MGMT 8020 Project Planning and Scheduling - 16 hours (1.6 CEUs)

COURSE OBJECTIVES	After completing this course, students will know: • A step-by-step method for planning and scheduling your projects • How to enter tasks and time durations in Microsoft® Project • How to connect tasks and build a working project model • How to enter resources and assign them to tasks
PREREQUISITE	MGMT 8010 Introduction to Project Management/Instructor's approval
TEXTS	*A Guide to the Project Management Body of Knowledge (PMBOK® Guide), 6th Edition*, Project Management Institute, 2017 *Microsoft® Project 2016 Step by Step*, Microsoft® Press, 2016
INSTRUCTOR	Dohn Kissinger, MBA, PhD, PMP, PMI-SP

Module 4

Module Objectives

The objectives of this module are:

- Learn ways to estimate the costs of project tasks
- Learn how to calculate a project budget
- Define how to control costs using the Earned Value Technique
- Learn how to assign resources to tasks in Microsoft Project

Reading Assignment

PMBOK® Guide, Chapter 7

Microsoft® Project Step by Step, Chapter 6

Step 7 – Project Budget Chart

Chapter 7 of the *PMBOK® Guide* discusses Project Cost Management, including cost estimating, cost budgeting, and cost control. The two basic types of schedule and cost estimates are top-down (macro estimates) and bottom-up (micro estimates).

Top-down estimates include:

- Parametric (ratio) methods – parametric estimating is using the actual cost of a previous project to estimate the cost of the new project. For example, if House #1 was $100K and 1,000 ft^2, we estimate that future houses may be approximately $100K/ 1,000 ft2, or $100 / ft^2. If we are building a second house with 2,000 ft^2, we estimate the cost as $100 / ft^2 x 2,000 ft^2 = $200K.

- Analogous (apportion) estimating – analogous (apportion) estimating is using the actual portions of a previous project to estimate the cost of the new project, as shown in Figure 5-1 of the text. For example,

	House #1	Portion	House #2
House	$100K	100%	$200K
Foundation	$20K	20%	$40K
Framing	$30K	30%	$60K
Roof	$10K	10%	$20K
Interior	$15K	15%	$30K
Other	$25K	25%	$50K

- Function point estimating – function point estimating is using the number of elements, or "function points" and the complexity to obtain a cost and schedule estimate for a complex project

Bottom-up (micro estimates) include:

- Template methods – a template based on past projects is used to generate schedule and cost estimates.

- Parametric task estimating – parameters are used to estimate the schedule and cost of the project tasks.

- Detailed estimating – the resources who are going to do the work estimate the schedule and cost of each project task that they are assigned to.

As we did in our task duration estimates, we take into account that the cost of each task has some uncertainty associated with it, which we need to address with a budget contingency. To calculate this budget contingency, we can use the PERT three-point estimating process discussed in Module 1, but focused on the task cost rather than the task duration. The cost estimates for each task are listed in terms of optimistic, most likely, and pessimistic, as shown below:

	Optimistic ($K)	Most Likely ($K)	Pessimistic ($K)
Initiate house project	-	0	-
Design house	3	5	10
Select contractor	0	0	0
Grade lot	5	10	20
Build foundation	10	20	30
Frame house	30	40	60
Put on roof	10	20	40
Finish exterior	30	40	60
Finish interior	30	40	50
Buy appliances	20	30	40
Buy furniture	20	30	50
Install appliances	3	5	10
Install furniture	5	5	5
Install landscaping	20	30	60
Complete house project	-	0	-

Task Budget Table for House Project

We then calculate the project budget based on the most likely cost values plus a budget contingency. The contingency is computed using the Goldratt approximation of 50% of the difference between the pessimistic values and the most likely values. In the House project the most likely cost estimates total to $275K, and the pessimistic estimates total to $435K. Taking half of the difference between the pessimistic estimate and the most likely estimates gives us a budget contingency of $80K:

Budget contingency = 0.50 x (Pessimistic total – Most likely total)

= 0.50 x ($435K – $275K) = $80K

Adding this budget contingency to the most likely total of $275K gives us a budget of $355K:

Project budget = Most likely total + Budget contingency = $355K

	Optimistic ($K)	Most Likely ($K)	Pessimistic ($K)
Initiate house project	-	0	-
Design house	3	5	10
Select contractor	0	0	0
Grade lot	5	10	20
Build foundation	10	20	30
Frame house	30	40	60
Put on roof	10	20	40
Finish exterior	30	40	60
Finish interior	30	40	50
Buy appliances	20	30	40
Buy furniture	20	30	50
Install appliances	3	5	10
Install furniture	5	5	5
Install landscaping	20	30	60
Complete house project	-	0	-
Totals	186	275	435
Budget contingency		80	
Project budget		355	

