Full Monte SRA™ — The better approach   to Schedule Risk Analysis

Full Monte SRA™

Getting Started with Full Monte SRA
For Microsoft Project™

BARBECANA

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FOREWORD

Most project management software products implement a technique called Critical Path Methodology (CPM). This includes popular tools such as Microsoft Project™, Oracle Primavera™, and Deltek Open Plan™. The problem with the Critical Path Methodology is that it gives users a single-point estimate of when projects will be complete. This single, deterministic, estimate will not only most likely be wrong but in fact tends to be overly optimistic, often resulting in projects being delivered late and over budget.

By including information related to estimate uncertainty and the potential impact of threats and opportunities, we can enhance the CPM model to provide insight into how these uncertainties interact and produce a range of completion estimates with associated levels of confidence.

These types of enhancements are called 'Quantitative Risk Assessment' or 'Schedule Risk Analysis'.

Barbecana's Full Monte™ addresses the issue of cost and schedule risk analysis by replacing single-point estimates with probability distributions and using Monte Carlo simulation to provide a much more realistic assessment of likely project outcomes.

We have strived to make the product powerful and flexible while retaining ease of use for all levels of schedule maturity. We hope you enjoy using the software as much as we have enjoyed creating it.

Comments, suggestions, and feedback are always welcome, so please feel free to contact us.

Thank you go choosing Full Monte to help improve your chance of delivering a successful project.

Tony Welsh, Founder

Chapter 1: Introduction

1.1 Overview

Barbecana's Full Monte SRA enhances your project management capabilities by adding Monte Carlo simulation to your existing critical path method (CPM) project management system.

This is important because the critical path methodology used by tools such as Microsoft Project and Oracle Primavera, while an excellent technique for creating a model of the work to be performed to complete an objective, is inherently optimistic.

This means that any delivery/completion date calculated by such tools is typically unrealistic and has less than a 50% chance of being achievable. This is true even if your estimates are good and your execution performance is excellent. For further information on this inherent optimism please see the white paper "Merge Bias" available from the Barbecana web site here: https://www.barbecana.com/full-monte/white-papers/

This guide will explain how Full Monte SRA can quickly show the impact of risks, uncertainty and merge bias on your schedule and help you make more realistic commitments.

Note: This guide was produced using Microsoft Project 2019 Professional but all the techniques described can be used with any version of Microsoft Project Standard or Professional from 2010 through 2024.

1.2 Prerequisites

The guide assumes you have successfully installed Full Monte SRA. If you have not yet installed the software, you can request a copy here: https://www.barbecana.com/full-monte/free-trial-MSP/

Follow the instructions in the Installation Guide to install the software.

You will also need a sample schedule. You can use your own schedule but you may find it easier to follow this guide using the sample provided with Full Monte.

The Monte Carlo simulation engine in Full Monte SRA will simulate the execution of your project many times using different sampled durations based on the information described in section 1.4.

For these simulations to be meaningful it is important that the schedule: -

- Be Logic Driven – Dates for successors should be driven by logic from predecessors.
- Avoid Hard Constraints – Constraints such as Start No Later Than, Finish No Later Than, Finish On etc. will prevent the effect of delays to the schedule being modelled realistically. Even if the project has a firm required by date it is best to find out sooner rather than later that the date may be unrealistic. That gives us the opportunity to revise the schedule to improve our chances for on-time delivery.
- Avoid Manually Scheduled tasks – Manually scheduled tasks hide the effect of project logic. Full Monte SRA will model Manually Scheduled tasks using a Must Finish On Constraint.

1.3 The Full Monte SRA Demonstration Project

To open the Full Monte sample project, follow these instructions:

1. Start Microsoft Project and if necessary, dismiss the open project screen by selecting a new blank project.
2. Select the Add-Ins menu.
3. From the Full Monte Administration menu select Open Demonstration Project as shown in figure 1.1.
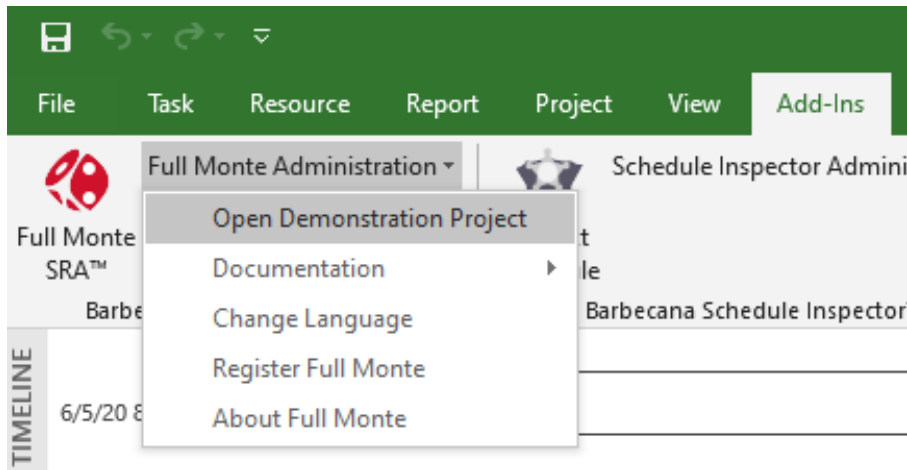

Figure 1.1

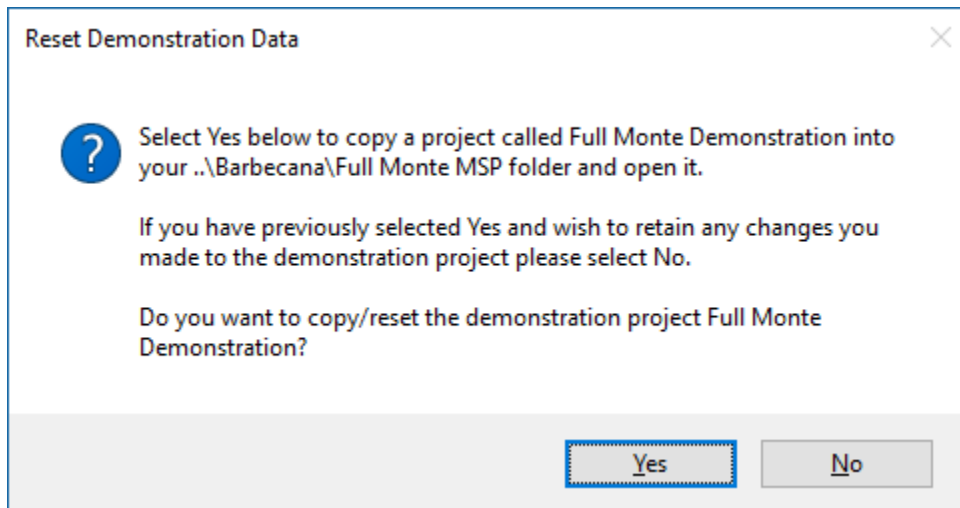4. The dialog displayed in figure 1.2 will be displayed.

Figure 1.2

5. Click Yes to confirm that you wish to create a copy of the demonstration project in your personal Barbecana Full Monte folder.

   Note: You can reset the demonstration project to its original state at any time by choosing Open Demonstration Project and clicking Yes on the dialog. If you wish to continue working with changes made in an earlier session, then either click No on the dialog or simply open the project by selecting the Full Monte Demonstration project from the Microsoft Project recent files list.

6. Full Monte will confirm the file was copied as shown in figure 1.3.
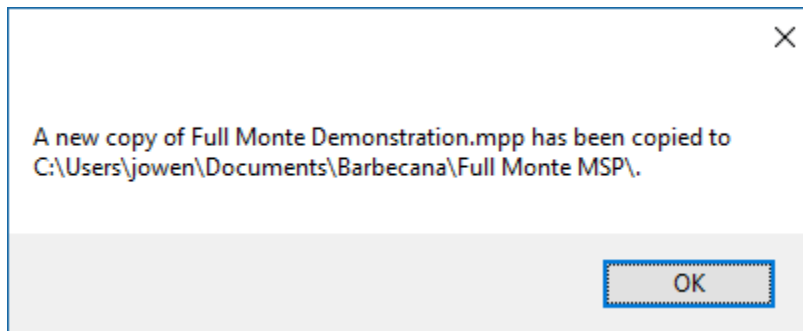

Figure 1.3

7. The demonstration project is opened in Microsoft Project as shown in figure 1.4
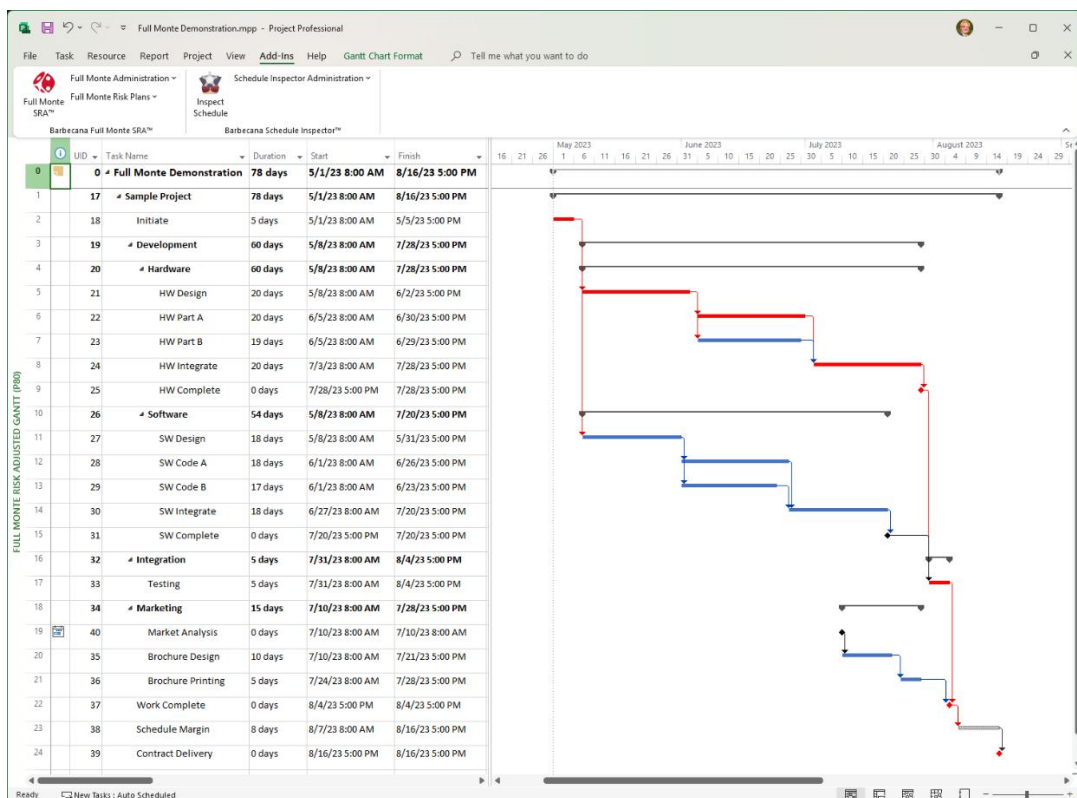

Figure 1.4

The sample data provided in the Full Monte Demonstration project is designed to quickly demonstrate some of the basic techniques of schedule risk analysis using Full Monte.

The project comprises two major components, a hardware component and a software component. These components are to be developed independently but must be integrated prior to project completion. There are also some marketing activities that should be completed ready for project delivery.

The Microsoft Project Gantt chart has been configured to show the critical path driving project completion using red bars. The critical (longest) path runs through Initiate, the HW tasks, and then

through Integration Testing to Delivery. The blue bars represent tasks with slack (float) that are not directly driving project completion although they must obviously be completed before the project can be deemed complete.

The schedule is showing a delivery date of August 4th.

1.4 Risk vs Uncertainty

Risks are 'random' events that may, or may not, affect the project. Risks are often described as either Threats (bad for the project) or Opportunities (good for the project). Risks have a probability of occurrence and an assessment of the impact they will have on the schedule should they occur. Risks are typically captured in a Risk Register where a response to the risk can be managed.

Note: Opportunities are often not completely random, and management decisions can typically be made regarding adoption of specific opportunities. Full Monte SRA allows scenarios to be created based on specific opportunities (or threats).

Uncertainty is caused by lack of exact knowledge regarding how long a task will actually take in practice. We capture that uncertainty using a three-point estimate.

Uncertainty usually causes the largest **unexpected** delays to a schedule, so Barbecana recommends an initial focus on capturing uncertainty in your schedule risk assessments.

1.5 Schedule Risk Assessment / Schedule Risk Analysis

The purpose of a schedule risk assessment / schedule risk analysis (for our purposes the terms are interchangeable) is to understand the potential effect of risk and uncertainty on the schedule enabling us to commit to a project completion (or interim milestone delivery) date that we have an acceptable confidence (probability) of being able to achieve.

The acceptable confidence of success can vary by organization/client but is usually more than 50% and often set at 80%. This means we want to commit to a delivery date that we have an 80% chance of being able to achieve. It is usually cost prohibitive to aim for probabilities higher than 80-90% and too risky to aim for probabilities below 50%.

Tasks in the schedule have a duration. This duration estimate is our best assessment of how long the task will take. It should not include any padding. Most tasks have some uncertainty regarding exactly how long they will ultimately take. Full Monte SRA allows us to capture that uncertainty as a range of estimates for each task.

Note: While it is not essential to capture discrete three-point estimates for every task in the schedule, we do recommend doing so for tasks on or near the critical path and those known to be high-risk. All other tasks can be assigned a small amount of template uncertainty. Keep in mind that a task's presence on the critical path does not automatically make it high risk.

To model estimate uncertainty we capture three separate estimates:

- Most Likely Duration - typically the duration from the schedule
- Optimistic (Best Case) Duration – the minimum duration we expect the task to take

- Pessimistic (Worst Case) Duration – the maximum duration we expect the task to take

These three estimates are often referred to as a three-point estimate.

For individual tasks, Full Monte allows the three estimates to be entered as either durations or percentages. Percentage estimates are calculated relative to the task duration.

*Note: Full Monte actually uses the **Remaining Duration** from Microsoft Project. For a task that has not started this will be the same as the Duration entered for the task. Once a task has started (has an Actual Start and Percent Complete is greater than 0) the Remaining Duration will start to decrease so by using Remaining Duration Full Monte can automatically reduce the effect of remaining uncertainty.*

For Example: If the schedule task duration is set to 4 weeks (20 working days) and the optimistic duration is set to 75% then this would represent a best-case duration of 3 weeks (75% of the 4-week task duration). Likewise, a pessimistic duration of 125% would represent a worst-case duration of 5 weeks (125% of the 4-week task duration).

Note: While individual task duration estimates can use either duration units or percentages (either 3-weeks or 75% for the optimistic duration example above), duration estimates on summary tasks and Full Monte SRA templates can only use percentages. This is because the uncertainty information on a summary task is just a default for lower-level tasks below that summary task.

Along with the three-point estimate, Full Monte allows us to specify a Duration Distribution Type. This is a probability distribution curve that allows us to weight the chance of sampled durations used in the simulation being closer to the elements of the 3-point duration estimate. Full Monte supports the following distribution/curve types.
- None
- Beta
- LogNormal
- Normal
- Triangular
- Uniform

1.6 Choosing a Distribution Curve

The selection of a distribution curve is somewhat subjective, and studies have shown that it is generally less important than the accuracy of the three-point duration estimates (optimistic, most likely, pessimistic).
The **Triangular distribution** is commonly used as the default because it allows for skewed distributions—meaning the optimistic and pessimistic values do not have to be evenly spaced around the most likely estimate. It is straightforward to understand and implement.
The **Beta distribution** can also represent skewed data, but it reduces the likelihood of sampled durations being very close to the absolute optimistic or pessimistic values compared to the Triangular distribution. This makes it more realistic in many cases and better reflects actual outcomes.
While the Beta distribution often provides a closer approximation to real-world behavior, the Triangular distribution remains more popular. It is simpler to use and, from a statistical standpoint, tends to

produce a higher standard deviation. This results in slightly more pessimistic forecasts, effectively building in an additional contingency for risk.

1.7 Three-Point Estimate Guidance

Rather than laboriously assign individual three-point estimates and duration distribution types to each task in the schedule, Full Monte allows uncertainty to be pre-defined using templates. Four templates are included as standard although these can be changed or expanded by the user (Edit, Manage Templates). The default duration uncertainty templates are:

Template Name	Distribution Type	Optimistic	Most Likely	Pessimistic
Default	Normal	90%	100%	110%
Low Risk	Triangular	90%	100%	115%
Medium Risk	Triangular	95%	100%	125%
High Risk	Triangular	95%	110%	150%

The **Default** template is automatically applied to all projects opened for the first time in Full Monte. While a symmetrical distribution may seem unrealistic, it is useful for assessing the impact of merge bias and potential changes to the critical path. User can modify the parameters of the default template, including changing the Distribution Type to (None) so new projects start out with no uncertainty.

The other three standard templates (Low Risk, Medium Risk, High Risk) are just suggestions for duration uncertainty values. Ideally the user will use the Full Monte SRA **History** view (see the Full Monte SRA User Guide for more information) to analyze past projects to see how actual durations ultimately compare to the initial baseline duration estimates and use this to guide specification of uncertainty parameters.

