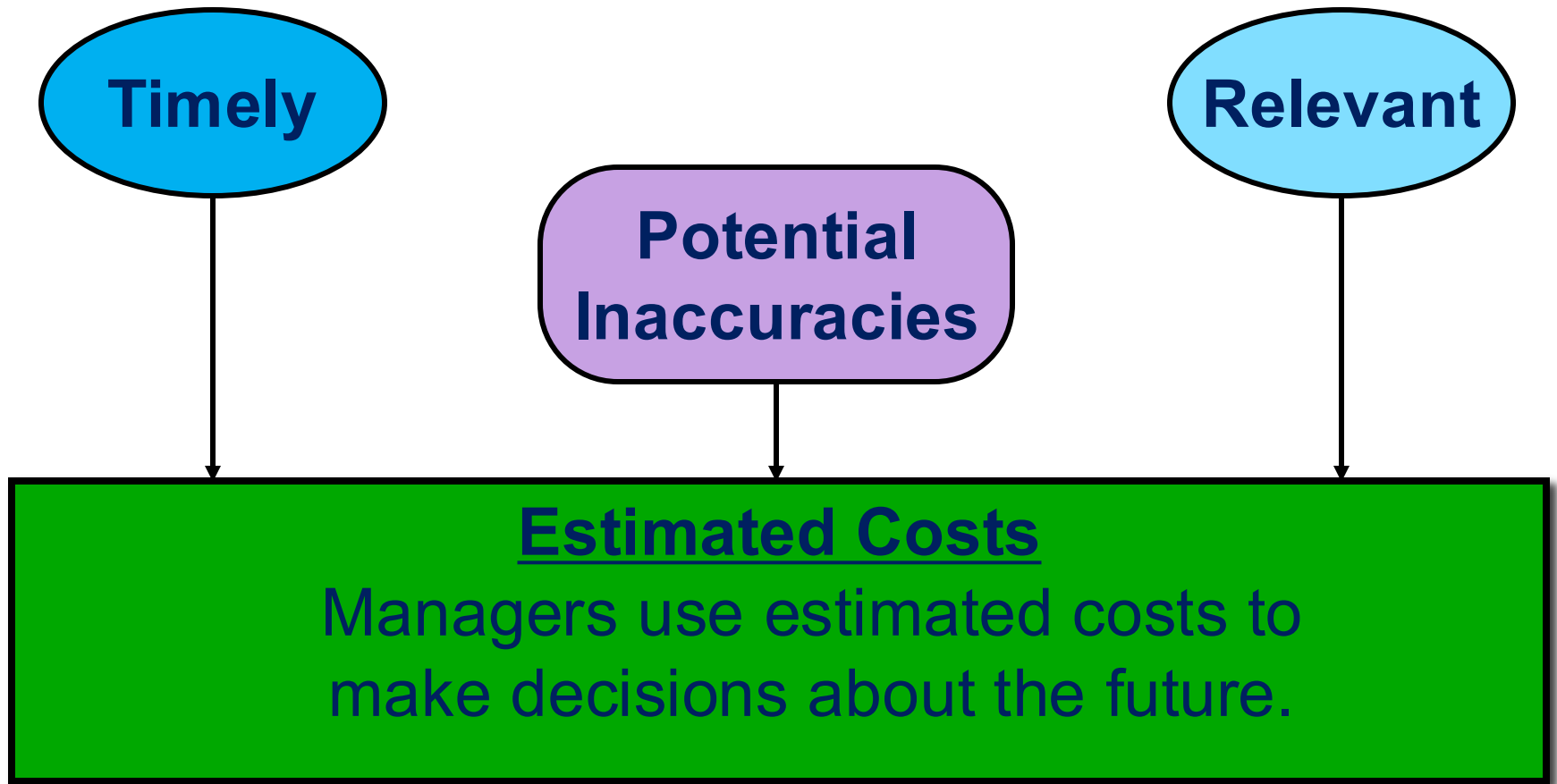
Applying Manufacturing Overhead



Transferring Completed Units



Estimated Versus Actual Cost



Allocating Costs to Solve Timing Problems

Allocating fixed costs can be complicated when the volume of production varies from month to month.

| | January | February |
|--------------------------------------|----------|----------|
| Supervisor's Salary | \$ 3,000 | \$ 3,000 |
| Units Produced | 800 | 1,875 |
| Salary Cost per Unit Produced | \$ 3.75 | \$ 1.60 |

If prices are based on these costs, units produced in January will be priced higher than those produced in February.

Will customers think this is reasonable?

Allocating Costs to Solve Timing Problems

We solve this problem by using estimated costs and estimated production for the year to obtain a **predetermined overhead rate (POHR)**.

$$\text{POHR} = \frac{\text{Estimated overhead for the year}}{\text{Estimated allocation base for the year}}$$

$$\text{POHR} = \frac{\$36,000}{18,000 \text{ units}} = \$2.00 \text{ per unit}$$

\$2.00 allocated to each unit produced for all months during the year.

Problems of Overhead Application

The difference between the overhead cost applied to Work in Process and the actual overhead costs of a period is referred to as either underapplied or overapplied overhead.

Underapplied overhead exists when the amount of overhead applied to jobs/product lines during the period using the predetermined overhead rate is *less than* the total amount of overhead actually incurred during the period.

Overapplied overhead exists when the amount of overhead applied to jobs/product lines during the period using the predetermined overhead rate is *greater than* the total amount of overhead actually incurred during the period.

Overapplied and Underapplied Manufacturing Overhead

| If Manufacturing Overhead is . . . | <u>Alternative 1</u> Close to Cost of Goods Sold | <u>Alternative 2</u> Allocation |
|--|---|--|
| UNDERAPPLIED (Applied OH is less than actual OH) | INCREASE Cost of Goods Sold | INCREASE Work in Process Finished Goods Cost of Goods Sold |
| OVERAPPLIED (Applied OH is greater than actual OH) | DECREASE Cost of Goods Sold | DECREASE Work in Process Finished Goods Cost of Goods Sold |

Learning Objective

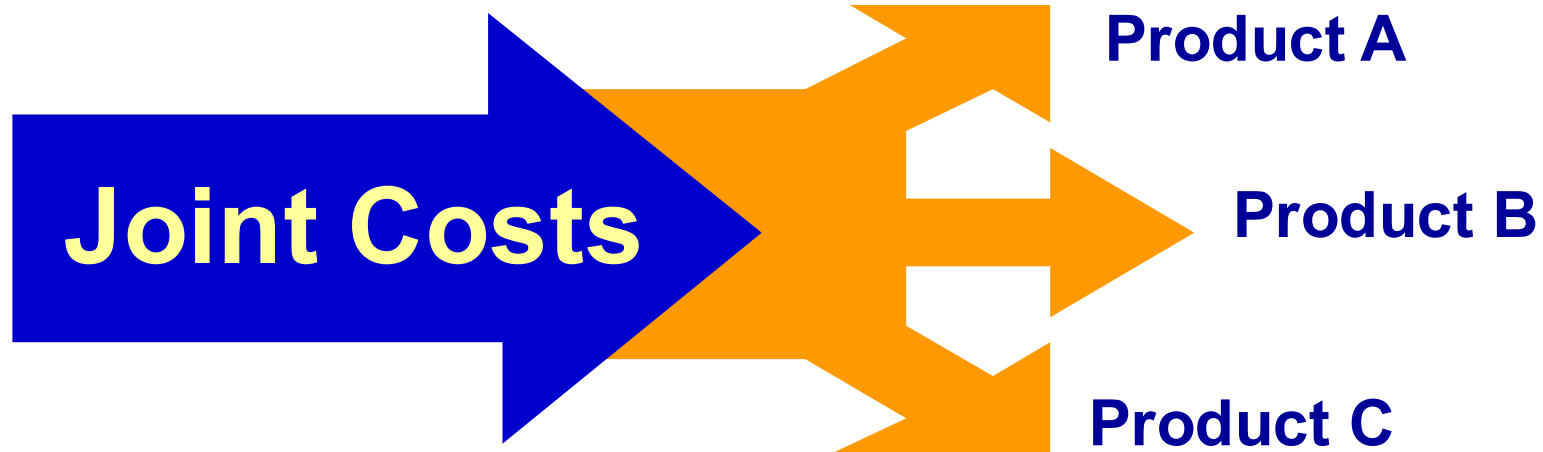
A stylized illustration of a computer monitor with a grey frame and a white screen. The screen displays the learning objective text. The monitor sits on a grey base.

