University of Rome

Tor Vergata

DEPT. MANAGEMENT & LAW

BACHELOR DEGREE IN BUSINESS ADMINISTRATION & ECONOMICS

COURSE
Cost Analysis for Business Decisions

Cost Accumulation, Tracing, and Allocation

Dr. Gabriele Palozzi

palozzi@economia.uniroma2.it

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.**
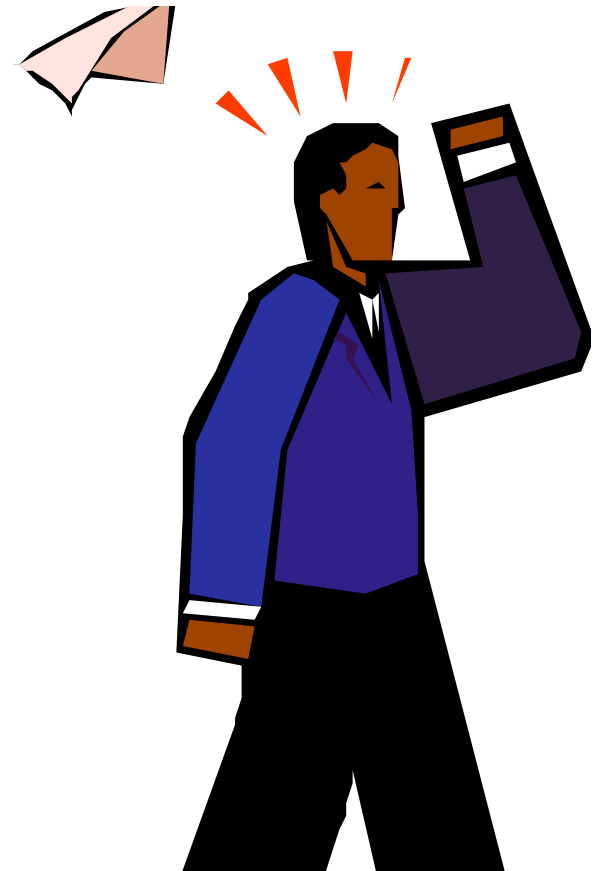- **Prepare financial statements.**

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.
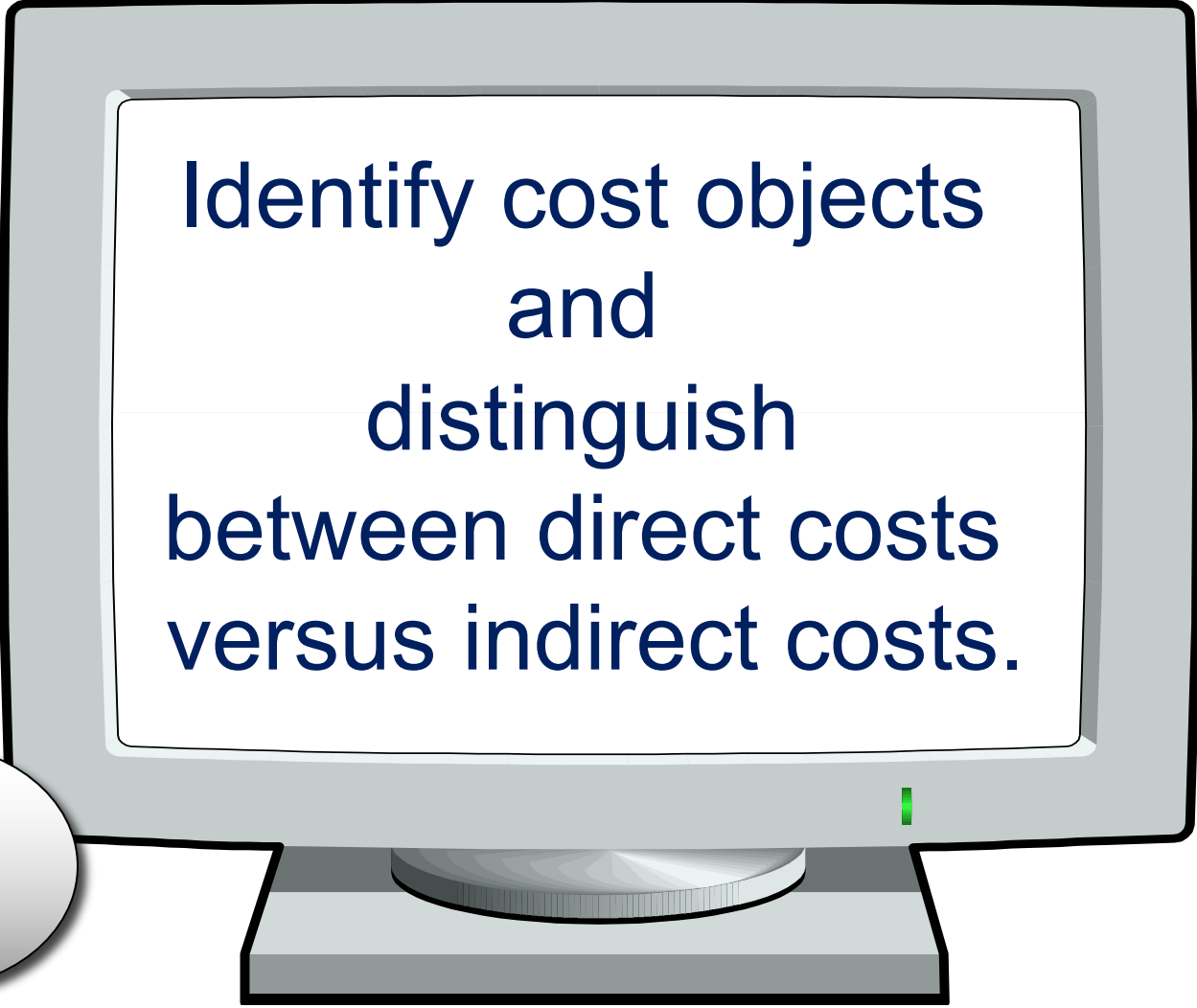
C. To Encourage Evaluation of Services

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

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

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

Direct Costs	Cost Tracing →	Cost Object
Indirect Costs	Cost Allocation →	
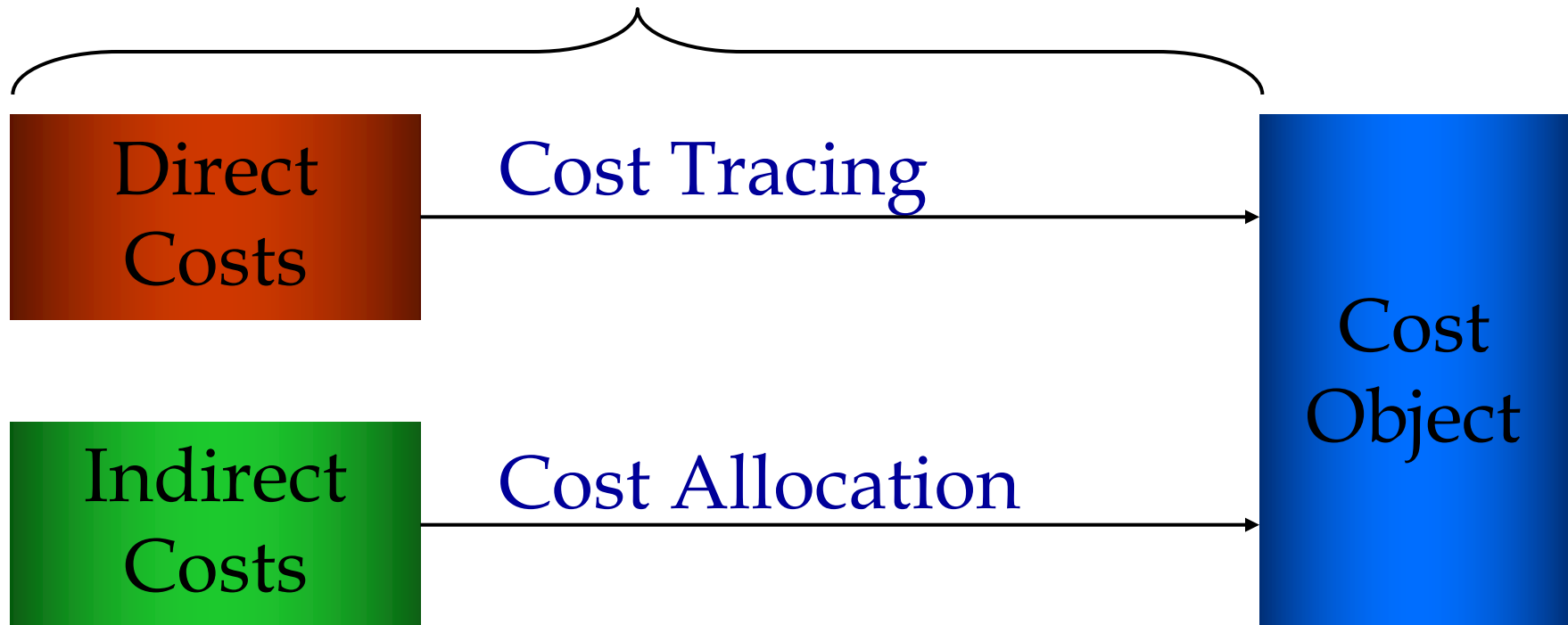
2. Form Cost Pools

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

Cost pool

Cost allocation base

2b. Use of Cost Drivers to Accumulate Costs

Accumulated Cost **=** Minutes Talked **X** Rate per Minute

Total Long Distance Telephone Bill
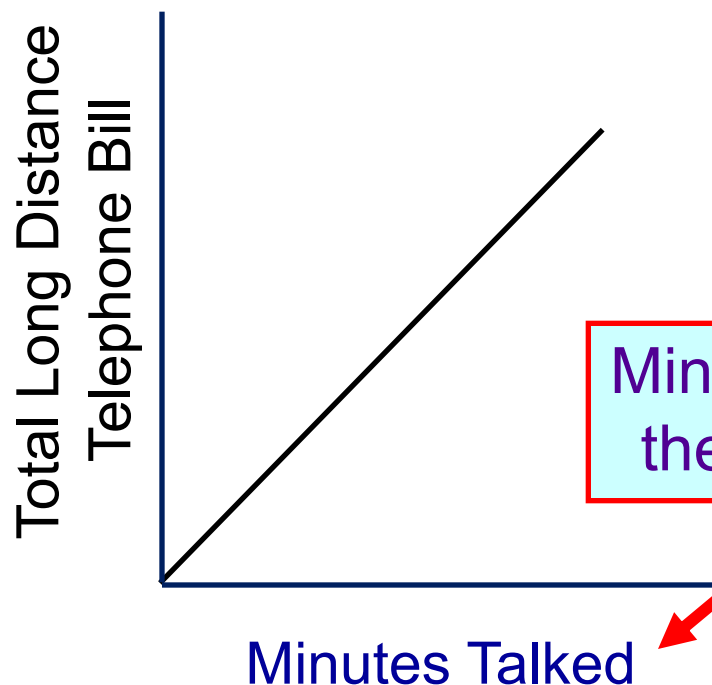
Minutes Talked

Minutes talked is the cost driver.

3a. Use of Cost Drivers to Accumulate Costs

Units produced

Machine hours

A cost driver is any factor that causes or "drives" an activity's costs

Miles driven

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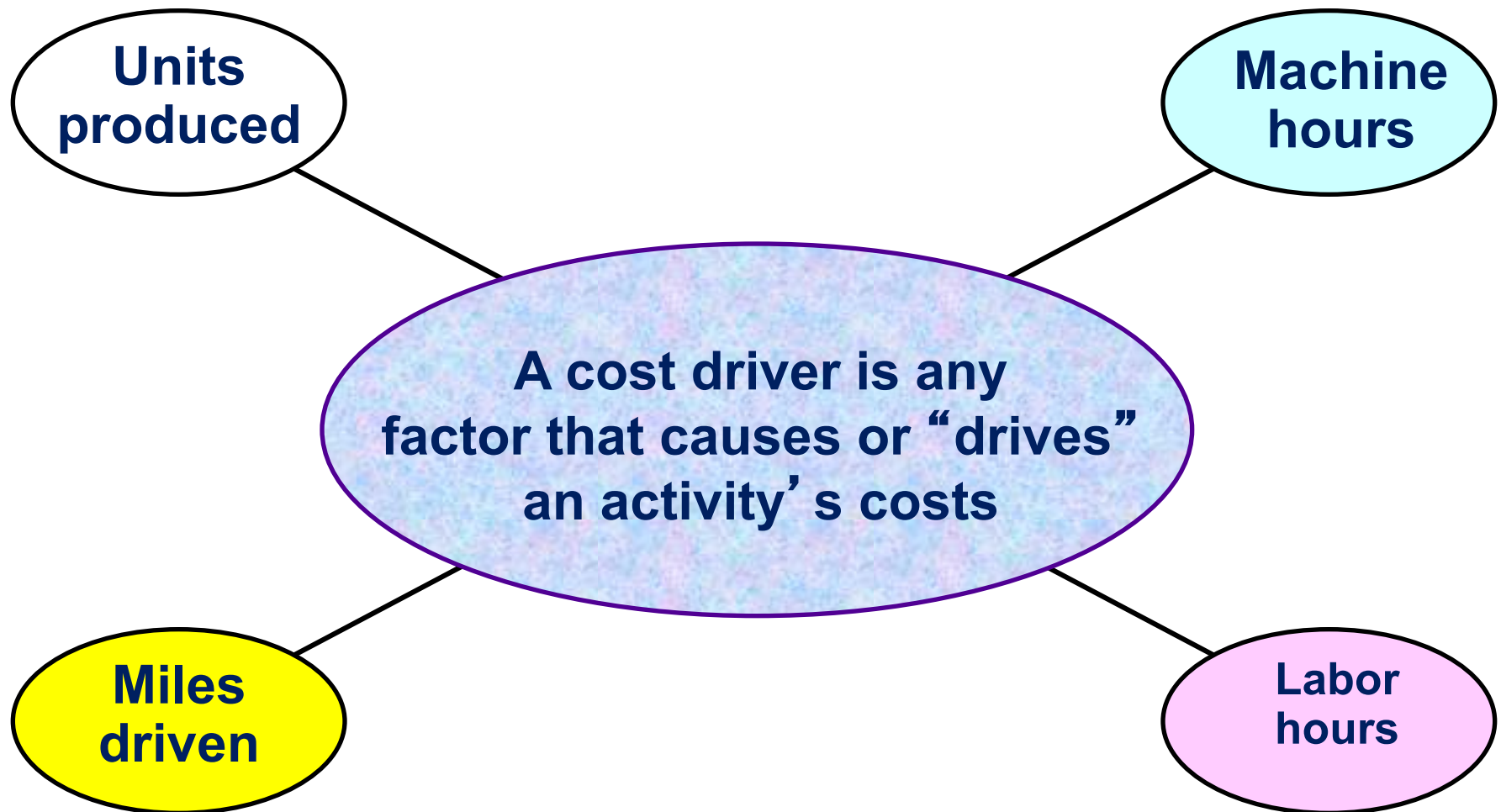
3. Select an Allocation Base to Relate the Cost Pools to Cost Objects