Chapter 2: Getting Started with Full Monte

2.1 Opening a Project in Full Monte

With a project open in Microsoft Project, select the Add-Ins menu and click the Full Monte dice icon on the menu.
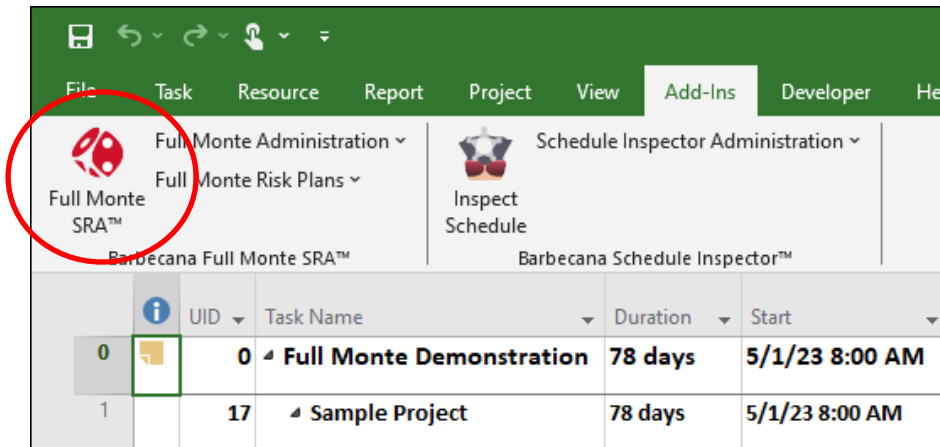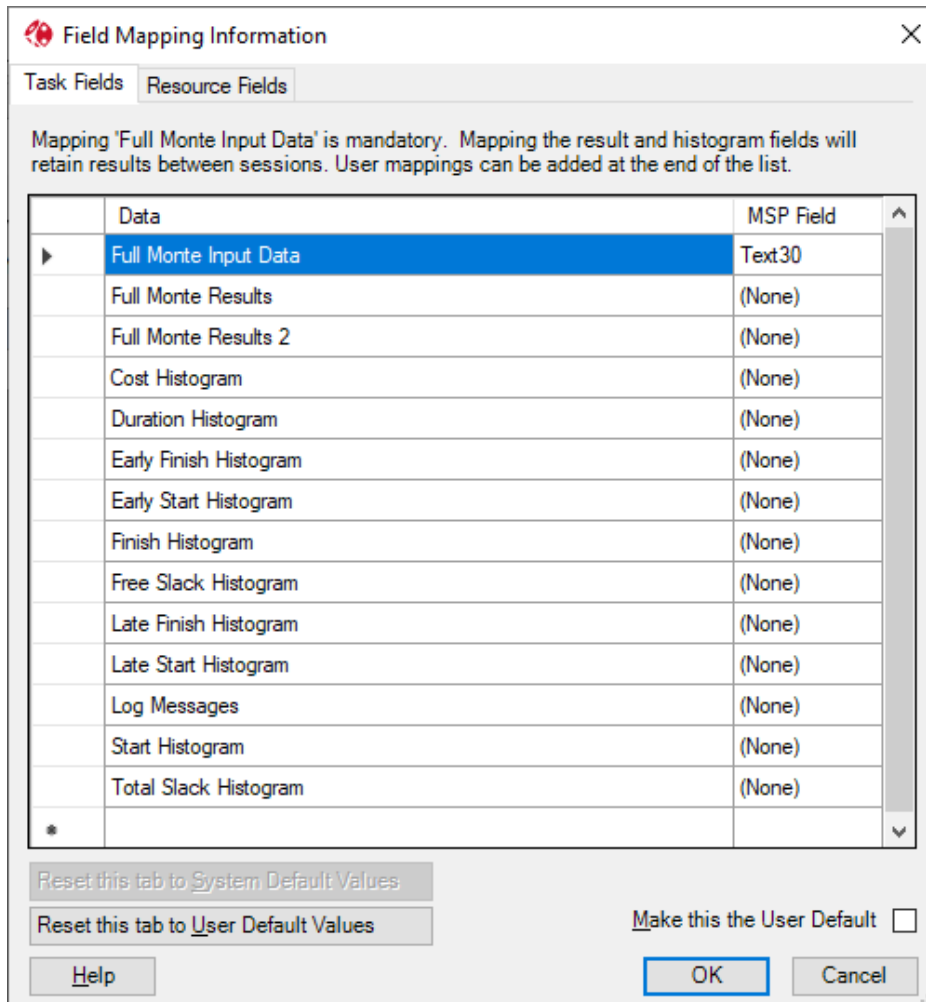

Figure 2.1

2.2 Field Mappings

Full Monte stores user input data and results in Microsoft Project custom fields. The exact fields used by Full Monte can be specified by the user in the Field Mappings Dialog.

The initial, system default, mapping is shown in figure 2.2.

Figure 2.2

The default field mappings shown in Figure 2.2 set 'Full Monte Input Data' (the only mandatory field to be mapped) to Text30. Customers may change these defaults and Full Monte may change the default fields if they are already in use by the customer.

Note: Earlier versions of Full Monte used different default mappings. Full Monte now maps fewer fields by default to reduce any conflicts with existing user data.

If all the required custom fields are empty in the new project, then Full Monte SRA will simply open the project and display the Task Edit dialog shown in Figure 2.7 however, customer projects may already

have some custom data in one or more of these fields. If this is the case, Full Monte will warn the user that the default mappings conflict with existing data as shown in Figure 2.3.
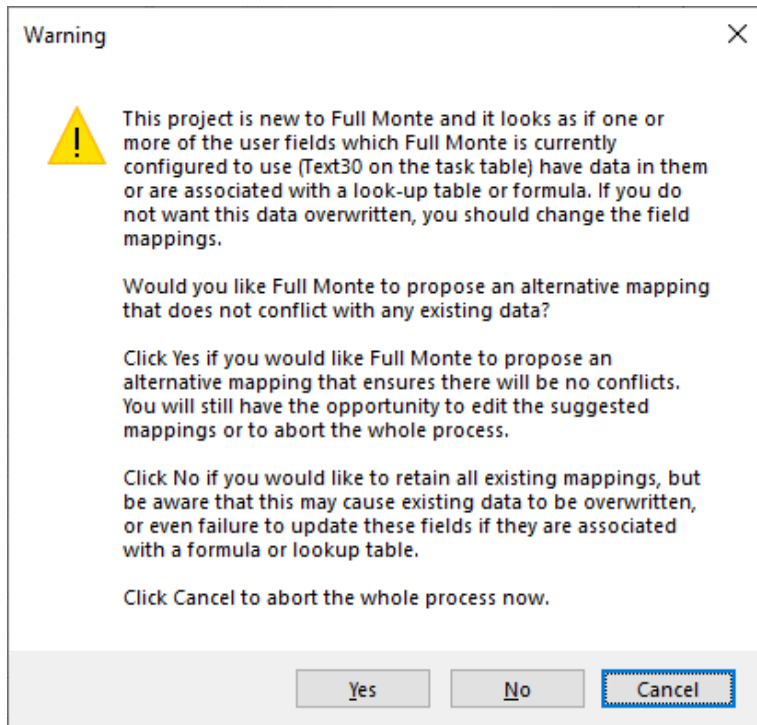

Figure 2.3

In Figure 2.3, we can see that Full Monte is warning that there is existing customer data in Text30. The default field mapping (Figure 2.2) shows that Full Monte is configured to store 'Full Monte Input Data' in Text30.

The dialog offers the choice to select 'Yes' to have Full Monte SRA propose an alternate mapping that does not conflict with Text30. The user may also choose 'No' which will cause Full Monte SRA to continue with the default mapping which will result in the existing data in Text30 being deleted and replaced by Full Monte SRA data. You may also click 'Cancel' to abort the field mapping process and return to Microsoft Project to review what data is stored in Text30 before committing to a course of action.

It is entirely possible that there will be multiple conflicts. They will all be listed in the dialog.

If you select 'Yes' then an alternate mapping will be displayed as shown in Figure 2.4.
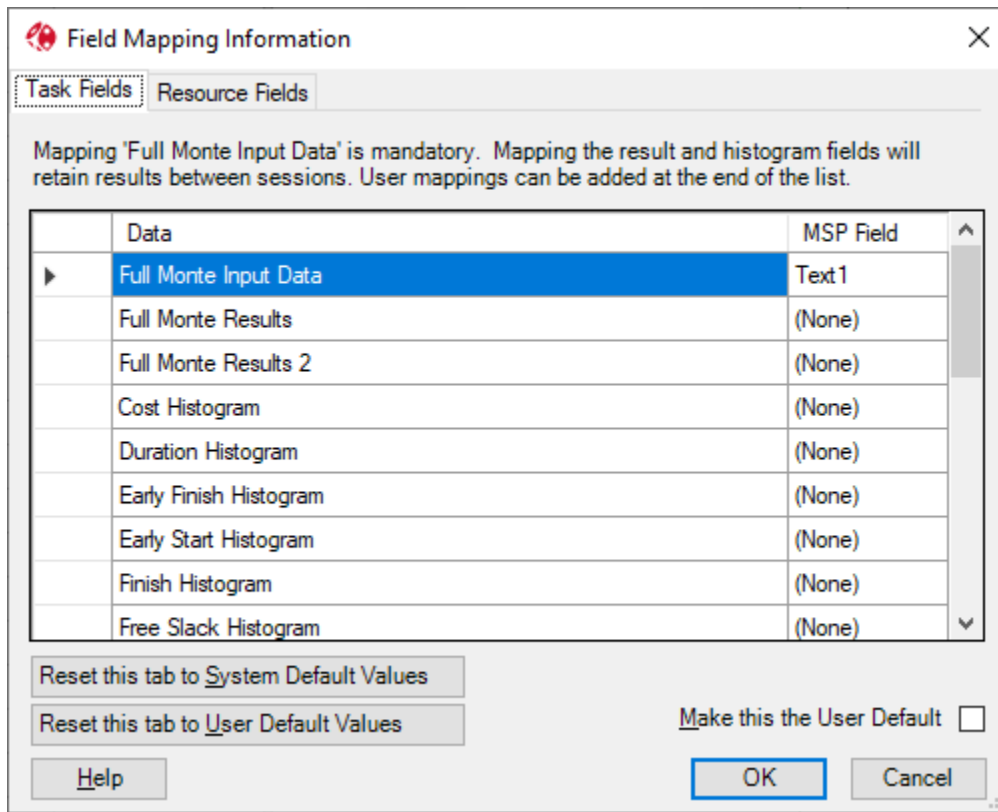

Figure 2.4

In the example shown in Figure 2.4, Full Monte SRA is now proposing to use Text1 for the Full Monte Input Data. Many customers reserve several custom fields for standard reporting purposes. In this case, you can manually modify the fields mappings to avoid using any reserved fields.

Note: The Full Monte field 'Full Monte Input Data' is the only field that must be mapped. All other fields can be set to (None) to reduce the number of custom text fields required. The only disadvantage of not mapping the standard fields is that they will not be available for reporting in Full Monte until a Risk Analysis has been performed in a new session. Full Monte uses these additional mapped fields to persist reporting data between sessions. It is not required and does not reduce the functionality of the product if these additional fields are not mapped.

It is also possible to add additional Full Monte fields to the mapping as shown in Figure 2.5

Figure 2.5

In Figure 2.5 some additional Full Monte fields (Analysis Focal Item, Cost Expected Value, Cost Percentile (80%), Finish Expected Value, Finish Percentile (80%), Percent Active, Percent Critical, Risk Path, Schedule Margin Flag, Start Expected Value, Start Percentile (80%)) have been added. The Analysis Focal Item and Schedule Margin Flag fields are optional inputs to Full Monte SRA to identify special task attributes. The remaining additional values will save the specified Full Monte SRA results into Microsoft Project Custom Fields for reporting in standard Project Views.

Clicking OK will apply the new mapping to the project.

Note: Check the 'Make this the User Default' option before clicking OK if you wish the proposed mapping to become the default for any new projects you open in Full Monte SRA.

Full Monte SRA will again verify that the new mappings are not using custom fields with existing data. If a conflict is found, then the message shown in Figure 2.6 is displayed.
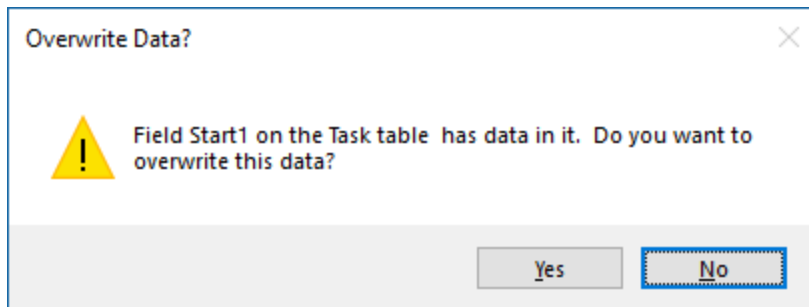
Figure 2.6

Select Yes to continue applying your chosen mapping (which in this example will delete any existing data in Start1) or select No to be returned to the Field Mapping dialog to make further changes.

Note: Because of the checks Full Monte makes when applying fields mappings, this may take some time on very large projects. Please be patient.

Note: The selected field mappings are stored in the Task 0 (Project Summary row) text field used for Full Monte Input Data. Provided the user saves the project after using Full Monte, the mappings will be retained and used automatically the next time the project is opened.

The Full Monte Task Edit window will be displayed as shown in figure 2.7
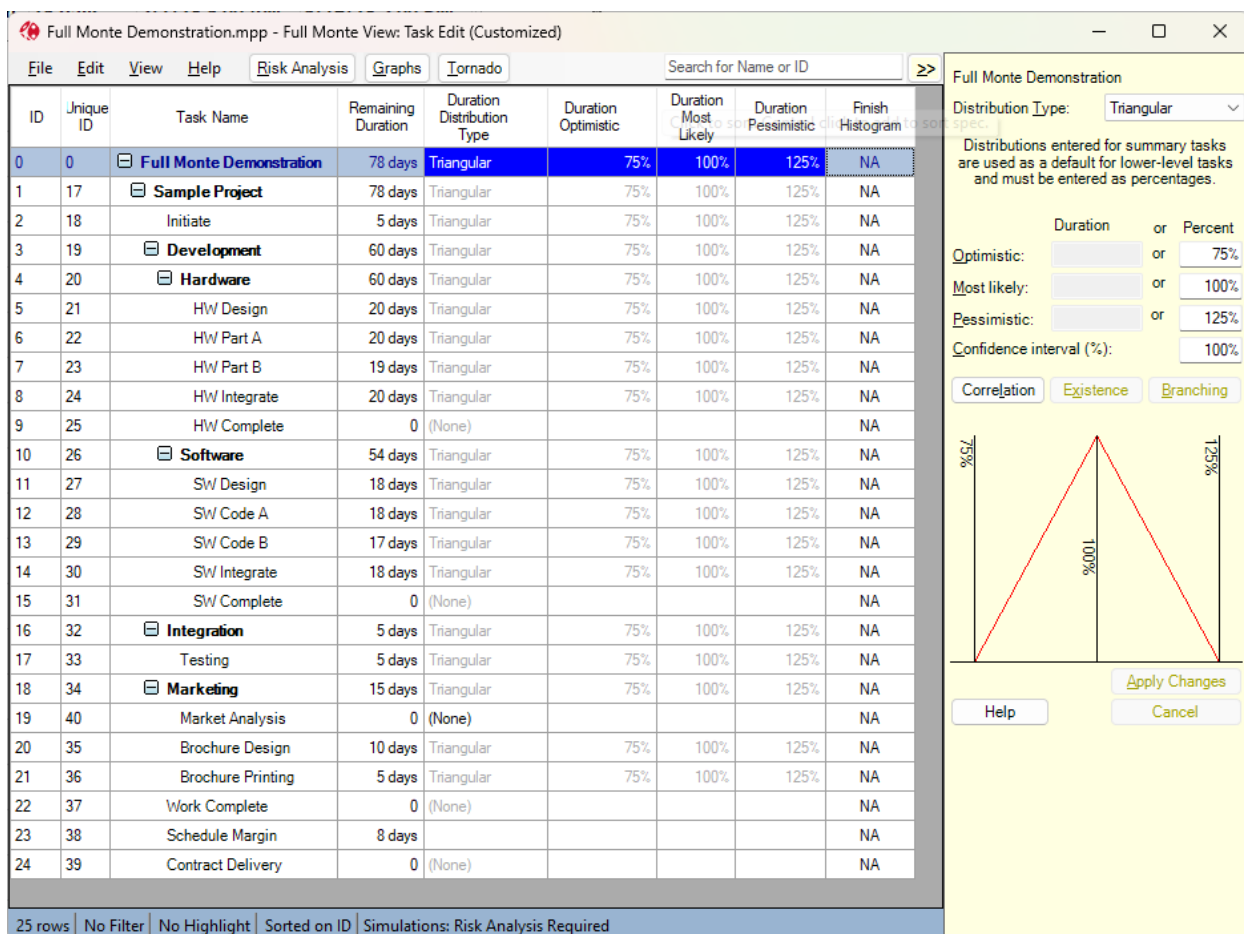
Figure 2.7

The data displayed may vary if you have previously modified the columns displayed in the Task Edit window. Columns can be added, removed or resized by right-clicking on the column headings in the view.

Uncertainty distribution data can be edited directly in the spreadsheet. Both uncertainty data and more advanced features such as correlation and branching can be edited in the edit panel to the right of the view.

Note: The edit panel can be hidden/displayed using the chevron button at the top left of the panel (to the right of the search control on the menu bar).

2.3 Task Hierarchy and Uncertainty Inheritance

By default, Full Monte displays the task hierarchy (summary tasks and tasks) as entered in Microsoft Project. The hierarchy can be switched off from the View menu. You may wish to turn off the hierarchy view if you wish to sort/group tasks based on other criteria such as a custom Text or Outline code.

It is often the case that uncertainty data (distribution type, optimistic, most likely, and pessimistic durations) will be the same for similar tasks contained within a single summary task. Full Monte allows uncertainty data to be specified at the summary task level and inherited by all the indented child tasks below the summary.