Allocate joint costs
to joint products

A circular badge with a grey gradient and a black outline, containing the text 'LO4' in blue.

LO4

Allocating Joint Costs

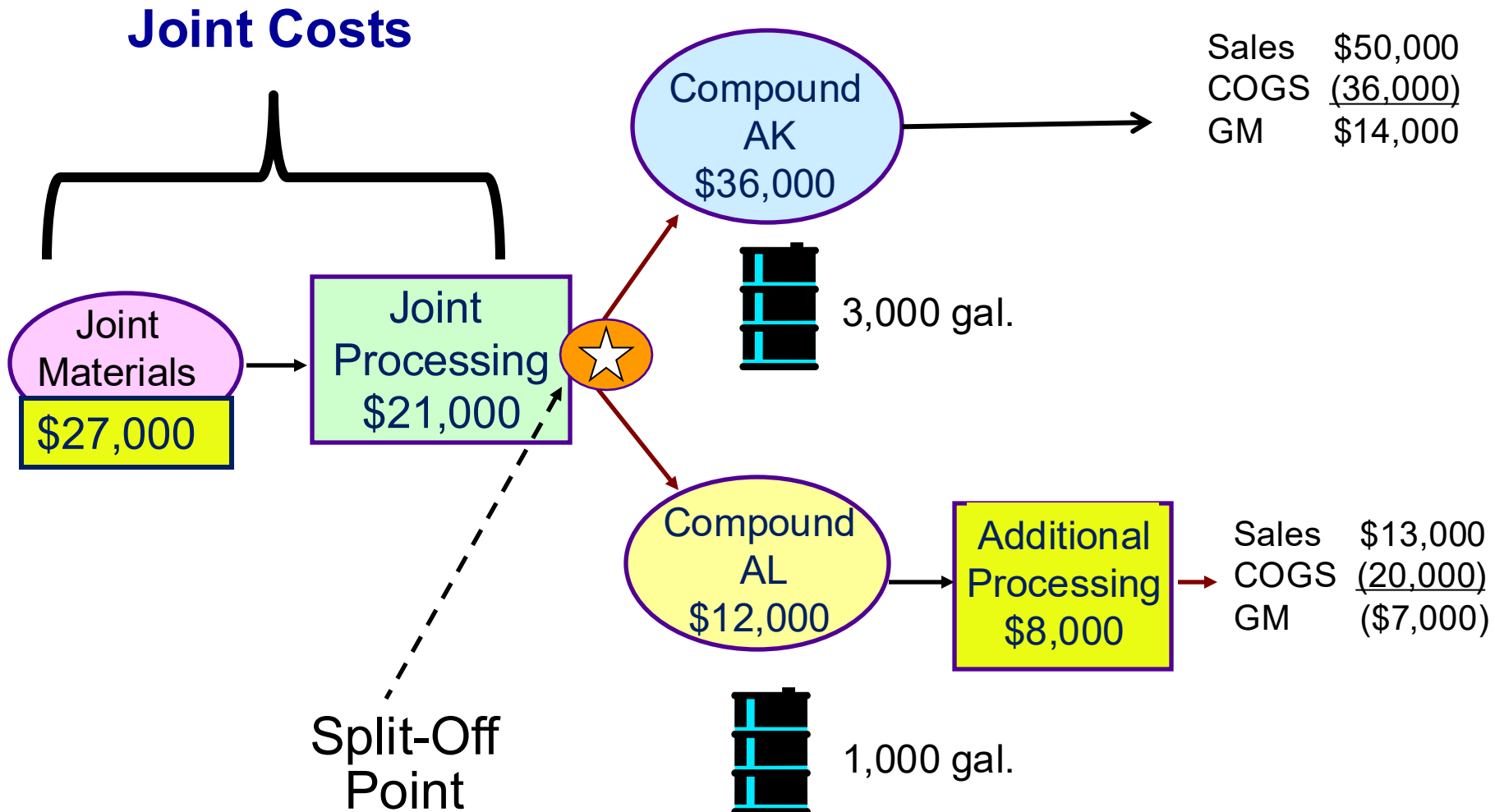


Joint products – products resulting from a process with a common input.

Split-off point – the stage of processing where joint products are separated.

Joint costs – costs of processing joint products prior to the split-off point.

Allocating Joint Costs

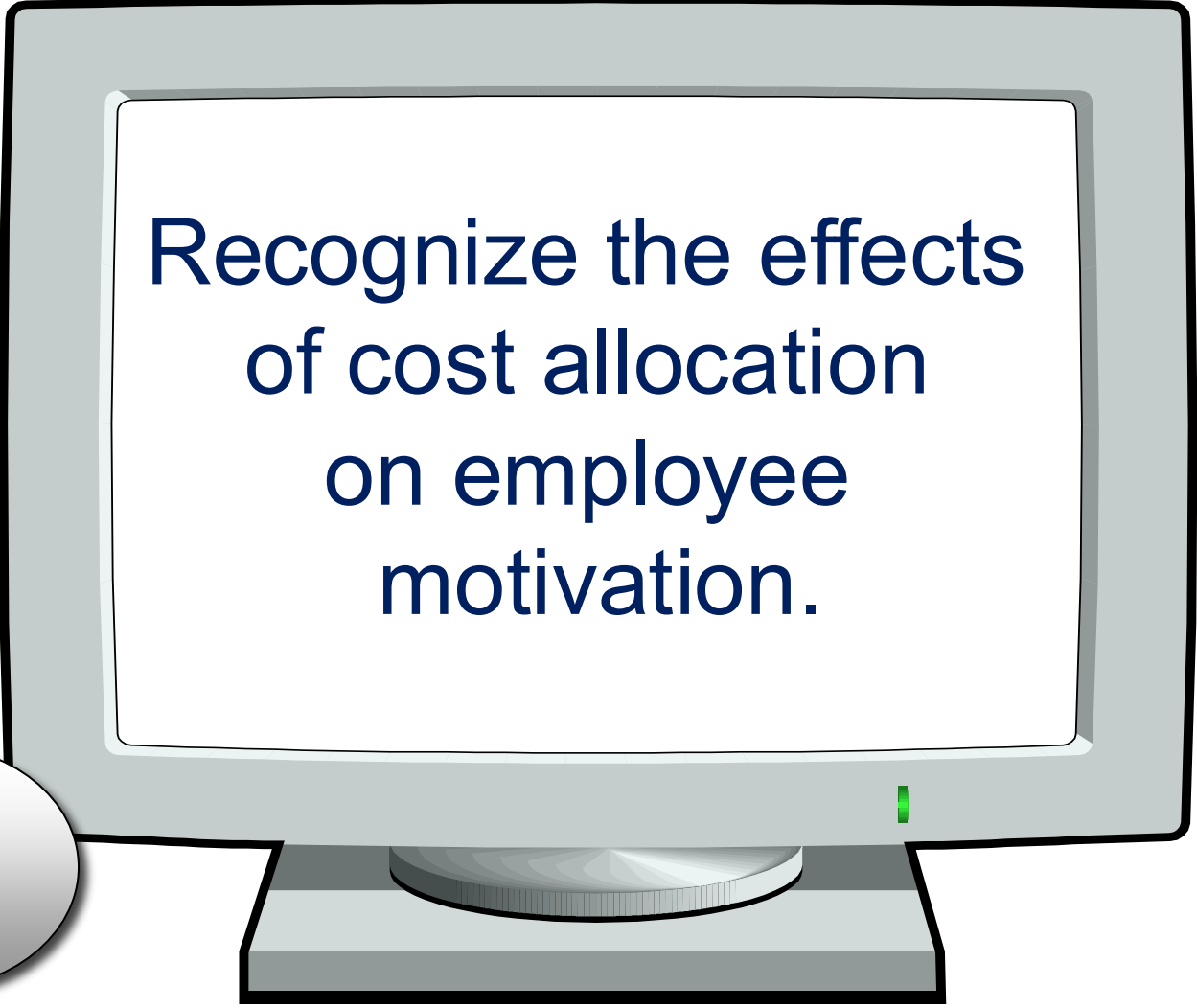


Relative Sales Value Method

| | | With Compound AL | Without Compound AL |
|--------------------|-----------------|-------------------------|------------------------|
| Sales | \$63,000 | $(\$50,000 + \$13,000)$ | \$50,000 |
| Cost of goods sold | <u>(56,000)</u> | $(\$36,000 + \$20,000)$ | <u>(48,000)</u> |
| Gross margin | <u>\$ 7,000</u> | | <u>\$ 2,000</u> |

