

Full Monte Example using LOE Flag

Prerequisites to use the example

Microsoft Project 2010 or later
Barbecana's Full Monte 3.3 or later

Introduction

Most scheduling tools have some mechanism to model support or overhead effort associated with a project but not directly involved with the work being performed to produce the project deliverables.

Examples include IT Support, Project Accounting, and even project Management itself.

The duration of these support tasks is usually automatically derived from the duration of the discrete work tasks that they are supporting.

These support tasks are officially called **Level of Effort (LOE)** and are sometimes implemented as **Hammocks** in scheduling tools. A Level of Effort task should never appear on the Critical (Longest) Path of the project schedule as it should never add time to the project.

Unfortunately, Microsoft Project does not have a built-in facility to model Level of Effort (LOE) tasks, so regular tasks must be used. This forces users to manually adjust the duration of the LOE tasks to match the current duration of the underlying discrete work in the project.

Modelling Level of Effort Tasks in Microsoft Project

File: Full Monte Example using LOE Flag.mpp

Best Practice is to create tasks that are logically linked to the underlying discrete work tasks so the work being supported is easily identified. Using Manually Scheduled tasks should be avoided as this creates additional work to maintain the support tasks and is considered a poor practice by schedule auditors.

In the example in Figure 1, we can see the task **IT Support** that is being used to specify the IT resources required to support the main project tasks; Design, Fabricate A/B and Testing.

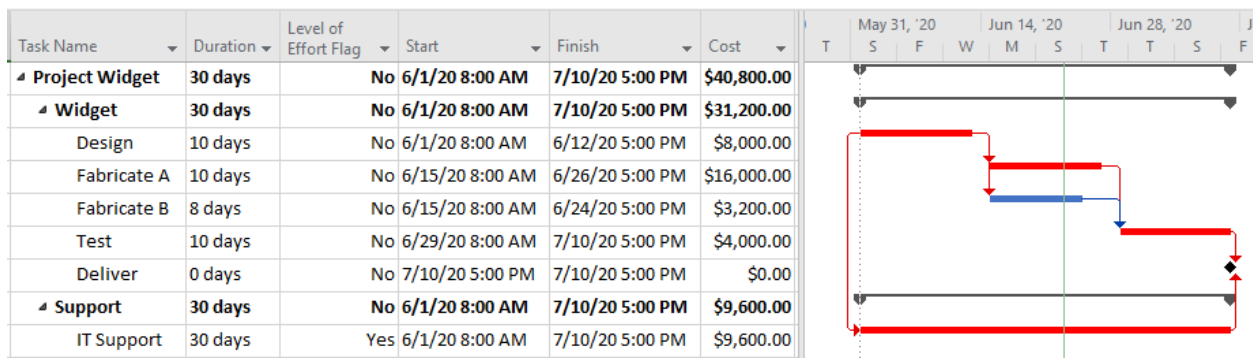


Figure 1

The task **IT Support** has been logically linked with the start of 'Design' and the 'Deliver' milestone. The duration of the task has been manually set to 30-days to match the total duration of the underlying discrete tasks. If the logic or durations of the discrete tasks are subsequently modified, then the duration of the **IT Support** task will need to be manually updated.

Microsoft Project is depicting the task as Critical but that is a limitation of the tool.

Unfortunately, this will become an issue when we perform a Schedule Risk Analysis (SRA) because, if the primary discrete work tasks (Design, Assembly etc.) happen to finish early during the simulation then the **IT Support** task will prevent 'Deliver' for occurring any earlier than the finish of **IT Support** which is fixed at 30 days in this example.

Modelling Level of Effort Tasks in Full Monte

Fortunately, Full Monte has a feature that allows Level of Effort tasks to be identified and their durations automatically calculated based on the underlying discrete work.

Note: This feature is further explained in Appendix F of the Full Monte User Guide.

Full Monte allows LOE tasks to be identified using a Microsoft Project custom Flag field. Setting the Flag field to No (false) will indicate the task is not LOE while settings the Flag field to yes (True) will inform Full Monte that the task should be considered as LOE. Any available Flag field can be used.

After opening the project in Full Monte, the specific Flag field used should be mapped to the Full Monte field 'Level of Effort Flag' as shown in Figure 2.