When a project is first opened in Full Monte, the highest-level summary task (the project summary task) is assigned duration uncertainty data from the Full Monte Default template. The standard Default template is set to apply a Normal Distribution with an Optimistic Duration of 90%, Most Likely Duration of 100%, and a Pessimistic Duration of 110%. This information is then inherited by all the lower level tasks.

Note: The Full Monte Demonstration project has the top-level uncertainty set to a Triangular Distribution Type with Optimistic Duration set to75%, Most Likely Duration set to 100%, and Pessimistic Duration set to 125%. This is to exaggerate the effect of uncertainty for the purposes of demonstration. The customer can modify the default template (Edit, Manage Templates) to define their own initial values for uncertainty.

Revised uncertainty data can be entered at any level of the hierarchy and this will be inherited by lower level tasks unless those lower level tasks have been explicitly assigned different uncertainty values.

As an example, try changing the uncertainty information in Full Monte SRA for the Hardware and Software summary tasks. In the example shown in figure 2.8, the uncertainty information for Hardware summary task has been changed to use a Triangular distribution with optimistic/pessimistic values of 90% and 110% while the Software summary task remains as a Triangular distribution, but the Optimistic value is now 95%, the Most Likely 110% and the pessimistic 150%.

This revised information is then applied to their respective lower level tasks.

ID ▲	Unique ID	Task Name	Remaining Duration	Duration Distribution Type	Duration Optimistic	Duration Most Likely	Duration Pessimistic	Finish Histogram
0	0	⊟ **Full Monte Demonstration**	78 days	Triangular	75%	100%	125%	NA
1	17	⊟ **Sample Project**	78 days	Triangular	75%	100%	125%	NA
2	18	Initiate	5 days	Triangular	75%	100%	125%	NA
3	19	⊟ **Development**	60 days	Triangular	75%	100%	125%	NA
4	20	⊟ **Hardware**	60 days	Normal	90%	100%	110%	NA
5	21	HW Design	20 days	Normal	90%	100%	110%	NA
6	22	HW Part A	20 days	Normal	90%	100%	110%	NA
7	23	HW Part B	19 days	Normal	90%	100%	110%	NA
8	24	HW Integrate	20 days	Normal	90%	100%	110%	NA
9	25	HW Complete	0	(None)				NA
10	26	⊟ **Software**	54 days	Triangular	95%	110%	150%	NA
11	27	SW Design	18 days	Triangular	95%	110%	150%	NA
12	28	SW Code A	18 days	Triangular	95%	110%	150%	NA
13	29	SW Code B	17 days	Triangular	95%	110%	150%	NA
14	30	SW Integrate	18 days	Triangular	95%	110%	150%	NA
15	31	SW Complete	0	(None)				NA
16	32	⊟ **Integration**	5 days	Triangular	75%	100%	125%	NA

Figure 2.8

If you do not wish to have any uncertainty data automatically applied to projects when first opened in Full Monte SRA, change the Distribution Type on the Default template to None.

2.4 Entering Duration Uncertainty data

As mentioned in section 1.4, the task three point estimates can be either entered using duration or percentages. Percentage durations are calculated based on the task remaining duration.

The example shown in Figure 2.9 shows two 4 week tasks, one with the uncertainty data specified as a percentage of the original duration and the other using durations.

1	Percentage	4 wks	NA	Triangular	75%	100%	125%	100%
2	Duration	4 wks	NA	Triangular	3 wks	4 wks	5 wks	100%

Figure 2.9

The uncertainty information can be entered either directly into the spreadsheet or by using the edit panel. The edit panel shows the duration uncertainty data in both formats as shown in figure 2.10.

Figure 2.10

2.5 Confidence Interval

The Confidence Interval allows you to model the effect of caveats applied to the supplied distribution information.

Note: We recommend leaving the Duration Confidence Interval set to 100% unless there are compelling reasons to change it.

For example, if a subject matter expert (SME) states they are 80% confident the duration will fall between 18 and 24 days then setting the confidence interval to 80% would take this into account.

Note: Be aware that this is effectively saying the SME expects 20% of results to be outside of these bounds. Since most distribution types decrease the probability of samples being selected close to the extreme optimistic/pessimistic ends of the distribution even an 80% confidence interval can greatly increase the possible range of sampled values.

Figure 2.11 shows an example of applying an 80% confidence interval to a triangular distribution.
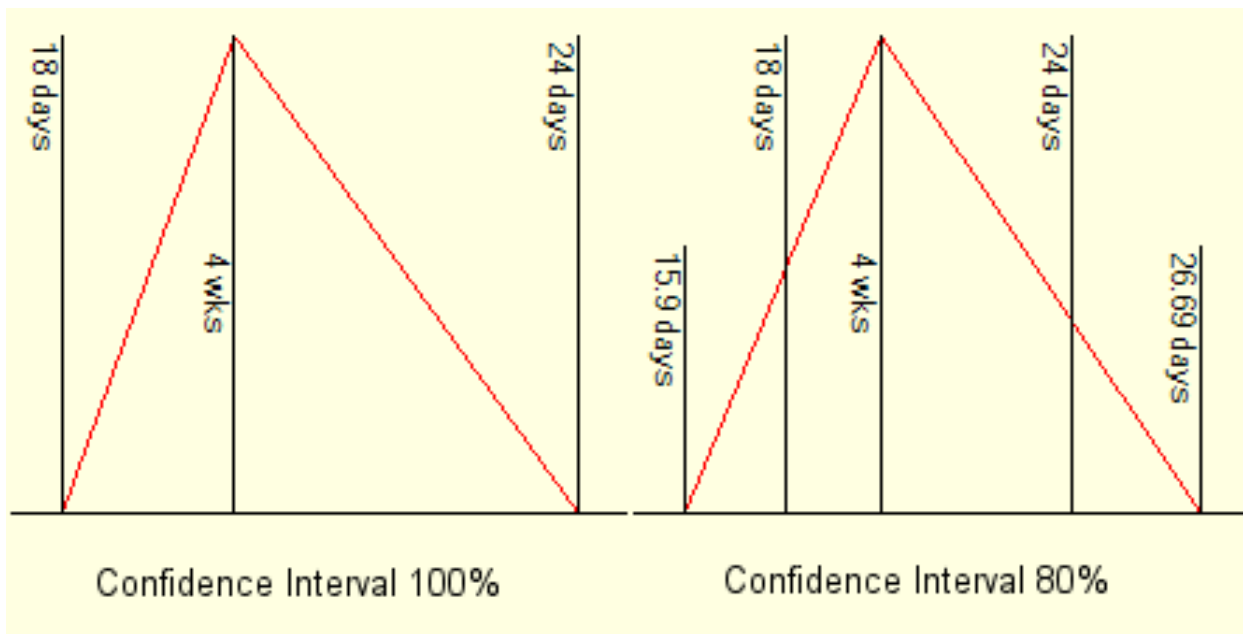

Figure 2.11

We can see that having the system model 20% of results as occurring outside the estimated range (18 to 24 days) increases the range of sampled durations from 6 days (18 to 24) to 10.79 (15.9 to 26.69) days. The effect would be even more pronounced with distribution types with long thin tails (Beta, LogNormal). It is therefore recommended that confidence interval is left at 100% and the estimator encouraged to provide as realistic best case/worst case estimates as possible without a caveat.

Note: If you are using distribution types with long thin tails (for example the Beta distribution), then slightly decreasing the confidence interval below 100% can be a way of ensuring that some samples are included from close to the extreme optimistic/pessimistic durations at the expense of the risk that some samples may be taken from outside of the specified range.

See Chapter 4 for further information on defining and applying template uncertainty.

See Section 4.3 for information on applying Templates from data stored in Microsoft Project custom fields.

Chapter 3: Performing a Risk Analysis and Viewing Results

3.1 Performing a Risk Analysis (Monte Carlo Simulation)

For this example, we will use the Full Monte Demonstration Project described in section 1.3. Open the project in Microsoft Project and then launch Full Monte as described in section 2.1.

The project has already been configured for Full Monte so the main Full Monte Task Edit view will open as shown in Figure 3.1.

ID	Unique ID	Task Name	Remaining Duration	Duration Distribution Type	Duration Optimistic	Duration Most Likely	Duration Pessimistic	Finish Histogram
0	0	⊟ **Full Monte Demonstration**	78 days	Triangular	75%	100%	125%	NA
1	17	⊟ **Sample Project**	78 days	Triangular	75%	100%	125%	NA
2	18	Initiate	5 days	Triangular	75%	100%	125%	NA
3	19	⊟ **Development**	60 days	Triangular	75%	100%	125%	NA
4	20	⊟ **Hardware**	60 days	Triangular	75%	100%	125%	NA
5	21	HW Design	20 days	Triangular	75%	100%	125%	NA
6	22	HW Part A	20 days	Triangular	75%	100%	125%	NA
7	23	HW Part B	19 days	Triangular	75%	100%	125%	NA
8	24	HW Integrate	20 days	Triangular	75%	100%	125%	NA
9	25	HW Complete	0	(None)				NA
10	26	⊟ **Software**	54 days	Triangular	75%	100%	125%	NA
11	27	SW Design	18 days	Triangular	75%	100%	125%	NA
12	28	SW Code A	18 days	Triangular	75%	100%	125%	NA
13	29	SW Code B	17 days	Triangular	75%	100%	125%	NA
14	30	SW Integrate	18 days	Triangular	75%	100%	125%	NA
15	31	SW Complete	0	(None)				NA
16	32	⊟ **Integration**	5 days	Triangular	75%	100%	125%	NA
17	33	Testing	5 days	Triangular	75%	100%	125%	NA
18	34	⊟ **Marketing**	15 days	Triangular	75%	100%	125%	NA
19	40	Market Analysis	0	(None)				NA
20	35	Brochure Design	10 days	Triangular	75%	100%	125%	NA
21	36	Brochure Printing	5 days	Triangular	75%	100%	125%	NA
22	37	Work Complete	0	(None)				NA
23	38	Schedule Margin	8 days					NA
24	39	Contract Delivery	0	(None)				NA

Full Monte Demonstration

Distribution Type: Triangular

Distributions entered for summary tasks are used as a default for lower-level tasks and must be entered as percentages.

	Duration	or	Percent
Optimistic:		or	75%
Most likely:		or	100%
Pessimistic:		or	125%
Confidence interval (%):			100%

Correlation | Existence | Branching

Help | Cancel | Apply Changes

25 rows | No Filter | No Highlight | Sorted on ID | Simulations: Risk Analysis Required
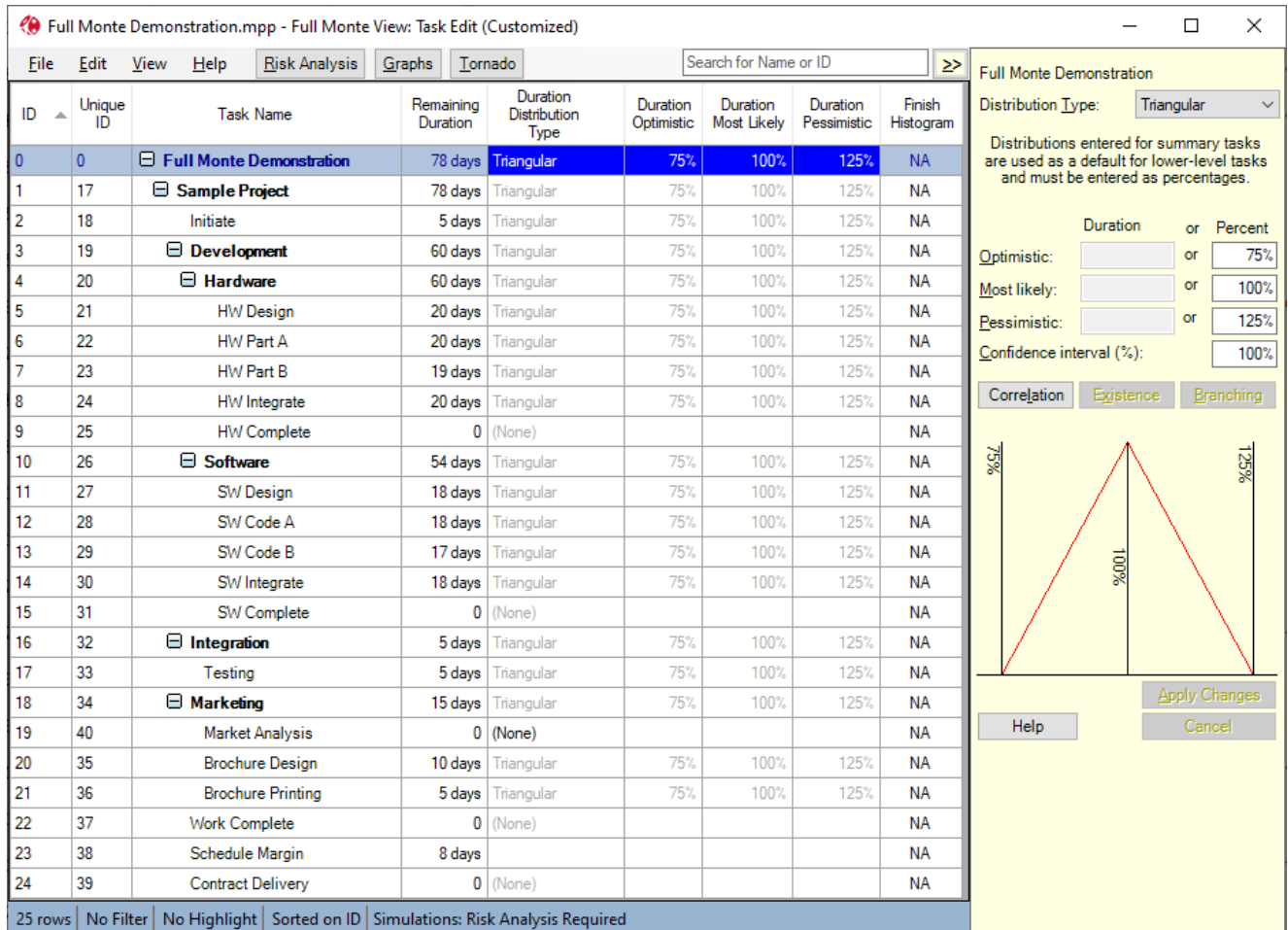
Figure 3.1

The uncertainty information for all tasks is being inherited from the top-level project summary task (highlighted in yellow). The inherited information has set all tasks to have duration uncertainty information using a Triangular distribution with an Optimistic duration of 75% (75% of the remaining duration loaded from Microsoft Project), Most Likely duration of 100% (100% of the remaining duration loaded from Microsoft Project) and a Pessimistic duration of 125% (125% of the remaining duration loaded from Microsoft Project).

Click the 'Risk Analysis' button on the Full Monte menu bar. The dialog shown in Figure 3.2 is displayed.
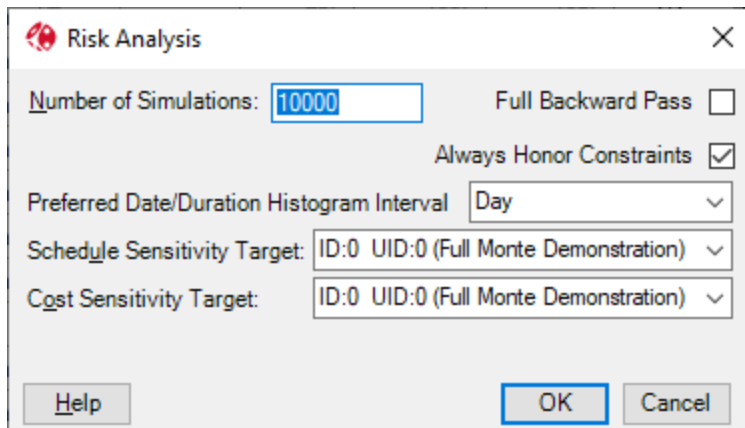
Figure 3.2

On a new project the number of simulations will default to 1000. Running a larger number of simulations improves the quality of the information provided by Full Monte. We recommend experimenting to find the largest number of simulations that you can perform in a reasonable amount of time on your project. The demonstration project is set to run 10,000 simulations which will take just a few seconds on such a small project.

Risk Analysis results improve with more simulations. For new projects, the option 'Full Backward Pass' will be disabled. This reduces the time taken for each simulation by not calculating Late Dates and Slack(Float). If it is necessary to report this information, then the option can be enabled. Since most risk reporting is based on Early Dates (Start Expected/Finish Expected) or percentiles of these values (e.g. Finish Percentile 80%) the Late date and Slack information is not required.

Microsoft Project has a feature on the Options, Schedule tab called 'Task will always honor their constraint dates'. If this feature is enabled (checked) Microsoft Project will honor constraints that prevent dates moving into the future during analysis. These constraints include Finish No Later Than, Start No Later Than, Must Finish On, Must Start On. Using such constraints is a poor practice because it can create misleading information (giving the impression a date is achievable when it is not). If the option is set in Microsoft Project, then Full Monte will show the option checked on the dialog above. However, it can be disabled in Full Monte to improve the realism of the results.

Use the 'Preferred Date/Duration Histogram Interval' to request a specific scale for histograms produced by the simulation. The default 'Let Full Monte Decide' will scale each histogram per the range of data in the chart. Forcing all charts, for example, to 'Day' may make it easier to compare charts from various tasks. If the selected scale cannot be realistically applied to a specific chart (for example the user selected 'Hours' but the data in the chart spans several months) then Full Monte will use an appropriate scale

The 'Schedule Sensitivity Target' and 'Cost Sensitivity Target' allow the user to select intermediate milestones as the focus for sensitivity and risk path analysis. This can be useful on long programs where the next major milestone is more important that then ultimate project completion.