| | Compound AK | Compound AL |
|--------------------|-----------------|-----------------|
| Sales | \$50,000 | \$13,000 |
| Cost of goods sold | <u>(48,000)</u> | <u>(8,000)</u> |
| Gross margin | <u>\$ 2,000</u> | <u>\$ 5,000</u> |

Learning Objective

A stylized illustration of a computer monitor with a grey frame and a white screen. The screen displays the learning objective text in blue. The monitor sits on a grey base.

Recognize the effects
of cost allocation
on employee
motivation.

A circular badge with a grey gradient and a black outline, containing the text 'LO5' in blue.

LO5

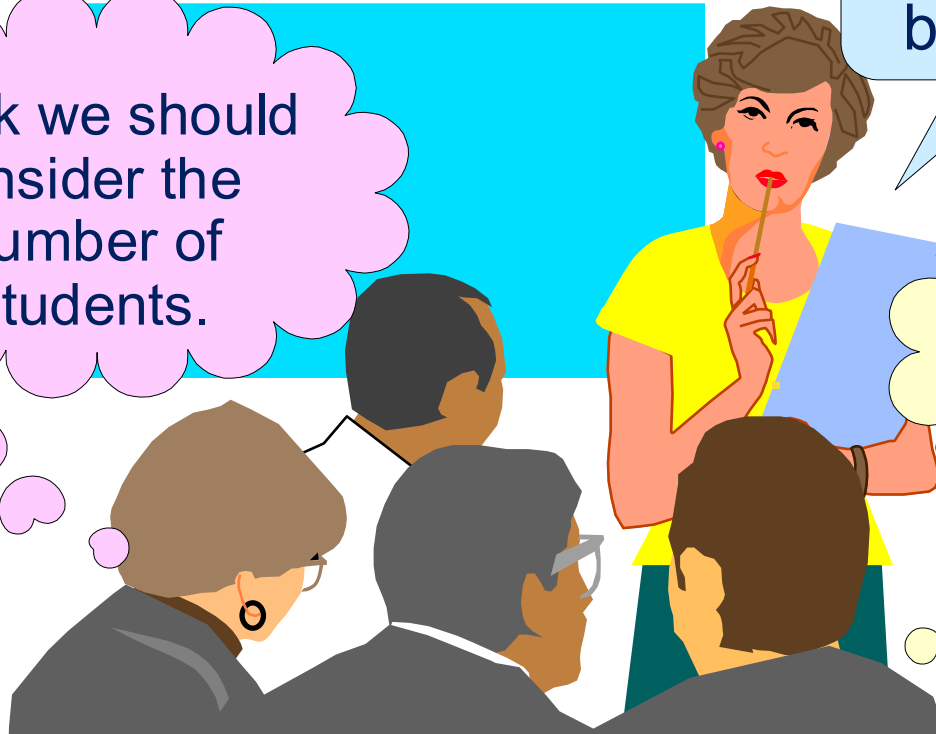
Cost Allocation: The Human Factor

They need to allocate the copying cost for \$ 36,000

Is it fair to divide the College of Business's copy budget equally?

I think we should consider the number of students.

I think we should consider the number of faculty.



Cost Allocation: The Human Factor

| Academic Departments | Number of Faculty | Number of Students | Actual Cost Prior Year |
|----------------------|-------------------|--------------------|------------------------|
| Management | 29 | 330 | \$ 12,000 |
| Accounting | 16 | 360 | 10,000 |
| Finance | 12 | 290 | 8,000 |
| Marketing | 15 | 220 | 6,000 |
| Totals | 72 | 1,200 | 36,000 |

Let's see how the allocation of budgeted amounts will effect the different departments.

We will begin by allocating based on the number of faculty in each department.

① $\$36,000 \div 72 \text{ faculty} = \$500 \text{ per faculty member}$

② $\$500 \times 29 \text{ faculty members} = \$14,500$

$\$500 \times 16 \text{ faculty members} = \$8,000$

$\$500 \times 12 \text{ faculty members} = \$6,000$

$\$500 \times 15 \text{ faculty members} = \$7,500$



| Academic Departments | Actual Cost Prior Year | Allocation | Difference |
|----------------------|------------------------|---------------|------------|
| Management | \$ 12,000 | <div></div> | \$ 2,500 |
| Accounting | 10,000 | | (2,000) |
| Finance | 8,000 | | (2,000) |
| Marketing | 6,000 | | 1,500 |
| Totals | 36,000 | 36,000 | - |

① $\$36,000 \div 72 \text{ faculty} = \$500 \text{ per faculty member}$

② $\$500 \times 29 \text{ faculty members} = \$14,500$

\$5
\$5
\$5



Now let's allocate the \$36,000 budget based on the number of students in each department.

| Acad Depart | | | Difference |
|----------------|---------------|---------------|------------|
| Manag | | | \$ 2,500 |
| Accou | | | (2,000) |
| Finance | 8,000 | | (2,000) |
| Marketing | 6,000 | | 1,500 |
| Totals | <u>36,000</u> | <u>36,000</u> | <u>-</u> |

① $\$36,000 \div 1,200 \text{ students} = \30 per student

② $\$30 \text{ per student} \times 330 \text{ students} = \$9,900$

$\$30 \text{ per student} \times 360 \text{ students} = \$10,800$


$\$30 \text{ per student} \times 290 \text{ students} = \$8,700$

$\$30 \text{ per student} \times 220 \text{ students} = \$6,600$



| Academic Departments | Actual Cost Prior Year | Allocation | Difference |
|----------------------|------------------------|---------------|------------|
| Management | \$ 12,000 | <div></div> | \$ (2,100) |
| Accounting | 10,000 | | 800 |
| Finance | 8,000 | | 700 |
| Marketing | 6,000 | | 600 |
| Totals | 36,000 | 36,000 | - |