Project Budget Chart for House Project

Cost Control

Section 7.4 of the *PMBOK® Guide* discusses tools and techniques to control project cost. One of the tools and techniques is the Earned Value Technique. Earned value uses scope, cost, and schedule performance measures to obtain an integrated performance analysis of the project. For example, if both actual cost and actual schedule values are different than the planned values, earned value can be used to determine if the project is proceeding positively or negatively. Values are:

- Planned Value (PV), previously known as the Budget or Budgeted Cost of Work Scheduled (BCWS), is the planned project budget value vs. time.
- Actual Cost (AC), previously known as Actual Cost of Work Performed (ACWP), is the actual cost incurred to date in accomplishing the project work.
- Earned Value (EV), previously known as Budgeted Cost of Work Performed (BCWP), is the actual work accomplished on the project to date.

The Earned Value is calculated using Earning Rules that are different depending on the type of the task involved. Some of these Earning Rules are:

- Percent Complete – the Earned Value of a task is the Budgeted Value of the task times the Percent Complete of the task
- 0/100 Percent Rule – the Earned Value of a task equals 0 until the task is complete, then the Earned Value of the task is the Budgeted Value of the task
- 50/50 Rule – the Earned Value is 50% of the Budgeted Value of the task when the task is started, and 100% of the Budgeted Value of the task when the task is completed

From the three Earned Value measures, the integrated performance measures for the project can be calculated as follows:

- Cost Variance CV = EV – AC, where a positive number is good, zero is exactly on target, and less than zero is bad.
- Schedule Variance SV = EV – PV, where a positive number is good, zero is exactly on target, and less than zero is bad.
- Cost Performance Index CPI = EV/AC, where a number greater than 1.0 is good, 1.0 is exactly on target, and less than 1.0 is bad.

- Schedule Performance Index SPI = EV/PV, where a number greater than 1.0 is good, 1.0 is exactly on target, and less than 1.0 is bad.

From these results, we can estimate the Actual Cost AC of the project at completion using the total project budget, or Budget at Completion (BAC), and the Cost Performance Index:

- Estimate (Cost) at Completion EAC = BAC/CPI

We can also estimate the Actual Duration of the project at completion using the Scheduled Duration and the Schedule Performance Index:

- Estimated Actual Duration at Completion = Scheduled Duration/SPI

An example that illustrates Earned Value is shown as follows. At a given point in time in a project, we have:

- Planned Value PV or Budget = $100K
- Actual Cost AC = $80K

This project would seem to be positive, because the actual cost to date AC is less than the Budget or Planned Value PV, meaning that we are under budget. However, if we do an earned value analysis, we find that the work performed, or Earned Value EV, is only $60K.

Using the formulas discussed, we see that:

- Cost Variance CV = Earned Value EV – Actual Cost AC = $60K – $80K = –$20K (bad).
- Schedule Variance SV = Earned Value EV – Planned Value PV = $60K – $100K = –$40K (bad).
- Cost Performance Index CPI = Earned Value EV/Actual Cost AC = $60K/$80K = 0.75 (bad).

This is interpreted to mean that we only got 75 cents worth of work for every dollar we have spent so far.

- Schedule Performance Index SPI = Earned Value EV/Planned Value PV = $60K/$100K = 0.60 (bad)

This is interpreted to mean that we have only done 60% of the work that was planned to be done so far.

Microsoft Project Task Schedule with Assigned Resources

Reading Assignment: *Step by Step*, Chapter 6

Download the Chapter 6 Practice File SimpleAssignWorkResouce.mpp from the website (see *Step by Step* p. xiv). Assign resources to the tasks, as described in Chapter 6, starting on p. 120. If you have trouble downloading the Practice File, I will post it. If you are using a Microsoft Project 2003 or Microsoft Project 2007 version of Microsoft Project, I will download the Practice File and convert it to Microsoft Project 2003 or Microsoft Project 2007 formats and post them.

Save the project file and submit it by the date shown in the Syllabus.

Module 4 Summary

We learned in Module 4:

- How to estimate the costs of project tasks
- How to calculate a project budget
- How to control costs using the Earned Value Technique
- How to assign resources to tasks in Microsoft Project

Individual Project Assignment

The purpose of the Individual Project is to give you practice in the project planning and scheduling process. The fourth assignment for this Individual Project is to create a Project budget chart for your project, as described in this module. Submit this chart by the date shown in the Syllabus. Also, please address the following questions:

1. What did you like best in this course?
2. What changes would you suggest to improve the course in the future?
3. What were the most interesting or most important ideas and/or tools that you learned in this course?

Step by Step Assignment 3

Submit the *Step by Step*, Chapter 6 Microsoft Project task schedule with assigned resources described in this module.

Discussion Postings

There are no discussion postings for this course.