

Part 3 Project Schedule Management

The schedule management process should generate a project schedule that meets the following criteria:

- **Complete** - the schedule must represent all the work the project will do. This is why the quality and completeness of the WBS is so important.
- **Realistic** - the schedule must be realistic with regard to time expectations and the availability of beneficiaries to participate.
- **Accepted** - the schedule must have "buy-in" from team members and stakeholders, especially the beneficiaries.

Schedule management consists of a series of tasks and steps designed to help manage the time constraints of the project, the steps are:

Plan - Define the Schedule, the sequence of activities, estimate durations and identify the critical path

Do - Publish the Schedule, and ensure all groups assigned to work in the project have a copy of the schedule

Check - Monitor the Schedule, update the schedule progress and identify issues

Adapt - Update the Schedule, based on approved changes or issues caused by delays, distribute updated schedule

Inputs: Inputs for the project scope management include the following documents or sources of information:

Eg. The **WBS**, which contains a detailed list of all project activities and tasks; **Historical information** from similar projects and their lessons learned; **Expert advice** from subject matter experts on a specific technical area of the project; Information from **project beneficiaries** about their own time commitments, **calendar events**, holidays, etc.; **Resource Planning**, the number of people available to the project, and **Milestones**, or agreed on dates for the delivery of specific outputs.

Outputs: The project team will use the above information to develop three important documents for the project:

E.g. Project Schedule; the Schedule Variance Report; The project network diagrams with the critical path, and GANTT chart

Steps in Defining the Schedule:

1. Define the sequence of all activities
2. Estimate the duration of each activity
3. Assign resources
4. Develop the schedule

Define sequence

1. **Finish to Start** - the successor task cannot begin until the predecessor activity has completed, this is the most common type of relationship.
2. **Start to Start** - the successor task depends on the start of the predecessor task, used for starting tasks in parallel but a delay of the first task delays the successor task.
3. **Finish to Finish** - has the finish of the successor task dependent on the finish of the predecessor.
4. **Start to Finish** - the finish of the successor task is dependent on the start of its predecessor, it is seldom used.

Figure 3.1: Activity Dependencies

Estimate task duration

1. **Analogous estimating** - is a top down technique that involves basing the estimate of the duration of a future activity on the actual duration of a previous, similar activity.
2. **Parametric estimating** - is estimating the duration of an activity based on a rate or industry standard for productivity. For example the productivity rate of one

person to collect survey data from a certain number of beneficiaries per day.

3. PERT estimating (*Program Evaluation and Review Technique*) - uses a calculation to obtain a weighted average estimation using optimistic, most likely and pessimistic estimates. The formula is: $PERT = (\text{Most Optimistic} + (4 \times \text{Most Likely}) + \text{Most Pessimistic}) / 6$.

Assign resources & Develop schedules

Tools and techniques to analyze the schedule:

- *Schedule Network Analysis* – Graphic representation of the project's activities, the time it takes to complete them, and the sequence in which they must be done.
- *Critical Path Analysis* – process of looking at all of the activities that must be completed, and calculate the longest line – or critical path. The method calculates the earliest and latest possible start and finish times for project activities, and it estimates the dependencies among them to create a schedule of critical activities and dates.
- *Schedule Compression* – helps reduce the total duration of a project by decreasing the time assigned for certain activities. This is done in a way that keeps the time constraints and maintains the original scope of the project. The project manager can use two methods (1) *Crashing*, and (2) *Fast Tracking* (see below).

Project Network Diagram

A network diagram is a **graphical representation of the sequence of project activities and the dependencies among them**. There are two types of network diagrams: (1) activity on arrow (AOA), and (2) activity on node (AON). The most common network diagram uses the AON diagram technique in which boxes represent activities. The complex and dynamic nature of development projects make this tool especially valuable because it helps the project team to identify the potential interactions of project activities that can be easily missed otherwise.

Critical Path

The critical path is in **essence the shortest time a project can be completed, even though the critical path is the longest path on the project**. It is not the

path with the most critical activities or the shortest path on a project network diagram. There are cases in which a network diagram may have two critical paths that have the same total duration.

Figure 3.2 – PND and CP

Project Gantt Chart

A popular method to display project schedule is known as the Gantt chart, it has become a popular method for its use in the most common project scheduling software.