Learning Objective

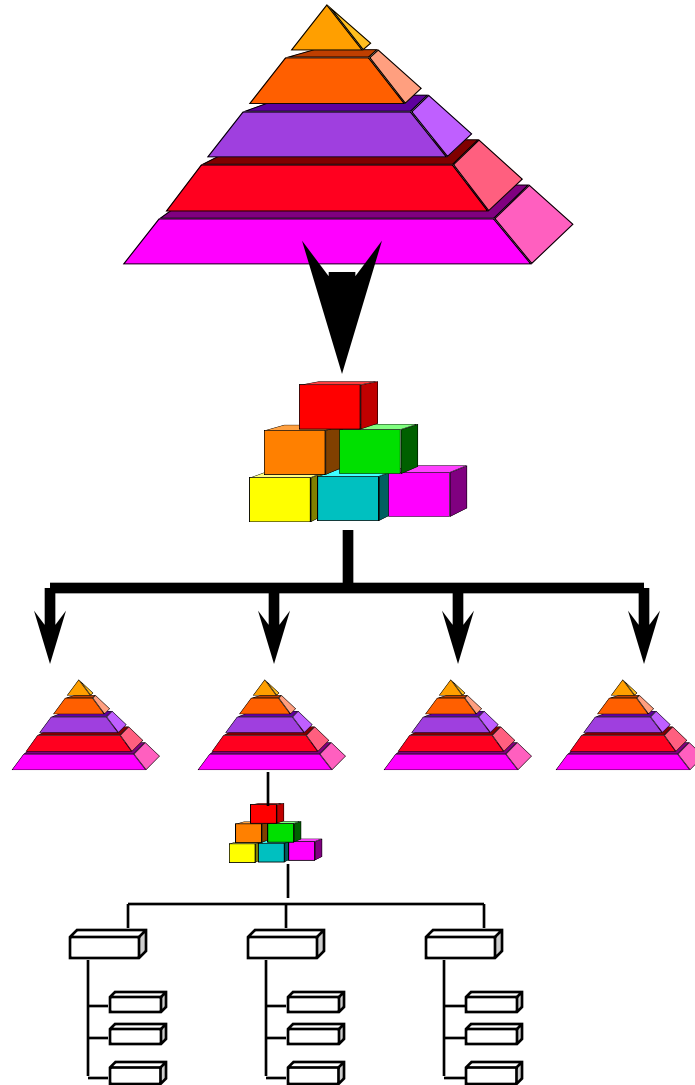
A stylized illustration of a computer monitor with a grey frame and a white screen. The screen displays the learning objective text in blue. The monitor sits on a grey base.

Allocate service
department
costs to
operating departments
(Appendix).

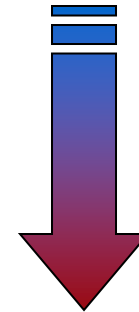
A circular badge with a grey gradient and a black border, containing the text 'LO6' in blue.

LO6

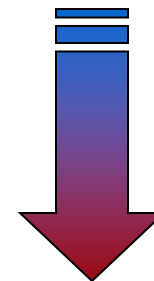
Operating and Service Departments



Organizational Structure



Responsibility Centers

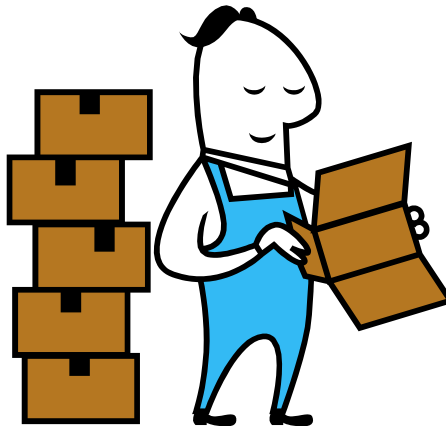


Operating and Service
Departments

Operating Departments

An operating department carries out the central purpose of the organization

**The
Accounting
Department
at your
University.**



**An
Assembly
Department
at General
Motors.**

Service Departments

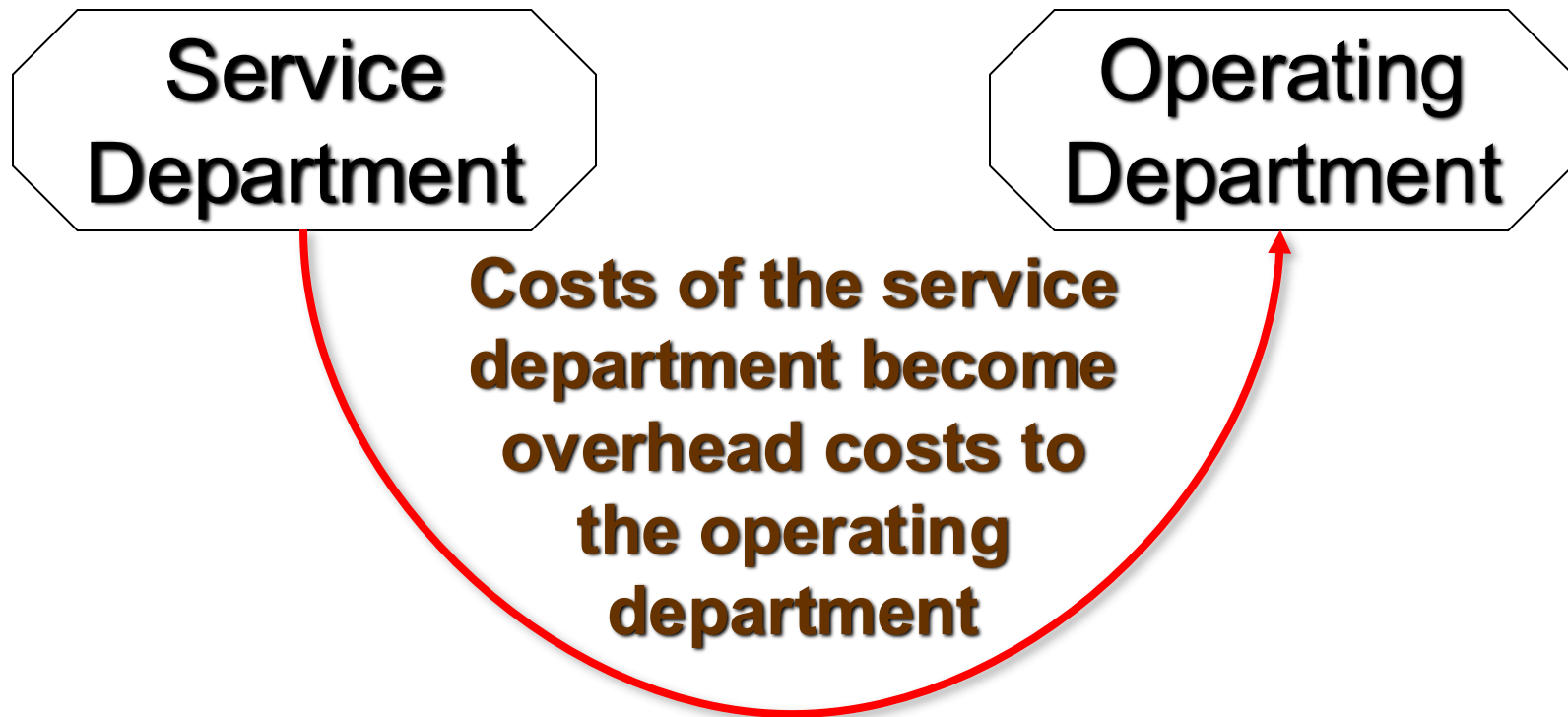
A service department does not directly engage in operating activities.

