

Module 1

Introduction to Project Management

Objectives Covered In This section

The Introduction to project management section covers the basics of Project Management that provides a basic understanding of various areas and concepts of Project Management:

- Defining Project
- Defining Project Management
- Project Management characteristics
- PMI Project Management Knowledge Areas
- Triple Constraint
- Project Scope Management
- Project Time Management
- Project Cost Management

1. Defining Project

The Project Management Institute defines Project as ‘a temporary endeavor undertaken to create a unique product or service’. The key words of this definition are:

Unique – The end product of a project is unique in some way or the other. Two products can be similar to each other but can never be the same. Product characteristics are progressively elaborated.

Temporary - A project has a finite duration with a definite beginning and a definite end. Project ceases when objectives are met. Team is disbanded upon project completion.

Other important characteristics of a project are:

- It has a tangible, measurable, verifiable objective.
- Is unique to a great extent
- It is a coordinated effort of inter-related activities
- Performing the project activities require Resources
- Resources cost money

Examples of a Project can be:

- Building a house
- Relocating a data center
- Writing a book
- Developing a software program

1.1 Project Stakeholder

Stakeholders are individuals or organizations that are positively or negatively impacted by the project or its result. The role of a project manager is to:

- identify stakeholders
- assess their knowledge and skills
- analyze the project and ensure that their needs are met
- Keep them involved in the project through work, using them as experts, reporting, involve in changes, involve while documenting Lessons Learned etc.

1.2 Defining Project Management

Project management is the application of knowledge, skills, tools & techniques to project activities in order to meet project objectives.

PMBOK has identified five process groups, i.e. Initiating, Planning, Executing, Monitoring & Controlling, and closing that comprises the Project Management Life Cycle.

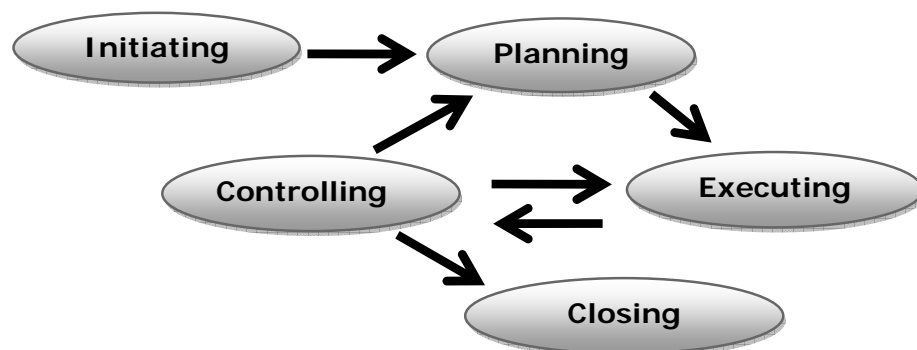


Fig 1.1: Project Management Process Groups

Every project goes through the same project life cycle and managing the project includes:

1. Determining project objectives

What is the goal (or goals) of the project? Examples of project goals include building a bridge, relocating the MIS department to a new site, or installing a new phone system. More importantly, some examples of things that are not projects include scheduling the usage for a training facility or scheduling engineers in a technical service department. These are not projects because they do not meet all the criteria of a project. They do not have a definitive start, finish, and duration.

2. Managing manpower, budgets, and resources

Projects do not get done without people and other resources required. To ensure successful completion of a project, it is important to estimate correctly the number of personnel and the amount of equipment needed. It is also important to estimate the cost of the project. Some projects can be completed in a shorter time by increasing the manpower on the project. However, doing this also increases the cost. One of the project manager's jobs is to maintain a balance between reducing costs and reducing the time to complete the project.



3. Reporting Progress

The key to project management is reporting progress. It is essential that key players in a project know what is happening, and whether they are behind or ahead of schedule. By reviewing progress on a regular basis, you can avoid possible problems in advance. For example, if you notice that a certain task was scheduled to take 10 days to accomplish, but on day 5 only 25% of the work was finished, you could try to reallocate resources to that task in order to complete it on time.

4. Evaluating efficiency and effectiveness

During and after a project, it is important to review and analyze the performance of the project. This information can provide valuable insight into possible changes to make for future projects. For example, your project was to build a house, and one of those steps was landscaping. After the project is finished, you notice that it took less time to do the landscaping than you originally planned. If you build another house, and the scope of the landscaping is comparable in both projects, this information could be valuable because you could reduce the time allocated for landscaping. By constantly reviewing the efficiency and effectiveness of your project, you can more accurately plan future projects. These are also called Lessons Learned.