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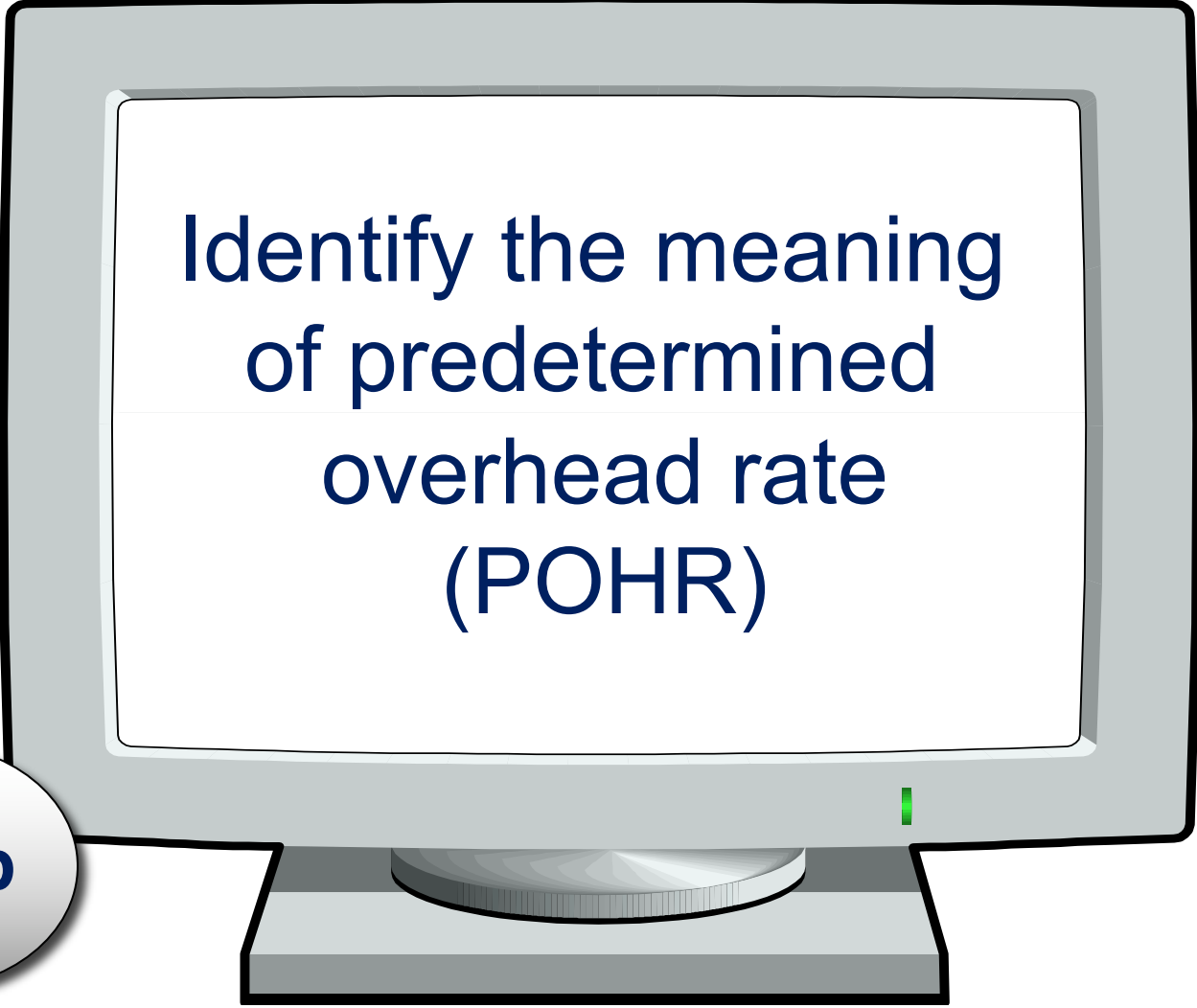
When overhead cost allocation systems were first developed, direct labor made up a large part of total manufacturing cost. It was widely accepted that there was a high correlation between direct labor and the incurrence of overhead cost. As a result, direct labor became the most popular basis for overhead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

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

Overhead Costs → Direct Labor Hours → Products

Learning Objective

Identify the meaning of predetermined overhead rate (POHR)

LO1b

Types of Product Costing Systems

Process Costing

Job-order Costing
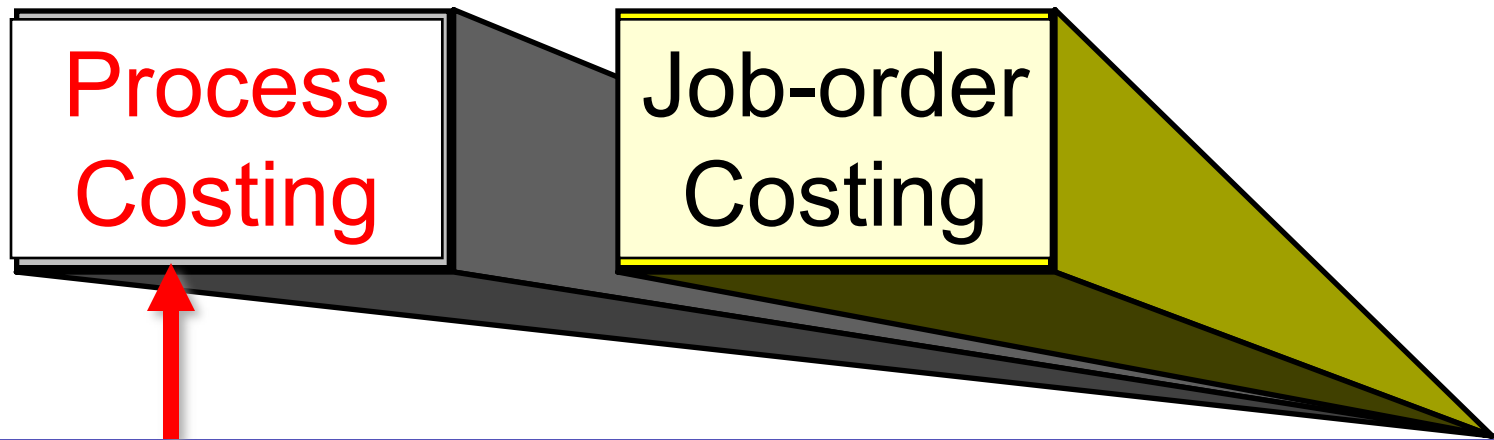
- ❖ A company produces many units of a single product.

- ❖ 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

Process
Costing

Job-order
Costing
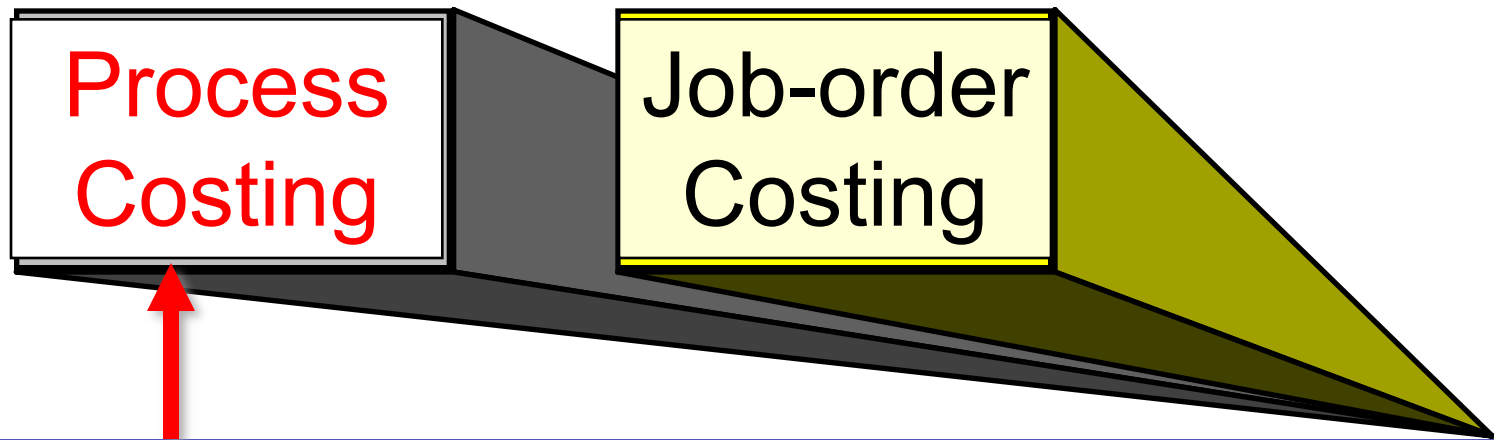
❖   A company produces many units of a single

Example companies:
1. Weyerhaeuser (paper manufacturing)
2. Reynolds Aluminum (refining aluminum ingots)
3. Coca-Cola (mixing and bottling beverages)

❖

❖   es
assigning the same average cost per unit.

Types of Product Costing Systems

Process Costing

Job-order Costing
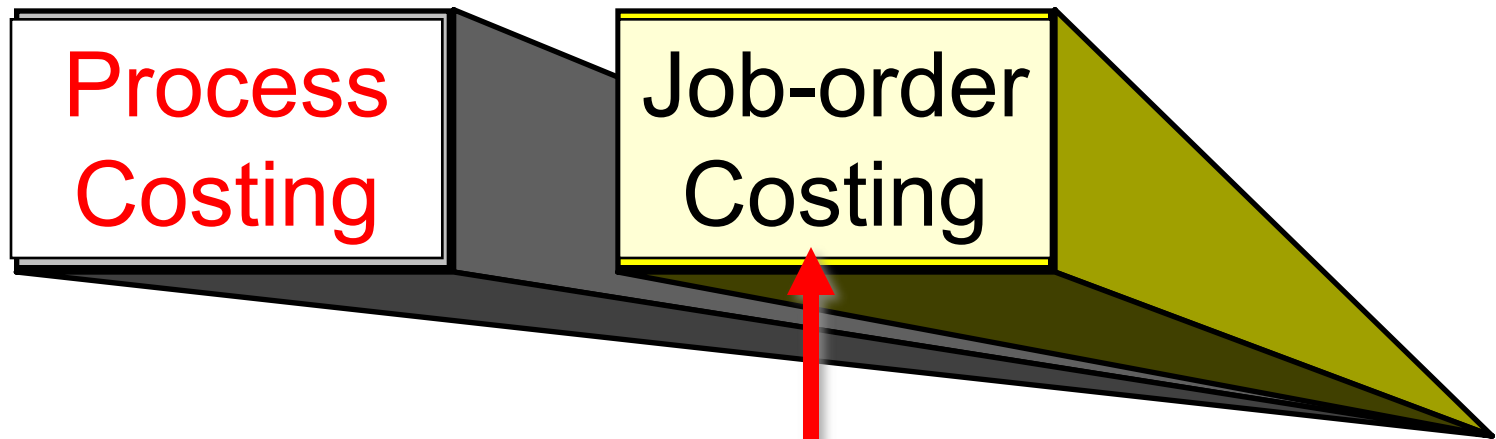
- ❖ Many different products are produced each period.

- ❖ 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

Process Costing

Job-order Costing
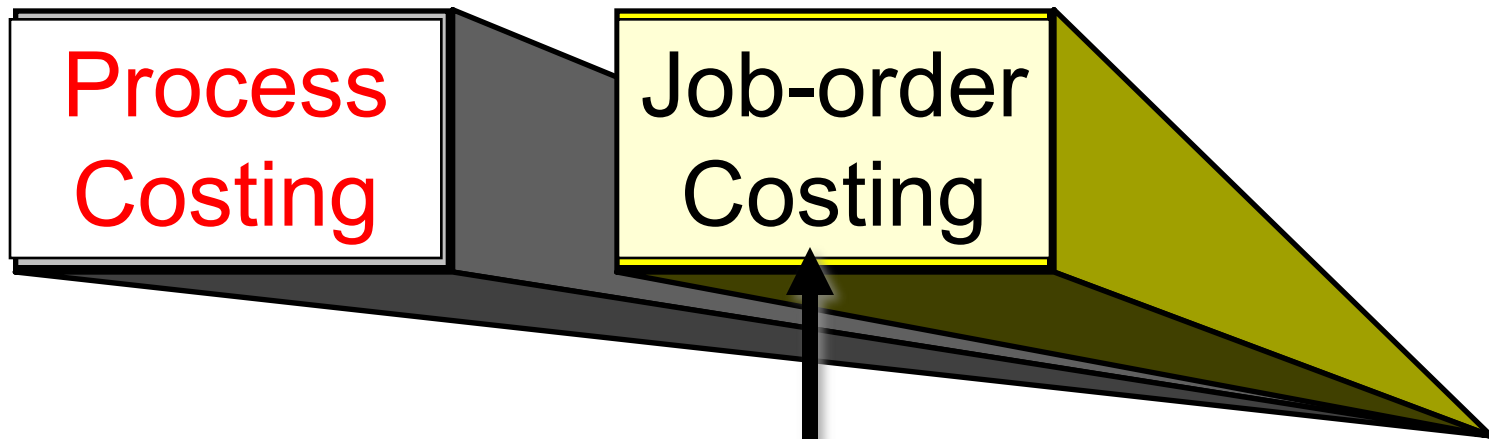
Example companies:
1. Boeing (aircraft manufacturing)
2. Bechtel International (large scale construction)
3. Walt Disney Studios (movie production)

