Building The Project Schedule

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, tasks will need to be done sequentially.
- What is the effectiveness of the personnel?
  - Amount of time is a person or resource available for the project

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

- Usually done in software such as Microsoft Project, but can be done manually in Excel
- Enter tasks from WBS into scheduling software
  - Use software features to establish a “tree structure” relationship
  - Lower-level tasks should be clearly associated with a higher-level task
  - Don’t forget shipping time or other project-specific lags as “tasks” in the schedule
- Enter time estimates for lowest 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.

Refinements to the schedule

- Define the characteristics of your personnel resources and assign these resources to specific tasks (who is doing this work)
- Take into account effects due to limited personnel availability (A person can only work on one task at a time)
- Include lags to reflect the effectiveness of personnel
- Improve the “parallelism” of your tasks
- Check that the schedule is consistent with constraints (are you meeting deadlines)
- Correct any schedule issues (May need to reassign personnel to assist tasks)

Personnel availability

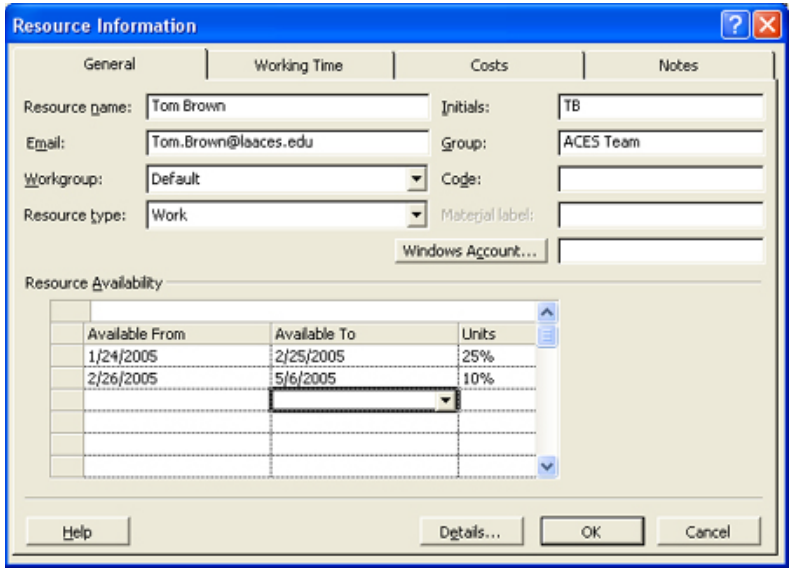
- The schedule can be affected by the number of people with appropriate skills available to the project
- Individuals can not work on multiple tasks at the same time
- If two tasks that would normally be worked in parallel are assigned to the same individual, then these tasks must be made dependent and worked in sequence
- This decision is made when assigning resources to tasks

Personnel Effectiveness

- Not everyone works at the same rate or has the same availability
- 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 …
  - A normal 100% efficient worker will need 1 week of calendar time
  - A worker who can only focus on a task for 10 hours per week will need four weeks of calendar time
- Schedule software can automatically handle some of these effects

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



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

Schedule tasks in parallel

- 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 opportunities for parallel effort.
  - Fabrication of duplicates of the 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
  - 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