Click OK to start the Monte Carlo simulation process.

Note: Most analysis will take less than 1 minute. If the progress bar is indicating an unacceptable length of time press Escape or click Cancel to abort the simulation. Reduce the number of simulations and try again.

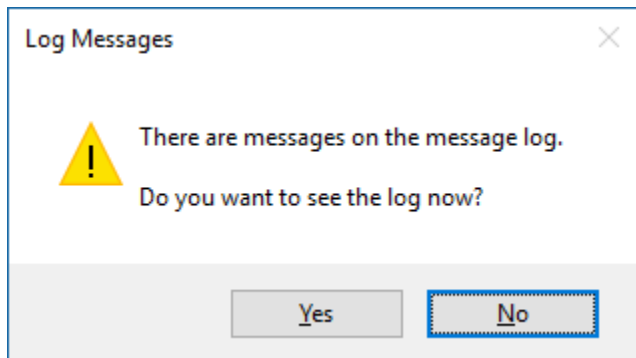When the simulation is complete, Full Monte may display the message shown in Figure 3.3.

Figure 3.3

This is a warning that Full Monte encountered data that may cause anomalous results. Click yes to see the issues.

After the simulation completes without log issues, or you close the log messages if displayed, the Task Edit dialog will update to show results. The screenshot shown in Figure 3.4 is the default configuration. The user may add/remove columns as described in the User Guide.
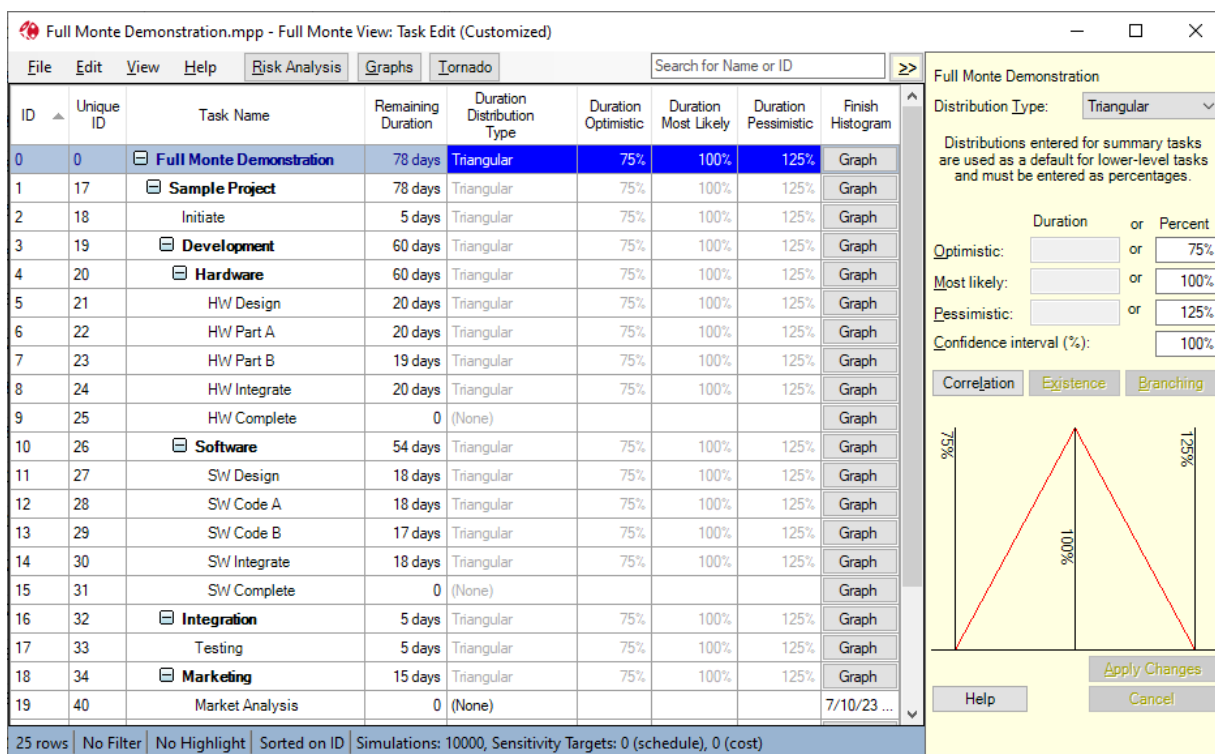
Figure 3.4

In the example shown in Figure 3.4 the 'Early Finish Histogram' column has updated to show there are graphs available to view. If a task finish has no uncertainty, then the graph button will be replaced by the deterministic date the task will finish.

3.2 Viewing Results

Clicking on the Graph button for the top-level task (ID 0) will produce a chart like that shown in Figure 3.5. The results may not be identical to the example shown since the simulations are based on random samples which will typically be slightly different for each simulation.
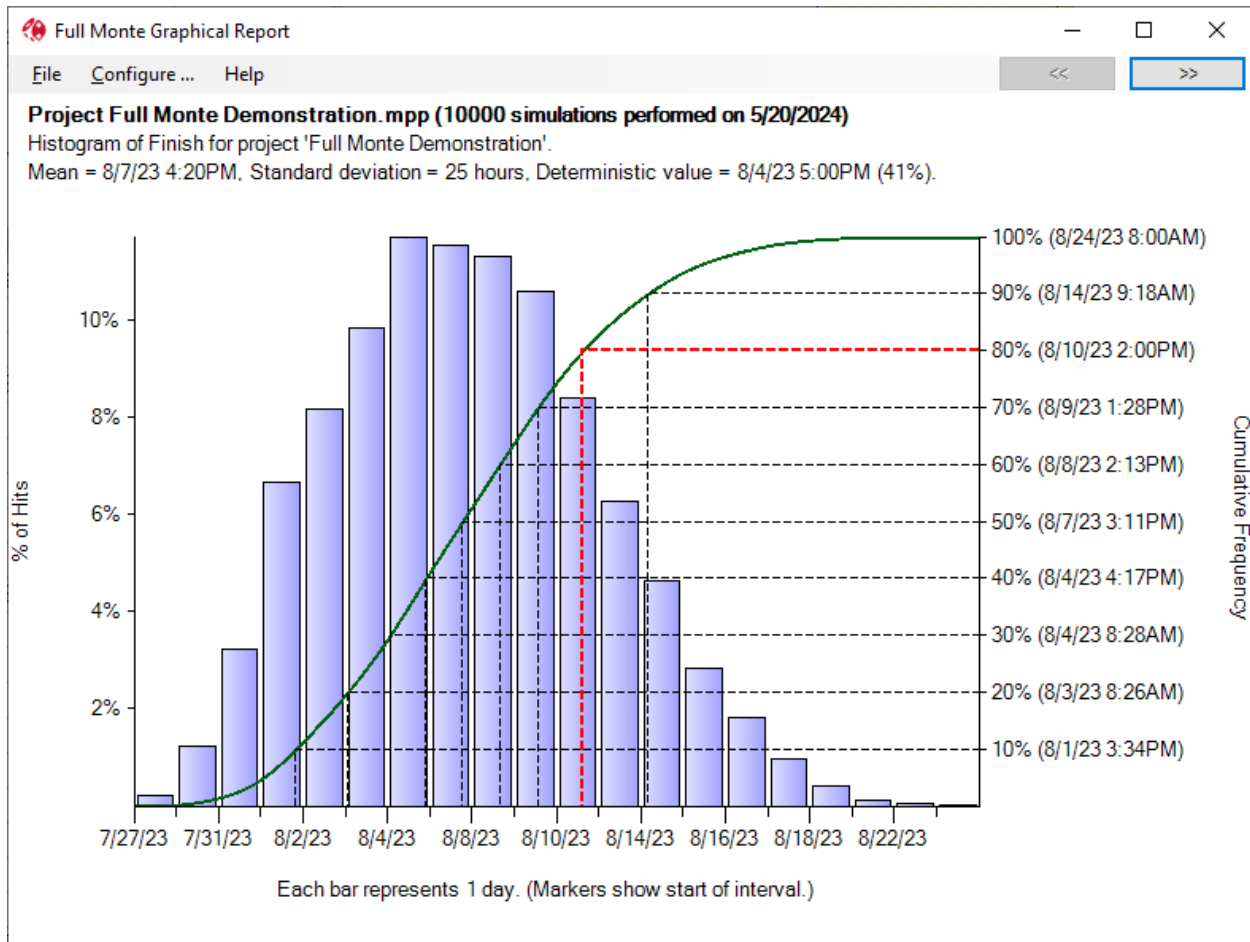
Figure 3.5

The chart title information includes the mean finish date for the task, the standard deviation (a measure of the range of uncertainty for the result), the deterministic date calculated by Microsoft Project and the chance of achieving that deterministic date based on the uncertainty data. In this example, we see the software is predicting only a 41% chance of achieving the project finish date of 4Aug23. Since we applied symmetrical uncertainty to all tasks (±25%) we might have expected a 50% chance of achieving the date suggested by Microsoft Project. Unfortunately, once we take into account uncertainty and the impact of Merge Bias, we can see that the date suggested by Microsoft Project is unrealistic and not likely to be achievable.

The histogram bars show the chance of a task finishing on a specific date (based on the X-Axis date scale). Hover the mouse over a specific bar to see the relevant data.

We are usually not all that interested on the probability of finishing **on** a specific day. Of more interest is the chance of finishing **by** a specific date. This is read from the right Y-Axis.

In the example in Figure 3.5 we can see that we have an 80% chance of completing the project by 10Aug24. The frequency of Y-Axis markings can be changed on the Chart Configure… menu as shown in Figure 3.6.
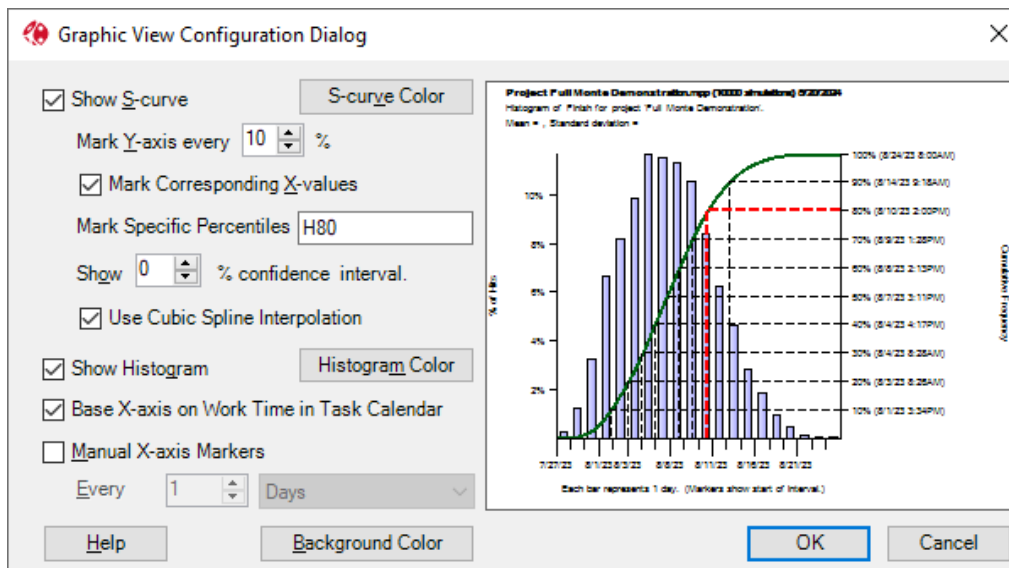
Figure 3.6

Clicking the 'Graphs' button on the Full Monte menu will display a view containing more available charts as shown in Figure 3.7.
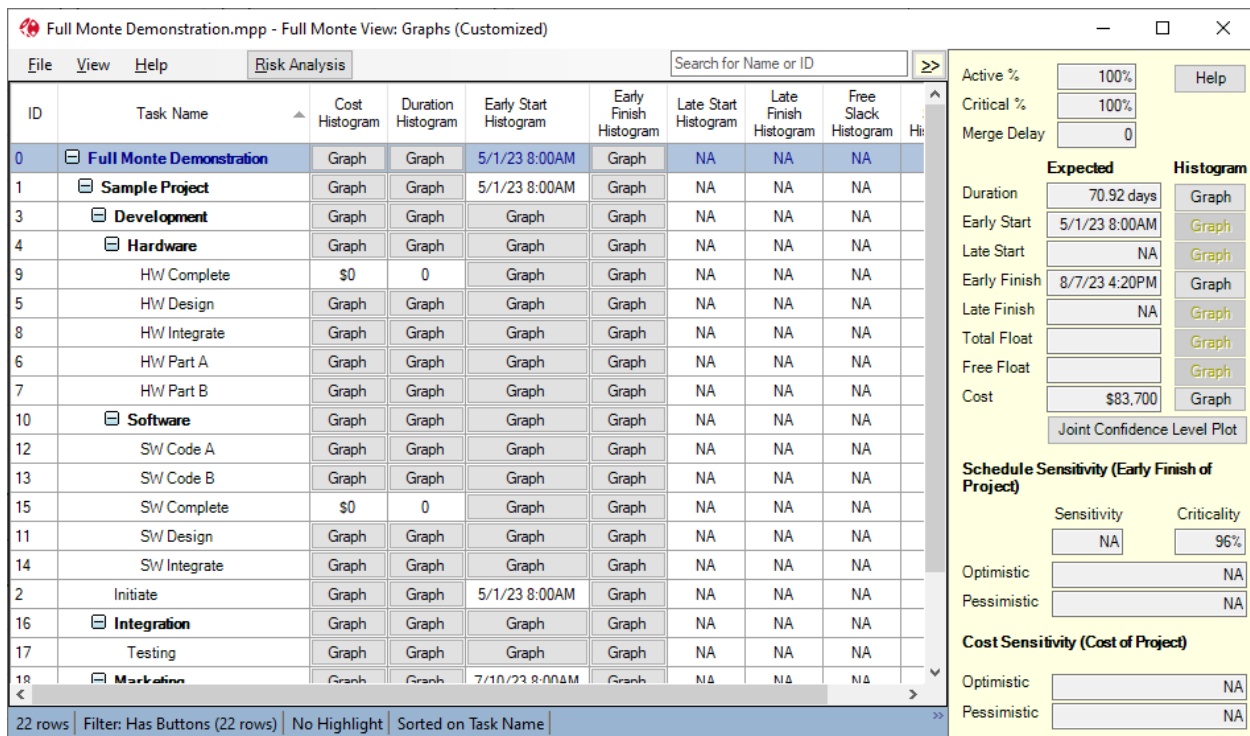
Figure 3.7

The columns include in the view can be modified by the user (right click a column heading for options). The optional pane to the right of the view displays detail information for the task selected in the spreadsheet.

See the User Guide for further information on configuring views in Full Monte.

Note: The Late date and slack columns are showing NA as this information is not calculated unless the Full Backward Pass option is selected on the Risk Analysis Dialog. As previously mentioned, this information is not generally reported following a typical schedule risk analysis.

Chapter 4: Applying Task and Milestone Uncertainty

4.1 Defining Template Uncertainty

We learned in section 1.5 that Full Monte allows uncertainty templates to be defined. This is useful because it is unusual and time consuming to derive detailed Three-Point estimates for every task in a schedule. It is more likely that most tasks will have similar uncertainty, perhaps defined by work type, with detailed three-point assessments reserved for known high risk tasks.

Templates are defined from the main Task Edit window from the 'Edit, Manage Templates' menu option. This displays the dialog shown in Figure 4.1.

Figure 4.1

Full details regarding configuring templates is available in the user Guide. Click the New button to create a new template or edit existing templates and click Save to apply the changes.

We can apply templates in two ways:

1. By selecting tasks in the Task Edit window and applying a template.
2. By applying templates based on a custom field in Microsoft Project.

4.2 Applying Template Uncertainty by Selecting Tasks

Using the Demonstration Project, we will first remove the initial generic uncertainty and update the project with more realistic uncertainty data using templates.