2. Project Management characteristics

Project Management: An Overview

Project Characteristics

- ☐ Goal (measurable/verifiable) Oriented
- ☐ Finite duration with a beginning and end
- ☐ Uniqueness to a great extent and related uncertainties
- ☐ Coordinated undertaking of interrelated activities
- ☐ Performing the activities involve resources
- ☐ Resources cost money

3. Project Manager

Project managers are individuals who are responsible for day-to-day project management activities such as creating, maintaining, updating schedules, and coordinating with other project managers, team members, and sponsor. They coordinate projects and related tasks, and sometimes have direct management responsibilities for resources assigned to their project. The resources involved in one project may not be the same resources involved in another project. Project managers focus only on work that is specific to their project or projects, and are primarily task and time-constrained. “How do I ensure my project gets finished in the shortest amount of time?” is a question on every project manager’s mind each day.

A Project Manager uses MS Project 2010 to do the following:

- Create project plans, perform what-if analysis, identify and analyze alternatives, and then implement organization’s project management standards and best practices over the lifecycle of a project
- Identify the project’s resource requirements and its individual costs and assign them to project activities
- Baseline the plans
- Determine the target and actual project timelines at any given time
- Update actual project status, track project progress, and determine variance
- Adjust plan based upon the variances to achieve project objective

Apart from this, project manager has the responsibility to prevent the project from changes and thus close the project successfully. To do the same, it is best to gather stakeholder requirements in the initial phases of a project because as the project progress, the cost of incorporating the change goes higher.

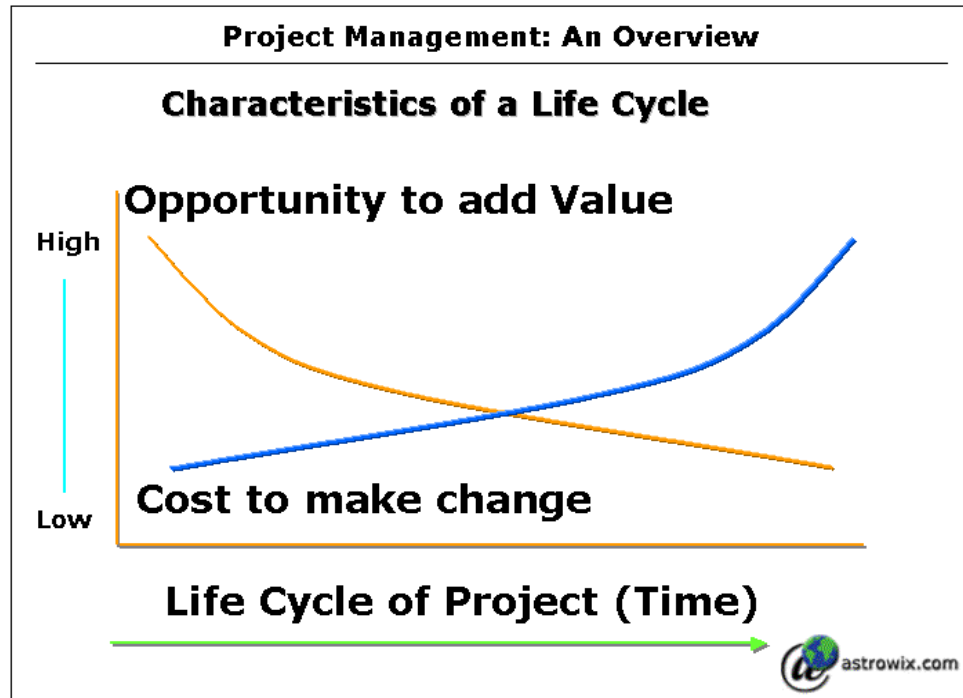


Fig 1.2: Life Cycle of Project

To minimize changes and variances, Harold Kerzner developed a theorem, popularly known as The Triple Constraint Theorem.

