



The Project Schedule

L24.03



The project scheduling process



- Establishing a project schedule determines the time ordering of tasks, helps identify potential resource conflicts, and provides assurance about completion time.
- A well defined schedule is also a very useful tool for monitoring progress.
- Developing a project schedule includes the following steps:
 - Establish the detailed WBS
 - Determine the task dependence or precedence
 - Identify time lags
 - Roll-up time estimates from bottom level WBS
 - Assign resources (i.e. people) to tasks & resolve conflicts
 - Identify milestone dates
 - Implement trade-off if schedule is not acceptable



Factor affecting the schedule



- Is the WBS complete?
 - Undefined tasks or time lags can disrupt the planned schedule
- How accurate is the work package time estimate?
 - Uncertainty in the times for the lowest WBS level will propagate upward during roll-up
- What is the level of task dependency?
 - Dependent tasks can only be accomplished in sequence rather than in parallel. Thus, increasing the number of personnel will not necessarily reduce the time required to complete the tasks.
- What is the availability of personnel resources?
 - An individual can not focus on more than one task at a time. Thus, without sufficient personnel independent tasks will need to be done sequentially.
- What is the effectiveness of the personnel?
 - What is the percentage of time per week that personnel can be “on task”?



Essential schedule information



- A complete WBS provides the first order schedule organization
 - All major tasks, subtasks and milestone events should be identified
 - The WBS units will usually already be in some kind of time ordering
- Determine which tasks require the results from some previous task (i.e. task precedence)
 - For example, you can not install a sensor until the sensor has been specified, ordered and delivered
- Determine which tasks can be accomplished in parallel
 - For example, you can build multiple copies of the same design at the same time.
- Identify milestone events and determine if any of these events require a fixed date
- Identify and estimate the length of any time lags like shipping time, holidays, exam schedule, time off, etc.



Begin “coding” the schedule



- Become familiar with project scheduling software such as Microsoft Project
- Enter tasks from WBS into scheduling software
 - Use software features to establish “tree structure” relationship
 - Lower level tasks should be clearly associated with a higher level task
 - Enter “shipping time” or other project specific lags as “tasks” in the schedule
- Enter time estimates for lowest level tasks and time lags
 - These times should then be rolled-up to the higher level summary tasks
 - Milestone events are indicated by having zero duration
- Enter task and milestone predecessor information
- Use software features to enter general time lags such as holidays, exam schedules, etc.
- Short tutorial of basic Project or alternatives usage is provided in L24.02



Refinements to the schedule



- Define the characteristics of your personnel resources and assign these resources to specific task
- Take into account effects due to limited personnel availability
- Include lags to reflect the effectiveness of personnel
- Improve the “parallelism” of your tasks
- Check that the schedule is consistent with constraints
- Correct any schedule issues



Personnel availability



- The schedule can be affected by the number of people with appropriate skills available to the project
- Individuals can not work on multiple tasks at the same time
- If two tasks that would normally be worked in parallel are assigned to the same individual, then these tasks must be made dependent and worked in sequence
- This decision is made when assigning resources to tasks
- Software like MS Project can automatically examine for resource conflicts and adjust the schedule
 - Select “Resource Leveling ...” from the “Tools” menu
 - Be careful and save your project before performing any automated leveling. The automation may not work exactly as you expect.



Personnel Effectiveness



- Include time lags to reflect the effectiveness of personnel
- Keep in mind that there is a difference between “time on task” and “calendar time”
- Both available work time and work efficiency must be taken into account
- If a task requires 40 hours of work ...
 - Normal 100% efficient worker will need 1 week calendar time
 - Worker that can only focus on task for 10 hours per week will need four weeks of calendar time
- Schedule software can automatically handle some of these effects by defining the characteristics of particular personnel resources

Define personnel resources

- Scheduling software should have some ability to define the characteristics of the project resources
 - Shown is the Resource Information panel in Microsoft Project
- These resources can then be assigned to particular tasks and the scheduling program will automatically take into account the resource characteristics

Available From	Available To	Units
1/24/2005	2/25/2005	25%
2/26/2005	5/6/2005	10%

- Characteristics of individuals include:
 - Normal working time
 - Personal absences
 - Percent of work week devoted to project
 - Calendar dates of availability



Schedule tasks in parallel



- To within personnel constraints, the more tasks you can schedule to run concurrently the shorter your overall schedule will be.
- Detailed WBS and task definitions may reveal parallel effort.
 - Fabrication of duplicates of same design can be run in parallel
 - Determine requirements early so development of different modules can run in parallel
- Take advantage of “natural” time lags
 - While parts for module A are being shipped, schedule work on module B



Check for consistency



- Make sure that your schedule is consistent with known constraints
- Is there work scheduled when no one will be available?
- Is the total work time shown in the schedule consistent with the total time personnel have committed to work?
- Are the major milestones occurring on the expected or required dates?
- Is the overall duration of the schedule as expected?



Tracking your schedule



- Once the initial schedule has been established you should monitor progress
 - In MS Project you can indicate the percentage that a task is done.
 - If your schedule is on track then you should show all tasks earlier than the current calendar date as being done
- There are a few things you can do if you are running behind schedule
 - Descope the project and eliminate tasks
 - Increase the number of personnel working on the project
 - Reassign tasks to more efficient or more available personnel
 - Increase the number of hours personnel work on the project