Cost tracing and allocation – An Overview

Direct Materials

Direct Labor

Manufacturing Overhead

Pr. No. 1

Pr. No. 2

Pr. No. 3
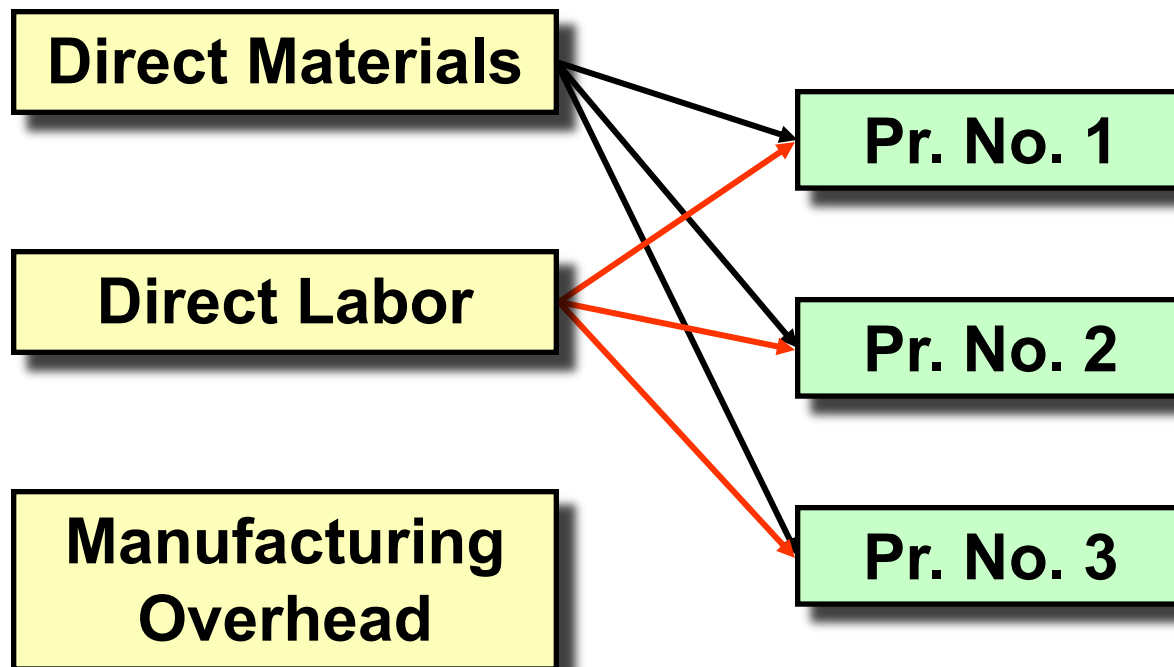
Charge direct material and direct labor costs to each finished good / job as work is performed.

Problem of Manufacturing Overhead

Direct Materials

Direct Labor

Manufacturing Overhead

Pr. No. 1

Pr. No. 2

Pr. No. 3
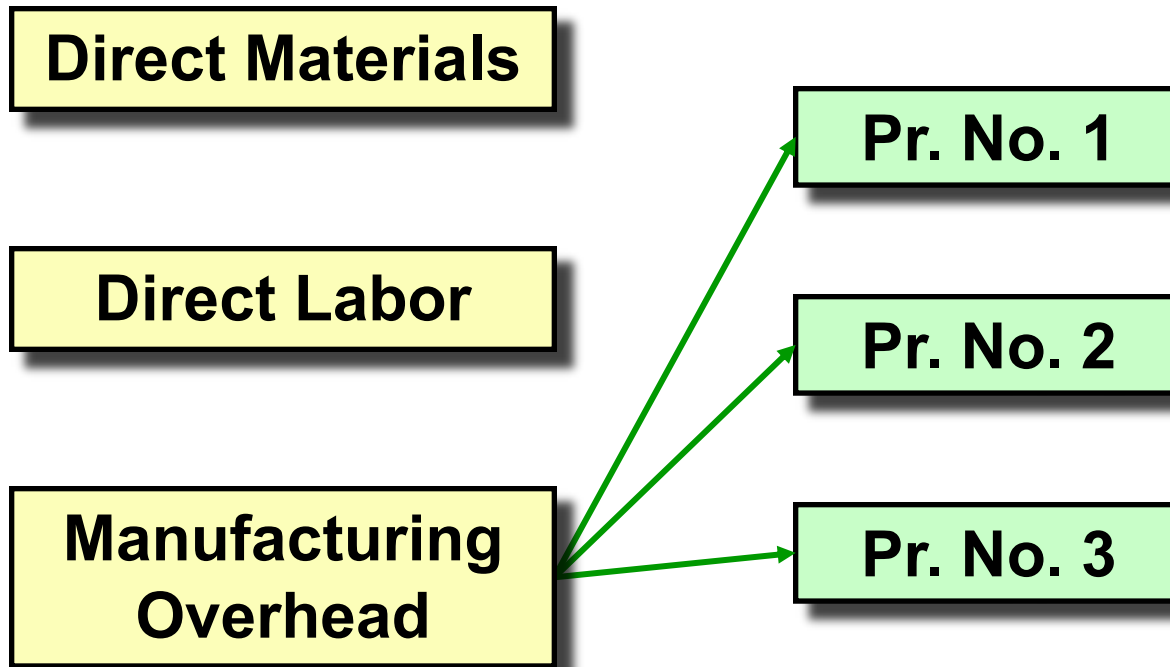
Manufacturing Overhead, including *indirect materials* and *indirect labor*, are allocated to all goods / jobs rather than directly traced to each finish good / job.

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:
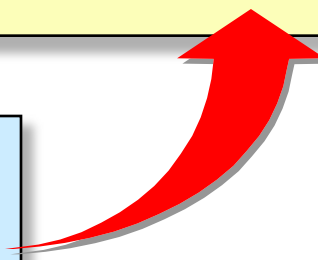
1. It is impossible or difficult to trace overhead costs to particular products or jobs.

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)

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

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.
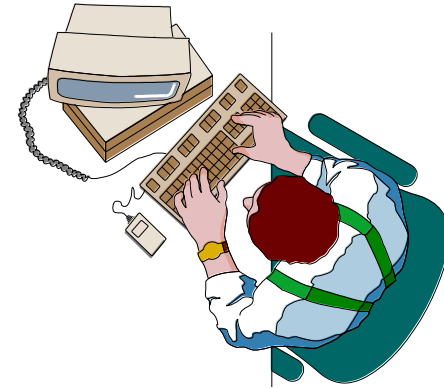
Overhead applied = POHR × Actual activity

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

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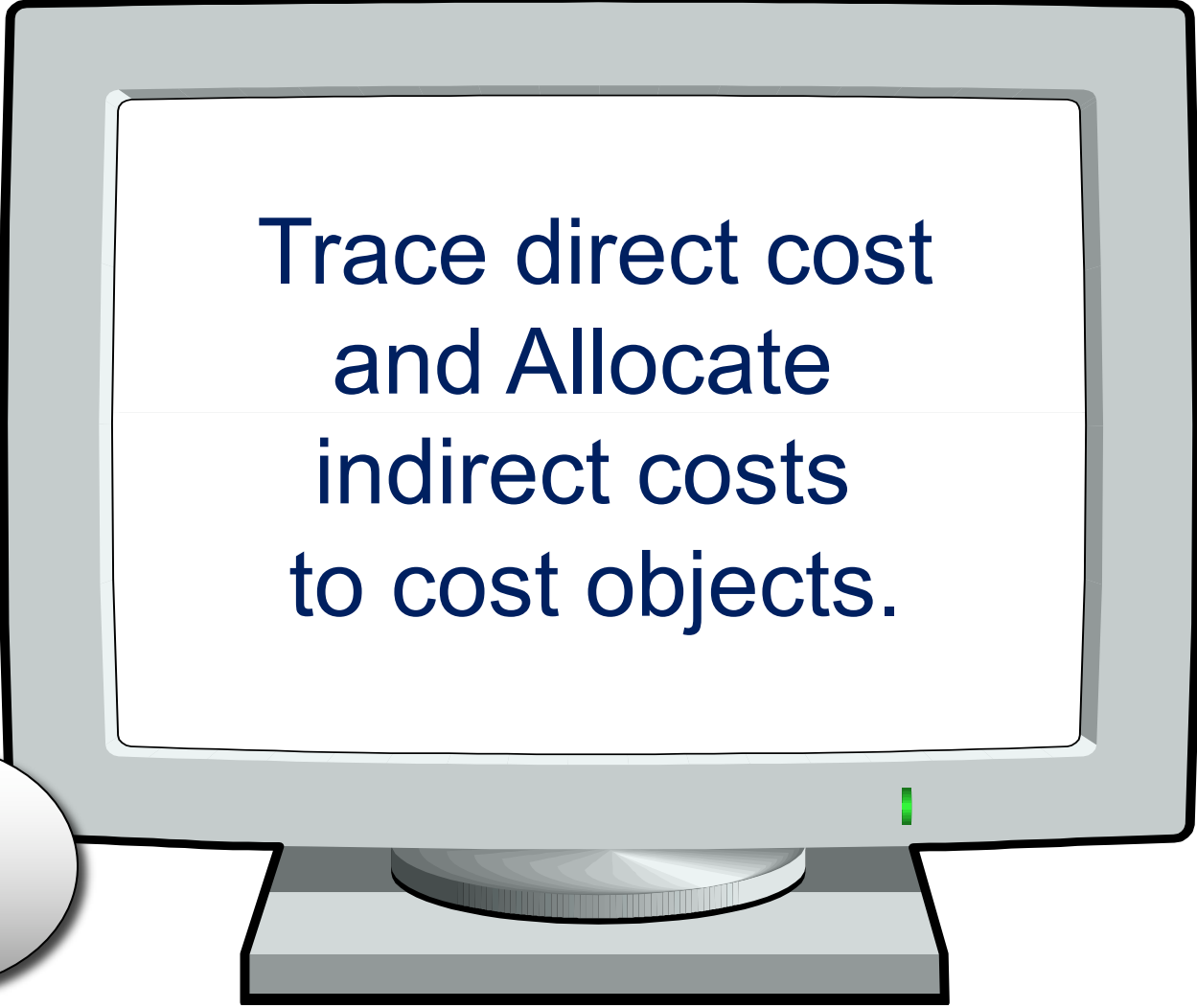
$$POHR = \frac{\text{Estimated total manufacturing overhead cost for the coming period}}{\text{Estimated total units in the allocation base for the coming period}}$$

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

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

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

Learning Objective

Trace direct cost
and Allocate
indirect costs
to cost objects.

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.

	Department			
	Women's	Men's	Children's	Total
Sales	$ 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
Sales	$ 190.000	$ 110.000	$ 60.000	$ 360.000

SQm occupied   12.000 sqm 7.000 sqm 4.000 sqm 23.000 sqm

Identifying Direct and Indirect Costs

	Department			
	Women's	**Men's**	**Children's**	**Indirect Costs**
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

Water

Gas

Electricity
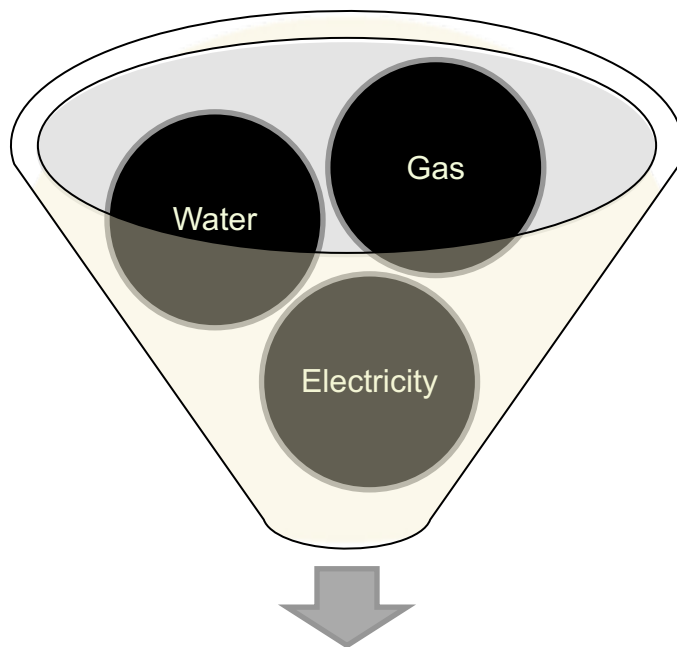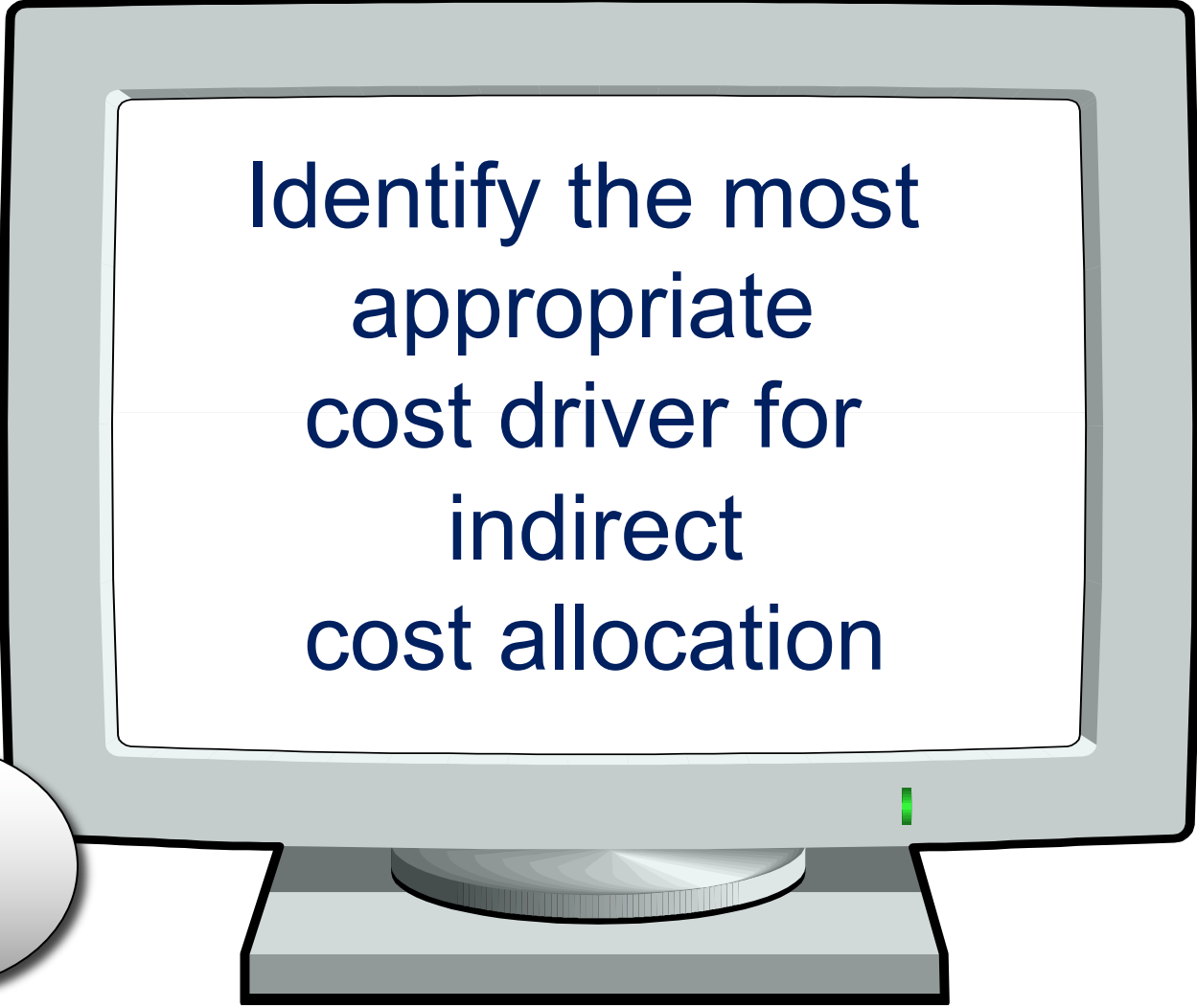
Utilities Cost Pool

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

Pooling should be limited to costs with common cost drivers.