**The
Accounting
Department
at Macys**

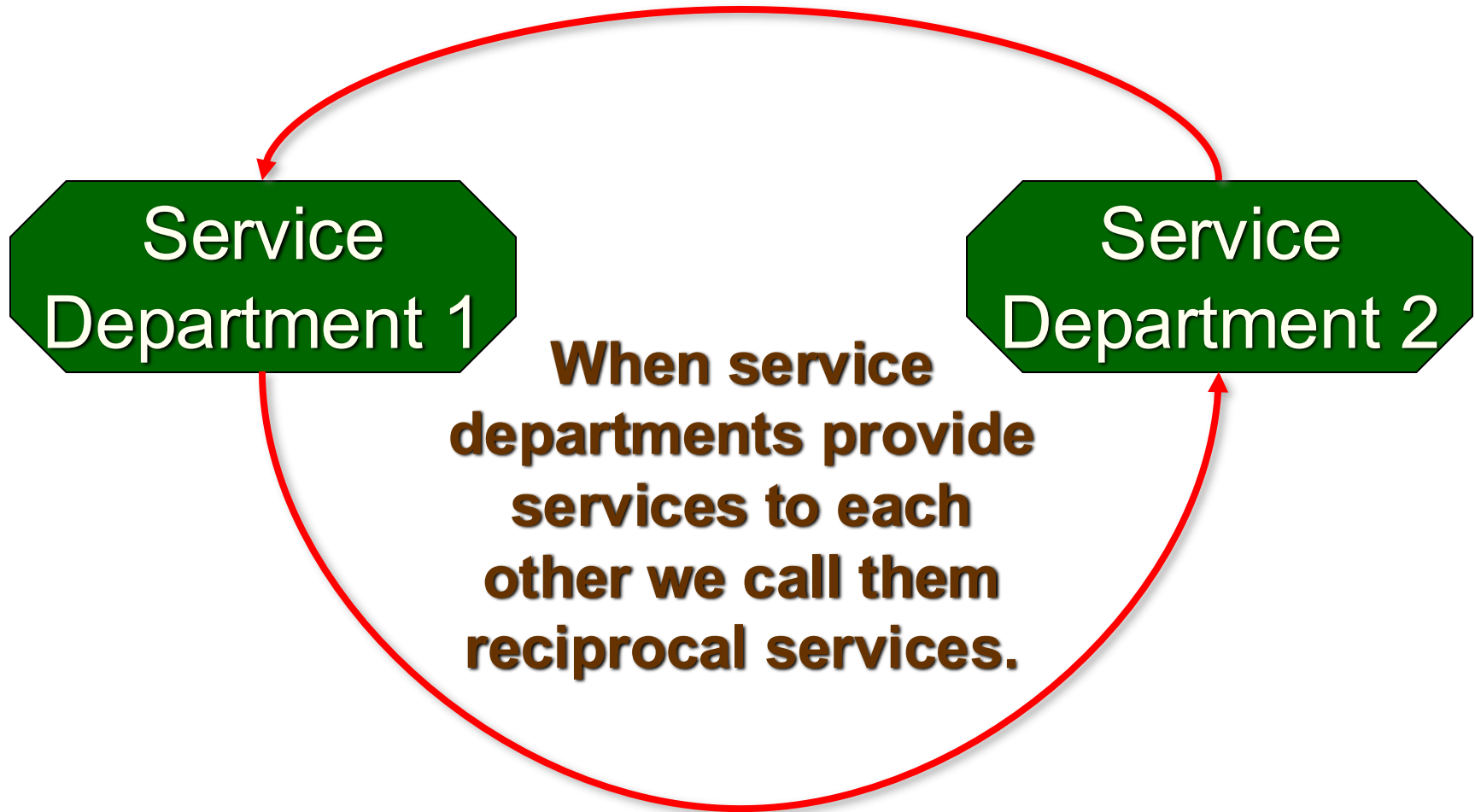


**The Human
Resources
Department
at Walgreens.**

Interdepartmental Services



Reciprocal Services



Allocation Approaches

Direct
Method

1

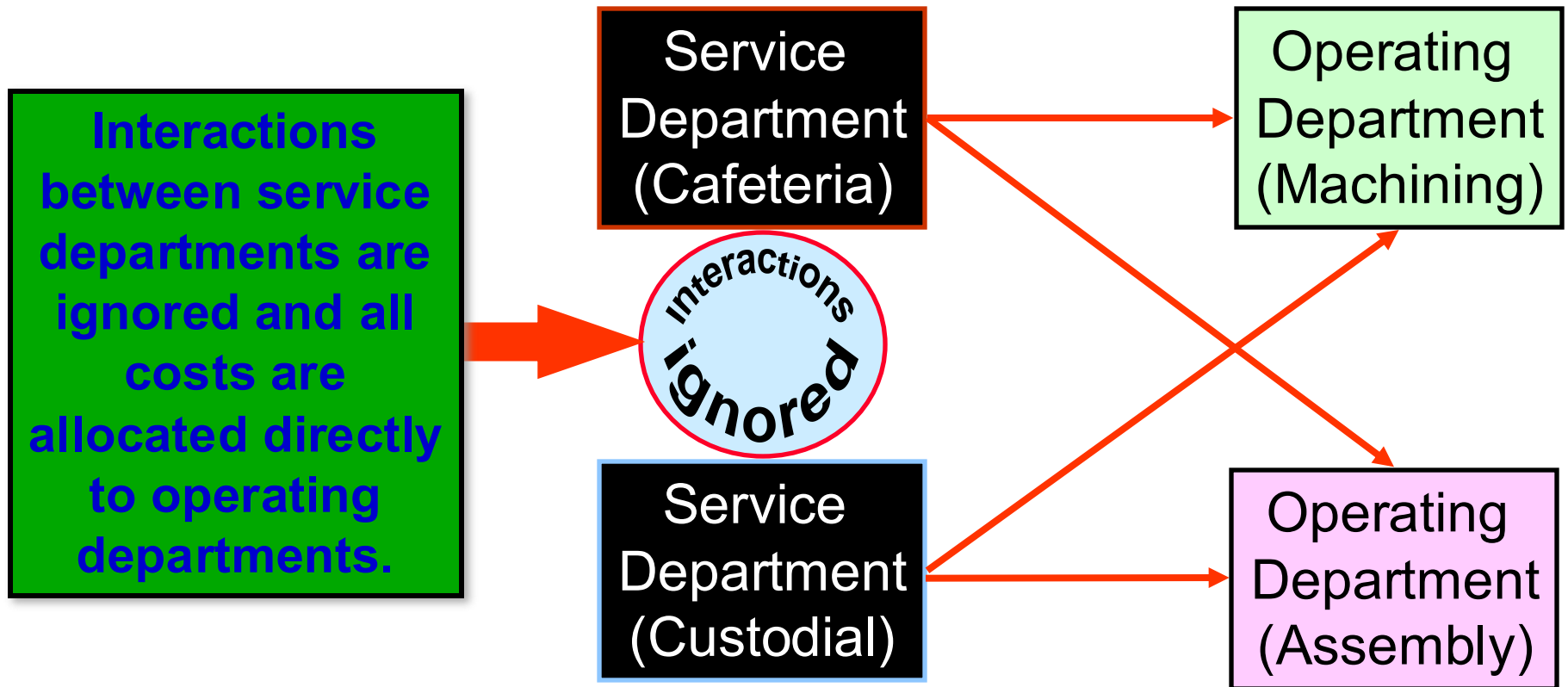
Step-Down
Method

2

Reciprocal
Method

3

Direct Method



Direct Method

| | <u>Service Departments</u> | | <u>Operating Departments</u> | |
|--------------------------------------|----------------------------|------------------|------------------------------|-----------------|
| | <u>Cafeteria</u> | <u>Custodial</u> | <u>Machining</u> | <u>Assembly</u> |
| Departmental costs before allocation | \$ 360,000 | \$ 90,000 | \$ 400,000 | \$ 700,000 |
| Number of employees | 15 | 10 | 20 | 30 |
| Square feet occupied | 5,000 | 2,000 | 25,000 | 50,000 |

| <u>Service Department</u> | <u>Allocation Base</u> |
|---------------------------|------------------------|
| Cafeteria | Number of employees |
| Custodial | Square feet occupied |

Direct Method

| | <u>Service Departments</u> | | <u>Operating Departments</u> | |
|--------------------------------------|----------------------------|------------------|------------------------------|-----------------|
| | <u>Cafeteria</u> | <u>Custodial</u> | <u>Machining</u> | <u>Assembly</u> |
| Departmental costs before allocation | \$ 360,000 | \$ 90,000 | \$ 400,000 | \$ 700,000 |
| Cafeteria allocation | ? | | ? | ? |
| Custodial allocation | | ? | ? | ? |
| Total after allocation | ? | ? | ? | ? |

How much of the Cafeteria and Custodial costs should be allocated to each operating department using the direct method of cost allocation?

