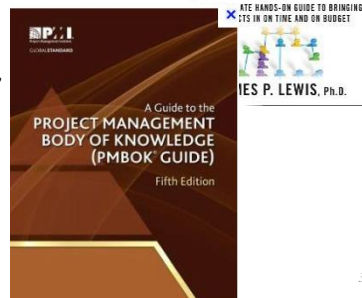




## Course Description (Continued ...)

- **Mid-term session:**
  - 23<sup>rd</sup>, Aban 1392
- **Reference:**
  - Kerzner, H., “Project Management—A Systems Approach to Planning, Scheduling, and Controlling, Eighth Edition”, 2003, John Wiley & Sons, Inc.
  - Lewis, James P.; “Project planning, scheduling, and Control a hands-on guide to bringing projects in on time and on budget”, 2001, McGraw-Hill
  - Project Management Institute; “A Guide to the Project; Management Body of Knowledge”, 5<sup>th</sup> edition, 2013, Project Management Institute, Inc.



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## Course Description (Continued...)

### Course Calendar:

		1,2																														
		W1																														
		Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu	
مهر	9 Sep	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	
مهر	10 Oct																															
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آبان	10 Oct	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	
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		6,7,8														9,10,11																
		W3														W4																
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آذر	11 Nov	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	
آذر	12 Dec																															
		12,13,14																														
		W5																														
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دی	12 Dec	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	
دی	1 Jan																															
2014		International Campus – Kish, Sharif University of Technology																												2014		
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## *Course Description (Continued..)*

- *Contents:*
  - *Chapter 1 - Overview*
  - *Chapter 2 - Project Management Growth—Concepts and Definitions*
  - *Chapter 3 - Organizational Structures*
  - *Chapter 4 - Organizing and Staffing the Project Office and Team*
  - *Chapter 5 - Management Functions*
  - *Chapter 6 - Time Management and Stress*
  - *Chapter 7 - Conflicts*
  - *Chapter 8 - Special Topics*
  - *Chapter 9 - The Variables for Success*
  - *Chapter 10 - Working with Executives*
  - *Chapter 11 - Planning*

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## *Course Description (Continued..)*

- *Contents:*
  - *Chapter 12 - Network Scheduling*
  - *Chapter 13 - Project Graphics*
  - *Chapter 14 - Pricing and Estimating*
  - *Chapter 15 - Cost Control*
  - *Chapter 16 - Trade-off Analysis in a Project Environment*
  - *Chapter 17 - Risk Management*
  - *Chapter 18 - Learning Curves*
  - *Chapter 19 - Modern Developments in Project Management*
  - *Chapter 20 - Quality Management*
  - *Chapter 21 - Contracts and Procurement*
  - *Chapter 22 - Critical Chain Project Management*

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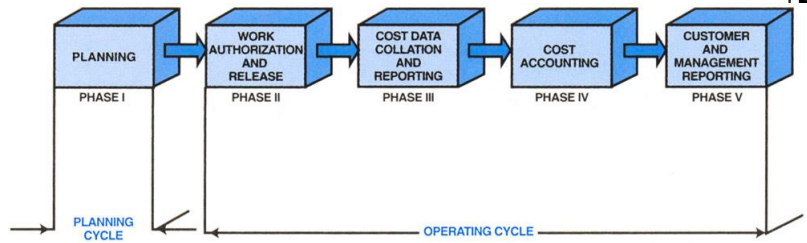
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## Chapter 15 – Cost Control

### Introduction

- Cost control is equally important to all companies, regardless of size.
- Cost control implies good cost management, which must include:

- Cost estimating
- Cost accounting
- Project cash flow
- Company cash flow
- Direct labor costing
- Overhead rate costing
- Other tactics, such as incentives, penalties, and profit-sharing