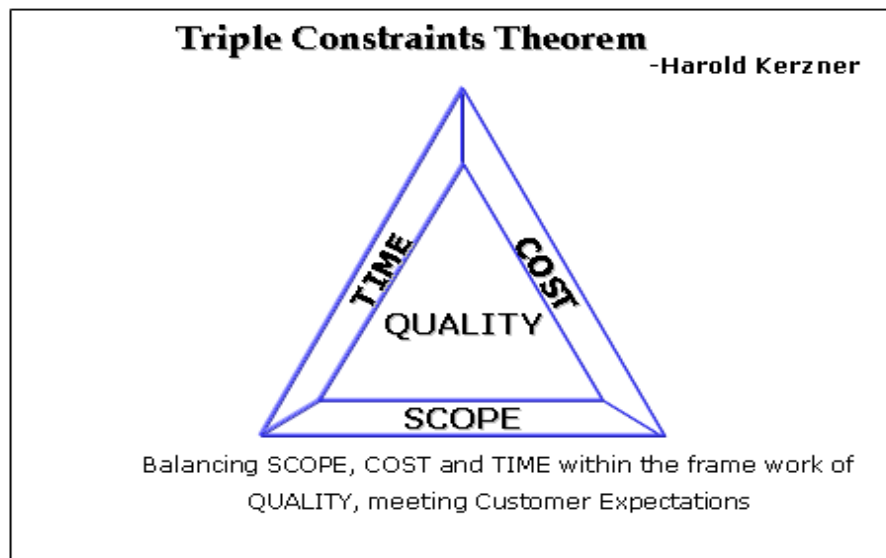


Fig 1.3: Triple Constraint Theorem

This Theorem states that Scope, Time & Cost are the three arms of a triangle. Either of these is reduced or stretched, the change impacts the other. As a project manager, you can best manage the triple constraint by offering the stakeholders to choose any two out of the three. This leads to increased customer satisfaction.

4. Project Scope Management

As per PMBOK, Project Scope Management is to ensure that the project includes all the work required, and only the work required, to complete the project successfully. It is primarily concerned with defining and controlling what is and not to be included in the project.

4.1 Work Breakdown Structure

While creating a plan in MS Project, the first step is to identify the work required to be done in order to complete the project successfully. This is done by decomposing the higher work deliverables into detailed and manageable activities. This is called a Work Breakdown Structure (WBS). The highest level of the WBS is the project itself, the next level comprises of the phases that have tangible verifiable deliverables produced at the end of it.

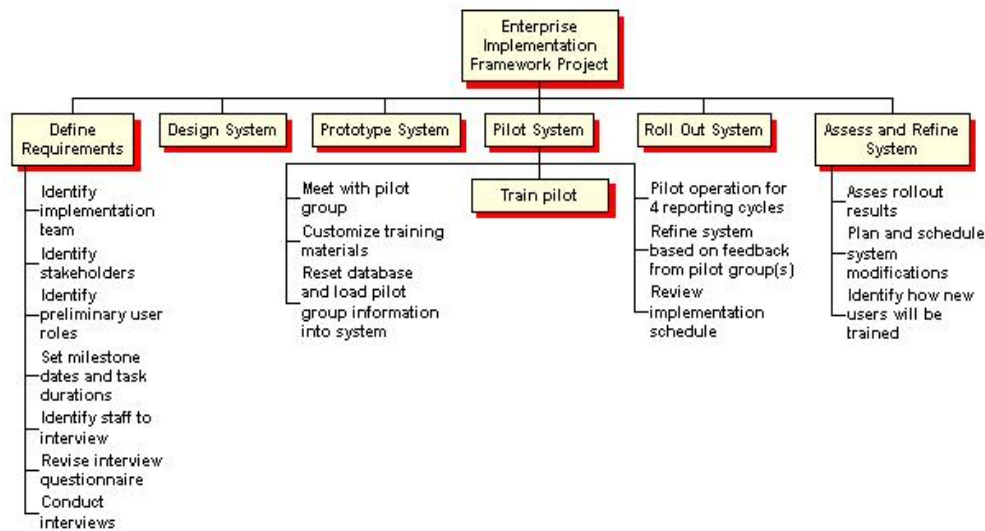


Fig 1.4: A sample WBS

Any work item that is stated in the WBS is part of project scope and anything that is not listed in the WBS is considered to be out of project scope.

TIP:

Break-down the project work only up to the desired level of tracking. i.e. activities should be decomposed in such a way that it can be tracked. It is considered best to decompose the work not less than 8hrs and not more than 80 hrs.

5. Project Time Management

According to the PMBOK, Project Time Management consists of the "processes required to accomplish timely completion of the project." Although the chapter topic title is time management, this chapter is more about schedule management and the processes necessary to complete and control a working schedule for a project.