Learning Objective

Identify the most appropriate cost driver for indirect cost allocation

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:

❶ **Allocation rate = total cost ÷ cost driver activity.**

❷ **Allocated cost = allocation rate × 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

❶ **$9,360 ÷ 3 departments = $3,120 per department**

❷ **$3,120 × 1 department = $3,120**

Indirect Costs	Women's	Men's	Children's	Total
			Department	
Store Manager Salary				$ 9,360
Store Rental				18,400
Utilities				2,300
Advertising				7,200
Supplies				900

1) Allocating Indirect Costs to Departments

❶ **$18,400 ÷ 23,000 square feet = $0.80 per square foot**

❷ **$0.80 × 12,000 Women's square feet = $9,600**

$0.80 × 7,000 Men's square feet = $5,600

$0.80 × 4,000 Children's square feet = $3,200

Indirect Costs	Department			
	Women's	Men's	Children's	Total
Store Manager Salary	$ 3,120	$ 3,120	$ 3,120	$ 9,360
Store Rental				18,400
Utilities				2,300
Advertising				7,200
Supplies				900

1) Allocating Indirect Costs to Departments

❶ **$2,300 ÷ 23,000 square feet = $0.10 per square foot**

❷ **$0.10 × 12,000 Women's square feet = $1,200**

   $0.10 × 7,000 Men's square feet = $700

   $0.10 × 4,000 Children's square feet = $400

Indirect Costs	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				2,300
Advertising				7,200
Supplies				900

1) Allocating Indirect Costs to Departments

❶ **$7,200 ÷ $360,000 sales = $0.02 per sales dollar**

❷ **$0.02 × $190,000 Women's sales = $3,800**

$0.02 × $110,000 Men's sales = $2,200

$0.02 × $60,000 Children's sales = $1,200

	Department			
Indirect Costs	**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

❶ **$900 ÷ $360,000 sales = $0.0025 per sales dollar**

❷ **$0.0025 × $190,000 Women's sales = $475**

$0.0025 × $110,000 Men's sales = $275

$0.0025 × $60,000 Children's sales = $150

	Department			
Indirect Costs	**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	3,800	2,200	1,200	7,200
Supplies				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.

Volume measures serve as good cost drivers for the allocation of variable overhead.

Units Produced

Labor Hours
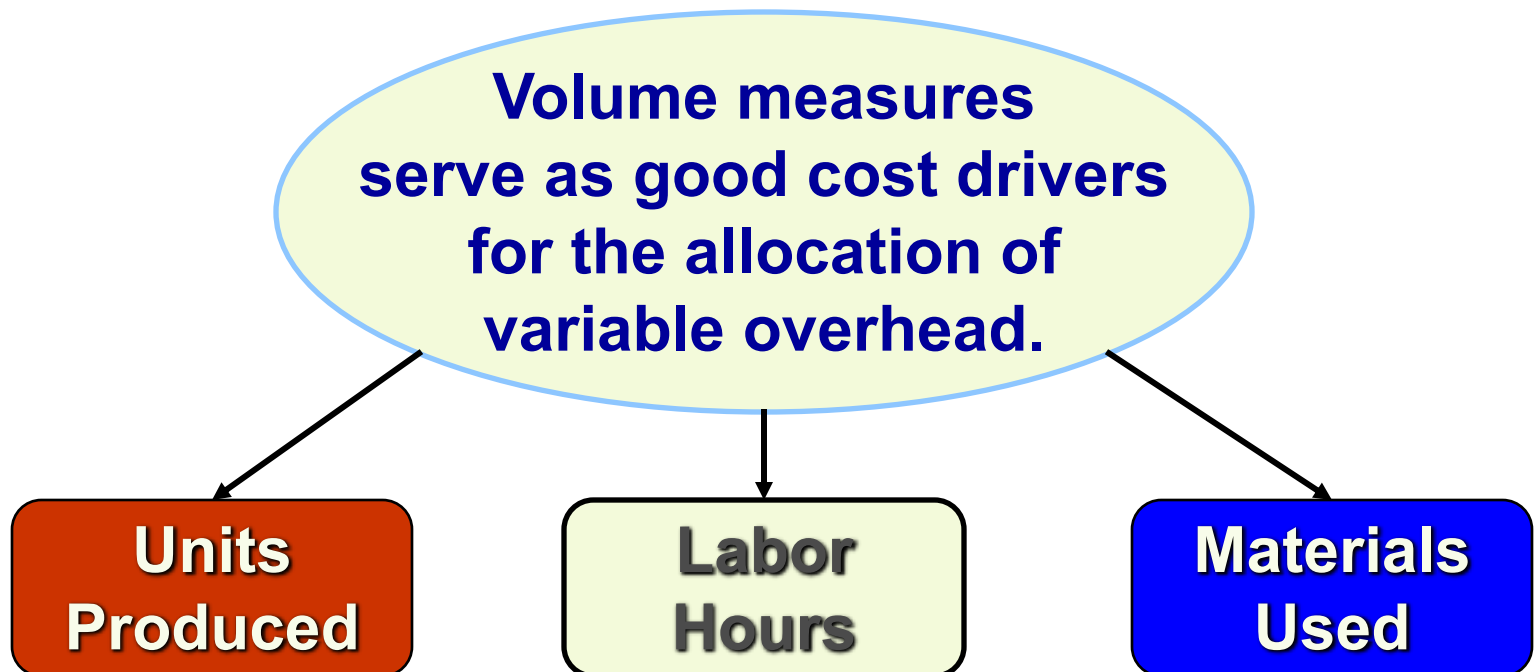
Materials Used

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

❶ **$60,000 ÷ 5,000 units = $12 per unit**

❷ **$12 per unit × 4,000 chairs = $48,000**

$12 per unit × 1,000 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

❶ **$60,000 ÷ 6,000 hours = $10 per hour**

❷ **$10 per hour × 2,500 hours = $25,000**

$10 per hour × 3,500 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

❶ **$60,000 ÷ $1,500,000 of direct material = $0.04 per dollar of direct material**

❷ **$0.04 per $ × $500,000 = $20,000**

$0.04 per $ × $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**

❶ **$28,000 ÷ 2,000,000 units = $0.014 per unit**

❷ **$0.014 per unit × 1,800,000 units = $25,200**

$0.014 per unit × 200,000 units = $2,800

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

1　　　　　　　　**2**　　　　　　　　**3**

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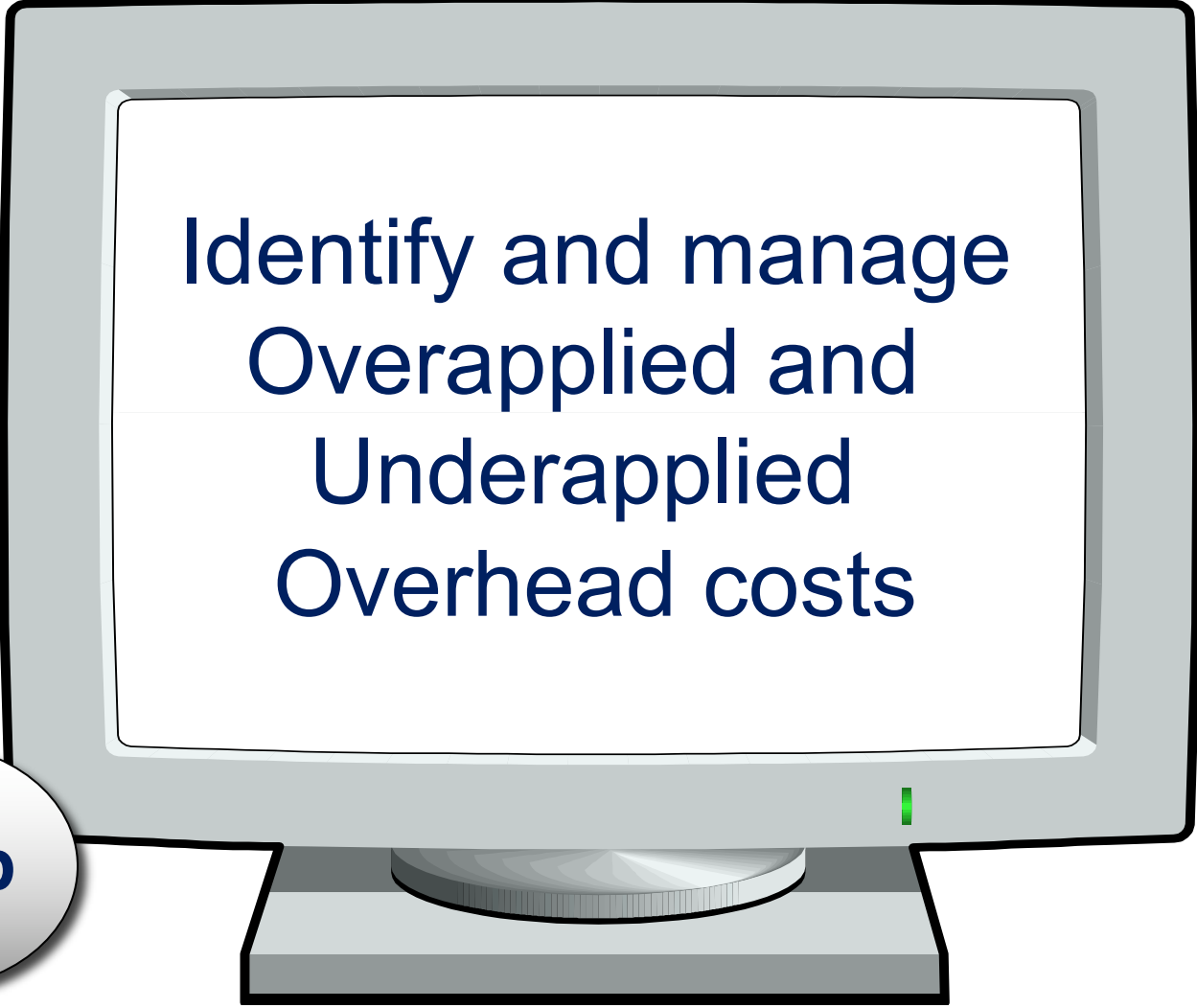
Exercise D.P. 4-1: My House/ Your House

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

a. 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.
b. 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.
c. 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

Identify and manage Overapplied and Underapplied Overhead costs

LO3b

The Flow of Costs

The transactions in T-account that capture the flow of costs in a managerial costing system are illustrated on the following slides.
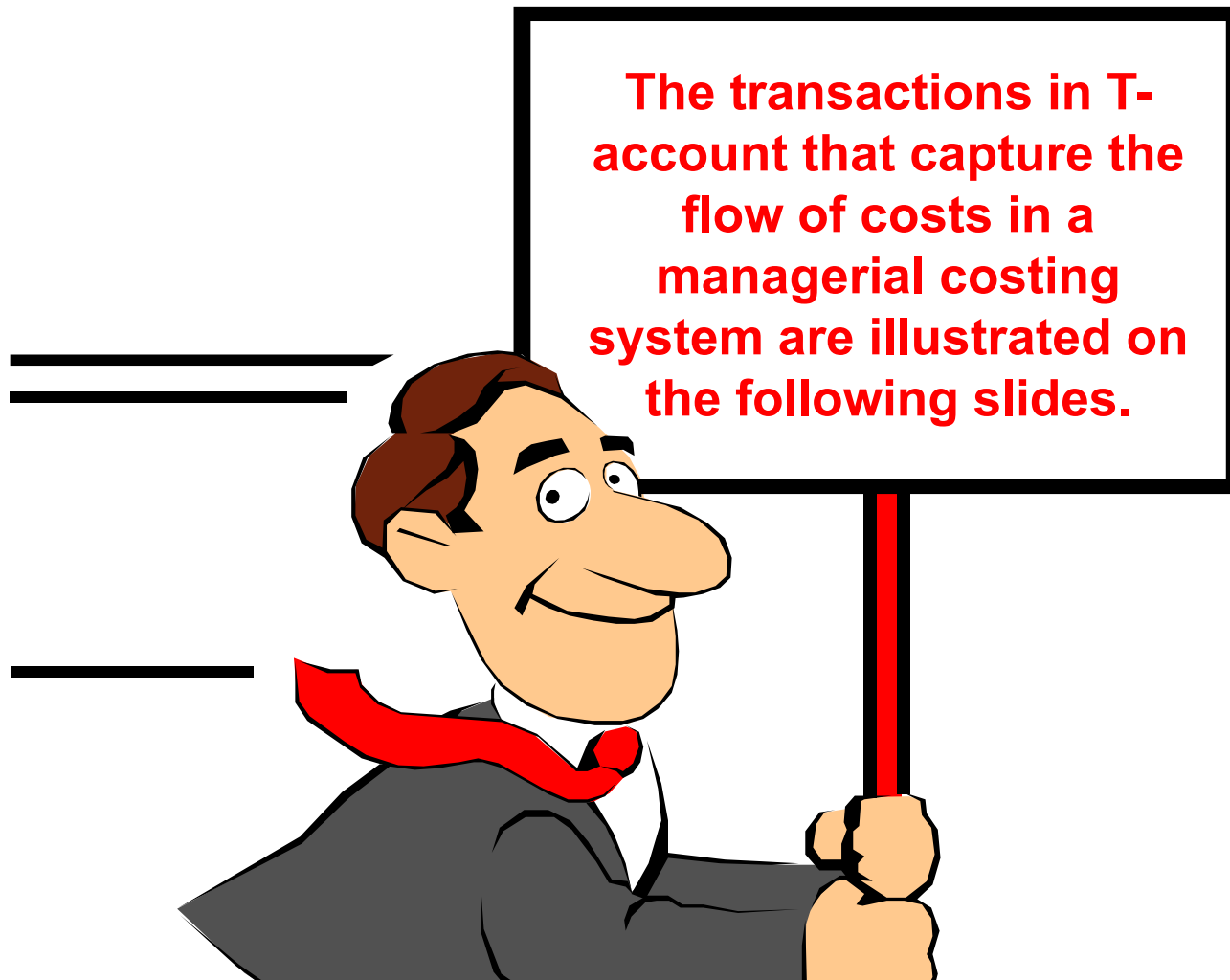
The Purchase and Issue of Raw Materials