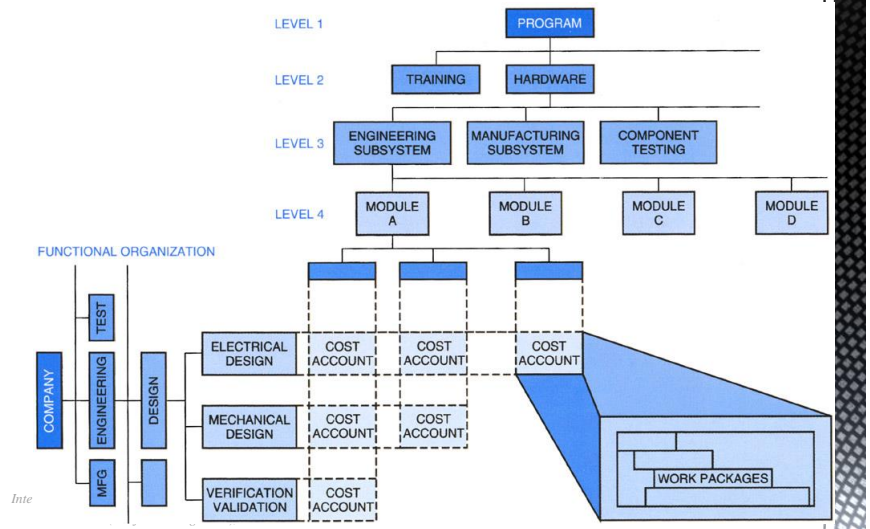
## Chapter 15 – Cost Control

### Cost accountant codes

- Since project managers control resources through the line managers rather than directly, project managers end up controlling direct labor costs by opening and closing work orders.
- Work orders define the charge numbers for each cost account. By definition, a cost account is an identified level at a natural intersection point of the work breakdown structure and the organizational breakdown structure (OBS)

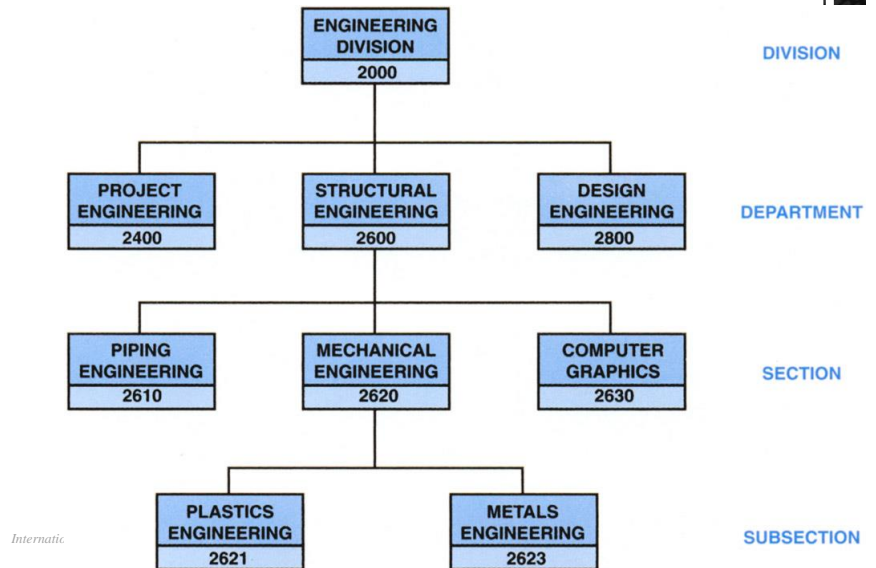
# Chapter 15 – Cost Control

- Cost accountant codes



# Chapter 15 – Cost Control

- Cost accountant codes



## Chapter 15 – Cost Control

- **Budget**
  - *The project budget, which is the final result of the planning cycle, must be reasonable, attainable, and based on contractually negotiated costs and the statement of work.*
  - *The basis for the budget is either historical cost, best estimates, or industrial engineering standards. The budget must identify planned manpower requirements, contract allocated funds, and management reserve.*
  - *All budgets must be traceable through the budget "log," which includes:*
    - *Distributed budget*
    - *Management reserve*
    - *Undistributed budget*
    - *Contract changes*