Publish the Schedule

Schedule Approval

This includes a series of negotiations with project stakeholders, for example the time a certain activity is needed by the administrative function of the organization must be negotiated so that the resources and people are made available. Schedule negotiations may require changes to the schedule, the skills of the project manager in making negotiations will determine the amount of change on the schedule.

Communicating the Schedule

Once the project has “locked” the schedule with a baseline it is ready to be shared with all the people that will be affected by it.

A good practice is to *draw a large version of the schedule and place it on a wall in a central location of the project office or room*, this way the project schedule is visible to all the team and visitors to the project office.

The project schedule is the principal communication tool that graphically shows the progress of the project and it is used to identify the progress of the activities. With the schedule the project begins to educate the stakeholders about the project's complexity and critical dependencies that will impact the project and ensure that all people who are responsible for delivering outputs for the project are aware of their responsibilities along the project timeline.

Schedule Updates

As the project starts to make progress, the project manager will use the activity status reports from the project team to update the schedule and update the information on progress. Schedule progress reporting includes information such as the actual start and actual

finish dates and any remaining durations for any unfinished scheduled activities. The project manager updates the schedule using two methods: (1) by placing the percentage by which each activity has been completed during a reporting period, or (2) by placing the number of days that have been worked on an activity.

These reporting periods could be weekly, monthly or quarterly, all depending on the length and detail of the project schedule. The results of these updates give the project manager information on the general status of the project, and provides with an insight on whether or not the project is meeting its planned milestones.

Monitor the Schedule

Project manager will determine what factors have influenced in the changes to the planned schedule; these factors may be internal or external. The project manager will determine the impact on the schedule and determine various actions to try to bring the schedule back to the original status.

For example a activity was estimated to take 10 days to complete, but an external factor (rain) caused a delay of two days. If the activity is on the critical path the entire project will be delayed by two days. The project manager will need to evaluate how critical is this delay and find alternatives such as adding resources to the next activity in the critical path in order to reduce the planned time and bring the project completion to the planned date.

Variance Analysis

To determine the degree of variance a schedule has from the baseline data. It compares target schedule dates with the actual start and completion dates of an activity. This helps detect variations and leads to the implementation of corrective actions in case of schedule delays. .

Schedule Modifications

The variance analysis may show that the project will have a delay on its planned end date. The project manager needs to evaluate the options available to bring the schedule back on track. This effort may include the use of additional resources and that can have an impact to the project budget.

There are two corrective actions techniques to amend the schedule:

- **Crashing** – is a technique for making budget and schedule trade-offs to obtain the greatest amount of schedule compression for the least amount of cost increase (e.g. assigning an extra resource to an activity in order to reduce the time to complete it).

- **Fast tracking** – involves doing activities in parallel that were originally planned to be in sequence. The project manager must determine if there are no critical dependencies. For example, an activity for aggregating baseline data was planned to start once all data was collected, but by fast tracking the activity could start earlier than planned and doesn't need to wait until all data is collected, some work like preparation of the database could start earlier than planned thus reducing the time to complete the project.

Part 4 Project Budget Management

Budget management consists of a series of tasks and steps designed to help manage the costs of the project, the steps are:

- **Plan** - Defining the Budget, estimating all costs and developing a final project budget
- **Do** - Executing the Budget, authorizing all planned expenses
- **Check** - Controlling the Budget, review budget reports and identifying variance
- **Adapt** - Updating the Budget, making the necessary modifications to bring the project under budget

Inputs: Inputs for the project budget management include the following documents or sources of information:

The Work Breakdown Structure, WBS
 Project contract or initial budget
 Resource requirements
 Resource cost estimates
 Activity duration estimates
 Historical information
 Market conditions
 Donor and organization policies

Outputs: The project team will use the above information to develop three important documents for the project:

1. Cost estimates by activity
2. The Project Budget
3. The Budget Variance Report

Resource Requirements

There are 3 typical types of resources under which all resource requirements can be grouped:

1. **Human or Labor Requirements** - the right people with the expertise and skills needed to complete the activities on the project schedule. People may come from the organization, or hired for the duration of the project. People skills also include consultants who

bring a high level technical expertise that is not found on the organization or in the local labor market.