Raw Materials
- **Material Purchases**
- **Direct Materials**
- **Indirect Materials**

Work in Process (Job Cost Sheet)
- **Direct Materials**

Mfg. Overhead
Actual | *Applied*
- **Indirect Materials**
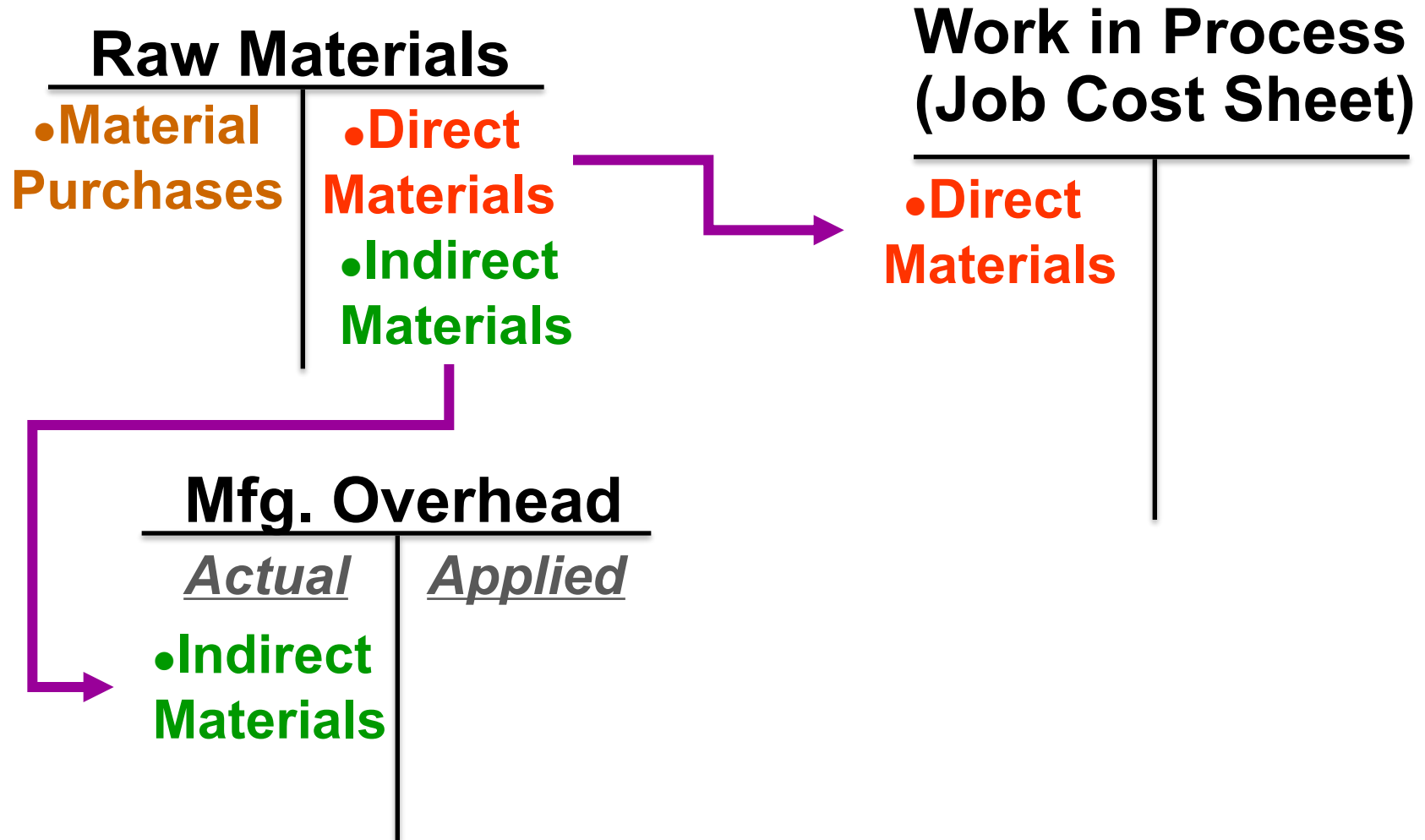
The Recording of Labor Costs

Salaries and Wages Payable

- Direct Labor
- Indirect Labor

Work in Process (Job Cost Sheet)

- Direct Materials
- Direct Labor

Mfg. Overhead

Actual	*Applied*
• Indirect Materials	
• Indirect Labor	
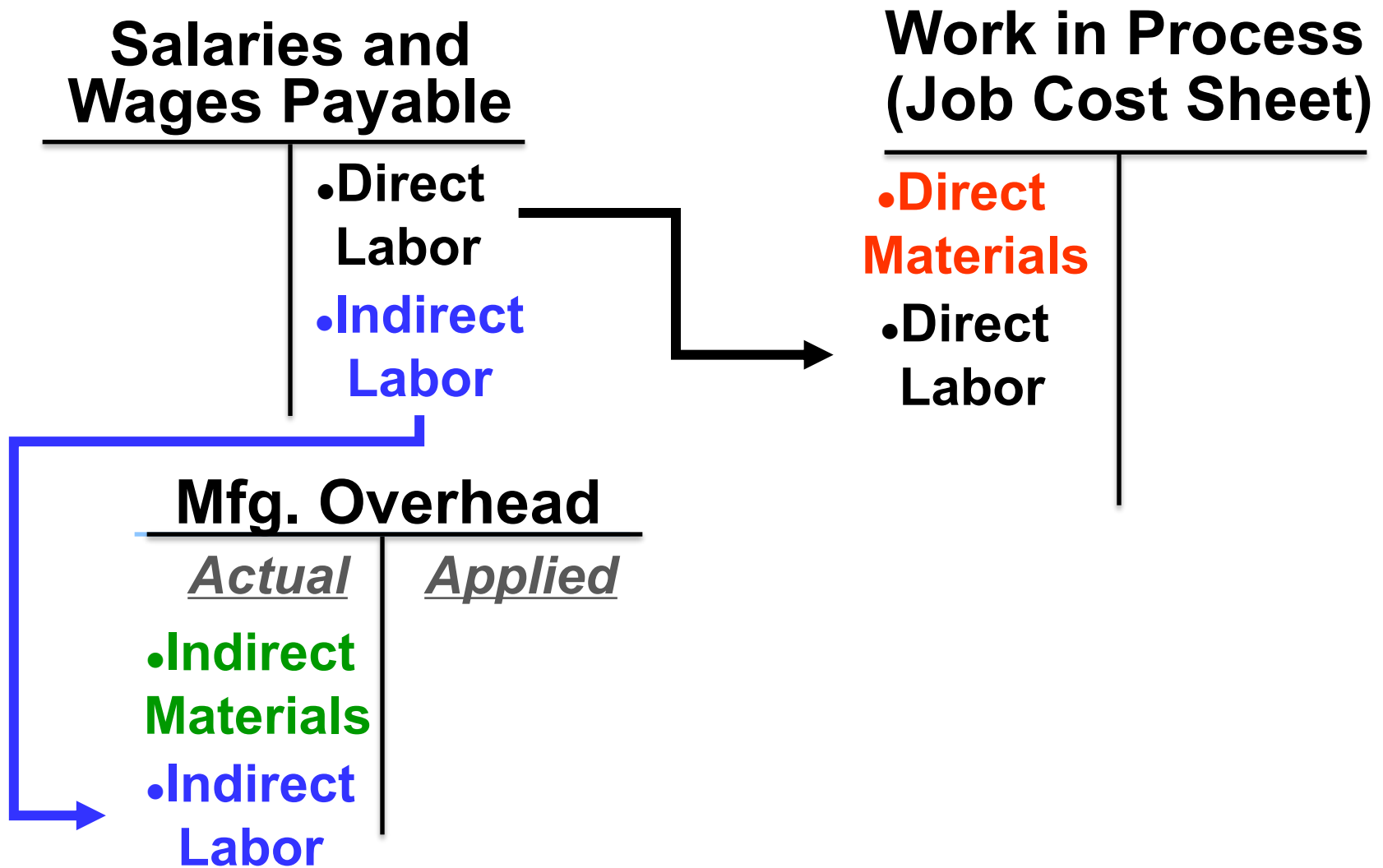
Recording Actual Manufacturing Overhead

Salaries and Wages Payable
_____

●Direct Labor

●**Indirect Labor**

Mfg. Overhead
_____

Actual | _Applied_

●**Indirect Materials**

●**Indirect Labor**

●**Other Overhead**

Work in Process (Job Cost Sheet)
_____

●**Direct Materials**

●Direct Labor

Applying Manufacturing Overhead

Salaries and Wages Payable

- Direct Labor
- Indirect Labor

Mfg. Overhead

Actual	*Applied*
●Indirect Materials	●Overhead Applied to Work in Process
●Indirect Labor	
●Other Overhead	

Work in Process (Job Cost Sheet)

- Direct Materials
- Direct Labor
- Overhead Applied

If actual and applied manufacturing overhead are not equal, a year-end adjustment is required.
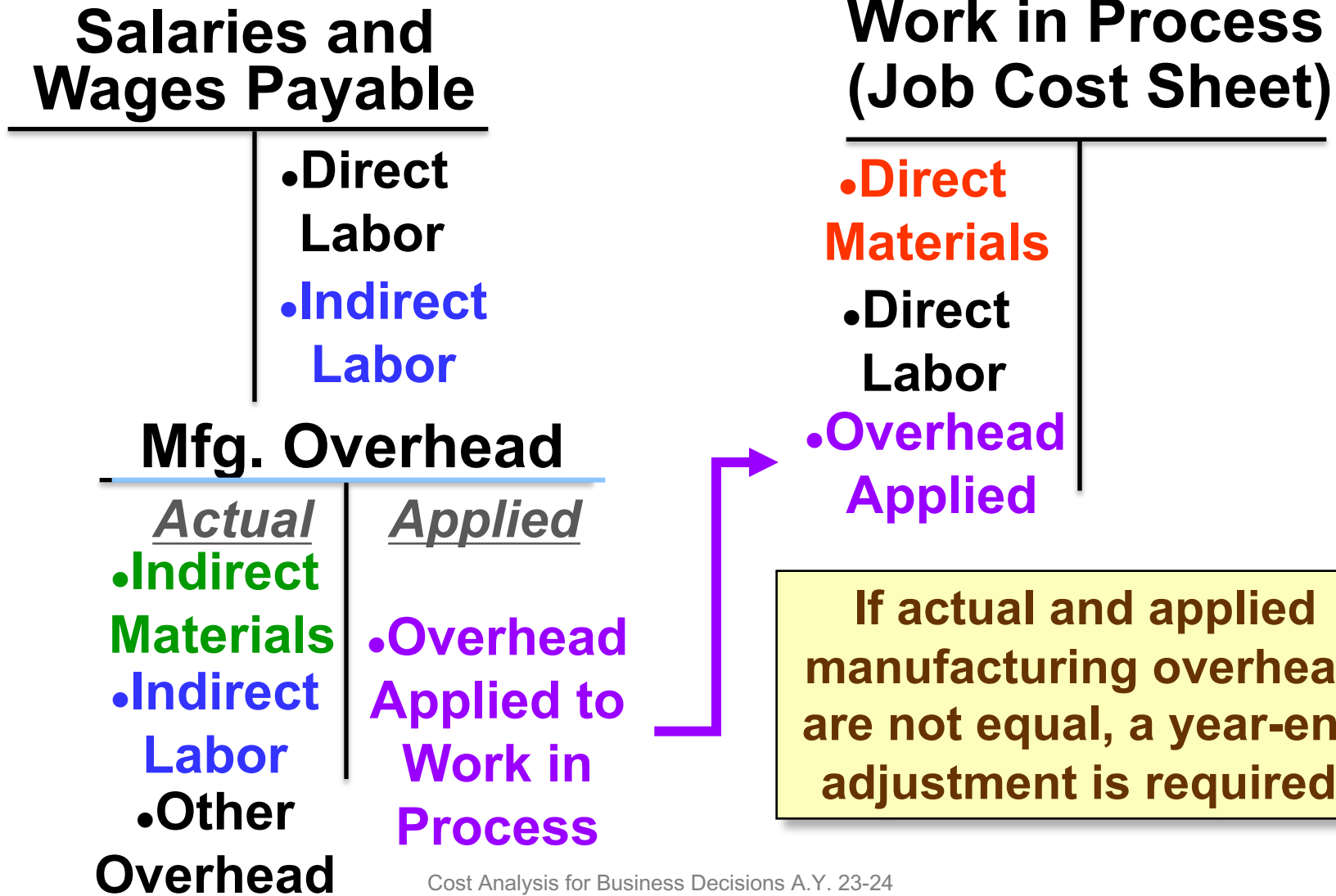
Transferring Completed Units

Work in Process (Job Cost Sheet)