To remove the generic uncertainty simply change the top-level project summary task Duration Distribution Type to (None). Press Tab or click away from the cell to apply the change. The task Edit window should look as shown in Figure 4.2.
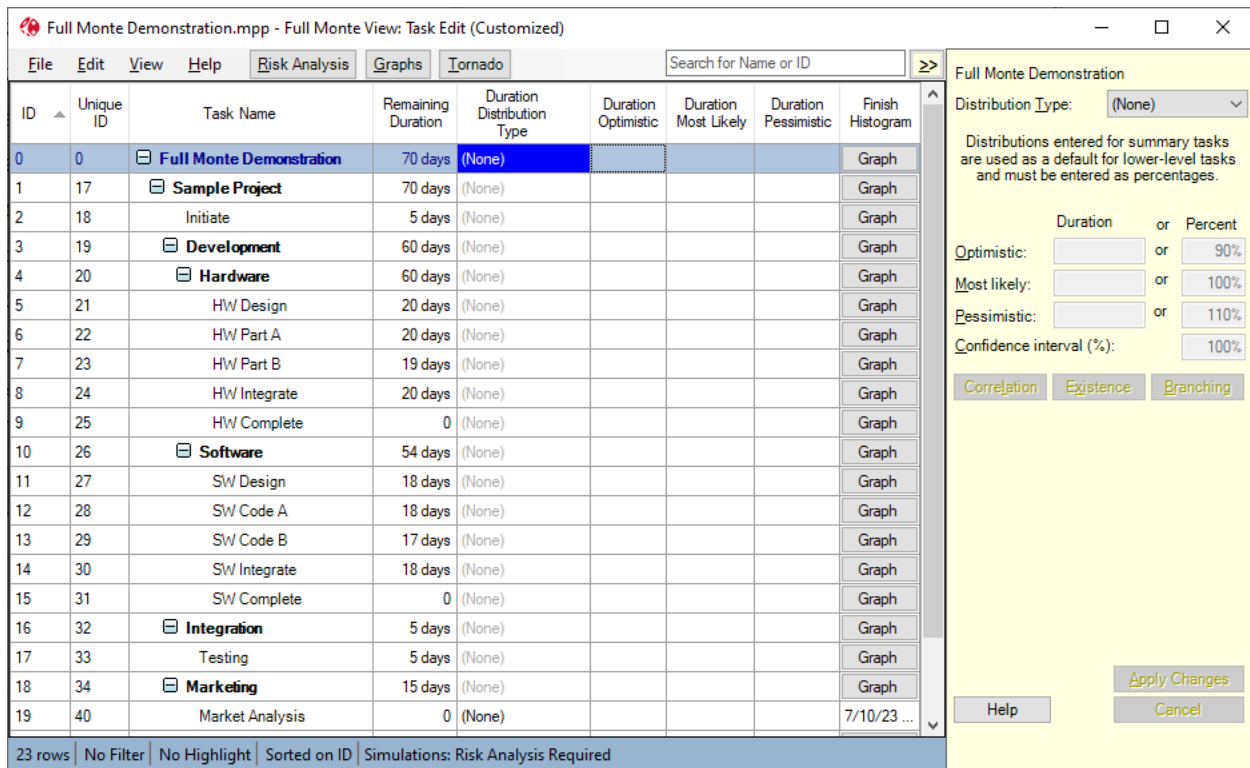
Figure 4.2

If some tasks still show duration uncertainty data, this means they are not inheriting from the top level. This can be resolved by selecting one or more of the affected tasks, right clicking on a selected task, and choose 'Inherit Distribution' as shown in Figure 4.3.
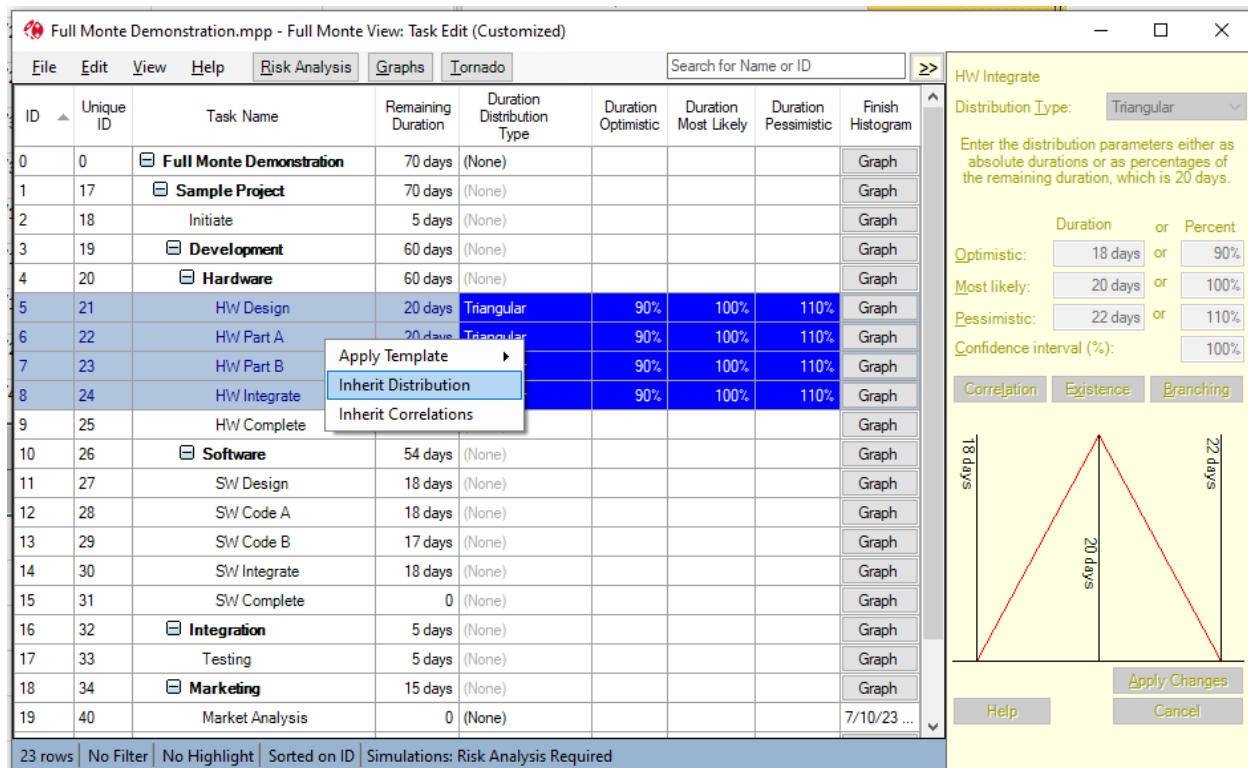
Figure 4.3

After applying the Inherit Distribution option the windows should again appear as per Figure 4.2.

For our example, we will set all the Hardware tasks duration uncertainty using the 'Low Risk' template and the Software Tasks duration uncertainty using the 'High Risk' template.

Select the four HW Tasks (ID's 5-8) using normal Windows techniques like Click, Shift-Click, or Ctrl-Click and then Right-Click on a selected task and choose Apply Template, Low Risk as shown in Figure 4.4.
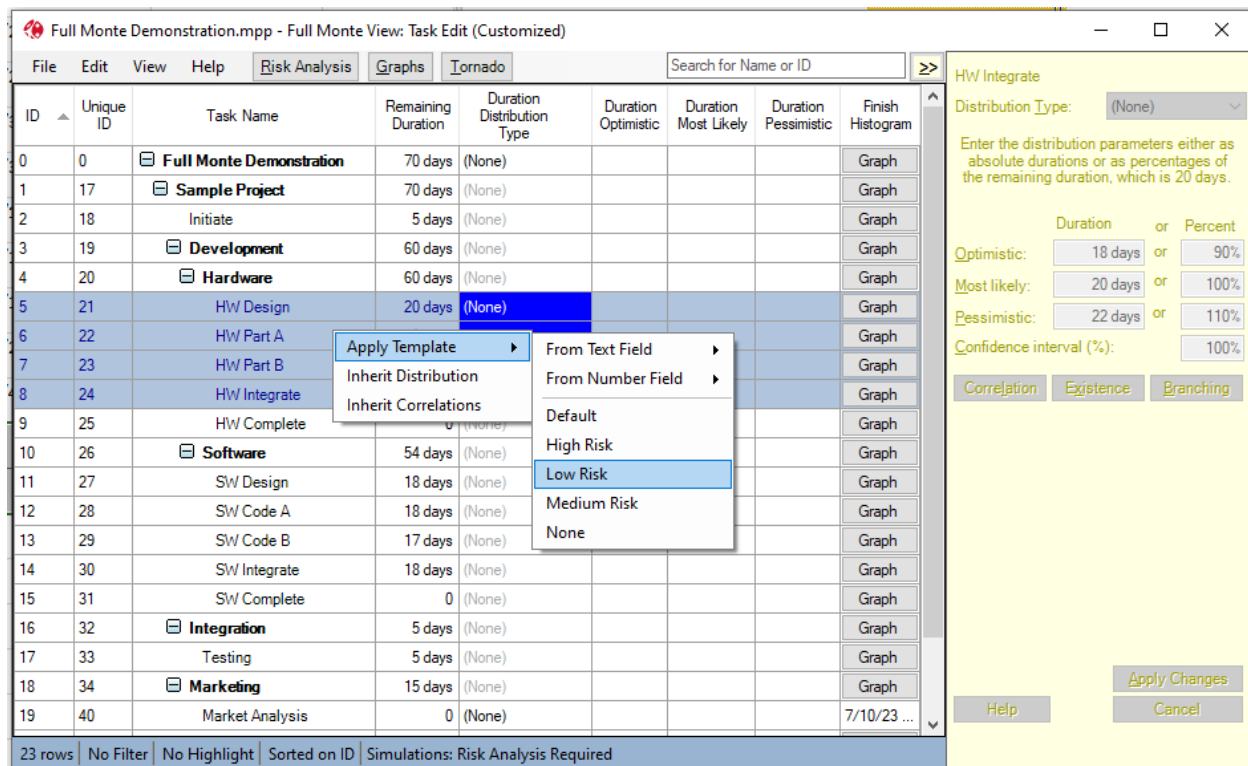
Figure 4.4

After selecting the 'Low Risk' template the dialog shown in Figure 4.5 is displayed.
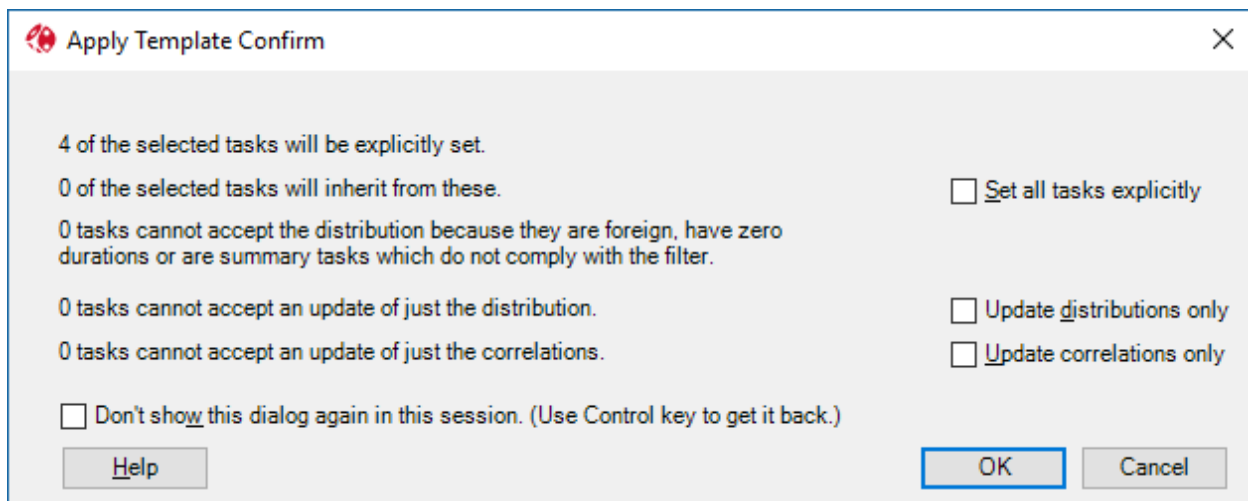
Figure 4.5

The Apply Template Confirmation dialog confirms what is about to happen. In the example shown in Figure 4.5 it confirms 4 tasks will be updated. None of the tasks are summary tasks so no lower level tasks will be affected. For more information regarding the settings please see the User Guide. Click OK to execute the template application. The Task Edit window will refresh as shown in Figure 4.6.
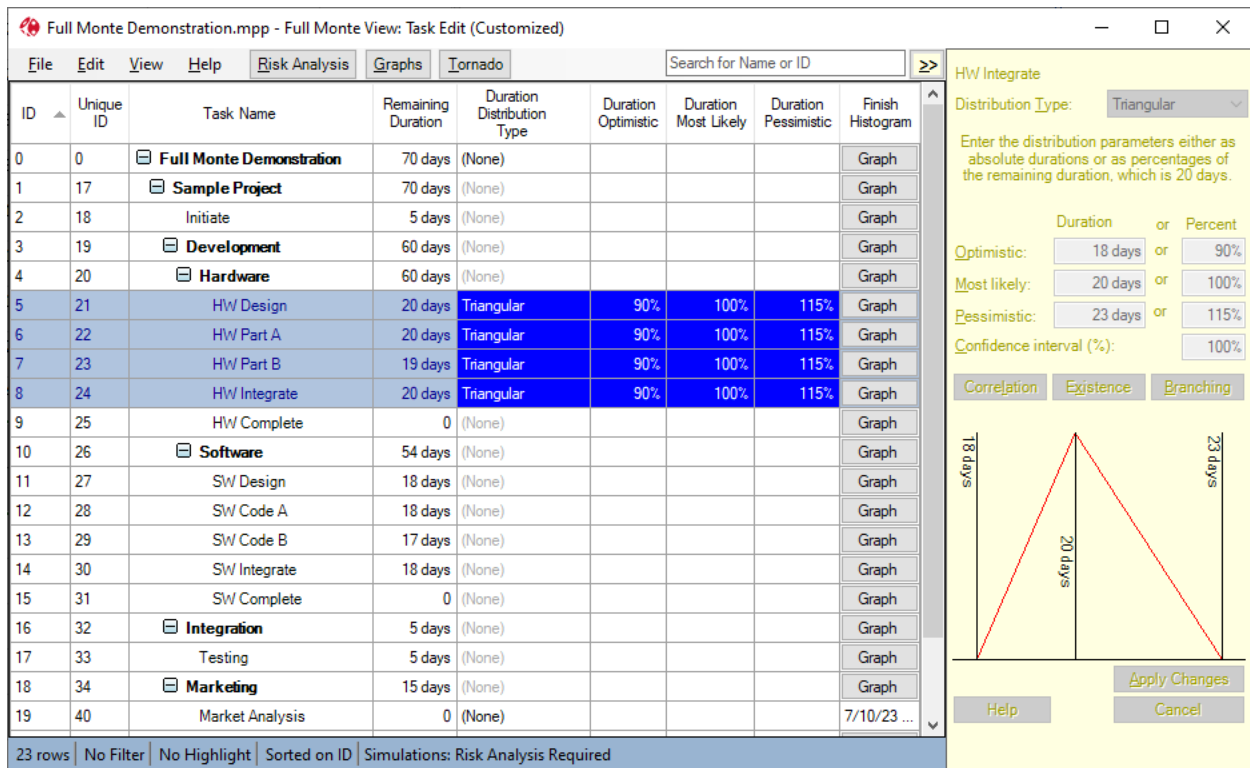
Figure 4.6

The Task Edit dialog shown in Figure 2.26 confirms that the expected 'Low Risk' duration uncertainty information has been applied to the selected tasks from the template.

Repeat the process for the SW Tasks using the 'High Risk' Template. The result is shown in Figure 4.7.
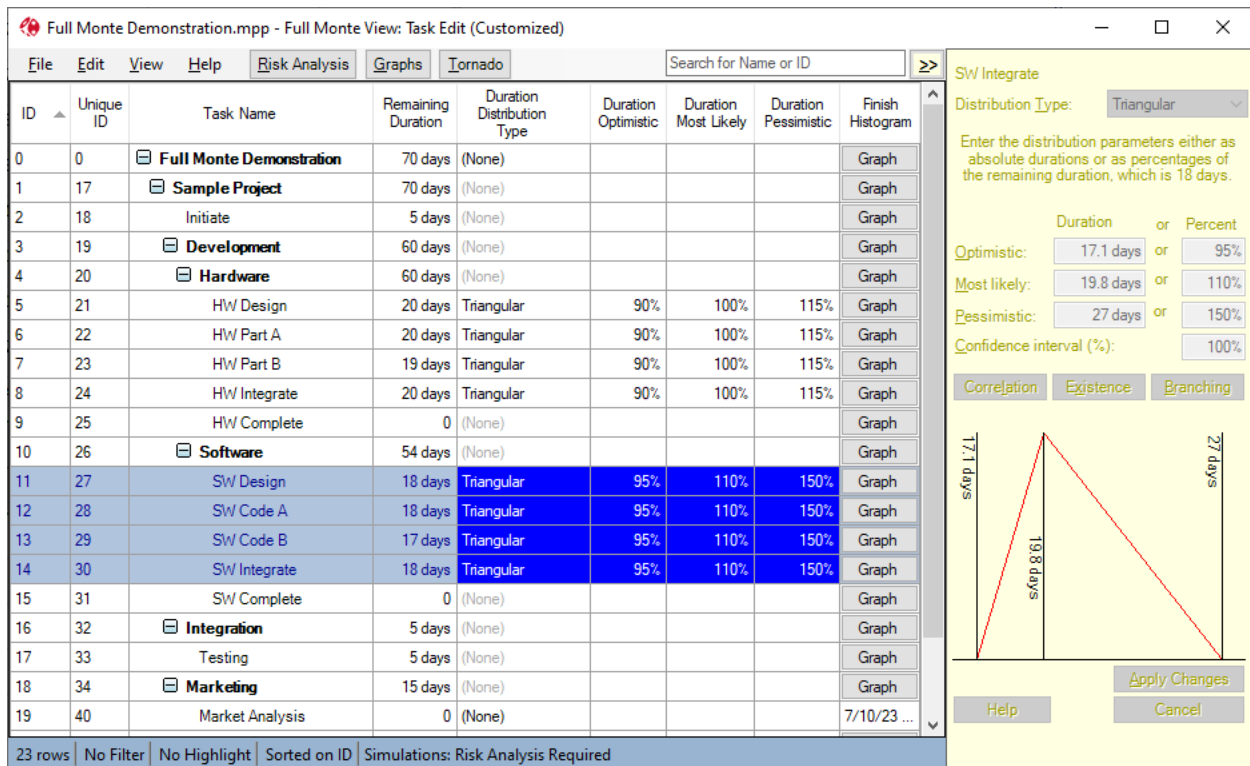
Figure 4.7

4.3 Applying Template Uncertainty using File Import from Custom Fields

While the technique shown in section 4.2 (applying a template to selected tasks) is quick and easy where there are relatively few groups of tasks using just a few templates, another technique that works well with many templates and facilitates group discussion regarding appropriate templates to use, is applying templates based on Microsoft Project custom fields.

