- # Developing the Project Schedule

A well-crafted project schedule is crucial for project managers to organize tasks, allocate resources, and track progress. It helps to ensure the timely completion of project tasks and identify potential risks and issues early on in the project timeline.

By following these steps, you can develop a project schedule that is realistic, achievable, and allows for effective project management.

Steps to Developing a Project Schedule

Step 1: Create a work breakdown structure

Step 2: Estimate durations

Step 3: Determine resources

Step 4: Identify predecessors

Step 5: Determine milestones

Step 6: Identify dependencies

Step 1: Create a Work Breakdown Structure (WBS)

A Work Breakdown Structure (WBS) is used for estimating the project scope by breaking it down into easily manageable components, or bites. WBS is the hierarchical list of project's phases, tasks, and milestones.

A WBS is very useful in planning a project and makes a complex project more manageable. The WBS is designed to help break down a project into manageable chunks that can be effectively estimated, managed, and supervised.

A WBS also provides the basis for a detailed duration and cost estimates. It gives accuracy in estimating a project by calculating how much time and effort is required to accomplish a task or activity, thereby aggregating to estimate the effort required to complete a superior component in the hierarchy.

Estimation Techniques

Following estimation techniques are commonly used in estimating a project scope:-

Top-Down Estimating

This technique is very useful in estimating the project when only high-level requirements

are known in a project and it is then decomposed progressively into smaller activities and work-packets. For example, activity excavation is broken top-down into activities 'Pouring concrete' and 'Cure and strips formation'.

Bottom-Up Estimating

This technique is used when requirements are known at a discrete level where the smaller workpieces are then aggregated to estimate the entire project. This is usually used when the information is only known in smaller pieces. For example, lower-level activities such as building 'Walls', 'Flooring', 'Roofing', 'Doors & windows' may be individually estimated to arrive at duration required to complete 'External Construction'.

WBS for a House Construction Project

The project is broken down into activities which are further decomposed into sub-tasks or sub-activities. The tasks done to complete the project are called activities. An activity is the lowest level subset in the project phase that is executed to accomplish a component of the project.

Define Broader Activities in the Project

Begin by listing the high-level activities (called summary tasks) required to do the project. Start mapping the lower-level pieces or activities in the hierarchy to the summary tasks. The high-level activities (summary tasks) to construct a house are:

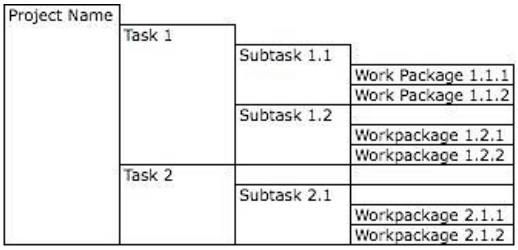
Foundation

External Construction

Internal Construction

Define Detail Activities in the Project

The project is broken down into lower-level activities, subtasks, and work packages until we arrive at a sufficient level of detail that supports the project plan.



Step 2: Estimate Task Duration

Once the list of activities is identified, estimate the task duration for all activities as to how much effort by duration is required to perform each activity. To estimate the task duration, make sure the activity is detailed enough to estimate how much effort each activity or sub-activity will require to complete.

For example, to calculate how much time is required to complete the 'Excavation' for constructing the house, you may need to know what is involved in doing excavation and how much time is required to complete each activity in the excavation. List the set of activities required to do excavation on the site and estimate the duration of each activity.

Step 3: Determine the Resources Requirements

Determine the personnel and non-personnel resources required to perform all activities. For example, the excavation work may require the following resources: Project Manager – Work duration 16 hours Site Grading Contractor – Work duration 80 hours.

Create a Resource Table of all resources who will work on the project

Assign or Allocate resources to activities

Step 4: Identify the Dependencies Between Tasks

After identifying all the activities and timeline necessary to complete the project, we identify and define the immediate predecessors of all activities. This will determine the sequence in which the activities may be performed. For example, excavation work will be carried out before the steel erection can be done. Hence, the predecessor to '1.2 Steel erection' activity will be '1.1 Excavation'.

Step 5: Identify Dependencies

In a project, dependency is a link between tasks or activities or elements. There are four kinds of dependencies:-

Finish to Start (FS): A FS B = B can't start before A is finished or B will start only after A is finished.

For example, concrete must cure before it can be used. Therefore, the builder pours the concrete, waits four days and then builds the walls on the concrete.

Finish to Finish (FF): A FF B = B can't finish before A is finished, i.e., B will finish only after A is finished.

For example, Foundations excavation cannot be completed unless the elevator pit excavation is complete.

Start to Start (SS): A SS B = B can't start before A starts, i.e., B can start only if A has started.

For Example

Curing cannot be started unless pouring for the foundation has started. Start to Finish (SF): A SF B = B can't finish before A starts, i.e., B can finish only after A has started.

Pouring & curing is a parallel activity and Pouring can finish only after curing has started.

During the project planning phase, the project is estimated to list out the set of activities, tasks, and resources required to complete the project. The project schedule is detailed enough to show each task to be performed, the resource allocated to perform the task, the start and end date of each task and the duration in which the task will be performed. During the lifecycle of a project, the project progress is monitored by the project schedule.

Step 6: Determine Milestones

The project is broken down into discrete chunks and the related tasks are grouped together as a phase or component. This phase or component of the project is assigned a measurable milestone as the target date or time to finish it.

- # Network Diagrams (AON, AOA)

Network Diagrams mainly are 2 types - Activity on arrow (AoA) and activity on node (AoN) are being used to analyze various tasks involved for completing any project, especially when it is being used most to the time that is required to complete each task and the minimum amount of the time that is required to complete the entire project. It is a well known method which comes under the Program Evaluation and Review Technique called as PERT.

There are 3 stages involved in developing a network diagrams are;

- Planning stage

- Sequencing stage

- Scheduling stage

AoA - Activity on Arrow

It uses arrows to represent activities while nodes stand for events.

Each nodes contains 3 numerical values :

* Start time

* Finish Time

* Float or Slack

AoA diagrams show the finish to start relationships with a limited offer like Arrow represents the time span from the event at the start of the arrow to the event at the end. Activities that are represented as arrows have to be added to illustrate some of the more complicated relationships and dependencies that are present between the activities.

Such diagrams use dummy activity to show the relationship among various dependencies and dummy activity needs Zero time to complete it.

AoN - Activity on Node

Each activity is represented by Arrow with nodes at each end to represent the Start and Finish of the activity.

In AoN diagrams, the activity is placed on the node. The interconnection arrows would illustrate the dependencies that are there between the activities. They are more flexible and are capable of illustrating the main relationship types. Since the activity is on nodes the data usually can be placed on the activity.

Such diagrams usually start from the Start Node and end with the End node. And generally dummy activity is not being used.