## Chapter 15 – Cost Control

- **Variance and Earned value**
  - *A variance is defined as any schedule, technical performance, or cost deviation from a specific plan. Variances must be tracked and reported.*
    - *They should be mitigated through corrective actions and not eliminated through a baseline change unless there is a good reason.*
  - *The budgeting and scheduling system variance must be compared because:*
    - *The cost variance compares deviations only from the budget and does not provide a measure of comparison between work scheduled and work accomplished.*
    - *The scheduling variance provides a comparison between planned and actual performance but does not include costs.*

## Chapter 15 – Cost Control

- *Variance and Earned value*
  - *There are two primary methods of measurement:*
    - *Measurable efforts: Discrete increments of work with a definable schedule for accomplishment, whose completion produces tangible results.*
    - *Level of effort: Work that does not lend itself to subdivision into discrete scheduled increments of work, such as project support and project control.*

## Chapter 15 – Cost Control

- *Variance and Earned value*
  - *Variances are used on both types of measurement.*
  - *In order to calculate variances, we must define the three basic variances for budgeting and actual costs for work scheduled and performed. Archibald defines these variables:*
    - *Budgeted cost for work scheduled (BCWS) is the budgeted amount of cost for work scheduled to be accomplished plus the amount or level of effort or apportioned effort scheduled to be accomplished in a given time period.*
    - *Budget cost for work performed (BCWP) is the budgeted amount of cost for completed work, plus budgeted for level of effort or apportioned effort activity completed within a given time period. This is sometimes referred to as "earned value."*
    - *Actual cost for work performed (ACWP) is the amount reported as actually expended in completing the work accomplished within a given time period.*

## Chapter 15 – Cost Control

- *Variance and Earned value*
  - *Variances are used on both types of measurement.*
  - *BCWS represents the time-phased budget plan against which performance is measured.*
    - *For the total contract, BCWS is normally the negotiated contract plus the estimated cost of authorized but unpriced work (less any management reserve).*
    - *For any given time period, BCWS is determined at the cost account level by totaling budgets for all work packages, plus the budget for the portion of in-process work (open work packages), plus the budget for level of effort and apportioned effort.*

## Chapter 15 – Cost Control

- *Variance and Earned value*
  - *Variances are used on both types of measurement.*
  - *Cost variance (CV) calculation:*

$$CV = BCWP - ACWP$$
    - *A negative variance indicates a cost-overflow condition.*
  - *Schedule variance (SV) calculation:*

$$SV = BCWP - BCWS$$
    - *A negative variance indicates a behind-schedule condition.*



## Chapter 15 – Cost Control

### ▪ Variance and Earned value

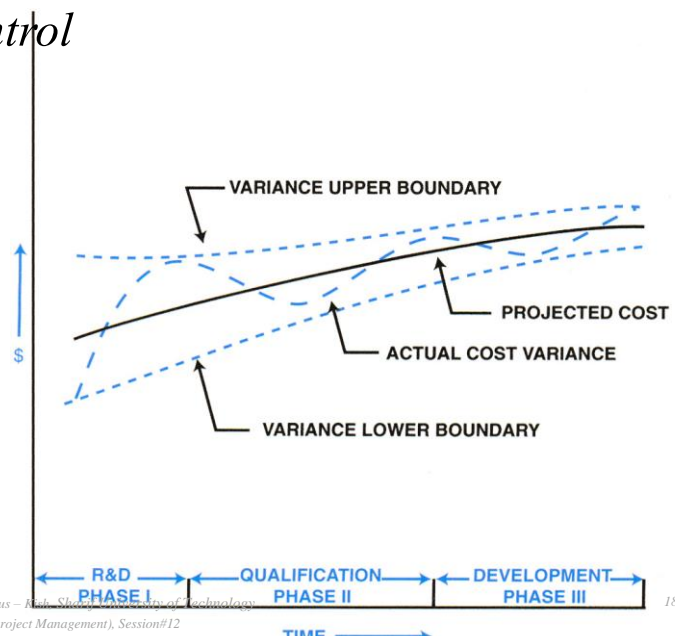
- In the analysis of both cost and schedule, costs are used as the lowest common denominator. In other words, the schedule variance is given as a function of cost. To alleviate this problem, the variances are usually converted to percentages:

$$\text{Cost variance \% (CVP)} = \frac{\text{CV}}{\text{BCWP}}$$

$$\text{Schedule variance \% (SVP)} = \frac{\text{SV}}{\text{BCWS}}$$

## Chapter 15 – Cost Control

### ▪ Variance and Earned value



## Chapter 15 – Cost Control

### ▪ Variance and Earned value

- In addition to calculating the cost and schedule variances in terms of dollars or percentages, we also want to know how efficiently the work has been accomplished. The formulas used to calculate the performance efficiency as a percentage of EV are:

$$\text{Cost performance index (CPI)} = \frac{\text{BCWP}}{\text{ACWP}}$$

$$\text{Schedule performance index (SPI)} = \frac{\text{BCWP}}{\text{BCWS}}$$

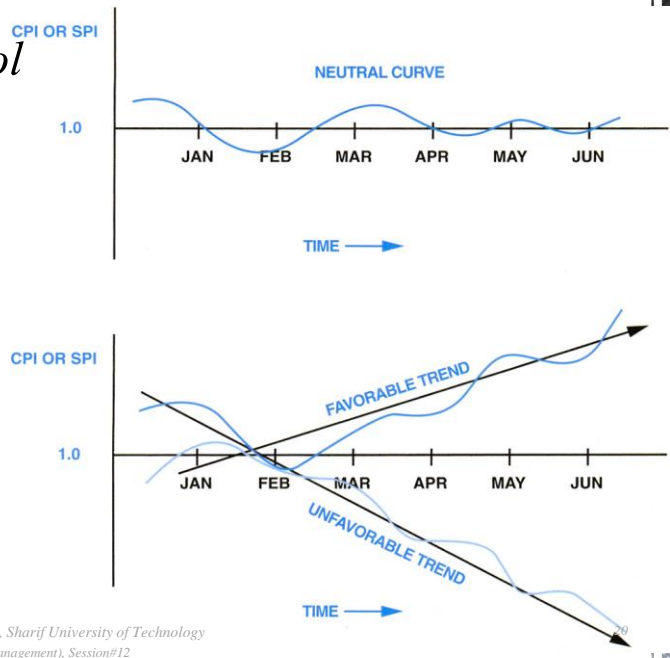
- If  $\text{CPI} = 1.0$ , we have perfect performance. If  $\text{CPI} > 1.0$ , we have exceptional performance. If  $\text{CPI} < 1.0$ , we have poor performance. The same analysis can be applied to the SPI.

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## Chapter 15 – Cost Control