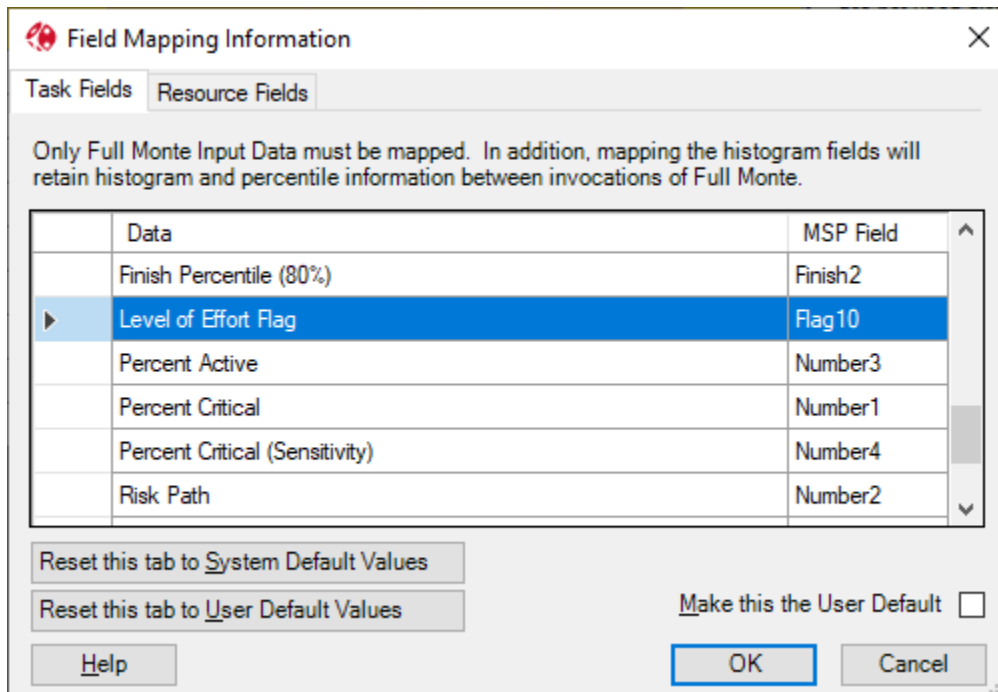


Figure 2

In the example in Figure 2, the Full Monte field 'Level of Effort Flag' (listed under 'Other Full Monte fields' in the field selection list) has been mapped to Microsoft Project custom field Flag10.

Note: After setting the new mapping, Full Monte should be closed and re-opened to cause the new data to be loaded.

Referring to Figure 1, we can see the custom field Flag10 has been renamed to 'Level of Effort' and included as a column in the Gantt view for easy reference and update. It has been set to 'Yes' for the **IT Support** task.

After opening the project in Full Monte, we see the task edit window as shown in Figure 3.

ID ▲	Task Name	Remaining Duration	Duration Distribution Type	Duration Optimistic	Duration Most Likely	Duration Pessimistic	Finish Histogram
0	LOE Example 4	30 days	Triangular	80%	100%	130%	Graph
1	Project Widget	30 days	Triangular	80%	100%	130%	Graph
2	Widget	30 days	Triangular	80%	100%	130%	Graph
3	Design	10 days	Triangular	80%	100%	130%	Graph
4	Fabricate A	10 days	Triangular	80%	100%	130%	Graph
5	Fabricate B	8 days	Triangular	80%	100%	130%	Graph
6	Test	10 days	Triangular	80%	100%	130%	Graph
7	Deliver	0	Triangular				Graph
8	Support	30 days	Triangular	80%	100%	130%	Graph
9	IT Support	30 days	Triangular				Graph

Figure 3

Observe that Full Monte has disabled editing of the Duration Uncertainty fields for **IT Support** as the duration of this task will depend on the overall duration of the underlying discrete tasks during the simulations.

After running the simulation, the resulting Probability Distribution Histogram for the Deliver tasks is shown in Figure 4.

Project Full Monte Example using LOE Flag.mpp (10000 simulations performed on 6/24/2020)

Histogram of Finish for task 'Deliver' (UID 41).

Mean = 14Jul20, Standard deviation = 14 hours, Deterministic value = 10Jul20 (28%).

