



# Project Schedule Management

PROJECT MANAGEMENT FOR  
DEVELOPMENT ORGANIZATIONS

# **PROJECT MANAGEMENT FOR DEVELOPMENT ORGANIZATIONS**

A methodology to manage development projects for international humanitarian assistance and relief organizations

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### PROJECT SCHEDULE MANAGEMENT

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Schedule management includes the processes required to ensure timely completion of the project. But before a project schedule is created, a project manager should typically have a work breakdown structure (WBS), an effort estimate for each task, and a resource list with availability for each resource. A Schedule is created using a consensus-driven estimation method; the reason for this is that a schedule itself is an estimate: each date in the schedule is estimated, and if those dates do not have the buy-in of the people who are going to do the work, the schedule will be inaccurate.

Setting overall completion dates must be done by the project team and key stakeholders. The project manager assists by assimilating information about scope, budget, resources, and estimating times for completion of project tasks.

Once an overall schedule is set, the project manager is responsible for monitoring the progress of the project and revising the schedule if needed. This must be done in consultation with project team members who are doing the work. There will typically be give-and-take as a project proceeds among budget, features, and schedule. It is essential for the project manager to keep all participants informed as to current schedule status

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

- Complete— the schedule must represent all the work to be done. 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, specially the beneficiaries.

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

- Defining the Schedule
- Publishing the Schedule

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- Monitoring the Schedule
- Updating the Schedule

Inputs	Process	Outputs
<ul style="list-style-type: none"><li>• WBS</li><li>• Historical Information</li><li>• Beneficiary Calendar Information</li><li>• Resource Planning</li></ul>	<ul style="list-style-type: none"><li>• Plan - Define activity sequence and duration, develop the network diagram and GANTT chart</li><li>• Do –Communicate and update Schedule Progress</li><li>• Check – Monitor schedule variances</li><li>• Adapt – Update the schedule</li></ul>	<ul style="list-style-type: none"><li>• Project Schedule Baseline</li><li>• Schedule variance report</li><li>• Schedule updates</li></ul>

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

- The Work Breakdown Structure 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
- Information on calendar events, holidays, etc.
- Resource Planning, the number of people available to the project
- 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:

- the **Project Schedule**
- the **Schedule Variance Report**

### DEFINING THE SCHEDULE

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The creation of the project schedule requires the team to define the conditions that will lead to the development of the schedule. The first piece of information needed for this step comes from the WBS that has all the activities identified for the project. The quality and completeness of the WBS will determine the quality of the schedule, and this is a good time for the project team to review if all the project activities are accounted for. Building the schedule is actually an easy part but once a project is published and issues and changes start to creep, the schedule becomes difficult to manage since it's the resources with the less flexibility.

The goal of defining the schedule is for the project team to have a complete understanding of all the work that needs they must accomplish, by defining the schedule the project also develops an understanding of the constraints, dependencies and sequence of the activities.

#### **Activity Sequence**

The first step in the creation of the project schedule is to define the sequence of the activities on a list; this sequence follows the natural progress the project will follow in the project cycle. The act of identifying which activity comes before or after another is the process of identifying dependency relationships between the activities.

There are three types of activity dependencies. Technical or mandatory dependency is defined by the type of work or activity, for example building the foundations before building the walls of a school. Discretionary dependencies are selected by the project manager to accommodate organizational or resource constraints, these are also based on educated guesses the project makes in order to circumvent other constraints. The last dependency come from external factors imposed to the project, for example the project beneficiaries completing harvesting of their crops. The end result is a list of activities in a sequence that will allow the development of relationships.

The next step is to determine the type of relationship among all activities; there are four types of relationships:

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

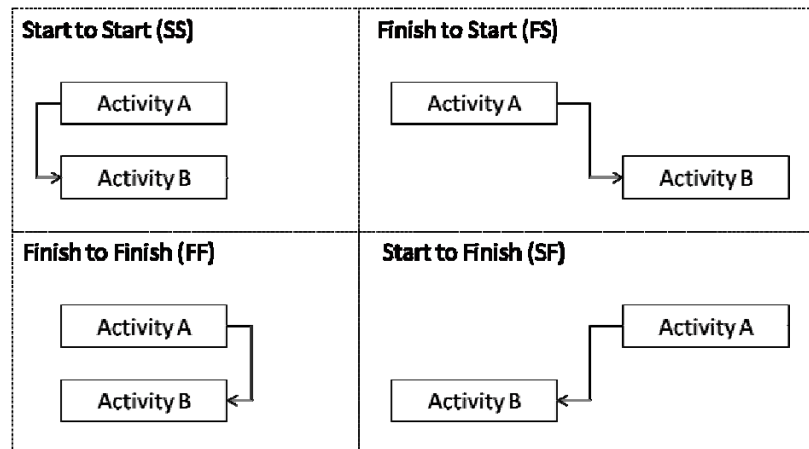


Fig. example of activity dependencies

### Activity Duration

The team will construct a list of all activities and assign an estimate of the duration of each activity; it will use historical information from similar projects and consult with experts. Duration includes the actual amount of time worked on an activity. If an activity takes one week by one person, the estimate may become two weeks if the person works only half time. This information is important at the moment of determining the total time of the project and the resources available for a project. That is why it is important that the people actually responsible for doing the work should have a say in the selection of the estimates. The typical unit for measuring the duration of an activity is days or weeks.