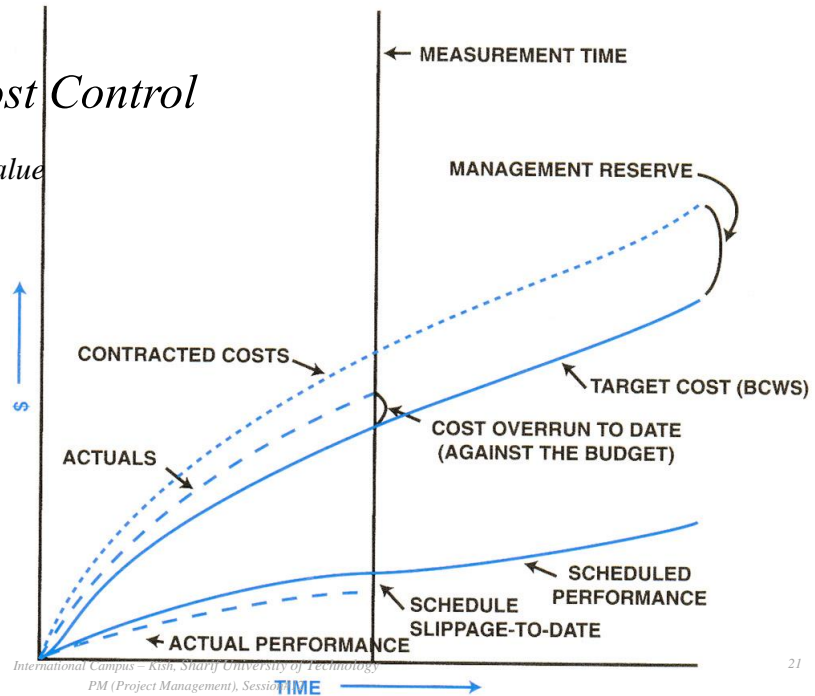
### ▪ Variance and Earned value



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## Chapter 15 – Cost Control

### ▪ Variance and Earned value



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## Chapter 15 – Cost Control

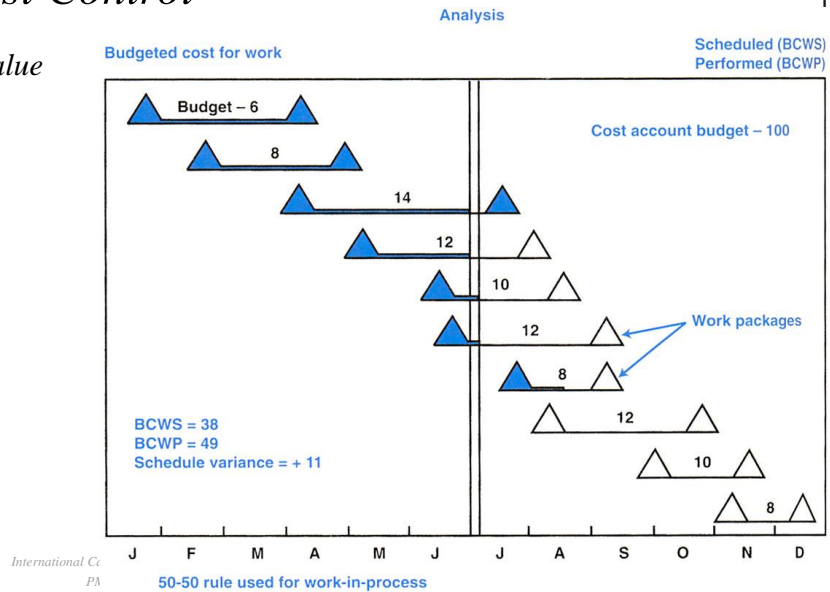
### ▪ Variance and Earned value

- The difficulty in performing variance analysis is the calculation of BCWP because one must predict the percent complete.
- To eliminate this problem, many companies use standard dollar expenditures for the project, regardless of percent complete.
  - We could say that 10 percent of the costs are to be "booked" for each 10 percent of the time interval.
- Another technique, and perhaps the most common, is the 50/50 rule.
  - Half of the budget for each element is recorded at the time that the work is scheduled to begin, and the other half at the time that the work is scheduled to be completed. For a project with a large number of elements, the amount of distortion from such a procedure is minimal.

