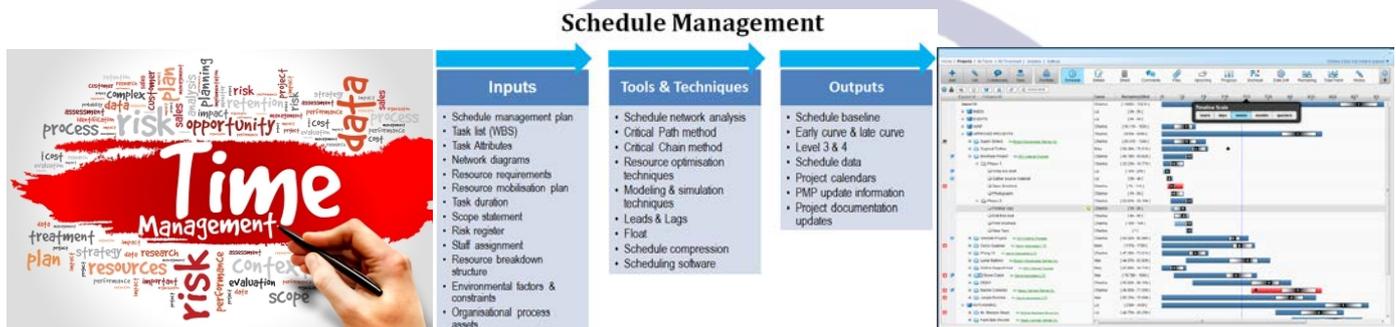


Schedule Management



Time management according to PMBOK is one of the nine (9) subject matters in project management. The project execution plan (PEP) has a designated chapter describing in detail how the time and phases of a project will be managed. Organising time properly is essential in the success of any project. There are 6 processes that are involved in PMBOK time management.

1. **Definition of activities.** The project management team (PMT) needs to list the activities and tasks that need to be done during the project life cycle so that they can be used for scheduling. Along with the tasks, activities and action items, the methods to be used during the processes should also be outlined such as breaking down of milestones into action items, constraints, risks.
 - I. The activities, which will define all the tasks to be completed in the project lifecycle, are broken down in the work breakdown structure (**WBS**). The WBS will be reflected in the task lines of the schedule.
 - II. Depending on the Level of the schedule the smallest task element of the WBS is the **work pack**. To make a project schedule work properly in engineering, procurement and construction phase, all essential WBS tasks need to be identified by length of duration.
 - III. No task should last longer than one (1) week. **L3 (weekly)** schedule will be broken down into **L4 (daily)** schedule. In the Commissioning phase the schedule needs to be broken down to **L5 (hourly)** level.
 - IV. **Constraints** need to be assessed for the activities, such as, permits, 3rd party utility providers (external with authorities), governance (internal with possible gates to be passed), and early works agreement in place, early purchase orders being placed for long lead items, tie-in points with any brownfield operations.
 - V. **Risks & Opportunities** need to be identified with their time impact on the project. Project **float** needs to be allocated, such as “inclement weather”, “COVID-19 quarantine requirements”, “logistic delays”, “union strikes”,
 - VI. Make it very clear **who owns the float** and how the float will be made visible in the schedule.

- VII. Ensure that you establish a **baseline**, an **early curve** and a **late curve** and explain how you did it. Define the strategic scenarios under which circumstances the baseline can be changed. Be careful! If you amend the baseline constantly you will not have any visibility when you will have schedule issues to address.
2. **Sequencing of activities.** During this time, project managers need to precede documents and map task dependencies. The team may use some tools such as precedence diagramming method and other techniques for diagramming dependencies and in the end, produce a network diagram. A scheduling expert can greatly use his experience when sequencing activities.
- I. Ensure that there cannot be any task, activity or milestone without a predecessor.
 - II. Explain if you do the sequencing from front to end or from end to front. This is one way to determine early curve and late curve.
 - III. Identify interdependencies
 - IV. Ensure the schedule supports “construction-driven engineering” and “commissioning-driven construction” activities. Not doing so can cause increase in uncertainties with time impacts and if ignored your schedule becomes questionable.
 - V. Always challenge, if the sequencing is logical or can be improved.
 - VI. Plan for regular schedule reviews.
 - VII. Engineering, procurement and construction with commissioning need to get involved. The scheduler need to plan this but the PM/PD has to action this interdisciplinary schedule review
 - VIII. From a schedule perspective it is wise to take the owner’s view because the owner is the main stakeholder.
 - IX. Ensure that the parallel integrated schedule activities of engineering firms and EPC or general trade contractors align and have an integrated and consequential workflow. If not the schedule will be in trouble.
 - X. Ensure that the sequences and durations will be aligned with upfront agreed Milestones. Raise a flag if a milestone date needs to be amended because of workflow issues.
3. **Estimating resources.** Resources include people, materials, equipment and machines that are needed to execute various project activities to produce the deliverables. The PMO with its experts and contractors needs to determine the type of resources required and the quantity needed. Each activity resource needs to be estimated and for this, an expert judgment is required.
- I. Ensure that all required resources are allocated especially for SIMOPS or parallel activities. Personal resources need to be aligned with the mobilisation plan.

- II. A schedule is only effective if resources are planned and integrated properly, because the activities have otherwise no proof of being able to get executed in the planned allocated time frame.
 - III. Ensure that the EPC contractor's manpower plan and other manpower plans including 3rd party construction advisers are included. They can become a constraint if not adequately allocated as early as possible.
 - IV. Plan for alternatives as personal requirements due to COVID could become a real issue in terms of schedule and warranty issues.
4. **Estimating activity durations.** The PD/PM together with the PMO team estimates the time needed to complete an activity in accordance to the scope and resource availability. To estimate time, experts use formulas such as the PERT (Program Evaluation Review Technique). Accuracy is important to develop an exact schedule.
- I. Determine durations and logic by front to back and back to front planning.
 - II. Establish a clear early and late curve according to I.
 - III. Clarify and build in the float
 - IV. Determine task risks and how to mitigate. The driving force is ALARP (as low as reasonable possible)
 - V. Ensure that you have a clear and measurable guideline at any time to know the actual schedule progress compared to the baseline planning.
 - VI. For that you might require a very detailed BOQ
 - VII. In case of utilising the EVM (earned value methodology) you need to phase-in the existing budget. This is normally the task of the Project Control manager or the PD/PM if no project controls manager is in the PMO.
 - VIII. Not using EVM can be quite misleading as you cannot compare SPI and CPI.
5. **Developing project schedule.** A tool such as Primavera 6 or Merlin can help to develop the schedule. There may be a need for resource levelling to prevent over or under allocation of resources. During this stage, the project team plots the start and end dates for each activity as well as the entire project's start and completion dates. The team may use activity sequences, duration and resource estimation as well as project schedule constraints to achieve an accurate schedule. Knowledge of PMBOK time management is essential in developing a project schedule.
- Develop at the same time a detailed schedule analysis
- a. Critical Path (CP)
 - b. Near CP (define the time/days)
 - c. Schedule Risks/Opportunities and ALARP mitigation
 - d. Scope changes impacting schedule
 - e. Point out – major engineering, procurement and construction achievements and concerns

6. **Controlling the project schedule.** Since processes change, so does the schedule. There is a need to create effective scheduling processes so that it becomes manageable so that when there is a need to change, it can be modified easily. The schedule control process explains and monitors the project status so that it is easy to identify change requirements in the schedule

- I. Always explain any schedule deviation by impact (cost and time), reason why and how to adjust in order to avoid delays
- II. Have always a "plan B"