There are three schedule constraints that govern when an activity starts or finish; The first one includes that an activity must be completed by no earlier than a specific date, this means that an activity may occur at any time after a specified date but no earlier that

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the given date, this constraint is oriented to meet a deadline. Another constraint defines that an activity must be completed no later than a given date. The last type of is a constraint that imposes that an activity must be complete on a given date, no earlier or later.

The schedule also uses critical information from key project stakeholder about their availability to the project, beneficiaries have limited time to commit to the project demands for their presence, the project team should verify what time constrains or limitations for a specific date or period exist from beneficiaries.

Estimating how long an activity takes requires understanding of the availability of resources, the type of skills needed to do the work and the budget limitations to obtain resources. Fr example one activity may take 5 weeks to be completed by one person, but two people working in parallel may be able to cut in half the duration of an activity. There are three types of activity estimation:

- 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.
- 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.
- PERT estimating; uses a calculation to obtain a weighted average estimation using optimistic, most likely and pessimistic estimates. The formula is  $PERT = (Most\ Optimistic + (4 \times Most\ Likely) + Most\ Pessimistic) / 6$

### Network Diagram

Once all the information on the sequence and duration of the project activities has been completed, the next step is to develop a network diagram. A network diagram is a graphical representation of the sequence of project activities and the dependencies among them. The network diagram is read from left to right or top to bottom. The network diagram uses a diagram technique in which boxes represent activities, used by project scheduling software. The complex and dynamic nature of development projects make this toll especially valuable because it forces the project team to address the potential interactions of project activities that can be easily missed otherwise.

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The value of the network diagram is that it provides the project team with visibility and control over the project schedule. It also helps determine the total duration of the project and its critical path or path with the longest duration.

The figure below shows an example of a project network diagram that includes the duration estimates and dependencies.

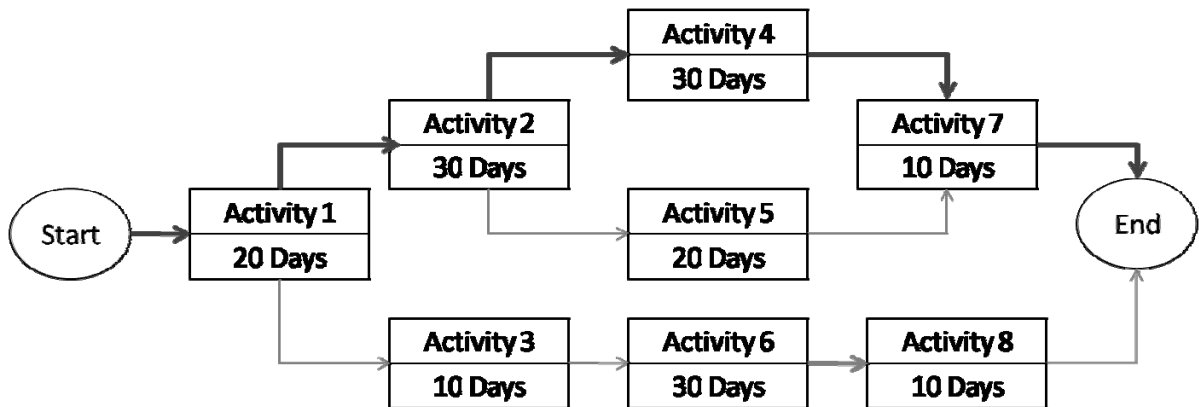


Figure Project network diagram

### Critical Path

The Critical Path is the longest total duration. Activities on the critical path cannot be delayed or the whole project will be delayed, unless the loss of time can be offset somewhere else later on the critical path. To find the critical path add up the duration of the activities for each possible path through the network, to determine which has the longest total duration. The difference between the longest total duration and the shortest path(s) is the total amount of float or slack for the non-critical path activities.

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 it is only concerned with the time dimension; it is not either 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

To calculate the path using the diagram above use the duration of each activity and all the possible paths on the network.