In the previous chapter we learnt about creating the WBS. We need to further decompose the WBS into an activity list. Once the activities are identified and outlined, they need to be sequenced. Thereafter it is required to estimate the durations of each activity. All these steps when performed, creates the project schedule. It is therefore very important to understand the following concepts– Network Diagrams, Critical Path Method, Task Relationships, Leads & Lags, Duration estimating.

5.1 Network Diagrams

There are two commonly used techniques to create a network diagram:

1. Precedence Diagramming Method (PDM) uses boxes or nodes as activities and arrows as dependencies between the nodes. PDM is also known as Activity On Nodes (AON). Most project management software uses this method.

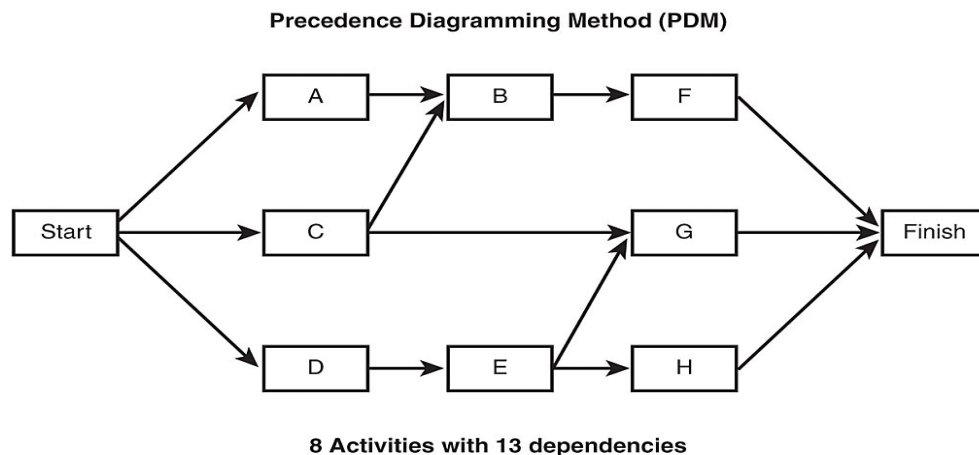


Fig 1.5: Precedence Diagramming Method

2. Arrow Diagramming Method (ADM) uses arrows as activities, and nodes are used to connect and show dependencies.

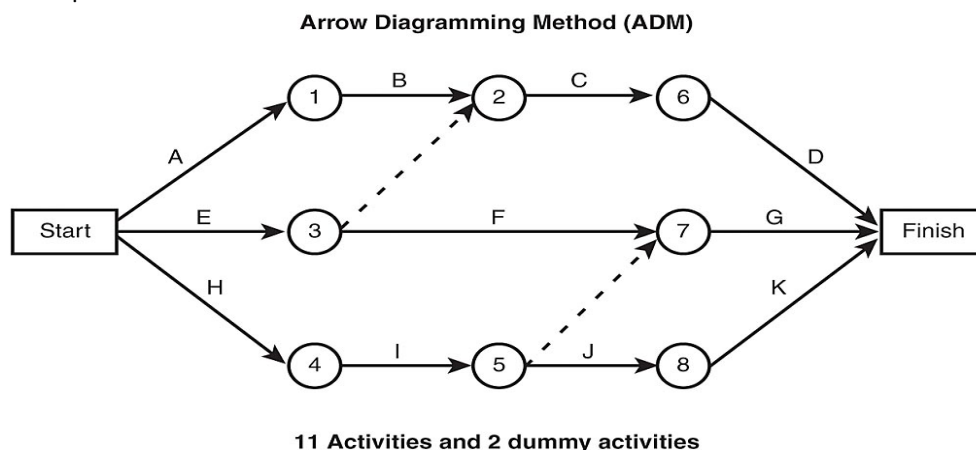


Fig 1.6: Arrow Diagramming Method

5.2 Activity Duration Estimating with PERT

Though project managers mostly estimate activity durations based upon their own knowledge of the subject, or from past project data, or by taking inputs from the team, there exists a mathematical approach to estimate the activity durations from the collected data from various sources. The method is called Program Evaluation and Review Technique (PERT). This method uses a weighted average duration estimate to calculate activity durations. It is also referred to as three-point estimate. Each activity will have three estimates: Pessimistic, Optimistic, and Most Likely.