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## Chapter 15 – Cost Control

### ▪ Variance and Earned value



## Chapter 15 – Cost Control

### ▪ Variance and Earned value

- Variances are used on both types of measurement.
- Cost variance (CV) calculation:

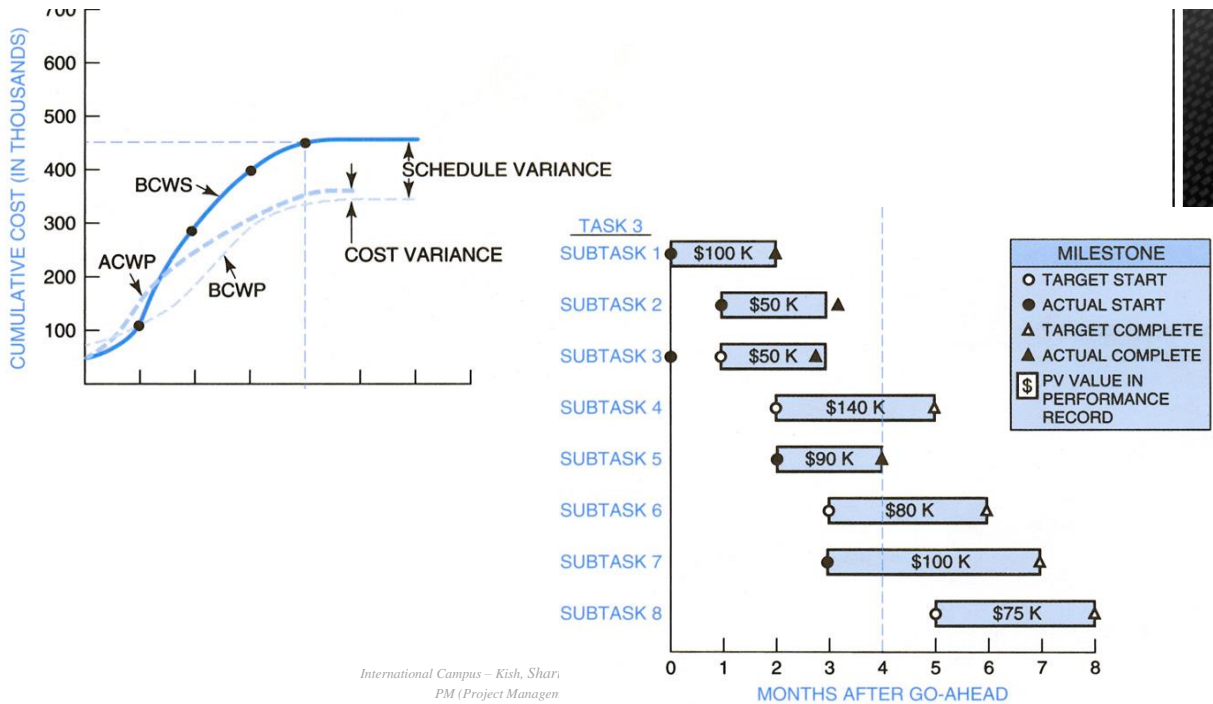
$$CV = BCWP - ACWP$$

- A negative variance indicates a cost-overflow condition.

- Schedule variance (SV) calculation:

$$SV = BCWP - BCWS$$

- A negative variance indicates a behind-schedule condition.



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## Chapter 15 – Cost Control

- **Variance and Earned value**
  - There are techniques available other than the 50/50 rule:
  - **0/100:** Usually limited to work packages (activities) of small duration (i.e., less than one month). No value is earned until the activity is complete.
  - **Milestone:** This is used for long work packages with associated interim milestones, or a functional group of activities with a milestone established at identified control points. Value is earned when the milestone is completed. In these cases, a budget is assigned to the milestone rather than the work packages.
  - **Percent complete:** Usually invoked for long-duration work packages (i.e., three months or more) where milestones cannot be identified. The value earned would be the reported percent of the budget.
  - **Equivalent units:** Used for multiple similar-unit work packages, where earnings are on completed units, rather than labor.