Path A, Activities 1-2-4-7, total time = 90 days

Path B, Activities 1-2-5-7, total time = 80 days



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Path C, Activities 1-3-6-8, total time = 70 days

The critical path is on Path A

## Gantt chart

Another method to display project schedule is known as the Gantt chart, it has become a popular method in project management for its use in the most common project scheduling software. It was developed by Henry Gantt in 1911 and since then has been incorporated, with some improvements, to the field of project management.

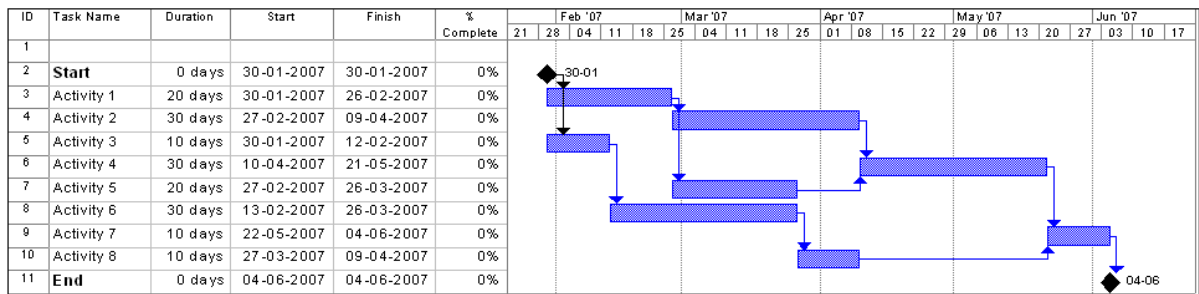


Figure Gantt chart

The chart above shows a Gantt schedule where activity durations are shown as bars and the arrows show the dependencies.

The steps needed to create a Gantt chart include:

- Review the network diagram to ensure all activity relationships are complete
- Review the activity durations, resource assignments and skill levels required to complete each activity
- Review the project calendar and include project dependencies and constraints
- Develop the Gantt chart and determine the time scale and the symbols to identify the activity bars and milestones

As a graphical representation of activities as segments on a time scale, the Gantt chart helps plan and monitor project development or resource allocation. The left hand side of the Gantt chart is a column with lists of activities. The horizontal axis is a time scale, expressed either in absolute or relative time. In a Gantt chart, each activity takes up one row. Dates run along the top in increments of days, weeks or months. Rows of bars in the Gantt chart show the start and end dates

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of each activity in the project. Activities may run sequentially, in parallel or overlapping.

### Reality Check

Once the project is completed the project team needs to take a look at it and determine if it relates to the realities the project will face, One of the first reality checks a project manager should make is to review the draft schedule that was originally included in the project contract, this draft may include only a few high level activities, the start and end date and significant milestones the project must meet, the contract includes some initial schedule expectations for the project; next the project manager must review the beneficiary or community calendar, holidays and other external factors that will interfere with the schedule. Changes are made to the schedule using trade offs, switching the start and end of activities, shifting resources for activities so that some activities can be completed earlier than planned and moving activities around until the project has a new schedule that still meets the initial end date.

## **PUBLISH THE SCHEDULE**

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### **Get Schedule Approval**

This step also includes 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. Another negotiation include meeting with community leaders or beneficiary representatives to agree on specific milestones or dates when the project requires the participation of the beneficiaries.

Once all people have agreed, at least in principle to the schedule, it is ready to be published. These negotiations may include in changes to the schedule, the skills of the project manager in making negotiations will determine the amount of change on the schedule. Stakeholders and management will often pressure the project team to either shorten or change the start dates of certain activities so that they do not interfere with their own schedules. The project team must learn to defend their estimates and learn to negotiate with these demands

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### Schedule Baseline

Once the team has completed the development of the project schedule they need to lock or set a baseline that will be used to monitor the schedule as the project makes progress. This baseline will be reviewed on a regular basis and all approved changes to the schedule will be updated against this baseline. This is the schedule that will be published to the team and stakeholders.

### **Communicate the Schedule**

Once the project has “locked” the schedule with a baseline version it is ready to be shared with all the people that will be affected by it. This obviously includes the project team, and the best way to communicate the schedule 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 room.

A copy of the schedule also needs to reach the organization and the administrative support functions, especially management. Stakeholders also receive a copy of the schedule, although it may include short versions that only highlight the major activities, copies can be distributed to the donor, key representatives of the community or beneficiaries, consultants, and partner organizations.

The project schedule is the principal communication tool that graphically shows the progress of the project and it is used to identify activities that are not on track, by publishing a copy of 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 of progress. This information comes from the Work Assignment Sheet or the Scope of Work report detailed on chapter 7.

