



CDC UNIFIED PROCESS JOB AID



MICROSOFT PROJECT

Purpose

The purpose of this document is to provide guidance on the practice of using **Microsoft Project** and to describe the practice overview, requirements, best practices, activities, and key terms related to this requirement. Because of the vast scope of the Microsoft Project application this guide focuses only on very selective best practice areas to help project managers address some of the nuances of working with this tool. In addition, templates and other references relevant to this practice are provided at the end of this guide.

Practice Overview

The Project Management Institute's Project Management Body of Knowledge defines a project schedule as the planned dates for performing schedule activities and the planned dates for meeting schedule milestones. A project schedule is developed by further decomposing work breakdown structure (WBS) work packages and analyzing activity sequences, durations, resource requirements, and project constraints to create a formal list of project activities and an outline of which order they should be performed. Once completed, a schedule needs to be regularly monitored and adjusted to reflect the ever changing environment of the project. Performing this practice is extremely difficult if done manually. Microsoft Project is one popular tool that assists project managers in the creation and management of project schedules. This practices guide will provide a high-level overview of the following Microsoft Project practices:

- General overall Microsoft Project schedule setup
- Basic setup of new Microsoft Project schedule
- Creating a new Microsoft Project schedule
- Understanding the Microsoft Project formula (*duration x units = work*)
- Entering actual work into a Microsoft Project schedule
- Resource leveling and identifying over/under allocation
- Replanning options

As a general rule, if not sure what affects actions will have on the project schedule; ask for help before making changes. One good practice is to make regular backup copies of the project schedule and backup prior to making any significant changes. This strategy will allow for the luxury of reverting back to a previous copy, if needed, and possibly avoiding errors that may take extensive time to repair.

General Overall Project Schedule Setup

The following formatting tips increase the ease of readability of the project schedule.

- The project schedule name should be written in a way that clearly links the project schedule to the project
- Milestones and deliverables should be easily identifiable, formatting in a different color such as green helps distinguish them from other schedule activities
- Bolding summary level tasks in addition to other creative uses of bolding, italics, and possibly multiple fonts may also help increase the readability of lengthy project schedules

There are over 400 data fields in MS Project, 296 assignment fields, and 122 resource fields. It would be very time consuming to verify all of the information in each of these fields each time one of the following things happened. Avoiding these things will help to better manage the schedule using Microsoft Project.

- Do not copy and paste tasks or resources. Doing this also copies all fields associated with the copied task or resource. It's extremely difficult to verify each of the many hundreds of fields associated with this each time you copy and paste.
- Do not type resource names anywhere in the schedule except on the resource sheet. Doing this will automatically add a new resource into the resource sheet. Microsoft project will automatically



CDC UNIFIED PROCESS JOB AID



MICROSOFT PROJECT

add information such as rate and maximum availability. Not doing this manually within the resource sheet will impact how that resource influences the overall project schedule.

- Do not overwrite or change resource names after the schedule has been approved or baselined, or any information has been entered into the schedule such as actual hours, comments, pay rates, etc. Doing this will also overwrite the names throughout the project. On negative impact of this is that all work performed by the previous resource is will show as worked by the new resource name.
- Do not overwrite or change task names after schedule has been approved, baselined, or any information has been entered into the schedule such as actual hours, comments, pay rates, etc. Doing this will also overwrite the names throughout the project. On negative impact of this is that all work performed on that previous task will show as worked on the new task name.
- Do not enter or edit % complete. Project will calculate this automatically based on the work remaining
- Do not enter fixed dates for tasks unless absolutely required (almost never). Project will dynamically calculate the task start and end dates based on duration, work, units, and task dependencies. Project dynamically calculates dates and schedules based on duration, units, and work. Allowing the application to do this provides a realistic picture of where the project is. Entering fixed dates for tasks eliminates this benefit thus reducing the benefits provided by using a schedule management tool such as Microsoft Project.
- Do not manually edit dates calculated by MS Project. Project calculates dates dynamically using a formula of duration x units = work. Based on the result of this formula and any task dependencies outlined within the schedule, Project dynamically calculates and recalculates task start and finish dates. Manually editing these dates distorts the project schedule and will have effects in other areas in the schedule modifying task duration, units, and/or work
- Do not create a separate project summary level task. Instead use the built in “Show project summary task” option built into the application
- Do not rebaseline, update, or change the baseline properties of the project after it has been initially baselined without formal approval to do so. Even after being authorized to rebaseline, keep a copy of the originally baselined schedule as part of the project’s archive and rebaseline using a new copy of the project schedule

Basic Setup of New Microsoft Project Schedule

Before entering any tasks or resources into a Microsoft project schedule, ensuring that the following basic schedule setup options have been considered. Doing this may help make managing the schedule easier as the project moves forward and information is entered into the project schedule.