$$\text{Pert Estimated Value} = \frac{\text{Pessimistic} + \text{Optimistic} + 4 \times \text{Most Likely}}{6}$$

6

5.3 Task Relationships

A task dependency describes how a task is related to the start or finish of another task. Microsoft Project provides four task dependencies that can be used to connect a series of tasks in a schedule. By using these dependencies effectively, one can modify the critical path and shorten the project schedule slack. These different dependency relationship types are:

Finish-to-start	FS	An activity must finish before the next activity begins
Finish-to-finish	FF	An activity must finish before the next activity can finish
Start-to-start	SS	An activity must start before the next activity can start
Start-to-finish	SF	An activity must start before the next activity can finish

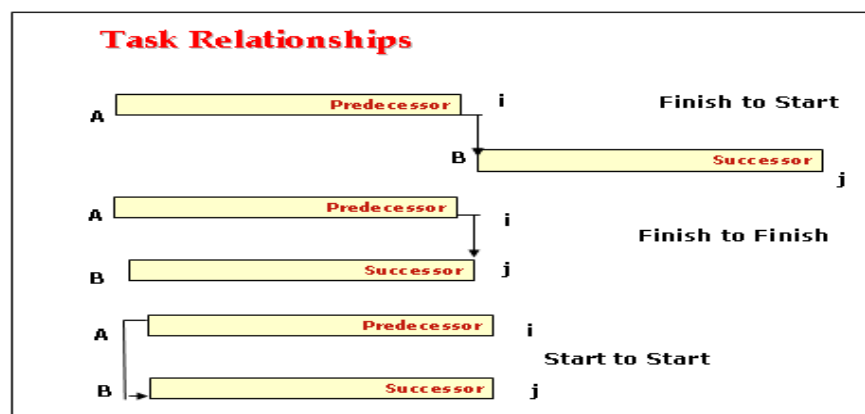


Fig 1.7: Task Relationship

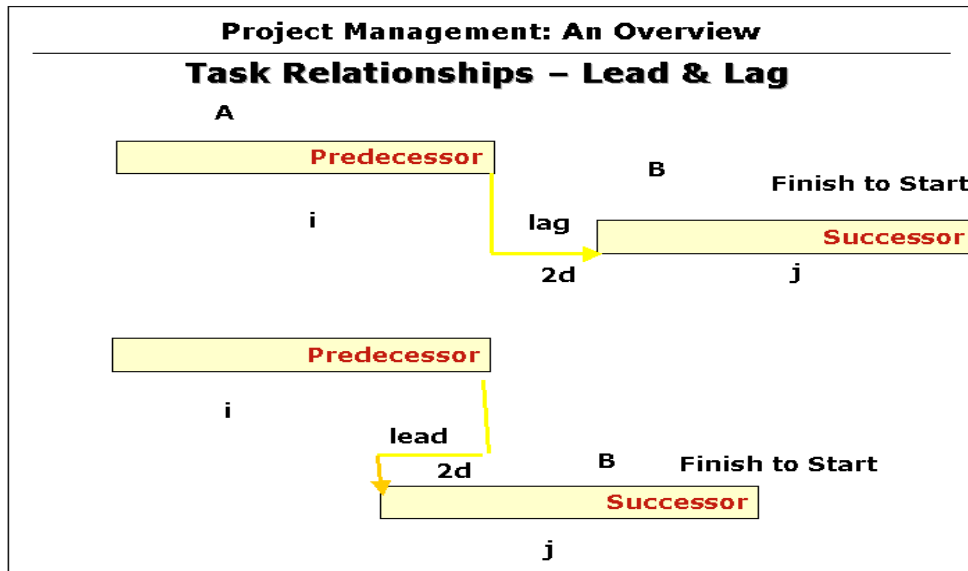


Fig 1.8: Task Relationship- Lead & Lag

5.4 Critical Path Method (CPM)

This is a method of calculating the total duration of a project based on a specified project start date individual duration of tasks and task dependencies. CPM also provides information about how far a task can slip into the future before it moves other tasks or makes the project finish later.

For a specified project start date and a set of tasks along with their dependencies and constraints, the CPM method calculates the following:

- The earliest each task can start and finish, and the earliest the project can finish.
- The latest each task can start and finish, without causing the project to finish later.
- How far into the future each task can slip without causing any other task to finish later, and how far into the future each task can slip without causing any other task to finish later.
- Which tasks is critical, i.e. Which tasks will delay the project if they slip?