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Schedule progress reporting includes information such as the actual start and actual finish dates and any remaining durations for any unfinished scheduled activities. To facilitate the reporting of schedule progress a form can be used that maintains a consistent use during the life of the project.

The project manager updates the schedule using two methods: by placing the percentage by which each activity has been completed during a reporting period, or 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 this updates with actual data, gives the project manager information on the general status of the project, and result in changes to the planned project end.

### MONITOR THE SCHEDULE

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Monitoring the project schedule is mainly focused on determining the current status of the project, the project manager, based on the information then will determine what factors have influenced the changes in the schedule and these may be internal or external factors. The project manager then will determine the impact on the schedule and determine various actions to either bring the schedule back to the original status or accept that the changes will cause an effect on the schedule.

#### **Monitor Schedule Performance**

Reporting progress reports are used to evaluate the impact to the schedule and determine if the project is still on track or will be delayed. Monitor performance basically results in deciding if the variation of the schedule requires any corrective action, For example an activity is reported to have lasted more days than actually planned, but if the activity is not on the critical path then the project end is not affected and no action is required.

The chart below shows that progress on activity 6 is behind schedule, as marked by the dark vertical line that shows the current reporting date, since activity 6 is not on the critical path, the delay will not cause



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### Propose Schedule Changes

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 simple corrective actions techniques to amend the schedule

- **Crashing** is a technique for making budget and schedule trade off to obtain the greatest amount of schedule compression for the least amount of cost increase. For example by assigning an extra resource to an activity in order to reduce the time to complete it. The project manager must be determined if reducing the project duration is enough to justify the higher costs associated with reducing the activity. The tradeoff may be with increasing an activity duration that is not on the critical path by moving the resources assigned initially to it.
- **Fast tracking** involves doing activities in parallel that was 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. In Fast tracking, activities can be arranged to take advantage of non-dependent activities that can occur simultaneously, thus shortening the overall project timeline.

Any corrective action must investigate the causes for the delays on the project; it is not enough to change the project schedule but to understand the root causes that identify the causes of the changes. These may include wrong assumptions about the project at the time of developing the estimates, changes in the project environment caused by internal factors, such as losing a key member from the team, or external factors such as a social or political upheaval in the area the project works that have caused the delays.

### **UPDATE THE SCHEDULE**

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In order to properly update the project schedule the project needs to determine the process to make changes to the project schedule, this process includes:

- Who has authority to make changes
- How to analyze impact of schedule changes to other constraints such as scope, budget and quality
- How often the schedule is monitored and updated
- Version control
- Schedule change approval process

#### **Update Schedule**

Updating the schedule requires modifications to the schedule baseline and new start dates or end dates are established on the project. All changes to the schedule must be approved as part of the change control procedures that defines the authorization levels for changes to the schedule.

Changes occur as part of the recommendations from the project to adjust the schedule, as best as possible, to meet the planned dates. The recommendations come from the schedule variance analysis which determines the severity of the delays and the corrective actions required.

The project manager presents the results of the changes to the schedule and gets approval to implement the changes and take the corrective actions needed.

#### **Document Lessons Learned**

Document the steps taken to make adjustments to the project schedule is part of the lessons learned process to build a historical database that will be compiled during the project close. Lesson learned also include the actions and steps taken to improve schedule performance and experience gained in estimating the duration of activities. The initial estimate may have been based on assumptions or guess estimates that only during the actual implementation the project team discovered the actual time that the activity required for completion. This information can also help activities that are still on the schedule and could benefit from the new knowledge.



### **Communicate Schedule Updates**

Once the changes and been approved and the schedule has been updated, the project manager needs to communicate the new schedule, this can be done during the regular reporting periods or if the change is significant, to communicate the change to all stakeholders impacted by it.

It is on no use if the project makes modification to the schedule and this change is not communicated to the stakeholders who can still be working on the original schedule dates. The project schedule posted on the project office is also replaced so that all project staff is aware of the modifications and can act accordingly.

# Project Schedule Management

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An advanced level, hands-on course, that will give you the skills to ensure your projects are completed on time and on budget while satisfying the needs of stakeholders. You will gain a strong working knowledge on the nine processes of project management, and be able to immediately use that knowledge to effectively manage your project. Participants will work on a case study to complete all exercises. Upon successful completion of the Effective Project Management Online course participants will: Understand the nine process areas of project management, know the steps required to plan and manage each project management process and use the primary planning and monitoring documents of a project.



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## Fundamentals of Project Management

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## Project Design Monitoring and Evaluation

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This Point of view provides a summary of themes, that in PM4DEV's experience, have proved critical in the successful implementation of project management methodologies.

It draws on the expertise of Project management professionals and provides a guide to deliver a methodology that increases the chances of project success.

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