- **Direct Materials**
- **Direct Labor**
- **Overhead Applied**

- **Cost of Goods Mfd.**

Finished Goods

- **Cost of Goods Mfd.**
- **Cost of Goods Sold**

Cost of Goods Sold

- **Cost of Goods Sold**
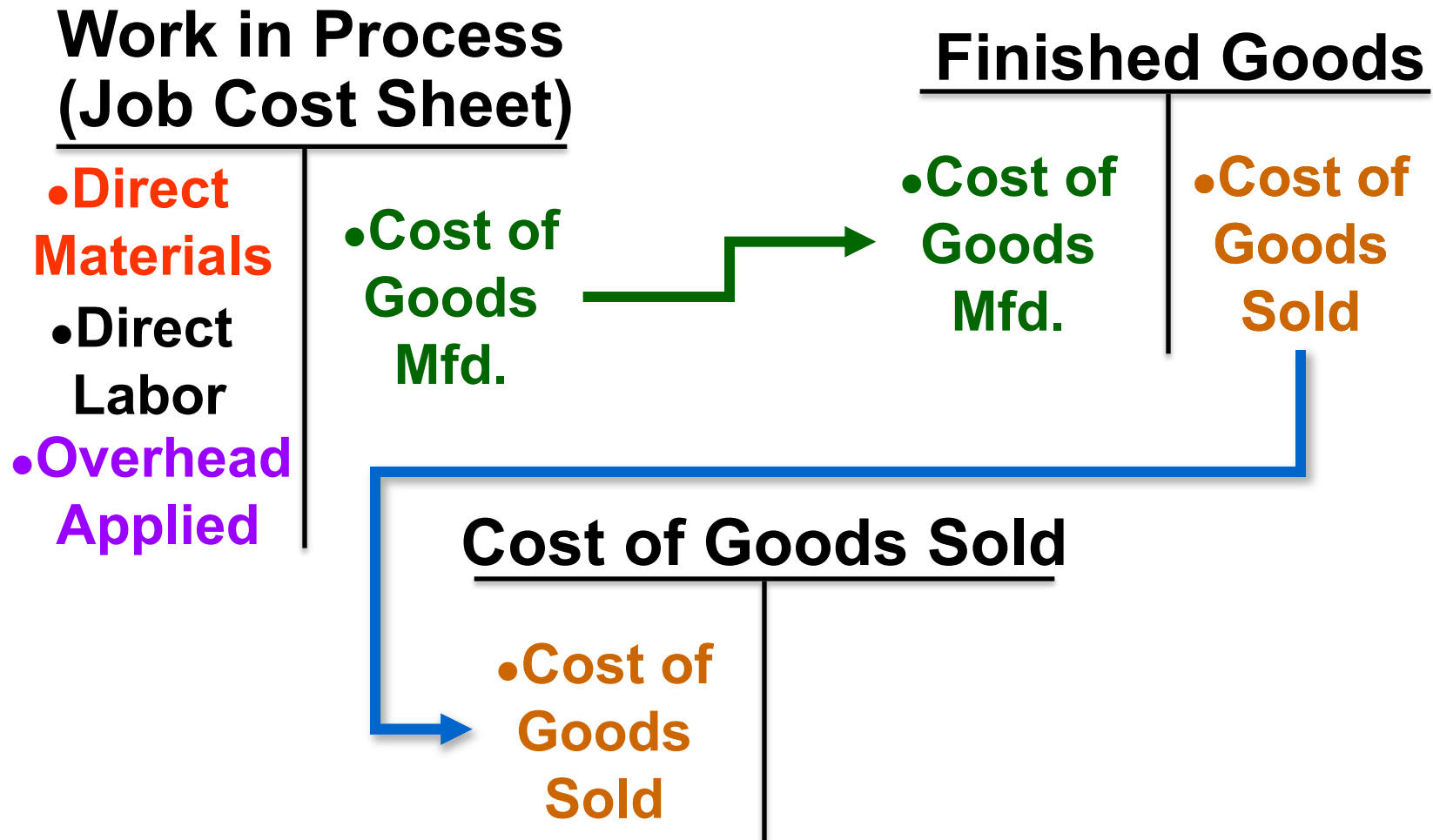
Estimated Versus Actual Cost

Timely

Potential Inaccuracies

Relevant

Estimated Costs
Managers use estimated costs to make decisions about the future.
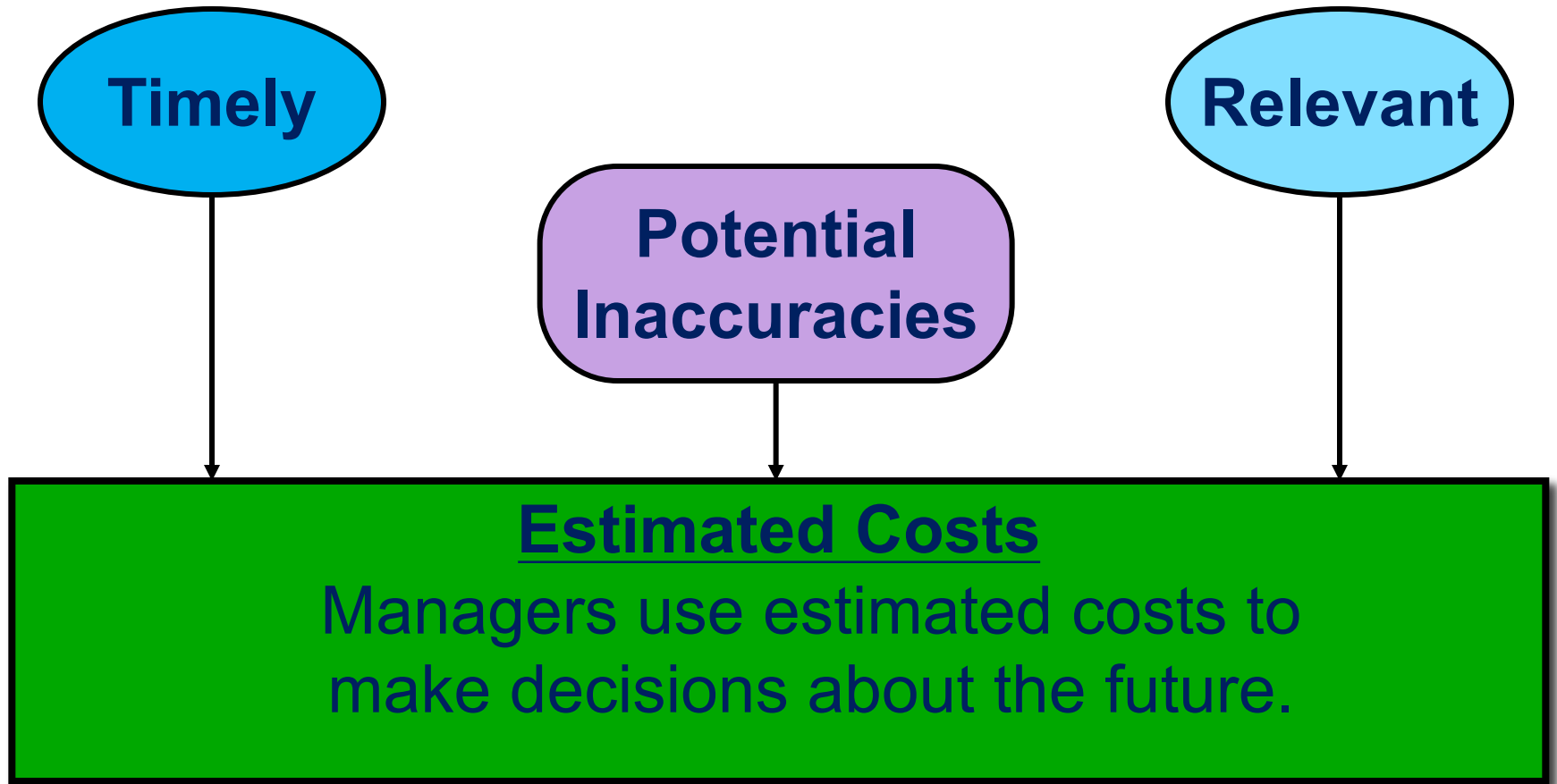
Allocating Costs to Solve Timing Problems

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 . . .	Alternative 1 Close to Cost of Goods Sold	Alternative 2 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

Allocate joint costs
to joint products

LO4

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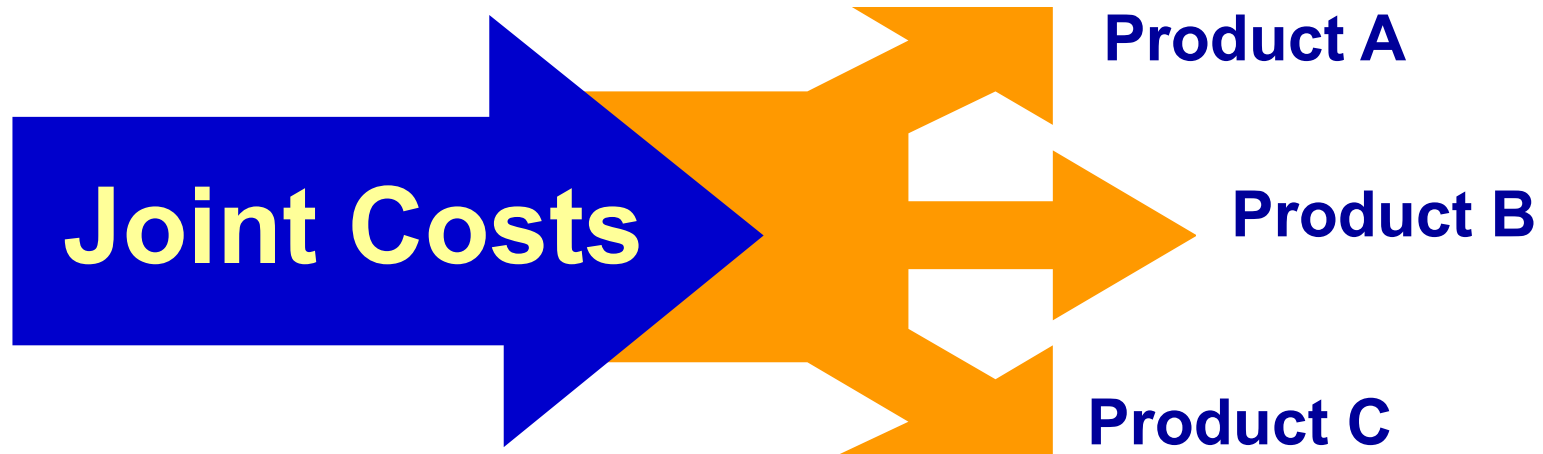
Joint products – products resulting from a process with a common input.

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

Joint Costs

Joint Materials
$27,000

Joint Processing
$21,000

Split-Off Point

Compound AK
$36,000

3,000 gal.

Sales	$50,000
COGS	(36,000)
GM	$14,000

Compound AL
$12,000

Additional Processing
$8,000

1,000 gal.