Using the Full Monte Demonstration project insert a column in the Microsoft Project task columns to display field Text20 (Assessment 1). This is a custom text field where we can store user information. In the example shown in Figure 4.8 we can see we have populated the HW Tasks and SW Tasks with the text 'Low Risk' and 'High Risk'. The user text in the column must match exactly the spelling of valid Template names defined in Full Monte.
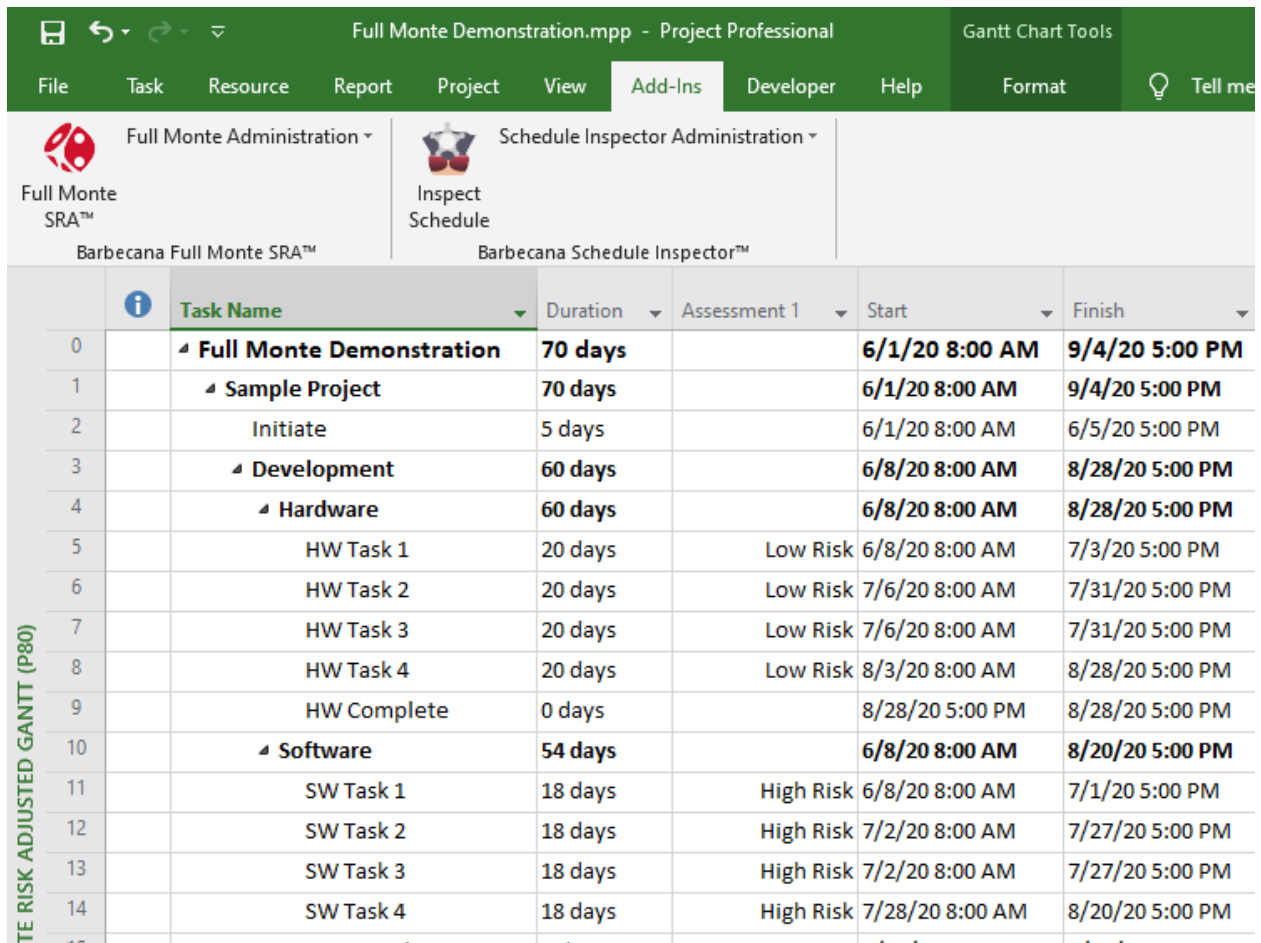
Figure 4.8

One way to ensure the text entered into the custom field is spelled correctly is to specify a Lookup table for the relevant field as shown in Figure 4.9.
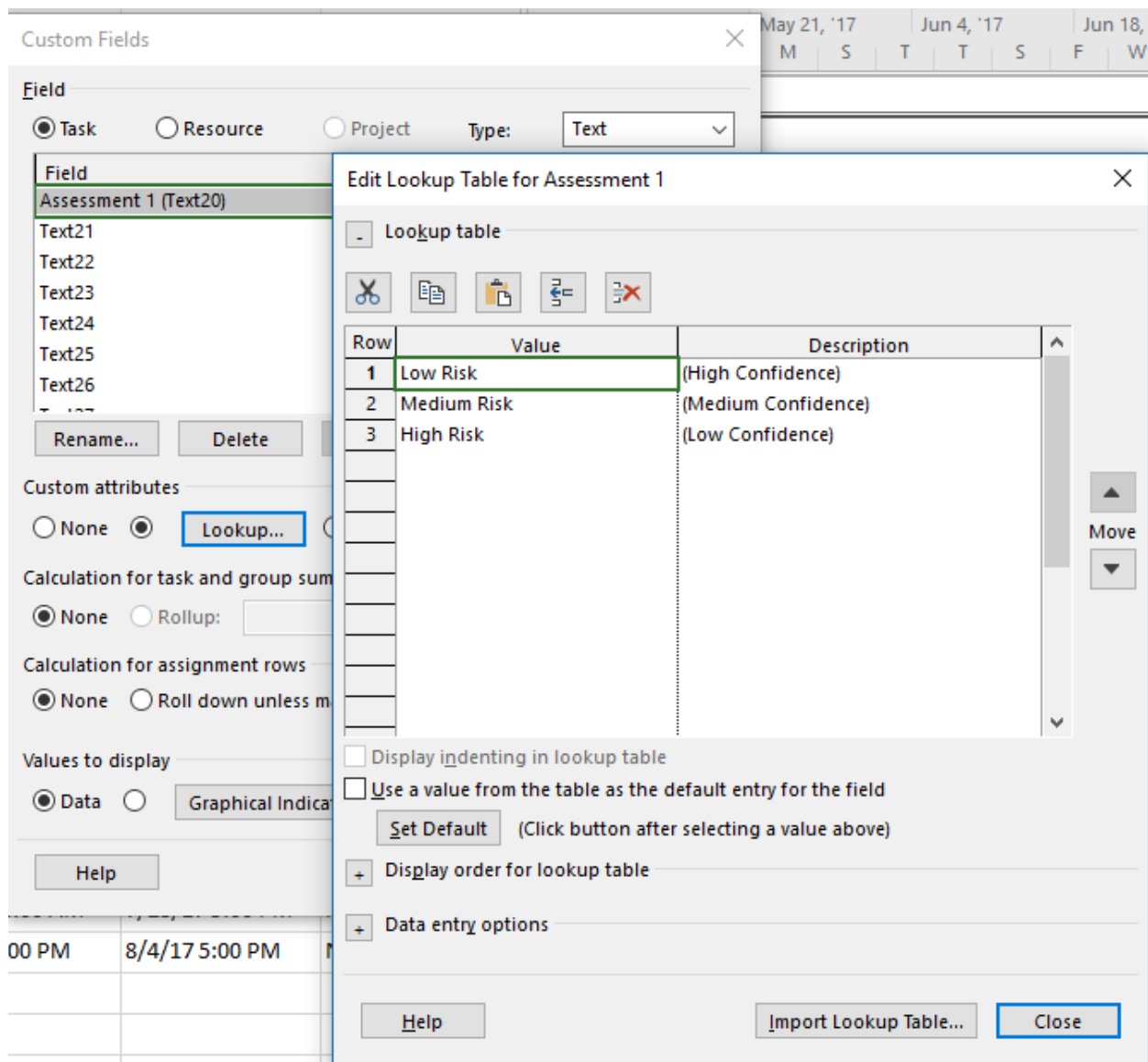
Figure 4.9

Note: The value descriptions reflect the fact that some customers prefer to assign duration uncertainty based on their confidence in the original task duration estimates. High Risk = Low Confidence in the estimate.

User can then simply choose an appropriate template from the drop-down list as shown in Figure 4.10.

Figure 4.10

Once the required tasks have been updated in Microsoft Project, launch Full Monte.

Ensure that all tasks have their Duration Distribution Type set to (None) as previously shown in Figure 4.2.

Select all tasks (using either Edit, Select All, Ctrl+A, or Click Shift-Click) and then right-click on a selected task and choose Apply Template, From Text Field, Assessment 1 (Text20) as shown in Figure 4.11.

Figure 4.11

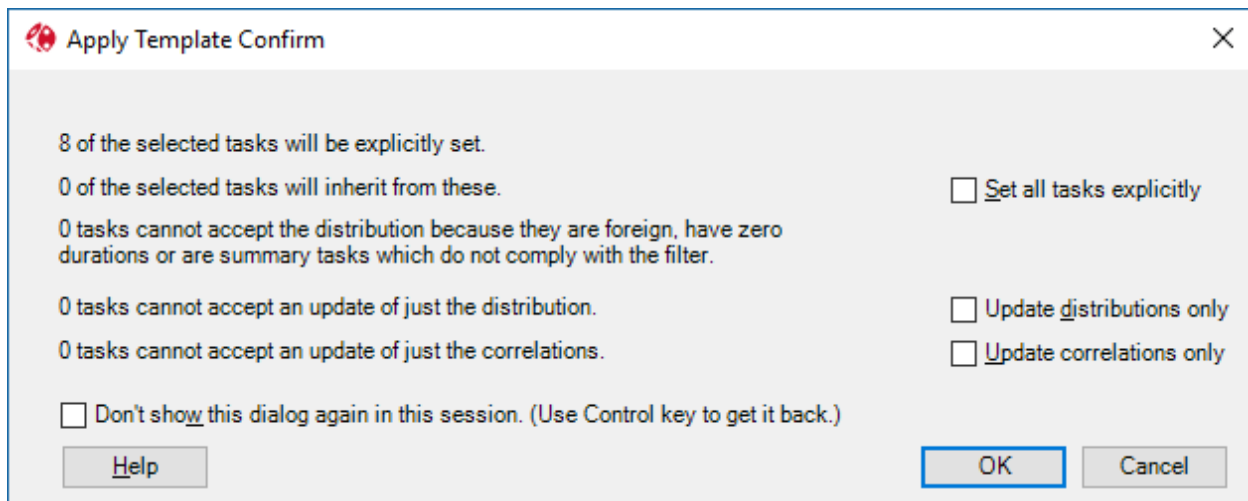Full Monte will confirm what will happen as shown in Figure 4.12.

Figure 4.12

In this case, we can see that 8 tasks will have their duration uncertainty data updated. Click OK to apply the templates. The result will be displayed as shown in Figure 4.13.
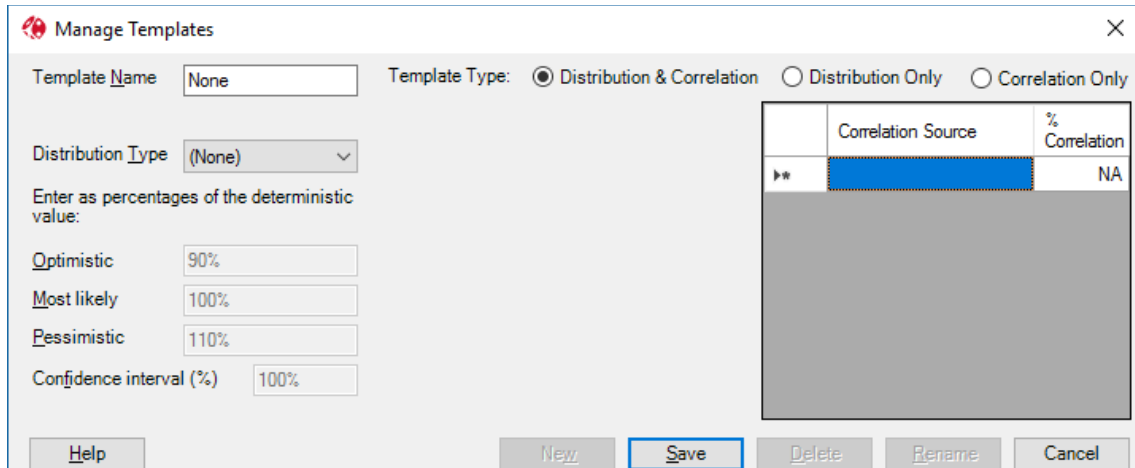

Figure 4.13

Note: If the custom field was blank (empty) for a specific task in Microsoft Project then no action is performed on that task when you apply templates from that field. This allows you to update some tasks in directly in Full Monte and other can be maintained in Microsoft Project. If you wish to allow updates to the custom field to clear existing uncertainty in Full Monte, then you can define a null template as shown in Figure 4.14 and add that to the Lookup table in Project.

Figure 4.14

We can now proceed to run the Risk Analysis on our customized uncertainty data.

4.4 Using File, Import to load Uncertainty Data

Section 4.3 showed how Template uncertainty could be applied using information stored in a Microsoft Project custom field to specify the appropriate template.

If customers prefer to capture uncertainty using discrete values rather than generic templates, then as we saw in section X.X, Full Monte SRA fully supports this. However, entering the durations into the Full Monte edit view can be time consuming.

A better approach is to use the Full Monte SRA File, Import facility to load information previously entered into Microsoft Project custom fields. Figure 4.15 shows custom Duration1,2, and 3 renamed to capture Best Case, Most Likely, and Worst case durations.

Figure 4.15

Note: *It is not necessary to rename the fields as shown. The field name can be left unchanged or set to anything the suits your organization.*

Uncertainty data can then be captured in the schedule. Figure 4.16 shows example data in the Full Monte Demonstration Project.

UID	Task Name	Duration	Start	Finish	Assessment 1	Distribution Type	Best Case Duration	Worst Case Duration
27	SW Design	18 days	5/8/23 8:00 AM	5/31/23 5:00 PM	High Risk	Triangular	17 days	25 days
28	SW Code A	18 days	6/1/23 8:00 AM	6/26/23 5:00 PM	High Risk	Triangular	17 days	26 days
29	SW Code B	17 days	6/1/23 8:00 AM	6/23/23 5:00 PM	High Risk	Triangular	16 days	25 days
30	SW Integrate	18 days	6/27/23 8:00 AM	7/20/23 5:00 PM	High Risk	Triangular	18 days	28 days

Figure 4.16

Discrete Duration Uncertainty values have been specified for the four SW tasks.

Note: *The field 'Most Likely Duration' is not visible in the example. This is because a decision was made to use the Task Duration as the Most Likely value. It can be captured if required.*

After opening Full Monte, the initial uncertainty inherited from the Default Template applied to the project is seen for the SW tasks as shown in figure 4.17.

Full Monte Demonstration.mpp - Full Monte View: Task Edit

File   Edit   View   Help   Risk Analysis   Graphs   Tornado   Import   Search for Name or ID

ID	Unique ID	Task Name	Remaining Duration	Duration Distribution Type	Duration Optimistic	Duration Most Likely	Duration Pessimistic	Finish Histogram
6	22	HW Part A	20 days	Triangular	75%	100%	125%	NA
7	23	HW Part B	19 days	Triangular	75%	100%	125%	NA
8	24	HW Integrate	20 days	Triangular	75%	100%	125%	NA
9	25	HW Complete	0	(None)				NA
10	26	⊟ Software	54 days	Triangular	75%	100%	125%	NA
11	27	SW Design	18 days	Triangular	75%	100%	125%	NA
12	28	SW Code A	18 days	Triangular	75%	100%	125%	NA
13	29	SW Code B	17 days	Triangular	75%	100%	125%	NA
14	30	SW Integrate	18 days	Triangular	75%	100%	125%	NA
15	31	SW Complete	0	(None)				NA

Figure 4.17

Select File, Import as shown in figure 4.18.
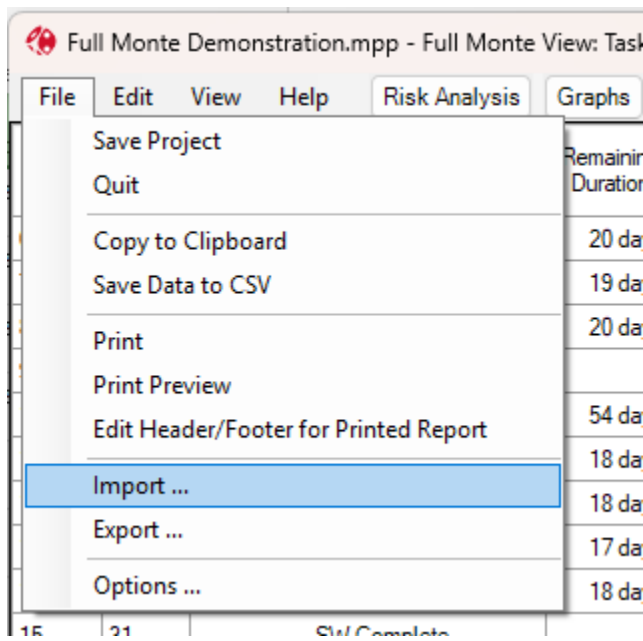
Figure 4.18