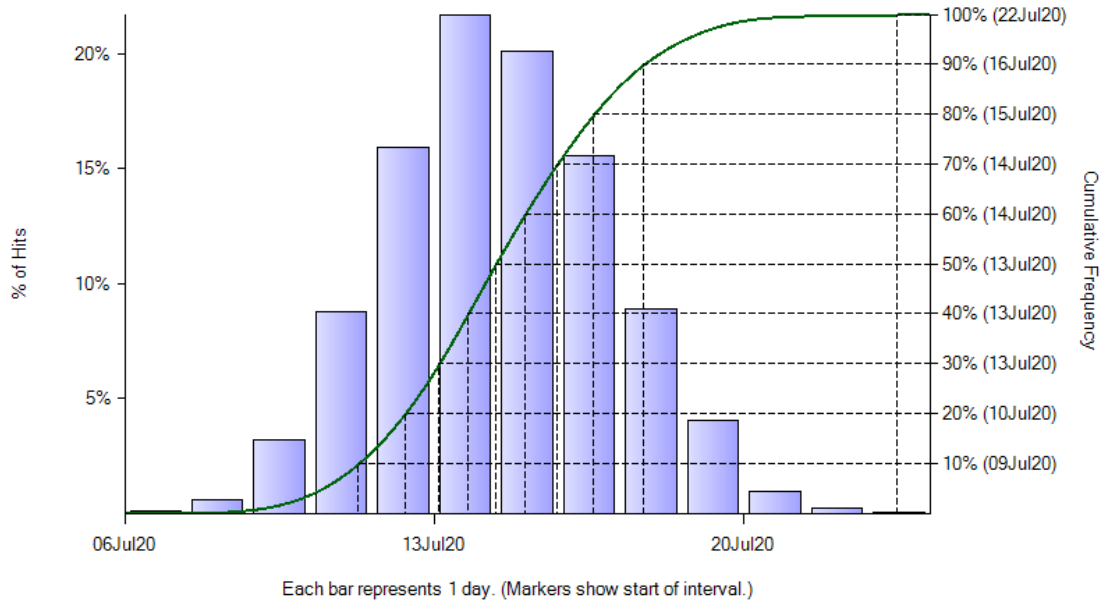


Figure 4

Observe that the histogram displays an approximately **Normal** (bell shaped) distribution as expected and shows no sign of being artificially constrained by the **IT Support** task. The Sensitivity Analysis Tornado chart shows the expected work as shown in Figure 5.

ID	Task Name	Remaining Duration	Percent Critical	Percent Critical (Sensitivity)	Sensitivity Index	Sensitivity Index 50.0	Optimistic Finish of Milestone ID 7	Pessimistic Finish of Milestone ID 7	2020
6	Test	10 days	100%	100%	58%		7/9/20 2:58PM	7/16/20 2:43PM	Jul 05 12
3	Design	10 days	100%	100%	58%		7/9/20 2:58PM	7/16/20 2:43PM	
4	Fabricate A	10 days	95%	95%	55%		7/10/20 11:37AM	7/16/20 2:43PM	
5	Fabricate B	8 days	5%	5%	3%		7/14/20 8:18AM	7/14/20 3:06PM	

Figure 5

Saving the Full Monte results back to Microsoft Project allows us to create the Gantt view shown in Figure 6.

Task Name	Duration	Level of Effort Flag	Start	Finish	Cost	Percent Critical	Cost Percentile (80%)	T	May 31, '20	Jun 14, '20	Jun 28, '20	Jul 12, '20
Project Widget	30 days	No	6/1/20 8:00 AM	7/10/20 5:00 PM	\$40,800.00	100	\$44,246.00					
Widget	30 days	No	6/1/20 8:00 AM	7/10/20 5:00 PM	\$31,200.00	100	\$33,910.00					
Design	10 days	No	6/1/20 8:00 AM	6/12/20 5:00 PM	\$8,000.00	100	\$9,029.00					
Fabricate A	10 days	No	6/15/20 8:00 AM	6/26/20 5:00 PM	\$16,000.00	95	\$18,033.00					
Fabricate B	8 days	No	6/15/20 8:00 AM	6/24/20 5:00 PM	\$3,200.00	5	\$3,605.00					
Test	10 days	No	6/29/20 8:00 AM	7/10/20 5:00 PM	\$4,000.00	100	\$4,508.00					
Deliver	0 days	No	7/10/20 5:00 PM	7/10/20 5:00 PM	\$0.00	100	\$0.00					
Support	30 days	No	6/1/20 8:00 AM	7/10/20 5:00 PM	\$9,600.00	0	\$10,419.00					
IT Support	30 days	Yes	6/1/20 8:00 AM	7/10/20 5:00 PM	\$9,600.00	0	\$10,419.00					

Figure 6

Observe that the **Percent Critical** for the **IT Support** task is correctly shown as 0 (zero), as it never appeared on the critical path during the simulations.

The Green bar in the Gantt chart shows the overall span of the **IT Support** resources at 80% confidence and can clearly be seen to spanning the 80% confidence bars for the discrete work tasks.

The cost for **IT Support** at 80% confidence is also shown in the table at \$10,419. Compare this to the budget cost calculated by Microsoft Project at \$9,600.

The revised cost for **IT Support** is included in the **Total Project Cost**, at 80% confidence, of \$44,246.

Summary

The **Full Monte LOE Flag** can be used to identify tasks in the schedule that should be treated as Level of Effort (LOE/Hammock) during the simulations. The LOE task duration will be automatically derived from the underlying linked discrete work and the LOE task will never be considered Critical.

This solution meets the requirements of regulatory agencies including the Defense Contract Management Agency (DCMA) that audit schedules on behalf of the US Government and supports a best practice approach to modelling overhead resources and costs.