Sales	$13,000
COGS	(20,000)
GM	($7,000)
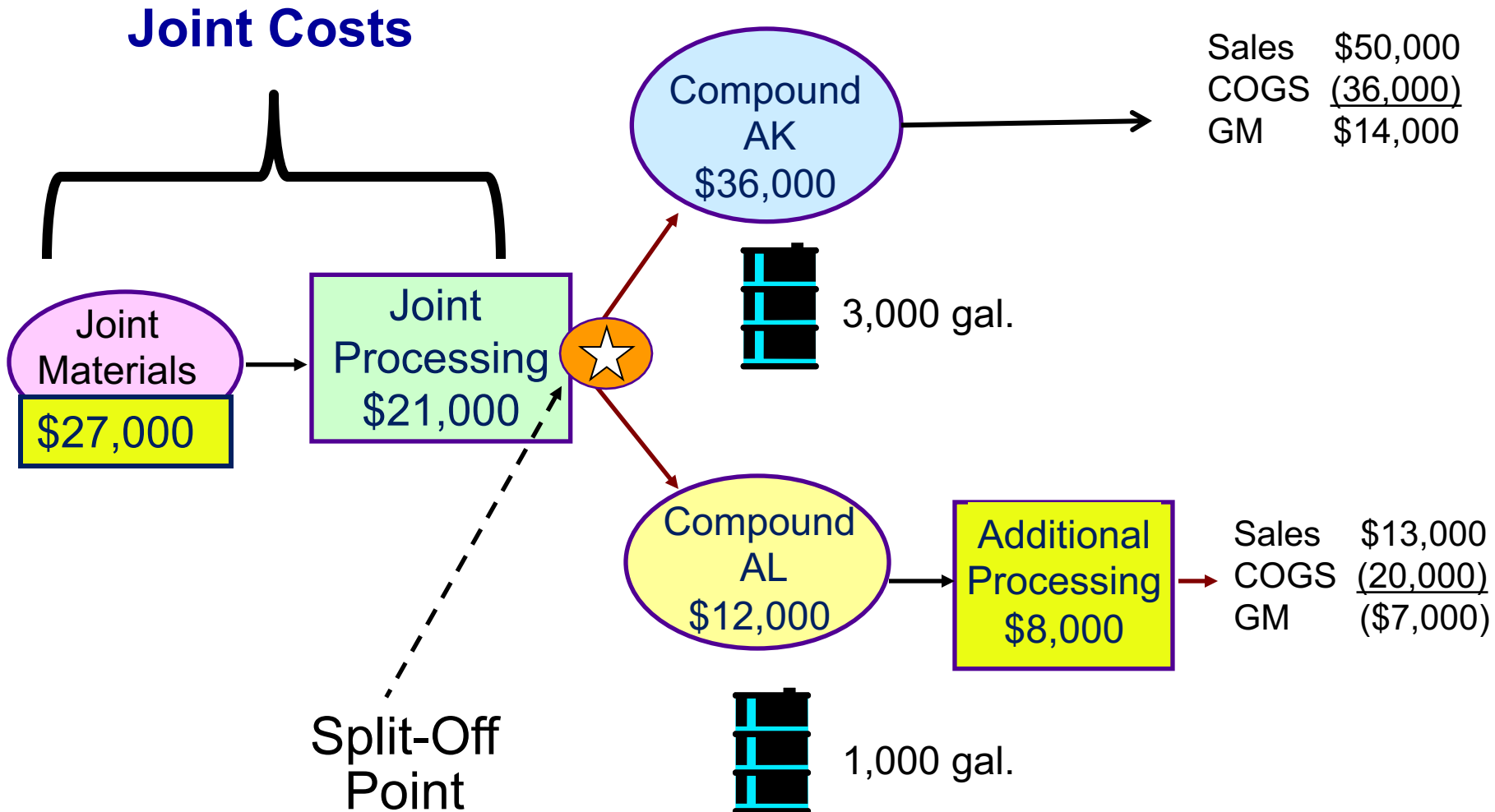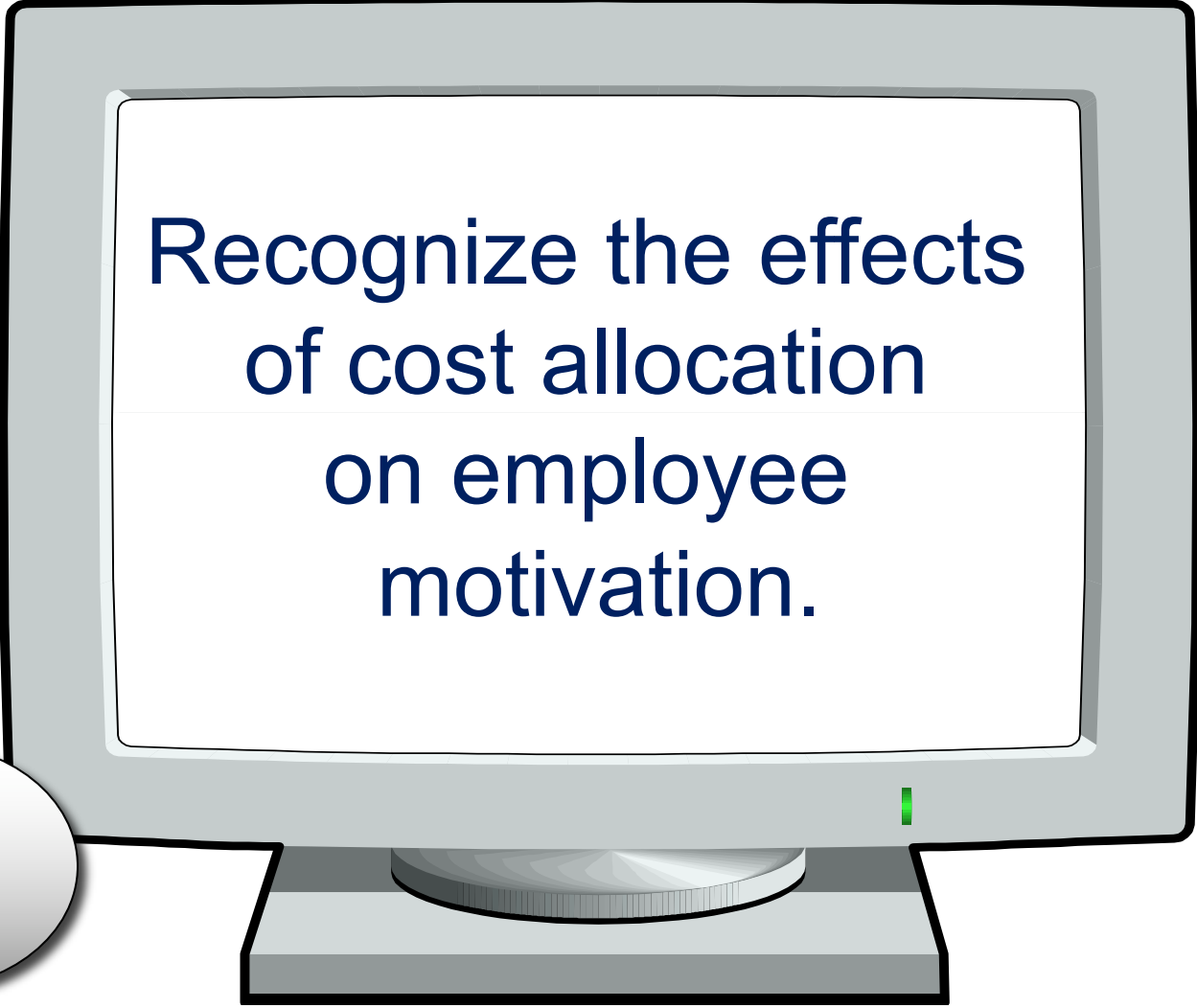
Relative Sales Value Method

		With Compound AL	Without Compound AL
Sales	$63,000	($50,000 + $13,000)	$50,000
Cost of goods sold	(56,000)	($36,000 + $20,000)	(48,000)
Gross margin	$7,000		$ 2,000

	Compound AK	Compound AL
Sales	$50,000	$13,000
Cost of goods sold	(48,000)	(8,000)
Gross margin	$ 2,000	$ 5,000

Learning Objective

Recognize the effects of cost allocation on employee motivation.

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.
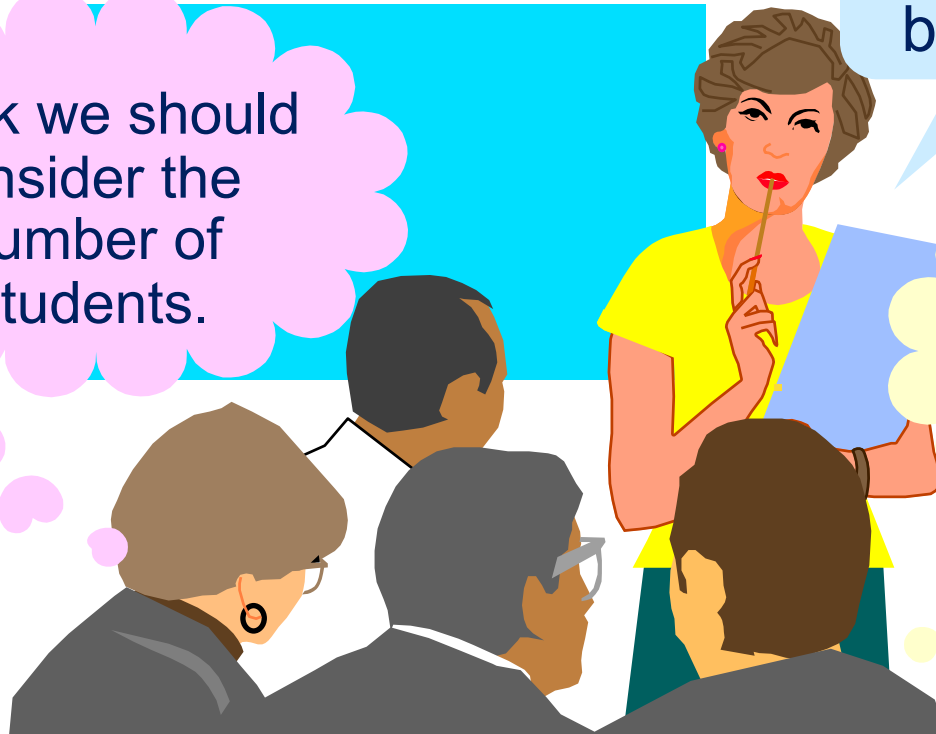
Cost Allocation: The Human Factor

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.

❶ **$36,000 ÷ 72 faculty = $500 per faculty member**

❷ **$500 × 29 faculty members = $14,500**
   $500 × 16 faculty members = $8,000
   $500 × 12 faculty members = $6,000
   $500 × 15 faculty members = $7,500

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

❶ **$36,000 ÷ 72 faculty = $500 per faculty member**

❷ **$500 × 29 faculty members = $14,500**

$5
$5
$5

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

Academic Department			Difference
Management			$ 2,500
Accounting			(2,000)
Finance	8,000		(2,000)
Marketing	6,000		1,500
Totals	36,000	36,000	-

❶ **$36,000 ÷ 1,200 students = $30 per student**

❷ **$30 per student × 330 students = $9,900**
$30 per student × 360 students = $10,800
$30 per student × 290 students = $8,700
$30 per student × 220 students = $6,600

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

Learning Objective

Allocate service department costs to operating departments (Appendix).

LO6

Operating and Service Departments
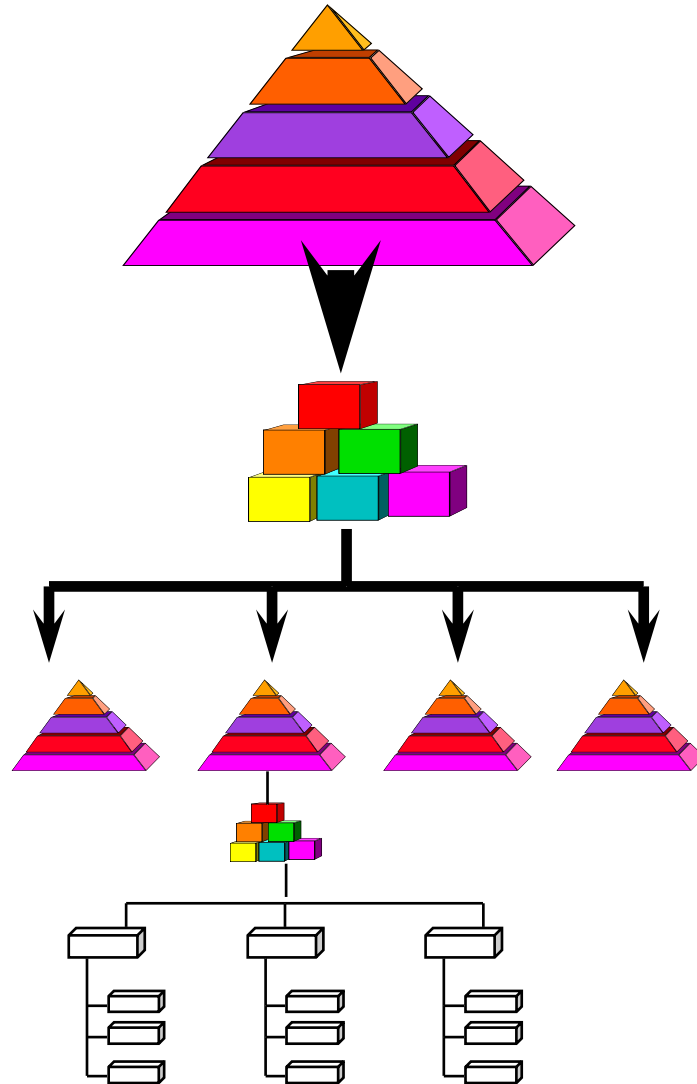
Organizational Structure
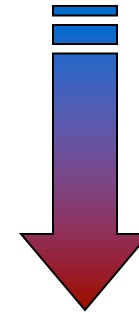
Responsibility Centers
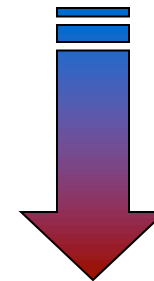
Operating and Service Deptarments

Operating Departments

An **operating department** carries out the central purpose of the organization

<table>
<tr>
<td>

The Accounting Department at your University.

</td>
<td>

</td>
<td>

An Assembly Department at General Motors.

</td>
</tr>
</table>

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

Service Department

Operating Department

Costs of the service department become overhead costs to the operating department