The Import dialog shown in Figure 4.19 is displayed.
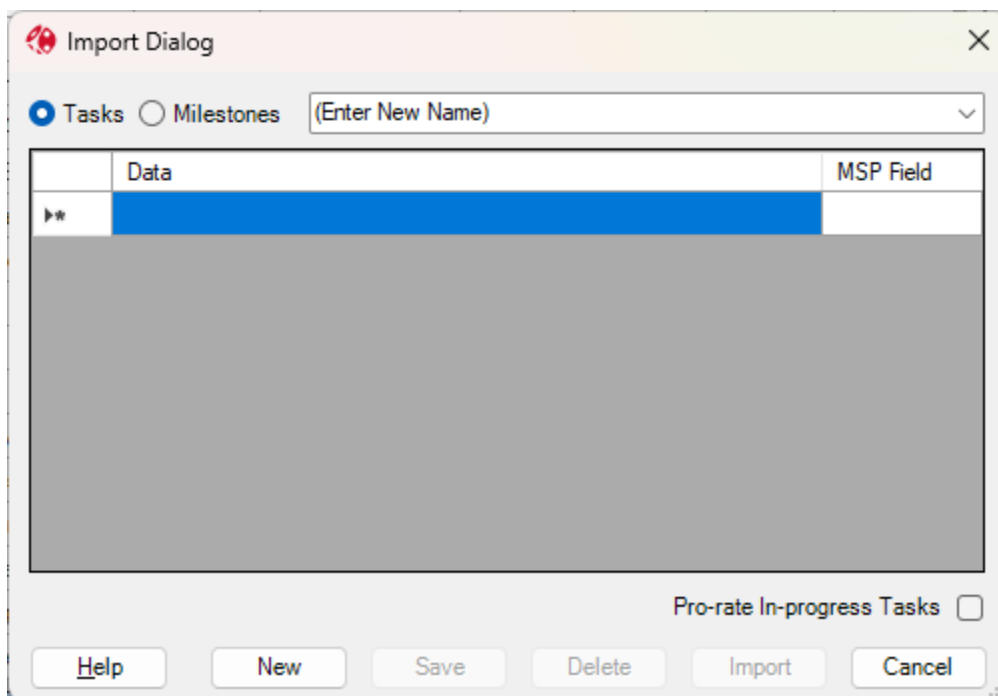
Figure 4.19

On first use, the Import dialog will be blank as shown in Figure 4.19. New import configurations can be created and saved for future use. In figure 4.20 the Import specification name has been entered as 'Duration Uncertainty' and clicking in the blank Data column displays the available field options.
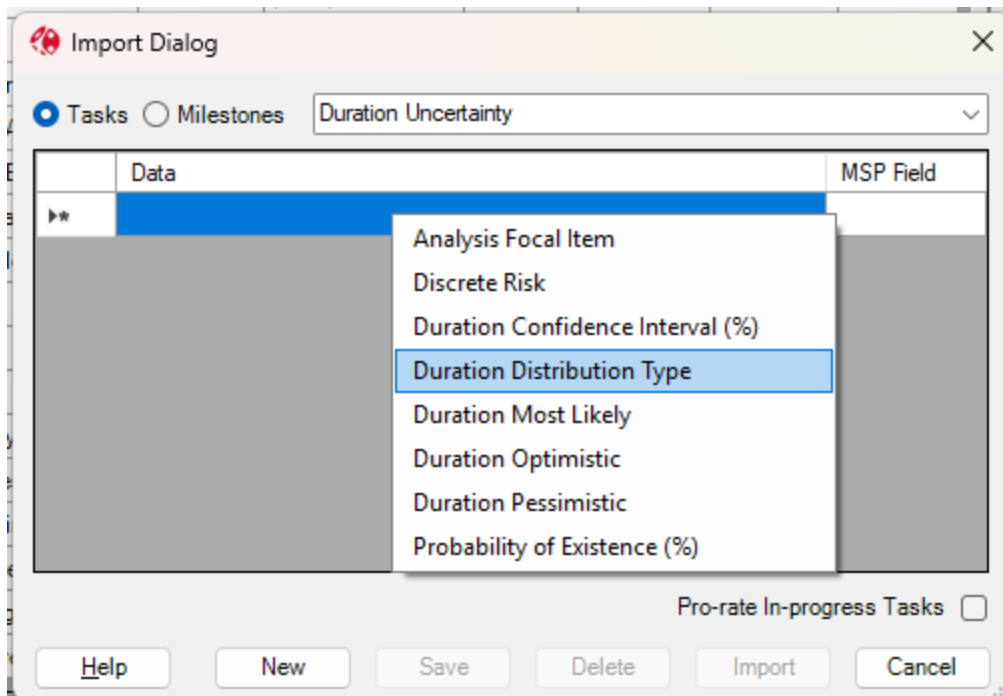
Figure 4.20

Proceed to 'map' the required fields to import as shown in Figure 4.21.
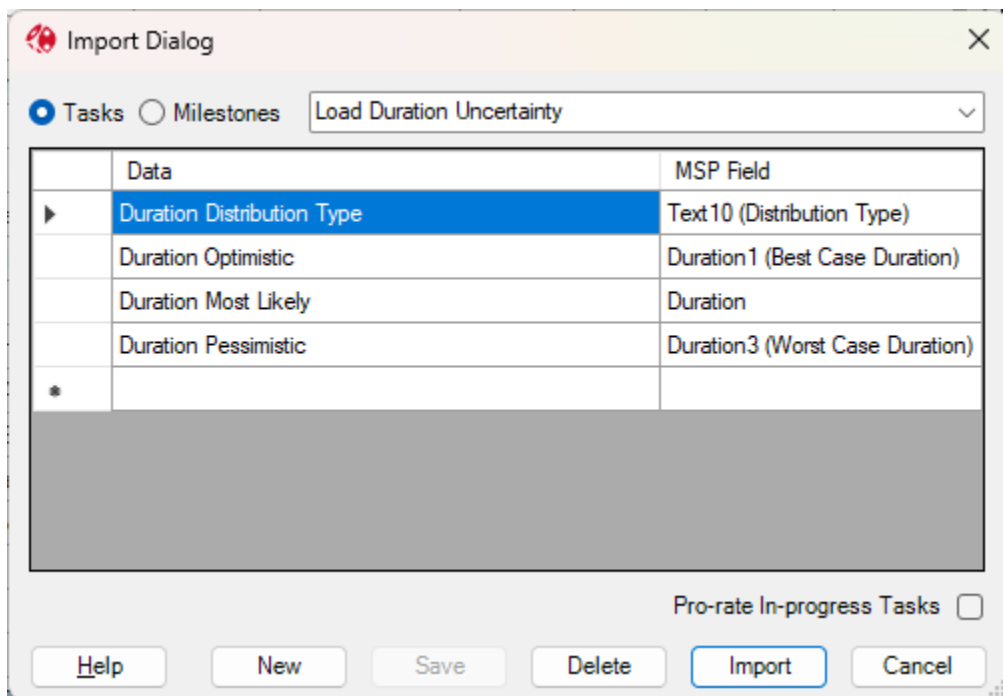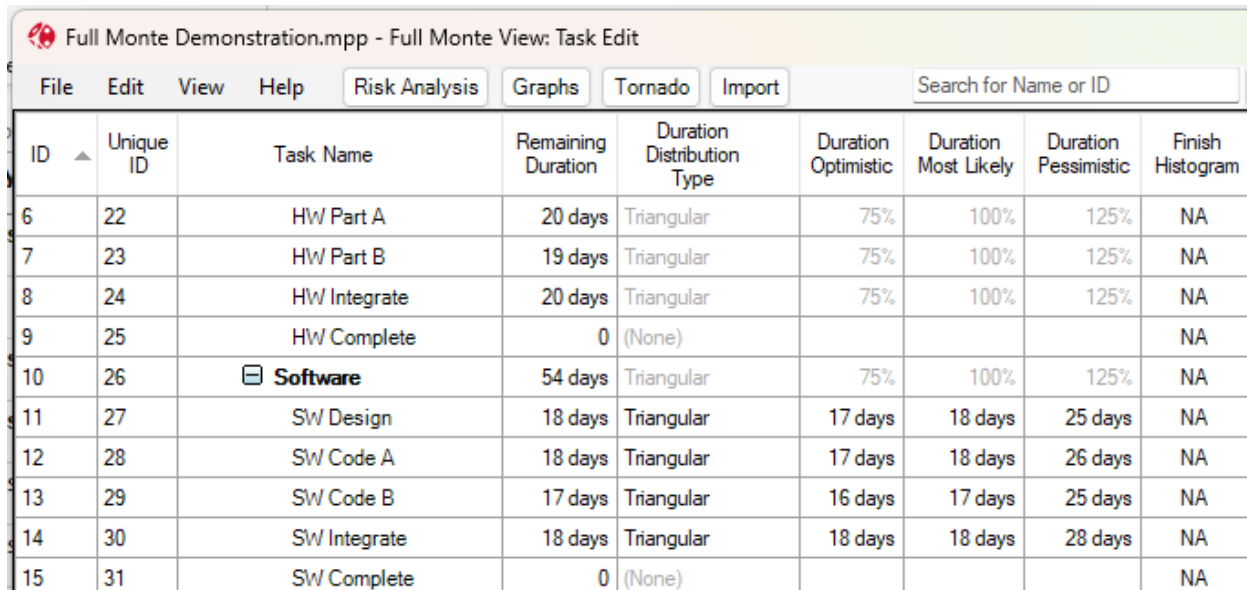
Figure 4.21

Note: *The 'Duration Most Likely' has been mapped to the Microsoft Project 'Duration' field rather than the custom field 'Duration Most Likely' that we defined. The choice is the users and depends on whether the original Duration estimates are considered reasonable.*

See section 4.11.1 of the Full Monte SRA User Guide for further information regarding managing and using Import definitions.

Click Import. The message 'Import Successful' should be displayed and the updated information displayed as shown in Figure 4.22

ID	Unique ID	Task Name	Remaining Duration	Duration Distribution Type	Duration Optimistic	Duration Most Likely	Duration Pessimistic	Finish Histogram
6	22	HW Part A	20 days	Triangular	75%	100%	125%	NA
7	23	HW Part B	19 days	Triangular	75%	100%	125%	NA
8	24	HW Integrate	20 days	Triangular	75%	100%	125%	NA
9	25	HW Complete	0	(None)				NA
10	26	⊟ **Software**	54 days	Triangular	75%	100%	125%	NA
11	27	SW Design	18 days	Triangular	17 days	18 days	25 days	NA
12	28	SW Code A	18 days	Triangular	17 days	18 days	26 days	NA
13	29	SW Code B	17 days	Triangular	16 days	17 days	25 days	NA
14	30	SW Integrate	18 days	Triangular	18 days	18 days	28 days	NA
15	31	SW Complete	0	(None)				NA

Figure 4.22

It is also possible to import Date uncertainty data for **Input Milestones** as shown in Figure 4.23.
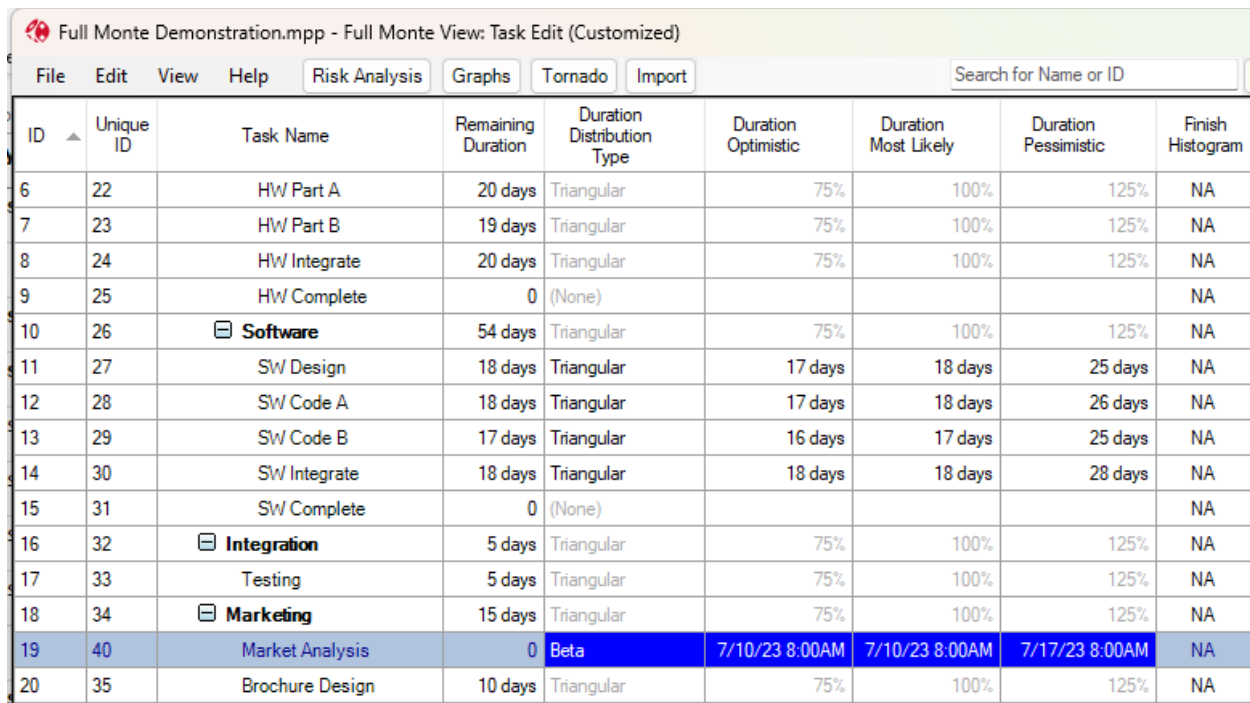
Figure 4.23

Note: *The Full Monte data fields are somewhat confusingly still called 'Duration Optimistic' etc. This is because the same field is used to store Percentages, Duration, and Dates internally in Full Monte. However the mapped Microsoft Project fields are clearly shown as dates.*

Note: *The Microsoft Project **Constraint Date** has been selected for the Most Likely value. An Input Milestones must have a Start No Earlier than Constraint to be considered by Full Monte.*

The result of the import is shown in Figure 4.24.

ID ▲	Unique ID	Task Name	Remaining Duration	Duration Distribution Type	Duration Optimistic	Duration Most Likely	Duration Pessimistic	Finish Histogram
6	22	HW Part A	20 days	Triangular	75%	100%	125%	NA
7	23	HW Part B	19 days	Triangular	75%	100%	125%	NA
8	24	HW Integrate	20 days	Triangular	75%	100%	125%	NA
9	25	HW Complete	0	(None)				NA
10	26	⊟ Software	54 days	Triangular	75%	100%	125%	NA
11	27	SW Design	18 days	Triangular	17 days	18 days	25 days	NA
12	28	SW Code A	18 days	Triangular	17 days	18 days	26 days	NA
13	29	SW Code B	17 days	Triangular	16 days	17 days	25 days	NA
14	30	SW Integrate	18 days	Triangular	18 days	18 days	28 days	NA
15	31	SW Complete	0	(None)				NA
16	32	⊟ Integration	5 days	Triangular	75%	100%	125%	NA
17	33	Testing	5 days	Triangular	75%	100%	125%	NA
18	34	⊟ Marketing	15 days	Triangular	75%	100%	125%	NA
19	40	Market Analysis	0	Beta	7/10/23 8:00AM	7/10/23 8:00AM	7/17/23 8:00AM	NA
20	35	Brochure Design	10 days	Triangular	75%	100%	125%	NA

Figure 4.24

4.5 Suggested Workflow

It is generally recommended that all uncertainty data be initially specified in Microsoft Project custom fields rather than manually entered into Full Monte for several reasons:

- It is generally easier to capture this information in the familiar Microsoft Project interface.
- The information will then be backed up along with the Project file
- Multiple Scenarios can be captured

Assuming the data has been captured in Microsoft Project the following sequence is suggested:

Open the project in Full Monte

1   Apply Template Uncertainty from the appropriate Project custom field.
2   Import Discrete Duration Uncertainty for high-risk tasks.
3   Import Input Milestones Date Uncertainty.
4   Perform the Risk Analysis

Chapter 5: Incorporating Risks (Threats and Opportunities)

Full Monte SRA has five separate mechanisms for modelling risks to the schedule.

1   Task Existence Probability
2   Discrete Risks
3   Risk Plans
4   Probabilistic Branching
5   Conditional Branching

5.1 Task Existence Probability

Task Existence Probability can be used to specify the chance that an existing task in the schedule will be performed. This is useful where tasks representing threats to the schedule timeline have already been incorporated in the schedule. Such tasks are sometimes marked as Inactive in Microsoft Project. Full Monte allows the probability that the task will occur to be specified. See the Full Monte SRA User Guide section 4.7.1 for further information.

5.2 Discrete Risks

Discrete Risks (Edit, Manage Risks) are a simple way to define risks and assign them to existing tasks in the schedule. The Risks has a probability of occurrence and Duration and Cost impacts that will be applied to the assigned task if the risk occurs. The limitations of Discrete Risk are only one risk per task and no individual duration uncertainty for the duration impact. See section 5.2 of the Full Monte SRA User Guide for further information.

5.3 Risk Plans

Full Monte Risk Plans are the most comprehensive risk modelling technique available. They feature a more comprehensive Risk Register that allows risks to be identified, and responses planned. Risks can be grouped into scenarios and multiple risks assigned to tasks. See section 5.1 of the Full Monte SRA User Guide for further information.

5.4 Probabilistic Branching

Probabilistic Branching allows you to specify the likelihood that each successor of a task with multiple successors will be executed. Unlike other probabilistic mechanisms, it enables entire chains of tasks to be included or excluded in a given simulation iteration. See section 4.7.2 of the Full Monte SRA User Guide for further information.

5.5 Conditional Branching

Conditional Branching allows alternate successors to be selected based on the finish date of the predecessor. This is useful for modelling risk mitigation plans. See section 4.7.3 of the Full Monte SRA User Guide for further information.

Chapter 6: Analyzing Results.

While the Histograms and S-Curves shown earlier (for example Figure 2.37) provide us with information about the effect of duration uncertainty and the dates by which we might complete our project at an acceptable level of confidence, they do not help us understand what was driving the result. This is where Sensitivity and Risk Path analysis can help us.