Direct Method

| | <u>Service Departments</u> | | <u>Operating Departments</u> | |
|--------------------------------------|----------------------------|------------------|------------------------------|-----------------|
| | <u>Cafeteria</u> | <u>Custodial</u> | <u>Machining</u> | <u>Assembly</u> |
| Departmental costs before allocation | \$ 360,000 | \$ 90,000 | \$ 400,000 | \$ 700,000 |
| Cafeteria allocation | (360,000) | | 144,000 | ? |
| Custodial allocation | | ? | ? | ? |
| Total after allocation | \$ 0 | ? | ? | ? |

$$\$360,000 \times \frac{20}{20 + 30} = \$144,000$$

Allocation base: Number of employees

Direct Method

| | <u>Service Departments</u> | | <u>Operating Departments</u> | |
|--------------------------------------|----------------------------|------------------|------------------------------|-----------------|
| | <u>Cafeteria</u> | <u>Custodial</u> | <u>Machining</u> | <u>Assembly</u> |
| Departmental costs before allocation | \$ 360,000 | \$ 90,000 | \$ 400,000 | \$ 700,000 |
| Cafeteria allocation | (360,000) | | 144,000 | 216,000 |
| Custodial allocation | | ? | ? | ? |
| Total after allocation | \$ 0 | ? | ? | ? |

$$\$360,000 \times \frac{30}{20 + 30} = \$216,000$$

Allocation base: Number of employees

Direct Method

| | <u>Service Departments</u> | | <u>Operating Departments</u> | |
|--------------------------------------|----------------------------|------------------|------------------------------|-----------------|
| | <u>Cafeteria</u> | <u>Custodial</u> | <u>Machining</u> | <u>Assembly</u> |
| Departmental costs before allocation | \$ 360,000 | \$ 90,000 | \$ 400,000 | \$ 700,000 |
| Cafeteria allocation | (360,000) | | 144,000 | 216,000 |
| Custodial allocation | | (90,000) | 30,000 | ? |
| Total after allocation | \$ 0 | \$ 0 | \$ 574,000 | ? |

$$\$90,000 \times \frac{25,000}{25,000 + 50,000} = \$30,000$$

Allocation base: Square feet occupied

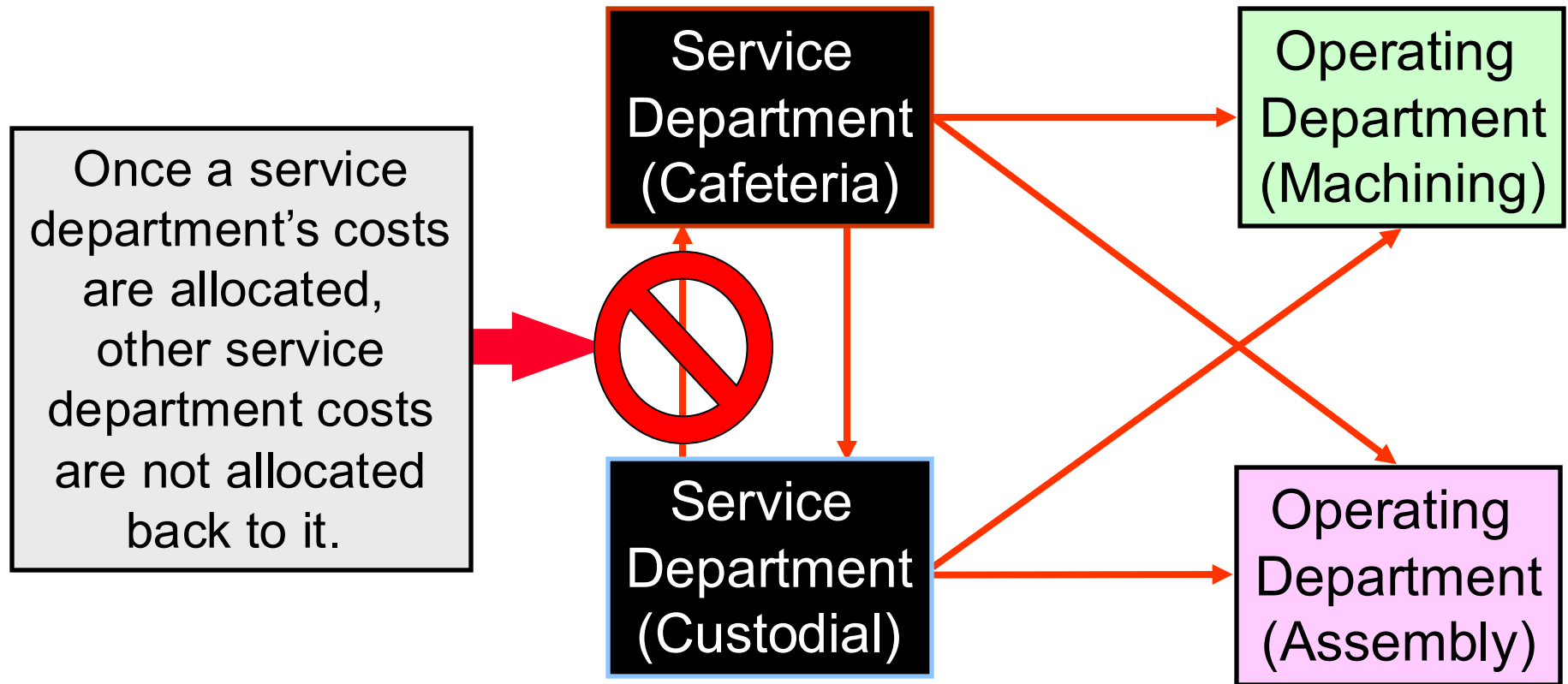
Direct Method

| | <u>Service Departments</u> | | <u>Operating Departments</u> | |
|--------------------------------------|----------------------------|------------------|------------------------------|-----------------|
| | <u>Cafeteria</u> | <u>Custodial</u> | <u>Machining</u> | <u>Assembly</u> |
| Departmental costs before allocation | \$ 360,000 | \$ 90,000 | \$ 400,000 | \$ 700,000 |
| Cafeteria allocation | (360,000) | | 144,000 | 216,000 |
| Custodial allocation | | (90,000) | 30,000 | 60,000 |
| Total after allocation | \$ 0 | \$ 0 | \$ 574,000 | \$ 976,000 |

$$\$90,000 \times \frac{50,000}{25,000 + 50,000} = \$60,000$$

Allocation base: Square feet occupied

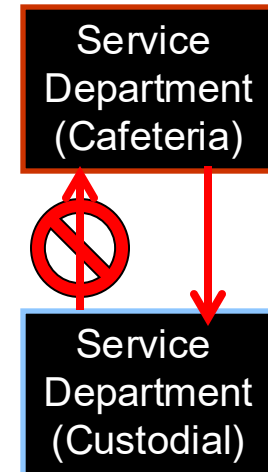
Step – Down Method



Step - Down Method: layout of allocation

In the step-down allocation method, the allocation layout of Service Department has to be decided by a conceptual “trade-off” between the potential information got and the potential information lost.

Accordingly, by this method it is possible to consider just ONE “cost relationship” between those reciprocal services provided by each Service Department to each others.



Practically speaking, there is the necessity to define an **ALLOCATION ORDER** of Service Departments.

Conventionally, it is used to **allocate firstly** the costs of those service departments that give (in percentage) the greatest part of their services to other departments, as compared to those service received from others.

This corresponds to the “manufacturing process - distance” between each Service Department and the final cost object defined.

Conceptually, **as far is the service provided** by Department from the final cost object, **earlier Department costs have to be allocated** to other Departments... **and so on..**

Step - Down Method: other observations

There are three key points to understand regarding the step-down method:

- ① In both the direct and step methods, any amount of the allocation base attributable to the service department whose cost is being allocated is always ignored.**
- ② Any amount of the allocation base that is attributable to a service department whose cost has already been allocated is ignored.**
- ③ Each service department assigns its own costs to operating departments plus the costs that have been allocated to it from other service departments.**

Step – Down Method

We will use the same data used in the direct method example.

| | <u>Service Departments</u> | | <u>Operating Departments</u> | |
|--------------------------------------|----------------------------|------------------|------------------------------|-----------------|
| | <u>Cafeteria</u> | <u>Custodial</u> | <u>Machining</u> | <u>Assembly</u> |
| Departmental costs before allocation | \$ 360,000 | \$ 90,000 | \$ 400,000 | \$ 700,000 |
| Number of employees | 15 | 10 | 20 | 30 |
| Square feet occupied | 5,000 | 2,000 | 25,000 | 50,000 |

| <u>Service Department</u> | <u>Allocation Base</u> |
|---------------------------|------------------------|
| Cafeteria | Number of employees |
| Custodial | Square feet occupied |

Step – Down Method

| | <u>Service Departments</u> | | <u>Operating Departments</u> | |
|--------------------------------------|----------------------------|------------------|------------------------------|-----------------|
| | <u>Cafeteria</u> | <u>Custodial</u> | <u>Machining</u> | <u>Assembly</u> |
| Departmental costs before allocation | \$ 360,000 | \$ 90,000 | \$ 400,000 | \$ 700,000 |
| Cafeteria allocation | ? | ? | ? | ? |
| Custodial allocation | | ? | ? | ? |
| Total after allocation | ? | ? | ? | ? |

Allocate Cafeteria costs first since it provides more service than Custodial.