Reciprocal Services

Service Department 1

Service Department 2
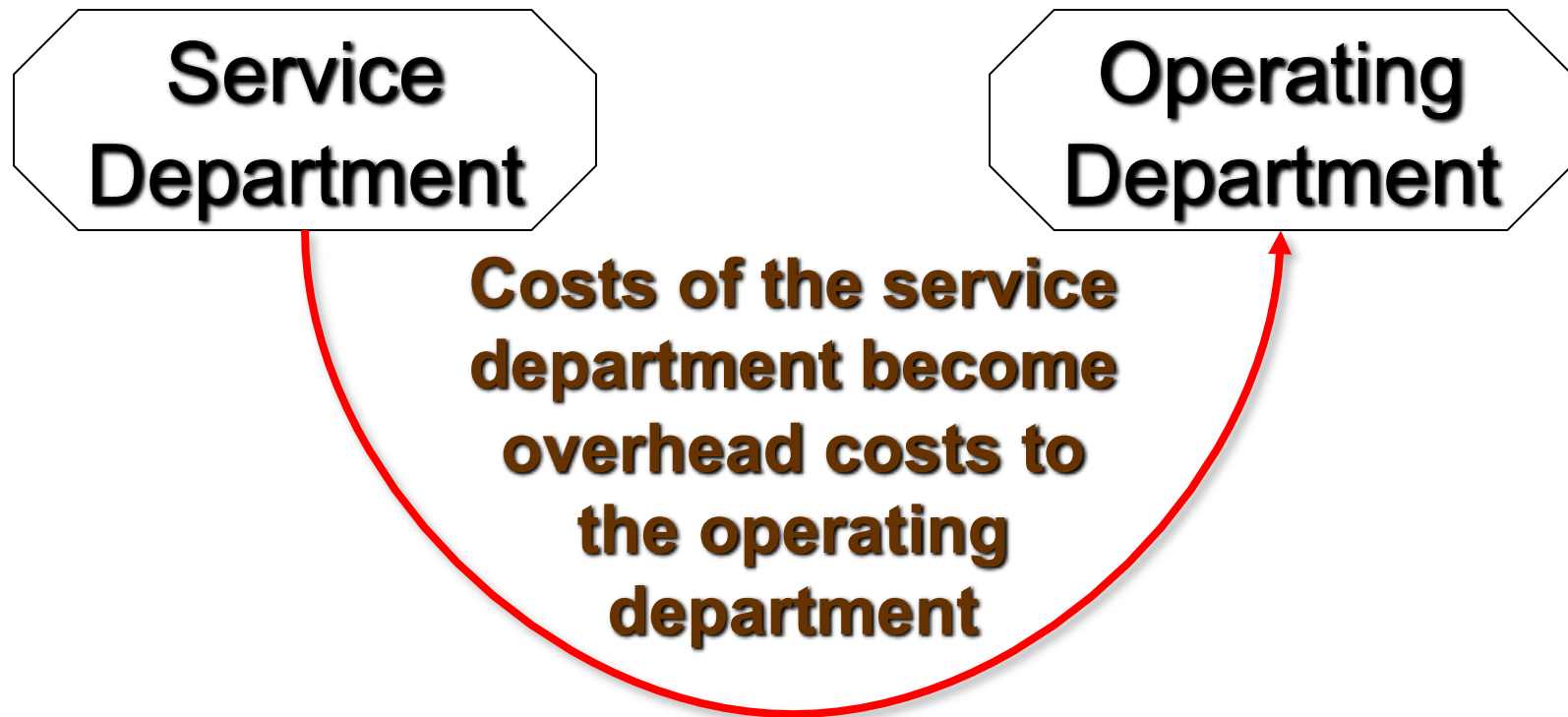
When service departments provide services to each other we call them reciprocal services.
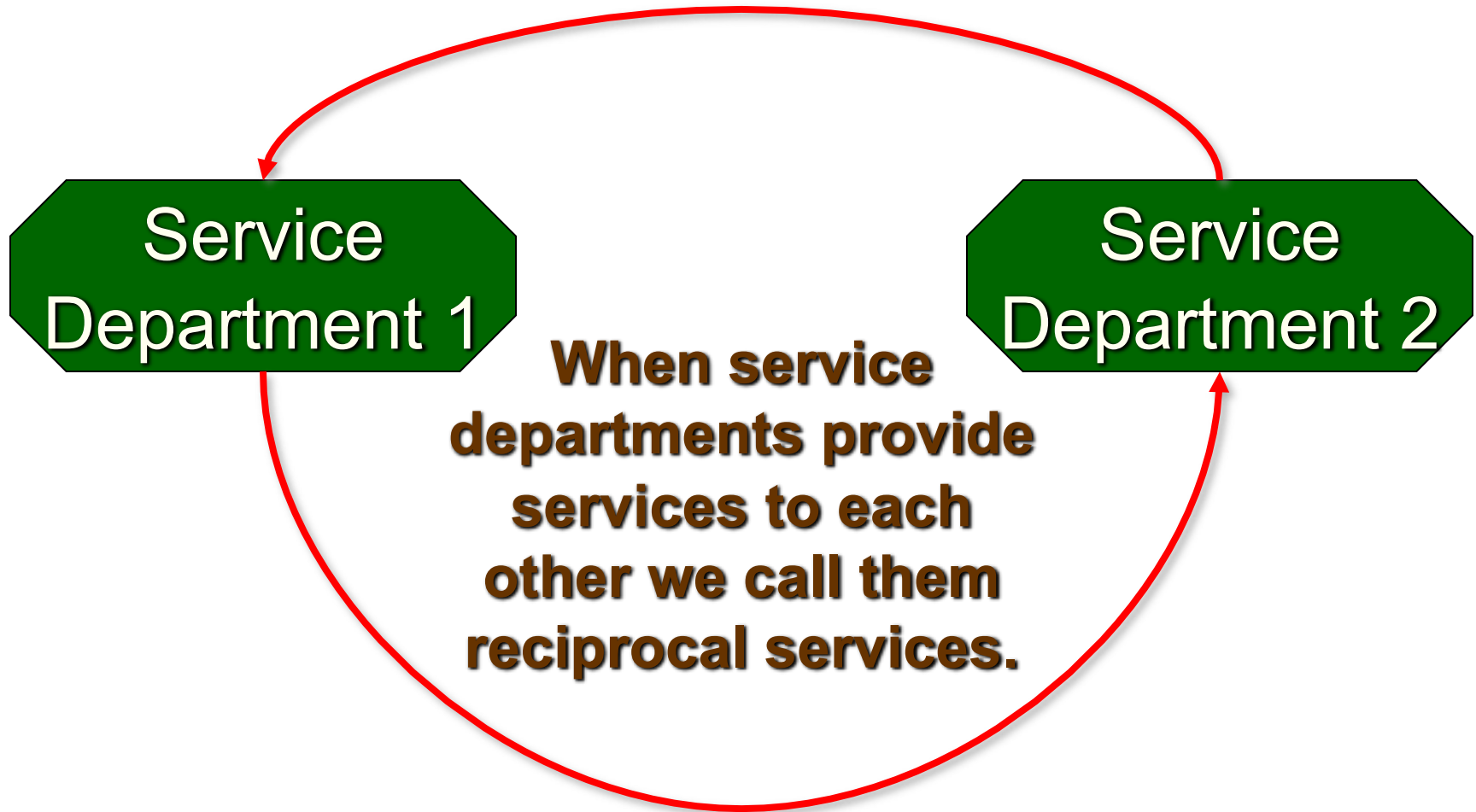
Allocation Approaches

Direct Method ❶

Step-Down Method ❷

Reciprocal Method ❸

Direct Method

Interactions between service departments are ignored and all costs are allocated directly to operating departments.

Service Department (Cafeteria)

Service Department (Custodial)

interactions ignored

Operating Department (Machining)

Operating Department (Assembly)

Direct Method

	Service Departments		Operating Departments	
	Cafeteria	**Custodial**	**Machining**	**Assembly**
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

Service Department	Allocation Base
Cafeteria	Number of employees
Custodial	Square feet occupied

Direct Method

	Service Departments		Operating Departments	
	Cafeteria	Custodial	Machining	Assembly
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

	Service Departments		Operating Departments	
	Cafeteria	**Custodial**	**Machining**	**Assembly**
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

	Service Departments		Operating Departments	
	Cafeteria	Custodial	Machining	Assembly
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

	Service Departments		Operating Departments	
	Cafeteria	Custodial	Machining	Assembly
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

	Service Departments		Operating Departments	
	Cafeteria	Custodial	Machining	Assembly
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

Once a service department's costs are allocated, other service department costs are not allocated back to it.

Service Department (Cafeteria)

Service Department (Custodial)

Operating Department (Machining)

Operating Department (Assembly)
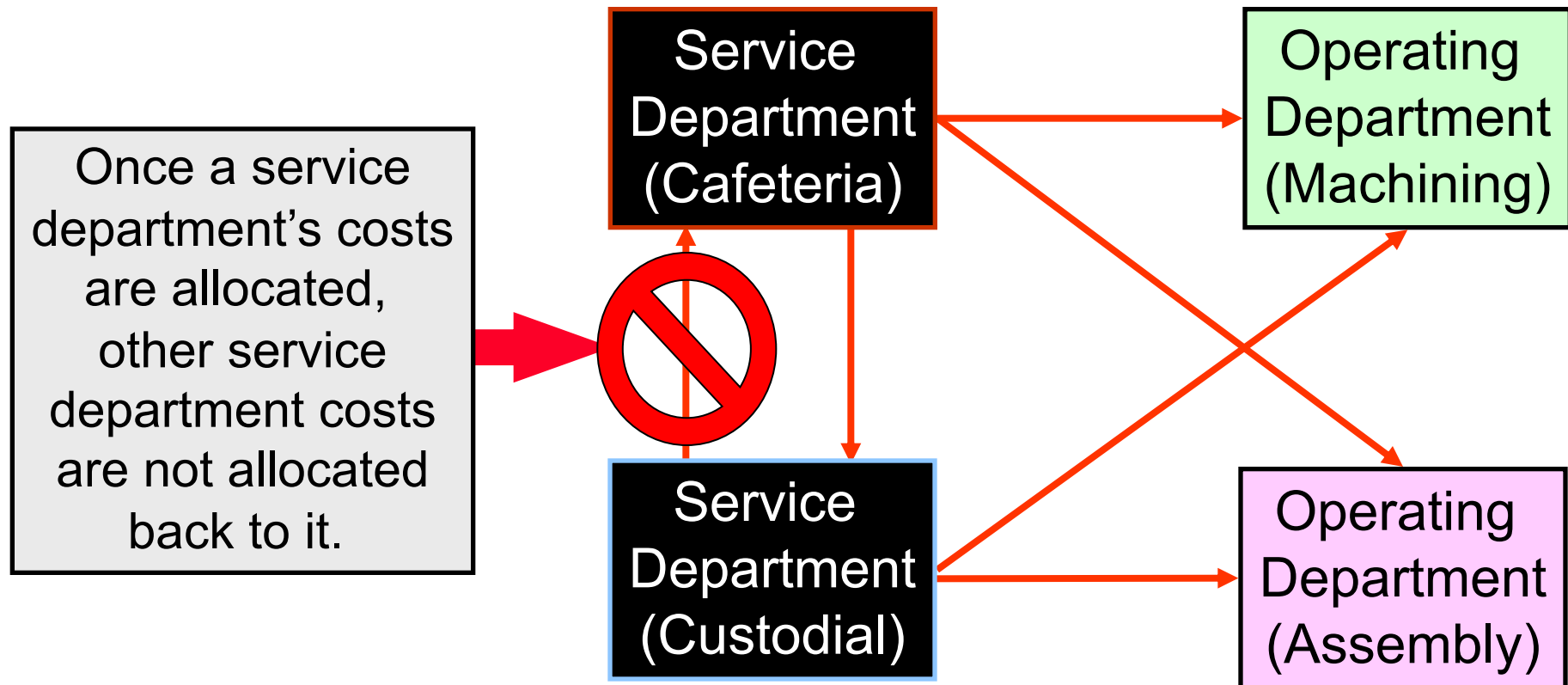
Step - Down Method: layout of allocation

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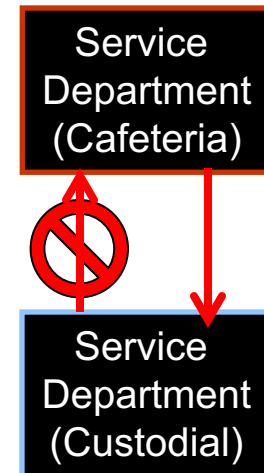
Practically speaking, there is the necessity to define an ALLOCATION ORDER of Service Departments.

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:

❶ 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.

❷ Any amount of the allocation base that is attributable to a service department whose cost has already been allocated is ignored.

❸ 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.

	Service Departments		Operating Departments	
	Cafeteria	**Custodial**	**Machining**	**Assembly**
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

Service Department	Allocation Base
Cafeteria	Number of employees
Custodial	Square feet occupied

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	?	?	?	?
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	?	?	?

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

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

	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	100,000
Total after allocation	$ 0	$ 0	$ 570,000	$ 980,000

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

Allocation base: Square feet occupied

Reciprocal Method

Interdepartmental services are given full recognition rather than partial recognition as with the step method.

Service Department (Cafeteria)

Service Department (Custodial)

Operating Department (Machining)

Operating Department (Assembly)
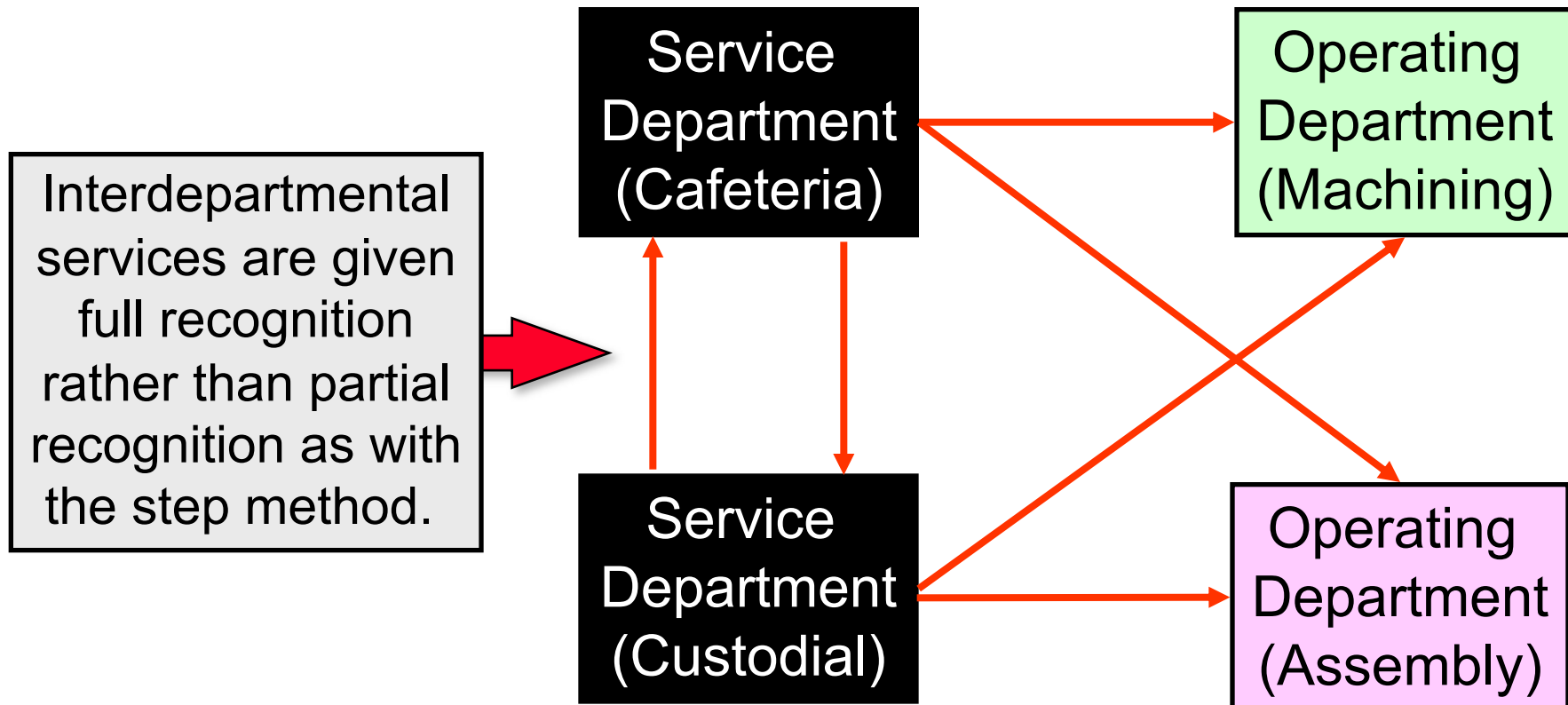
Because of its mathematical complexity, the reciprocal method is rarely used.

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

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

	Service Departments		Operating Departments	
	ADMIN	**BACS**	**Accounting**	**Others**
Departmental costs				
before allocation	$ 180,000	$ 90,000	$ 190,000	$ 900,000
ADMIN allocation	(180,000)		36,000	144,000

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

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 ✓

	Service Departments		Operating Departments	
	ADMIN	BACS	Accounting	Others
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	$ -	$ -	$ 239,500	$ 1,120,500

c. $270,000

d. $ 49,500

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

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

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

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
	170,000	85,000	525	200,000	90,000

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
Total budgeted cost	$1,061,000

*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	800	13,000
Total hours	2,800	14,600

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.