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## Chapter 15 – Cost Control

### ▪ Variance and Earned value

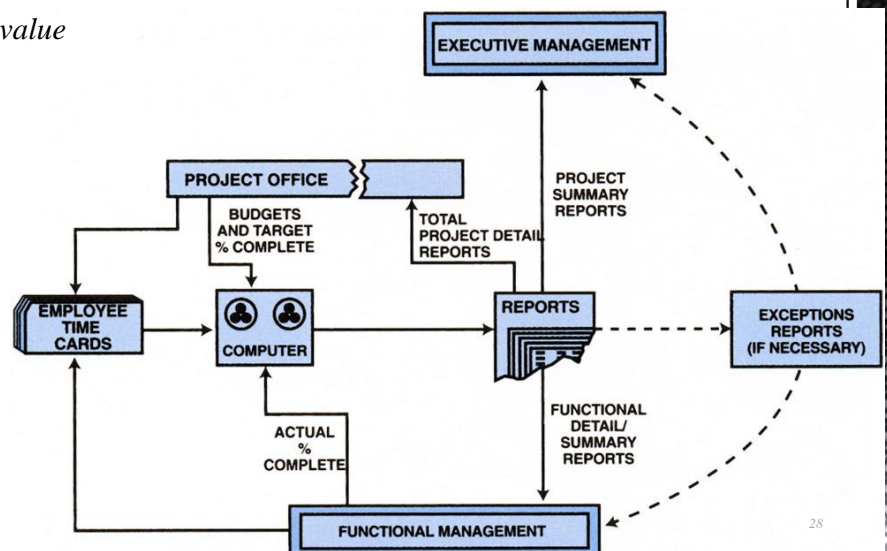
- There are techniques available other than the 50/50 rule:
- Cost formula (80/20): A variation of percent complete for long-duration work packages.
- Level of effort: This method is based on the passage of time, often used for supervision and management work packages. The value earned is based on time expended over total scheduled time. It is measured in terms of resources consumed over a given period of time and does not result in a final product.
- Apportioned effort: A rarely used technique, for special related work packages. As an example, a production work package might have an apportioned inspection work package of 20 percent. There are only a few applications of this technique. Many people will try to use this for supervision, which is not a valid application. This technique is used for effort that is not readily divisible into short-span work packages but that is in proportion to some other measured effort.

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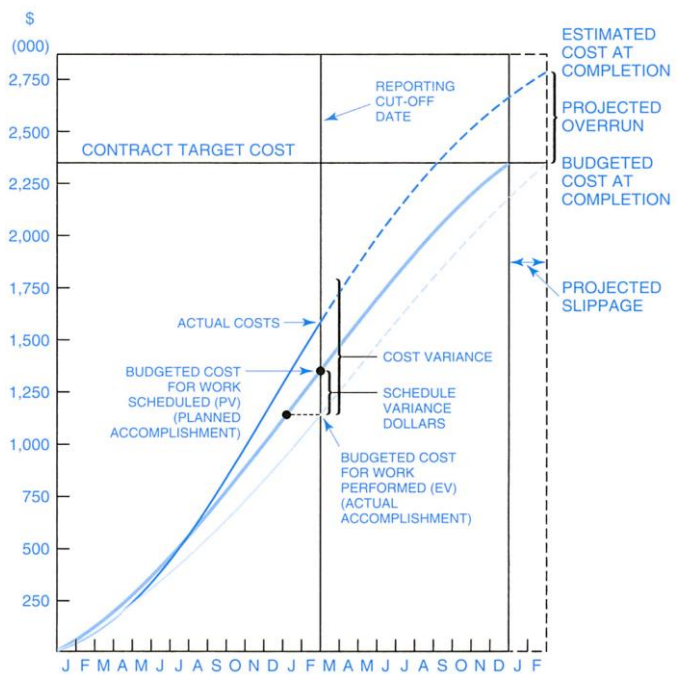
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## Chapter 15 – Cost Control

### ▪ Variance and Earned value



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