Step – Down Method

| | Service Departments | | Operating Departments | |
|--------------------------------------|---------------------|-----------|-----------------------|------------|
| | Cafeteria | Custodial | Machining | Assembly |
| Departmental costs before allocation | \$ 360,000 | \$ 90,000 | \$ 400,000 | \$ 700,000 |
| Cafeteria allocation | (360,000) | 60,000 | ? | ? |
| Custodial allocation | | ? | ? | ? |
| Total after allocation | \$ 0 | ? | ? | ? |

$$\$360,000 \times \frac{10}{10 + 20 + 30} = \$60,000$$

Allocation base: Number of employees

Step – Down Method

| | Service Departments | | Operating Departments | |
|--------------------------------------|---------------------|-----------|-----------------------|------------|
| | Cafeteria | Custodial | Machining | Assembly |
| Departmental costs before allocation | \$ 360,000 | \$ 90,000 | \$ 400,000 | \$ 700,000 |
| Cafeteria allocation | (360,000) | 60,000 | 120,000 | ? |
| Custodial allocation | | ? | ? | ? |
| Total after allocation | \$ 0 | ? | ? | ? |

$$\$360,000 \times \frac{20}{10 + 20 + 30} = \$120,000$$

Allocation base: Number of employees

Step – Down Method

| | Service Departments | | Operating Departments | |
|--------------------------------------|---------------------|-----------|-----------------------|------------|
| | Cafeteria | Custodial | Machining | Assembly |
| Departmental costs before allocation | \$ 360,000 | \$ 90,000 | \$ 400,000 | \$ 700,000 |
| Cafeteria allocation | (360,000) | 60,000 | 120,000 | 180,000 |
| Custodial allocation | | ? | ? | ? |
| Total after allocation | \$ 0 | ? | ? | ? |

$$\$360,000 \times \frac{30}{10 + 20 + 30} = \$180,000$$

Allocation base: Number of employees

Step – Down Method

| | Service Departments | | Operating Departments | |
|--------------------------------------|---------------------|-----------|-----------------------|------------|
| | Cafeteria | Custodial | Machining | Assembly |
| Departmental costs before allocation | \$ 360,000 | \$ 90,000 | \$ 400,000 | \$ 700,000 |
| Cafeteria allocation | (360,000) | 60,000 | 120,000 | 180,000 |
| Custodial allocation | | (150,000) | ? | ? |
| Total after allocation | \$ 0 | \$ 0 | ? | ? |

New total = \$90,000 original Custodial cost plus \$60,000 allocated from the Cafeteria.

Step – Down Method

| | Service Departments | | Operating Departments | |
|--------------------------------------|---------------------|-----------|-----------------------|------------|
| | Cafeteria | Custodial | Machining | Assembly |
| Departmental costs before allocation | \$ 360,000 | \$ 90,000 | \$ 400,000 | \$ 700,000 |
| Cafeteria allocation | (360,000) | 60,000 | 120,000 | 180,000 |
| Custodial allocation | | (150,000) | 50,000 | ? |
| Total after allocation | \$ 0 | \$ 0 | \$ 570,000 | ? |

$$\$150,000 \times \frac{25,000}{25,000 + 50,000} = \$50,000$$

Allocation base: Square feet occupied

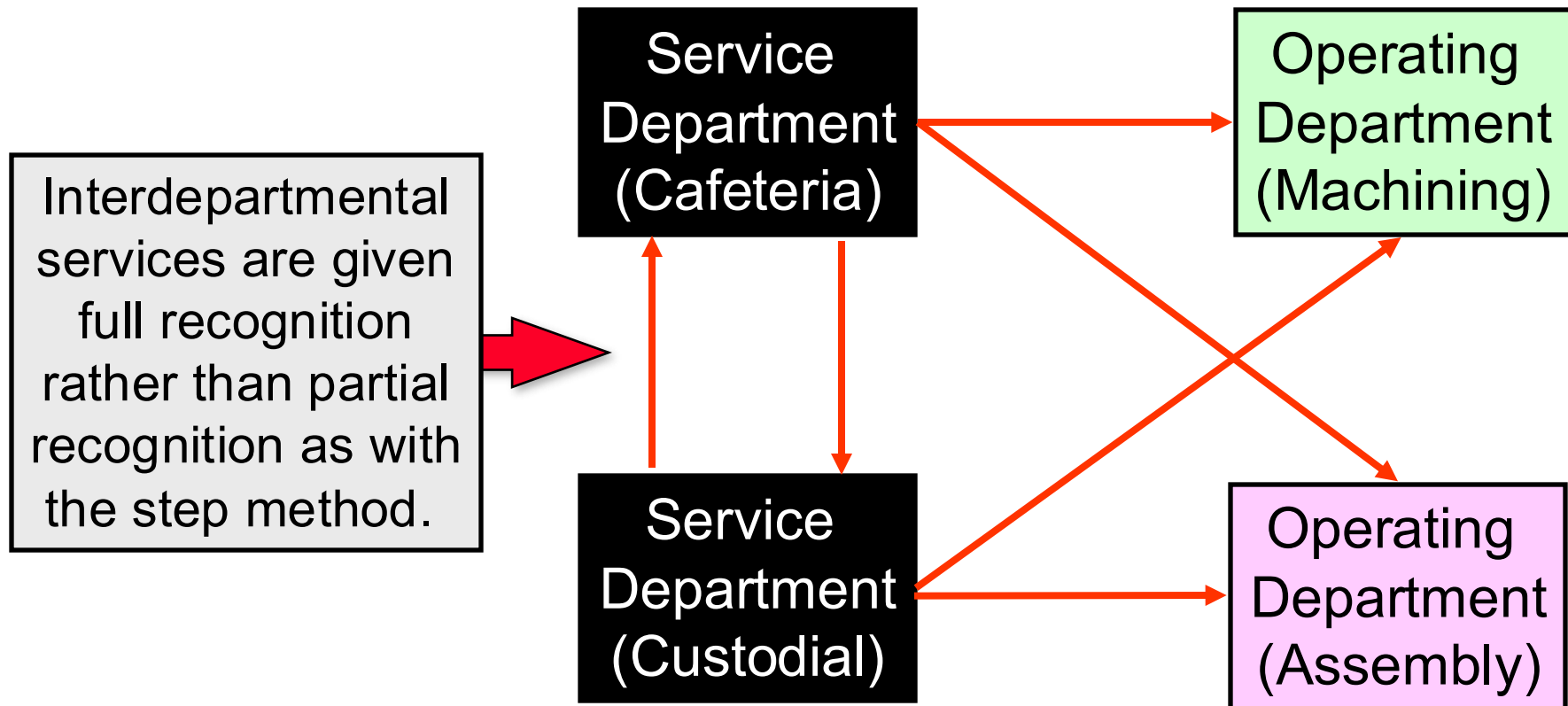
Step – Down Method

| | <u>Service Departments</u> | | <u>Operating Departments</u> | |
|--------------------------------------|----------------------------|------------------|------------------------------|-------------------|
| | <u>Cafeteria</u> | <u>Custodial</u> | <u>Machining</u> | <u>Assembly</u> |
| Departmental costs before allocation | \$ 360,000 | \$ 90,000 | \$ 400,000 | \$ 700,000 |
| Cafeteria allocation | (360,000) | 60,000 | 120,000 | 180,000 |
| Custodial allocation | | (150,000) | 50,000 | 100,000 |
| Total after allocation | <u>\$ 0</u> | <u>\$ 0</u> | <u>\$ 570,000</u> | <u>\$ 980,000</u> |

$$\$150,000 \times \frac{50,000}{25,000 + 50,000} = \$100,000$$

Allocation base: Square feet occupied

Reciprocal Method



Because of its mathematical complexity, the reciprocal method is rarely used.