2. **Material or Equipment Requirements** - all the specialized tools needed by the project, from water pumps to electrical generators that will be used by the project or delivered to the beneficiaries, it also includes the need for vehicles and office equipment such as computers, software and printers. Materials include a wider category of requirements such as utility services such as electricity, telephone lines, access to the internet, office material, office space and used by the project.
3. **Services** - internal or external services required by the projects. These include utilities, printing, communications, transportation, lodging, rent, etc.

Types of Budget Estimates

There are 3 types of budget estimates: (1) Initial; (2) Contract, and (3) Definitive estimate; they vary primarily on when they are done, how they are used and how accurate they are.

1. Initial estimate

Project managers develop the *first budget estimate used before or during the project initiation phase*; to get a *quick estimate of what would the costs of the project be to see if there is an interest in the organization or donor*. It provides a rough idea of the project budget; estimates are based on high-level objectives, and provide a quick view of the project deliverables. This is also called the **Rough-Order-of Magnitude Budget Estimate**. Most initial estimates, depending on the project, have a range of variance from -25% all the way to +75%. Initial estimates, are simply used to have a good look at the project's initial costs and should not be used as a definitive estimate or estimate for contract purposes.

2. Contract estimate

A *more accurate estimate*, it is *formulated late in the project's initiation stage*, it's done either from the donor's requirements, which sometimes *includes conditions and formats on how to present a budget – or for a final proposal*. It is based on analogous estimating - taking budget lessons learned from a similar project and applying them to the current project. A contract estimate is quick, but not very accurate. This is also called the

Detailed Budget, the one the donor will review and approve. The range of variance on the budget estimate is from -10 percent to +25 percent. This is the estimate that most of the time goes into a proposal and it's the basis for project negotiations between the donor and the organization.

3. Definitive Estimate

The most accurate of the types of estimates, but takes the most time to create. The definitive estimate makes use of the WBS. This type of estimate is usually done during the planning phase of the project to get detailed information on all the project costs, it is used by the organization's chart of accounts to track costs in the accounting system. The definitive estimate is used for estimating final project costs and used for making purchase decisions where the actual costs are required before making payments.

The definitive estimate is used *throughout the project life cycle and updated as soon as new information is made available*. This is also called the **Working Budget**. The accuracy of this estimate is normally -5 percent to +10 percent, meaning the actual costs could be 5 percent less or 10 percent more than the definitive estimate.

Methods of Estimating a Budget

1. Analogous
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2. Top – down
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3. Bottom – up
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4. Parametric
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Project Cash Flow

Cash flow is an important tool to a project manager who is responsible for the management of the budget for the project. The Cash flow is a *forecast of the project expenditures during its life cycle*. A project cash flow forecast the planned expenditures of the project; the periods are usually in months. The overall purpose of managing the cash flow is to make sure that the project has enough cash to pay current bills. Since all project

funds come from the donor, it is important to know the rate at which the project will use its budget and match it with the expected donor disbursements. The goal is to minimize the need to use the limited available funds of the organization.

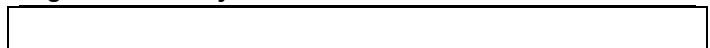
Figure 4.1 – Project Cash Flow



Budget Control

Control of the budget can be done via different methods. A common method is to divide the *total budget by number of months the project will last*, this is a quick method to control how the project budget measures against the plan, this is also known as the **Burn Rate** or the rate the project uses the budget. One of the problems with this approach is that projects budgets never follow a linear progress.

Figure 4.2 – Project “S” Curve



Most project budgets follow an “S”, the chart below shows an example of a project budget chart in which the planned budget (using the linear method) is a dotted line and the actual budget is show as a solid line.

Budget Reports

Budget reports are used to track the project budget and provide a picture of how the project is spending the budget. The project will need to determine the format and content of the budget reports it needs to control project expenses. The typical report contains a list of all budget accounts and columns that list the budget baseline, the cumulative expenses to date, the balance to date and the burn ration or how the budget is spend according to the yearly budget plan. Below is list of a typical budget report:

- **Expense Reports** - provide the expenses to date by account, project number and funding code.
- **Variance Reports** - show the difference between what has been expensed and the approved budget, the balance for each account.
- **Burn Ratio Reports** - shows the rate at which the project is using the budget according to the original plan, a quick method to see if the project budget is on track.