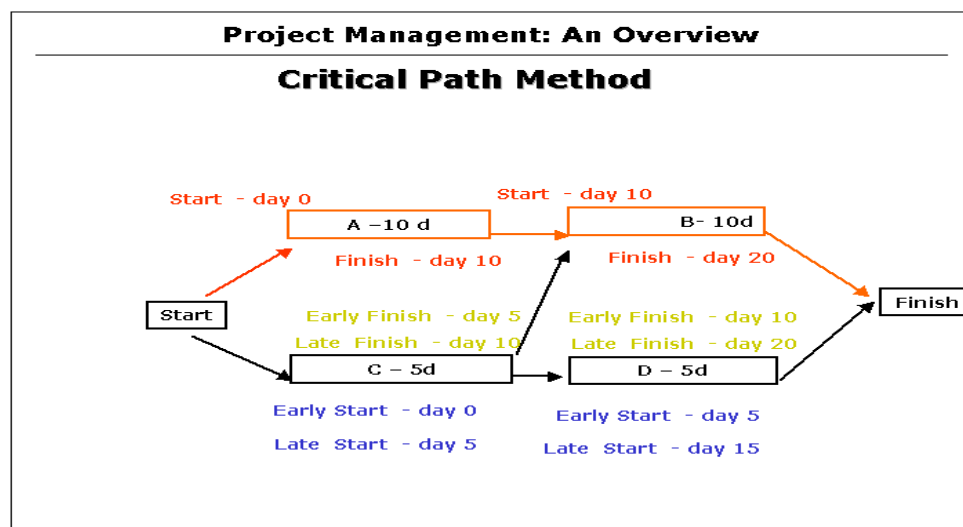


Fig 1.9: Critical Path Method

Here the path with the longest duration is the Project duration, and is Critical Path of the project. Difference between LS & ES or LF & EF gives the activity float. Activities on the critical path have zero float. Float is also known as slack.

- Slack: The amount of time a task can slip before it affects another task's dates or the project finish date.
- Free slack: The amount of time a task can slip before it delays another task.
- Total slack: The amount of time a task can slip before it delays the project finish date. When the total slack is negative, the task duration is too long for its successor to begin on the date required by a constraint.
- Project slack: The amount of time a project can be delayed so that it does not delay the externally imposed end date.
- It is most important for a project manager to monitor the critical path more closely as any delay on these activities will result in the delay of the project end date.

6. Project Cost Management

PMBOK describes Project Cost Management as "the processes involved in planning, estimating, budgeting, and controlling costs so that the project can be completed within the approved budget." As one of the triple constraints, cost is often the single most important indicator for the sponsor. The budget can determine the final scope of the project. If there are cost overruns then the project manager needs to take corrective action for the completion of a successful project.

6.1 Cost Estimating

There are three types of estimates listed in the PMBOK. Each has a range of accuracy. They are:

- Order of magnitude estimate: The estimate has a range of -25% to +75% accuracy. As you can see, this is a rather large range and is usually the first type of estimate that is done.
- Budget estimate: has a range of -10% to +25%. The range is narrowing from the order of magnitude estimate.
- Definitive estimate: ranges from -5% to +10%. A project manager should always try to achieve a definitive estimate as that is closest to the actual cost and results in minimum variances.

6.2 Earned Value Management System

Once the cost is estimated and assigned to resources and tasks, it is important to monitor it. Performance measurement shows variations from the baseline planning. Earned value management is one of the types of performance measurement system to calculate cost variances and forecast the project costs. This can be simply done by identifying the value of just three parameters on a given day, they are:

EV: Earned Value or also known as Budgeted Cost of Work Performed (BCWP).

PV: Planned Value or also known as Budgeted Cost of Work Scheduled (BCWS).