Quick Check Data for Direct Methods

| | Service Departments | | Operating Departments | |
|--------------------------------------|---------------------|-----------|-----------------------|------------|
| | ADMIN | BACS | Accounting | Others |
| Departmental costs before allocation | \$ 180.000 | \$ 90.000 | \$ 190.000 | \$ 900.000 |
| Number of employees | 15 | 5 | 20 | 80 |
| Number of PCs | 12 | 20 | 18 | 102 |

The direct method of allocation is used

Allocation bases:

- Business school administration costs (ADMIN):
Number of employees
- Business Administration computer services (BACS):
Number of personal computers

Quick Check ✓

How much cost will be allocated from Administration to Accounting?

- a. \$ 36,000
- b. \$144,000
- c. \$180,000
- d. \$ 27,000

Quick Check ✓

How much cost will be allocated from Administration to Accounting?

a. \$ 36,000

b. \$144,000

| | <u>Service Departments</u> | | <u>Operating Departments</u> | |
|--------------------------------------|----------------------------|-------------|------------------------------|---------------|
| | <u>ADMIN</u> | <u>BACS</u> | <u>Accounting</u> | <u>Others</u> |
| Departmental costs before allocation | \$ 180,000 | \$ 90,000 | \$ 190,000 | \$ 900,000 |
| ADMIN allocation | (180,000) | | 36,000 | 144,000 |

$$\$180,000 \times \frac{20}{20 + 80} = \$36,000$$

Quick Check ✓

How much total cost will be allocated from ADMIN and BACS combined to the Accounting Department?

- a. \$ 52,500
- b. \$135,000
- c. \$270,000
- d. \$ 49,500

Quick Check ✓

| | <u>Service Departments</u> | | <u>Operating Departments</u> | |
|--------------------------------------|----------------------------|-------------|------------------------------|---------------------|
| | <u>ADMIN</u> | <u>BACS</u> | <u>Accounting</u> | <u>Others</u> |
| Departmental costs before allocation | \$ 180,000 | \$ 90,000 | \$ 190,000 | \$ 900,000 |
| ADMIN allocation | (180,000) | | 36,000 | 144,000 |
| BACS allocation | - | (90,000) | 13,500 | 76,500 |
| Total after allocation | <u>\$ -</u> | <u>\$ -</u> | <u>\$ 239,500</u> | <u>\$ 1,120,500</u> |

c. \$270,000

d. \$ 49,500

$$\$90,000 \times \frac{18}{18 + 102} = \$13,500$$

Quick Check Data for Step - Down Methods

| | Service Departments | | Operating Departments | |
|--------------------------------------|---------------------|-----------|-----------------------|------------|
| | ADMIN | BACS | Accounting | Others |
| Departmental costs before allocation | \$ 180.000 | \$ 90.000 | \$ 190.000 | \$ 900.000 |
| Number of employees | 15 | 5 | 20 | 80 |
| Number of PCs | 12 | 20 | 18 | 102 |

The step method of allocation is used.

Allocation bases:

- Business school administration costs (ADMIN):
Number of employees
- Business administration computer services (BACS):
Number of personal computers

Quick Check ✓

How much total cost will be allocated from ADMIN and BACS combined to the Accounting Department?

- a. \$35,250
- b. \$49,072
- c. \$18,000
- d. \$26,333

Quick Check ✓

How much total cost will be allocated from ADMIN and BACS combined to the Accounting Department?

a. \$35,250

b. \$49,072

c. \$18,000

d. \$90,000

| | <u>Service Departments</u> | | <u>Operating Departments</u> | |
|--------------------------------------|----------------------------|-------------|------------------------------|---------------------|
| | <u>ADMIN</u> | <u>BACS</u> | <u>Accounting</u> | <u>Others</u> |
| Departmental costs before allocation | \$ 180,000 | \$ 90,000 | \$ 100,000 | \$ 900,000 |
| ADMIN allocation | (180,000) | 8,571 | 34,286 | 137,143 |
| BACS allocation | - | (98,571) | 14,786 | 83,786 |
| Total after allocation | <u>\$ -</u> | <u>\$ -</u> | <u>\$ 239,071</u> | <u>\$ 1,120,929</u> |

CASE STUDY

Exercise on Direct Vs Step-Down Method:

DATA (I)

“I can't understand what's happening here,” said Mike Holt, president of Severson Products, Inc. “We always seem to bid too high on jobs that require a lot of labor time in the Finishing Department, and we always seem to get every job we bid on that requires a lot of machine time in the Milling Department. Yet we don't seem to be making much money on those Milling Department jobs. I wonder if the problem is in our overhead rates.”

Severson Products manufactures high-quality wood products to customers' specifications. Some jobs take a large amount of machine work in the Milling Department, and other jobs take a large amount of hand finishing work in the Finishing Department. In addition to the Milling and Finishing departments, the company has three service departments.

Exercise on Direct Vs Step-Down Method:

DATA (II)

The costs of these service departments are allocated to other departments *in the order listed below*. (For each service department, use the most appropriate allocation base.)

| | Total Labor- Hours | Square Feet of Space Occupied | Number of Employees | Machine- Hours | Direct Labor- Hours |
|---------------------------------|--------------------------|-------------------------------------|------------------------|-------------------|---------------------------|
| Cafeteria | 16,000 | 12,000 | 25 | | |
| Custodial Services | 9,000 | 3,000 | 40 | | |
| Machinery Maintenance | 15,000 | 10,000 | 60 | | |
| Milling | 30,000 | 40,000 | 100 | 160,000 | 20,000 |
| Finishing | 100,000 | 20,000 | 300 | 40,000 | 70,000 |
| | <u>170,000</u> | <u>85,000</u> | <u>525</u> | <u>200,000</u> | <u>90,000</u> |

Exercise on Direct Vs Step-Down Method:

DATA (III)

Budgeted overhead costs in each department for the current year are as follows:

| | |
|--|---------------------------|
| Cafeteria | \$ 320,000* |
| Custodial Services | 65,400 |
| Machinery Maintenance | 93,600 |
| Milling | 416,000 |
| Finishing | 166,000 |
| | <hr/> |
| Total budgeted cost | <u><u>\$1,061,000</u></u> |
| <hr/> | |
| *This represents the amount of cost subsidized by the company. | |

The company has always allocated service department costs to the operating departments (Milling and Finishing) using the direct method of allocation, because of its simplicity.

Exercise on Direct Vs Step-Down Method: REQUIRED (I)



- 1) Allocate service department costs to operating departments by the step-down method. Then compute predetermined overhead rates in the operating departments for the current year, using machine-hours as the allocation base in the Milling Department and direct labor-hours as the allocation base in the Finishing Department.
- 1) Repeat (1) above, this time using the direct method. Again compute predetermined overhead rates in the Milling and Finishing Departments.

Exercise on Direct Vs Step-Down Method: REQUIRED (II)

- 3) Assume that during the current year the company bids on a job that requires machine and labor time as follows:

| | Machine-Hours | Direct Labor-Hours |
|--------------------------------|---------------------|----------------------|
| Milling Department | 2,000 | 1,600 |
| Finishing Department | <u>800</u> | <u>13,000</u> |
| Total hours | <u><u>2,800</u></u> | <u><u>14,600</u></u> |

Now, determine the amount of overhead that would be assigned to the job if the company used the overhead rates developed in (1) above. Then determine the amount of overhead that would be assigned to the job if the company used the overhead rates developed in (2) above.