1. Enter the properties window by clicking “File” -> “Properties” from the application’s file menu, select the “Summary” tab, and enter the appropriate information as described below:
 - Title – The project schedule title should be written in a way that clearly identifies the project. In most instances this should be identical to the project file name
 - Subject – Personalize this setting as appropriate for the project
 - Author – Identify the individual that was most responsible for the creation of the project schedule
 - Manager – Identify the individual responsible for managing the project and project schedule
 - Company – Identify the company that the project manager works for
 - Category – Personalize this setting as appropriate for the project
 - Keywords – Personalize this setting as appropriate for the project
 - Description – A short, but detailed, description of the schedule, clear enough so that anyone not on the project team can identify the schedules purpose without needing to contact the project manager. Include the client, product(s), product(s) version, purpose/goal of project, etc
 - Hyperlink Base – If the project schedule uses a path based on a relative link, entering that link here allows the schedule to be moved without breaking the link



CDC UNIFIED PROCESS JOB AID



MICROSOFT PROJECT

2. Enter the options window by clicking “Tools” -> “Options” from the application’s file menu, select the “Schedule” tab, and enable the checkboxes for these items:
 - Show scheduling messages
 - New tasks are effort driven
 - Auto-link inserted or moved tasks
 - Split in-progress tasks
 - Show that tasks have estimated durations

Disable the checkboxes for these items:

- Tasks will always honor their constraint dates
- New tasks have estimated durations

Drop Down Menu Selections

- New Tasks: Start on Current Date
- Duration is entered in: Days
- Work is entered in: Hours
- Default task type: Fixed Units

3. Enter the options window by clicking “Tools” -> “Options” from the application’s file menu, select the “Calendar” tab, and enter the appropriate information as described below:
 - Week starts on: Sunday
 - Fiscal year starts in: October
 - Default start time: 8AM
 - Default end time: 5PM
 - Hours per day: 8
 - Hour per week: 40
 - Days per month: 20
4. Enter the options window by clicking “Tools” -> “Options” from the application’s file menu, select the “Edit” tab, and enter the appropriate information as described below:
 - Personalize these settings as appropriate for the project
5. Enter the options window by clicking “Tools” -> “Options” from the application’s file menu, select the “General” tab, and enter the appropriate information as described below:
 - Personalize these settings as appropriate for the project
6. Enter the options window by clicking “Tools” -> “Options” from the application’s file menu, select the “View” tab, and enter the appropriate information as described below:
 - Enable the Project Summary checkbox
 - Personalize these settings as appropriate for the project
7. Enter the options window by clicking “Tools” -> “Options” from the application’s file menu, select the “Calculation” tab, and enable the checkboxes for these items:
 - Automatic

Disable the checkboxes for these items:

- Update task status updates resource status
- Edits to total task % complete will be spread to the status date
- Inserted projects are calculated like summary tasks
- Actual costs are always calculated by Microsoft Project
- Calculate multiple critical paths



CDC UNIFIED PROCESS JOB AID



MICROSOFT PROJECT

Creating a New Microsoft Project Schedule

At a high-level the following activities are required to complete the creation of a Microsoft Project schedule.

- Divide project work in to project phases. The actual phases used will depend on the type of project, work, lifecycle, and methodology used to complete the project
- Enter project tasks into the project schedule and appropriate phases
- Enter estimated task work/duration. Accurate estimation is a critical factor to project success. Review the CDC UP Estimating Practices Guide
- Set task dependencies
- Estimate resource needs and enter resources into the project schedule's resource sheet. When doing this also include any pertinent information such as availability calendars, cost, rate, etc
- Assign resources to tasks
- Review the schedule with project stakeholders and make any necessary updates
- Obtain approval for the schedule and baseline

Understanding the Microsoft Project Formula ($D \times U = W$)

Project calculates dates dynamically using a formula of duration x units = work. Based on the result of this formula and any task dependencies outlined within the schedule, Project dynamically calculates and recalculates task start and finish dates. Making changes to these variables will distort the project schedule and will have effects in other areas within the schedule modifying task duration, units, and/or work.