AC: Actual cost to date

Using these parameters, Earned Value Management System helps calculate the project status. Given below are the formulas to calculate:

Schedule Variance, i.e. SV	$SV = EV - PV$ (Negative SV means behind schedule)
Cost Variance, CV	$CV = EV - AC$ (Negative CV means over budget)
Schedule Performance Index, i.e. SPI	$SPI = EV / PV$ (SPI > 1 is good)
Cost Performance Index, i.e. CPI	$CPI = EV / AC$ (CPI > 1 is good)

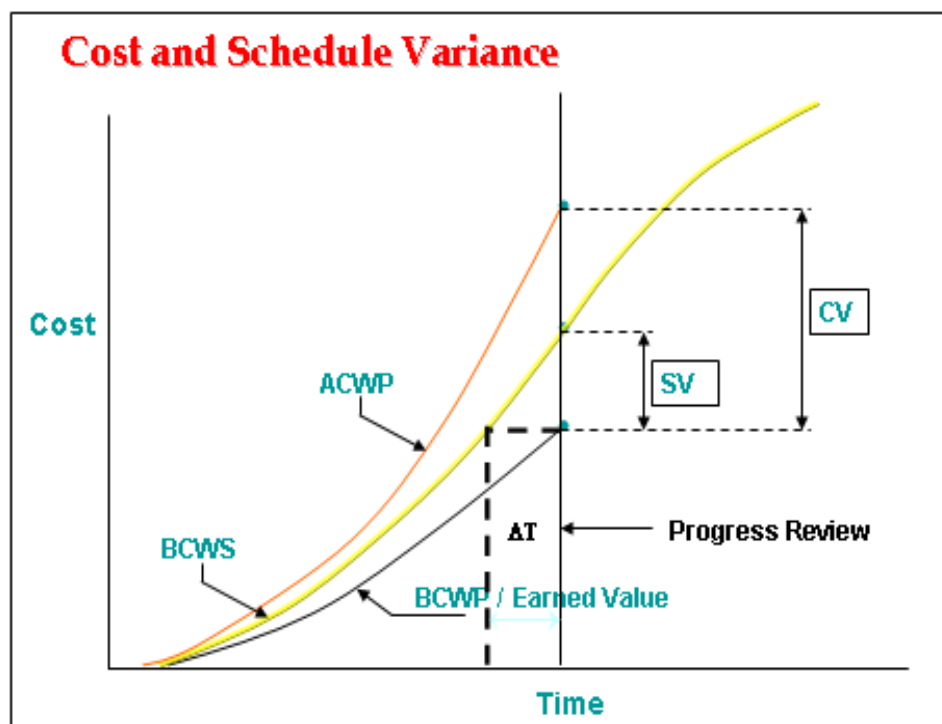


Fig 1.10: S-curve

Other terms to remember are:

- BAC = Budget at Completion
- EAC = Estimate at Completion
- VAC = Variance at Completion

Forecasting:

$EAC = BAC/CPI$	used if no variances from BAC
$EAC = AC+ETC$	used when original estimate is flawed
$EAC = (AC+BAC-EV)$	used when current variances are atypical
$EAC = AC+(BAC-EV)/CPI$	used when current variances are typical
$VAC = BAC-EAC$	

There are two general types of costs that can be tracked in Microsoft® Project, costs associated with tasks, or fixed costs, and the cost of resources. Microsoft Project can calculate costs for the project or they can be entered manually by setting specific options in the application.

7. Quiz

1. **A market demand, a technological advance, and a legal requirement are all examples of:**
 - A- Incredible amounts of hard work
 - B- Reasons for authorizing a project
 - C- Management concerns in terms of corporate strategy
 - D- Reasons to become a project manager
2. **When should detail about the product of the project be given?**
 - A- Before anything else happens in the project
 - B- Before the project plan is put under version control
 - C- As soon as possible in the project planning
 - D- Whenever the sponsor requires it
3. **When looking at historical information, it is important to note _____ made in previous projects.**
 - A- Project decisions
 - B- Tactical considerations
 - C- Errors and omissions
 - D- Strategic decisions
4. **The application of knowledge, skills, tools, and techniques to project activities to meet the project requirements is:**
 - A- Project Administration
 - B- Management systems
 - C- Project Management
 - D- Common knowledge
5. **A project is a _____ endeavor undertaken to create a unique product, service, or result.**
 - A- Difficult
 - B- Complex
 - C- Critical
 - D- Temporary
6. **The triple constraints of Project Management are frequently discussed in other contexts such as marketing classes and a variety of other subjects. The interaction between _____, _____, and _____ can be seen as a triangle, with the three sides impacting the others.**
 - A- quality, resources, time
 - B- money, resources, quality
 - C- scope, quality, planning
 - D- time, scope, cost

Answers: 1 – B, 2 – C, 3 – C, 4 – C, 5 – D, 6 – D

Notes