- Duration is how many business days you have to complete the work
- Units is how many resource units you have to complete the work
- Work is how much effort it will take to complete the scheduled work

The Project Manager only needs to supply two of the three formula variables and Project will automatically calculate the third. The first variable entered is often a given for most projects. It is often the estimate for the work. Depending on how the estimate was performed the end result will populate one of the three variables, often the *work*. The second variable is entered by the Project Manager and is often the resource *units*. For example, a six-day work week or assigning more than one resource to a task. Microsoft Project uses these two variables to then calculate the task duration.

ENTERING ACTUAL WORK

Entering actual work into a Microsoft project schedule is important because this is one factor that drives the dynamic recalculation of schedule dates and progress. Often a centralized tool such as Project Server is used to make this process more efficient. However, in the absence of a more formalized method for entering actual work, the project manager can enter actual work manually:

1. From the file menu select "View" -> "Task Usage"
2. Right click on the right side of the split screen and check only "Actual Work". Uncheck all other options to avoid confusion. However, you may want to select some of these later to learn additional information about how the project is progressing
3. Adjust the time scale to reflect days. To do this, right click the date header on the right side of the split screen and select "Time Scale". Change Major Scale to Weeks and Minor Scale to Days
4. Locate the task to enter actual work data for. Expanding the Task will expose all resources assigned to that task
5. Enter actual work by day for each individual resource working on the task

RESOURCE LEVELING AND IDENTIFYING OVER/UNDER ALLOCATION



CDC UNIFIED PROCESS JOB AID



MICROSOFT PROJECT

Resource leveling is a way to fix over/under allocation. In Project, resource allocations are fixed in one of two ways, by either delaying tasks or by splitting tasks. Leveling resources can also be done in two ways, manually or automatically by the application. Manually leveling resources is the safest way to resolve this type of scheduling issue.

1. From the file menu select "View" -> "Resource Graph". This will display a graphical view that affectively shows allocation by resource. Blue bars represent work at or below a resources standard workday. Red bars represent work over a resources standard workday. No bar indicates that no work is scheduled. Full utilization is represented by a bold black line
2. Change the "Resource Graph" time scale to weeks for a better view *initially*. Right clicking on the date header, select "Time Scale" and change Major Scale to Months, and Minor Scale to Weeks
3. Viewing the "Resource Graph" *initially* in weeks will provide an extended view of utilization for the project by resource, by week
 - a. Scroll right to view additional utilization information for the duration of the project
 - b. Click the down arrow key to view additional resources
4. Review each resource's utilization for the life of the project
5. Once a resource has been identified as either over or under allocated changes need to be made to adjust for this. This is done on the Resource Usage view. From the file menu select "View" -> "Resource Usage"
6. Right click on the right side of the split screen and check only "Work". Uncheck all other options to avoid confusion
7. Adjust the visible date range to show the current reporting period by days. Right clicking on the date header, select "Time Scale" and change Major Scale to Weeks and Minor Scale to Days
8. Identify over / under allocation at the right of the page. Over allocated resources and over allocated workdays are highlighted in red. Scroll to the right taking note of over / under allocated days. When an over / under allocated resource day has been found, expand the resource exposing the tasks that they are assigned to. Adjust the level of work, units, or duration for individual tasks to smooth over / under allocation for the duration of the project. NOTE: All tasks assigned for the life of the project will be listed. Look for assigned work in the period in question to identify those tasks that need adjustment

AUTOMATIC RESOURCE LEVELING GIVES CONTROL OF HOW RESOURCE ALLOCATION IS RESOLVED TO THE APPLICATION. PROJECT THEN CALCULATES THE BEST WAY TO RESOLVE ALLOCATION AS A WHOLE FOR THE PROJECT. USING THE AUTOMATIC RESOURCE LEVELING FUNCTION IS MOST OFTEN NOT THE BEST APPROACH TO LEVELING RESOURCES ALLOCATION. THE RESULTS ARE VERY UNPREDICTABLE AND OFTEN REQUIRE MANUAL LEVELING TO CORRECT CALCULATED ALLOCATIONS. IF SELECTING TO AUTOMATICALLY LEVEL RESOURCES MAKE A BACKUP COPY OF THE PROJECT SCHEDULE PRIOR TO APPLYING THIS CHANGE. THIS STRATEGY WILL ALLOW FOR THE LUXURY OF REVERTING BACK TO A PREVIOUS COPY, IF NEEDED, AND POSSIBLY AVOIDING ERRORS THAT MAY TAKE EXTENSIVE TIME TO REPAIR. TO APPLY AUTOMATIC LEVELING TO THE PROJECT:

1. *SAVE A BACKUP COPY OF THE PROJECT FILE PRIOR TO AUTO LEVELING*
2. *FROM THE FILE MENU SELECT "TOOLS" -> "LEVEL RESOURCES"*
3. *SELECT THE "AUTOMATIC" LEVELING CALCULATION RADIO BUTTON*
4. *ADJUST ANY ADDITIONAL OPTIONS/SETTING BEFORE CLICKING "OK"*

SCHEDULE RECOVERY OPTIONS

On occasion, due to a number of different circumstances such as poor planning, unavailability of resources, too tight of a deadline, etc., it is necessary to replan a project. When replanning, the practices covered earlier still apply. Bringing the replanned schedule completion date as close to the original as possible can be accomplished by:

1. Adjusting task dependencies so that work is being conducted on multiple tasks simultaneously.
2. Adding additional resources
3. Increasing the % units or availability to work for project resources
4. Negotiating a new project finish date based on progress to date
5. Reducing project scope



CDC UNIFIED PROCESS JOB AID



MICROSOFT PROJECT

Best Practices

The following best practices are recommended for the practice of **Project Scheduling**:

- **Develop Jointly** – Input from knowledge experts and other stakeholders from across the organization should be leveraged to develop a reasonably accurate schedule.
- **Decompose** – Decompose schedule activities to no less than ~8hrs and no more than ~2wks of work effort.
- **Leverage Past Work** – When creating the project schedule review examples of similar projects, project templates, expert judgment, etc.
- **Review** – Review the completed schedule with project stakeholders before baselining and continuously review the schedule and update stakeholders as part of the project status reporting.
- **Make Updates** – As the project environment changes updates in the form of appended change requests should reflect any changes to the WBS and/or the WBS Dictionary.
- **Minimize Acronyms** – Use actual system names and nomenclature instead of acronyms to avoid confusion.

Practice Activities

For projects the following practice activities are appropriate:

- Define the planned work by decomposing WBS work packages into schedule activities
- Sequence schedule activities in the order in which they will be performed
- Identify resources to complete the work
- Estimate the level of effort required to complete the work utilizing the available resources
- Develop a project schedule.
- Make adjustments to the sequence of activities that accounts for resource availability
- Control the schedule by identifying, monitoring and influencing factors that cause schedule change

Practice Attributes

This section provides a list of practice attributes to help project teams determine when and how applying **Microsoft Project** impacts a project.

Practice Owner	CDC UP Project Office – NCPHI
Criteria	All projects regardless of type or size should have some type of document that outlines how work will be performed, in what order, by whom, and when (a project schedule). However, it is not required that a project use Microsoft Project as its scheduling tool.
Estimated Level of Effort	Moderate
Prerequisites	WBS, Project Scheduling Practices Guide
Practice Dependencies	N/A
Practice Timing in Project Life Cycle	Developing a project schedule is an activity that takes place early in the project life cycle with updates and refinements made throughout the project's life, as necessary.
Templates/Tools	Project Scheduling Practices Guide, Microsoft Project Practices Guide, Project Schedule Template, Project Scheduling Checklist
Additional Information	N/A

Key Terms

Follow the link below to for definitions of project management terms and acronyms used in this document.



CDC UNIFIED PROCESS JOB AID



MICROSOFT PROJECT

http://www2.cdc.gov/cdcup/document_library/glossary/default.asp

Related Templates/Tools

Below is a list of template(s) related to this practice. Follow the link below to download the document(s).

http://www2.cdc.gov/cdcup/document_library/document_matrix.asp

- Project Scheduling Practices Guide
- Project Schedule Template
- Project Scheduling Checklist

- Additional project schedule templates:
 - <http://office.microsoft.com/en-us/templates/CT101527321033.aspx?Origin=EC010230401033&CTT=6&av=ZPJ>
- Presentation: Hidden Treasures in Microsoft Project by Lisa Grant, MBA, PMP, CTL, CL
 - http://www2.cdc.gov/cdcup/document_library/presentation/default.asp
- Reference reading:
 - Dynamic Scheduling with Microsoft Project by Eric Uyttewall, PMP