6.1 Sensitivity Analysis

As its name implies, Sensitivity Analysis can help us understand the relative sensitivity of our desired outcome to the uncertainty on each task in the schedule. In other words, this will show us the relative contribution of each task to the uncertainty of the outcome.

After having performed the Risk Analysis, choose View, Open Named View, Tornado (Schedule with Index). The report will look something like that shown in Figure 6.1.

ID	Task Name	Remaining Duration	Percent Critical	Percent Critical (Sensitivity)	Sensitivity Index	Sensitivity Index 20.0 40.0	Optimistic Mean Finish of Project	Pessimistic Mean Finish of Project	Project Mean Finish 11Aug23 16:50	Schedule Sensitivity Bar Basis
11	SW Design	18 days	81%	81%	56%		10Aug23 08:27	21Aug23 14:26		Estimated
14	SW Integrate	18 days	81%	81%	56%		10Aug23 08:27	21Aug23 14:26		Estimated
12	SW Code A	18 days	54%	54%	37%		11Aug23 08:01	21Aug23 09:35		Estimated
13	SW Code B	17 days	27%	27%	17%		11Aug23 14:15	17Aug23 15:14		Estimated
8	HW Integrate	20 days	19%	19%	7%		11Aug23 16:03	15Aug23 13:43		Estimated
5	HW Design	20 days	19%	19%	7%		11Aug23 16:03	15Aug23 13:43		Estimated
6	HW Part A	20 days	15%	15%	5%		11Aug23 16:17	15Aug23 11:28		Estimated
7	HW Part B	19 days	4%	4%	1%		11Aug23 16:46	14Aug23 14:40		Estimated

Figure 6.1

Although the critical path identified by Microsoft Project ran through the HW tasks we can clearly see that the SW Tasks are having more impact on the outcome. Although the SW tasks original had slack/float the higher risk applied to those tasks changes the critical path some 81% of the time.

The Percent Critical column shows how often each task was on the critical path duration the simulations. The Sensitivity Index shows the relative importance of each task to the uncertainty in the outcome. The Green/Red Gantt chart shows how the uncertainty affected the outcome relative to the Mean project completion date. The Green bar shows that when, for example, task 14 (HW Task 4) finished early then the project tended to finish early. Likewise, if task 14 finished late then it tended to push out the project completion.

Since tasks 14 and 11 were not only having the most impact on the outcome, but also tended to make the project finish earlier when their duration was set to the optimistic (best case) duration they will be good candidates for helping compress the schedule and reduce uncertainty.

As mentioned above there are three typical approaches:

- Reducing risk/uncertainty by further review of the estimates
- Reducing task durations perhaps by applying more resources
- Changing the schedule logic to give high risk tasks more slack/float.

As mentioned in section 3.1, it is possible to specify the desired Sensitivity Target for both Schedule and Cost when performing the risk analysis. This can be important on larger schedules where interim delivery milestones are important.

In the example shown in Figure 6.2 the Schedule Sensitivity Target has been changed to milestone ID 9 (HW Complete). Perhaps this represents a client deliverable or stage payment.

Figure 6.2

After running the risk analysis, the task histogram data will be unchanged but the Tornado (Schedule with Index) will be quite different as shown in Figure 6.3

ID	Task Name	Remaining Duration	Percent Critical	Percent Critical (Sensitivity)	Sensitivity Index	Sensitivity Index 20.0 40.0	Optimistic Mean Finish of ID 9 - HW Complete	Pessimistic Mean Finish of ID 9 - HW Complete	'HW Complete' Mean Finish 01Aug23 09:4	Schedule Sensitivity Bar Basis
5	HW Design	20 days	20%	100%	59%		27Jul23 16:23	03Aug23 16:08		Estimated
8	HW Integrate	20 days	20%	100%	59%		27Jul23 16:23	03Aug23 16:08		Estimated
6	HW Part A	20 days	16%	75%	45%		31Jul23 11:27	03Aug23 15:54		Estimated
7	HW Part B	19 days	4%	25%	14%		01Aug23 08:45	02Aug23 16:23		Estimated

Figure 6.3

Now the Tornado Sensitivity chart only shows tasks creating uncertainty in the HW Complete milestone.

Note: While the 'Percent Critical' column still shows the percentage of the time these tasks were on the critical path to project completion, the 'Percent Critical (Sensitivity)' column shows the percentage of the time the tasks were on the critical path to the sensitivity target.

The one disadvantage of the Tornado Sensitivity chart is that it only shows tasks creating uncertainty in the outcome. When we updated the task uncertainty data, some tasks (for example task 2 'Initiate') had no uncertainty defined and therefore do not appear on the Tornado chart despite being a critical predecessor to task 5 'HW task 1'. Risk Path Analysis can solve that problem.

6.2 Risk Path Analysis

While the Tornado sensitivity chart is an invaluable tool to highlight tasks creating the most uncertainty and the best opportunities for schedule compression, it does not show the complete picture so it can become difficult to understand **how** the tasks are affecting the outcome.

To solve this problem, Full Monte calculates a Risk Path index which identifies the various possible critical paths to the desired milestone or project completion based upon their probability of affecting the outcome (Percentage Critical).

The Risk Path can be inserted as a column in any Full Monte View. Right-Click on a column heading and choose Insert Column Before (or after), Other Full Monte Columns, Risk Path as shown in Figure 6.4.
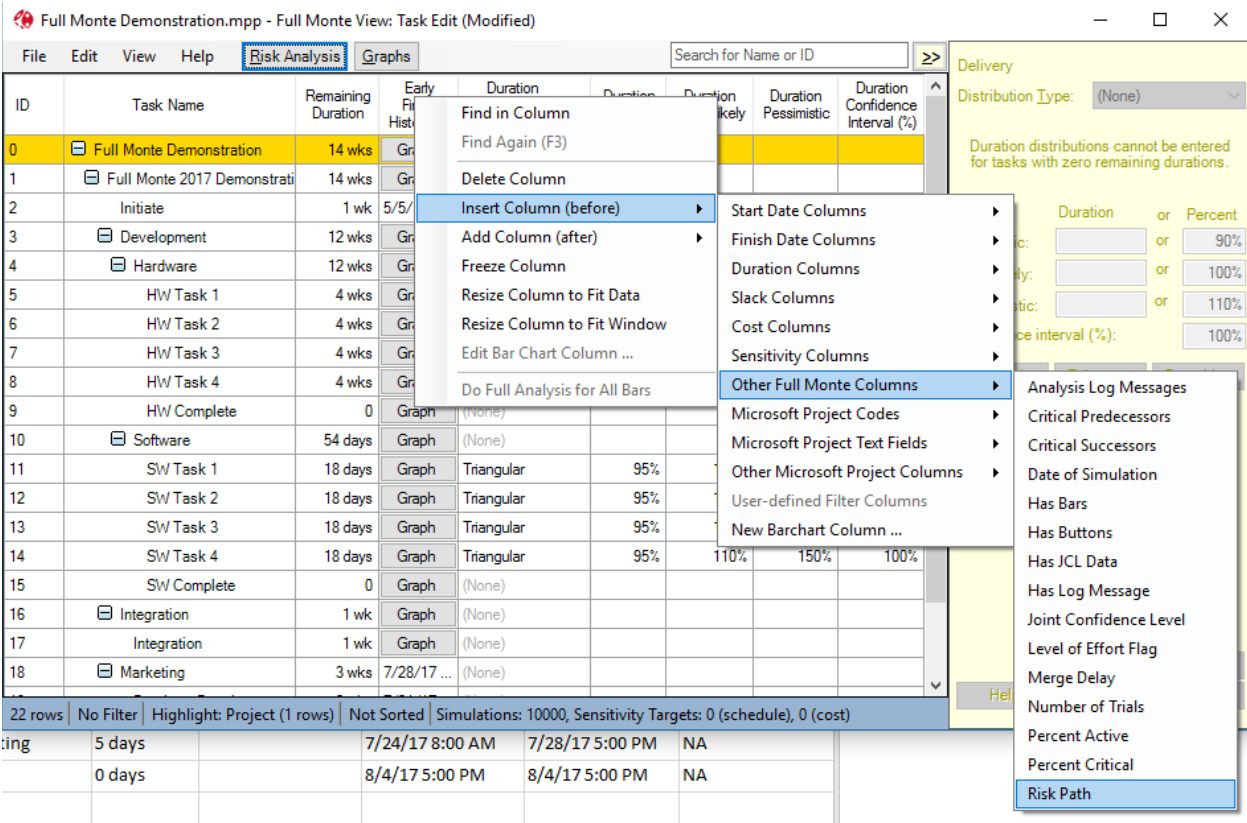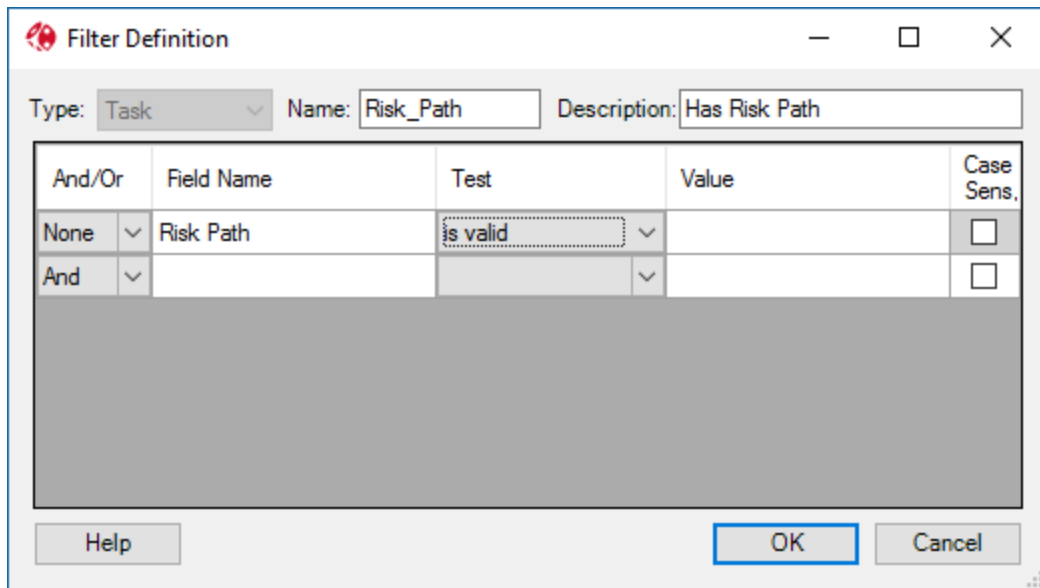

Figure 6.4

The result is shown in Figure 6.5

Figure 6.5

In Figure 6.5 we can see that Initiate, SW Task 1. SW task 3, SW Task 4, and Integration have been identified as the primary critical path to project delivery (Risk Path is set to 1)

This will be easier to visualize in a Gantt chart.

Note: You may skip this view creation tutorial and jump straight to the standard view, View, Open named View, Risk Path Gantt displayed in Figure 6.10.

From the View menu choose Open Named View and then select (New). When the new view opens turn off the 'Observe Hierarchy' option from the view menu.

Add the Risk Path column.

Then from the View menu, select Filter and then New Filter. Complete the details as shown in Figure 6.6.

Figure 6.6.

Click OK and the filter will be applied to the view as shown in Figure 6.7.

ID	Task Name ▲	Risk Path
21	Delivery	1
9	HW Complete	3
5	HW Task 1	3
6	HW Task 2	3
7	HW Task 3	4
8	HW Task 4	3
2	Initiate	1
17	Integration	1
15	SW Complete	1
11	SW Task 1	1
12	SW Task 2	2
13	SW Task 3	1
14	SW Task 4	1

Figure 6.7

We can now add a Gantt chart by right-clicking the Risk Path column heading and choosing New Barchart Column as shown in Figure 6.8.
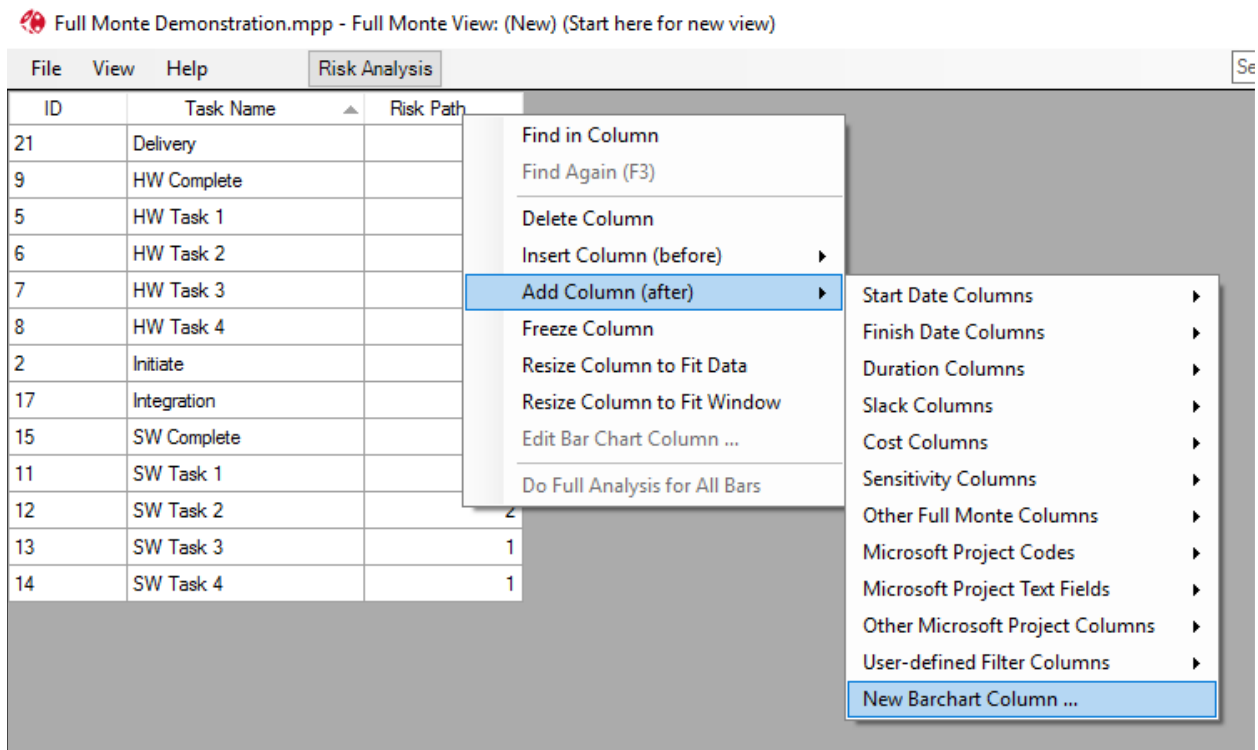
Figure 6.8

Configure the Barchart column as shown in Figure 6.9.
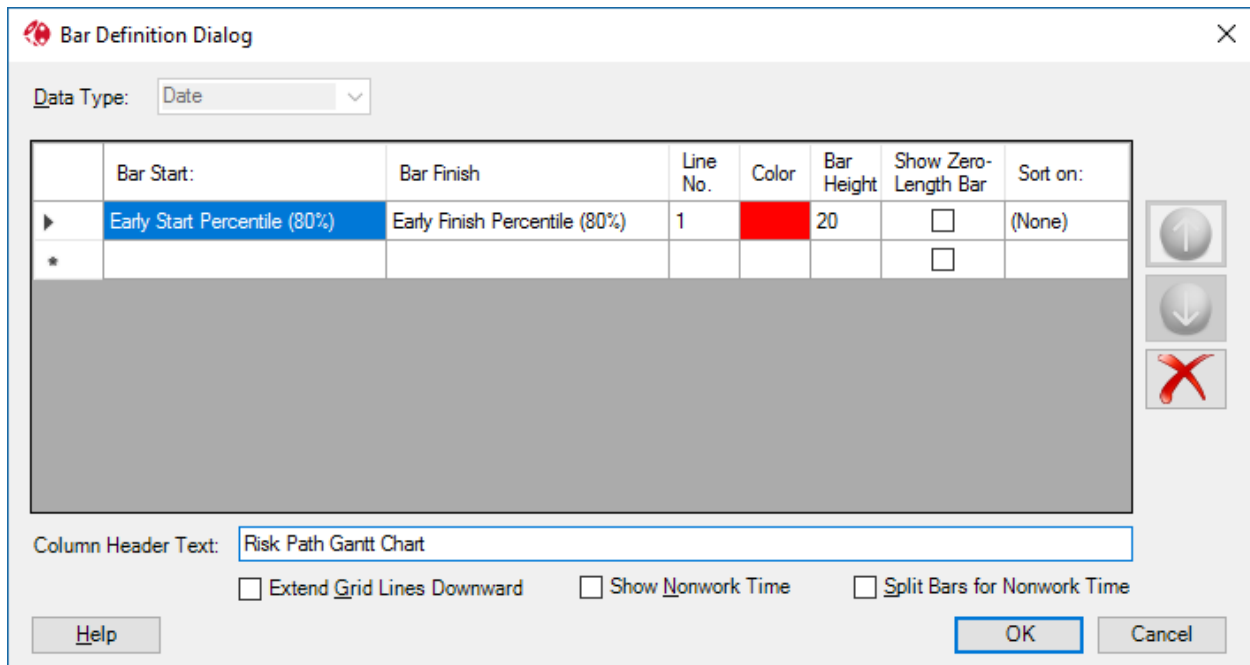

Figure 6.9

Click OK to draw the bars and then click the Risk Path column heading to sort the tasks into ascending order of Risk Path as shown in Figure 6.10.

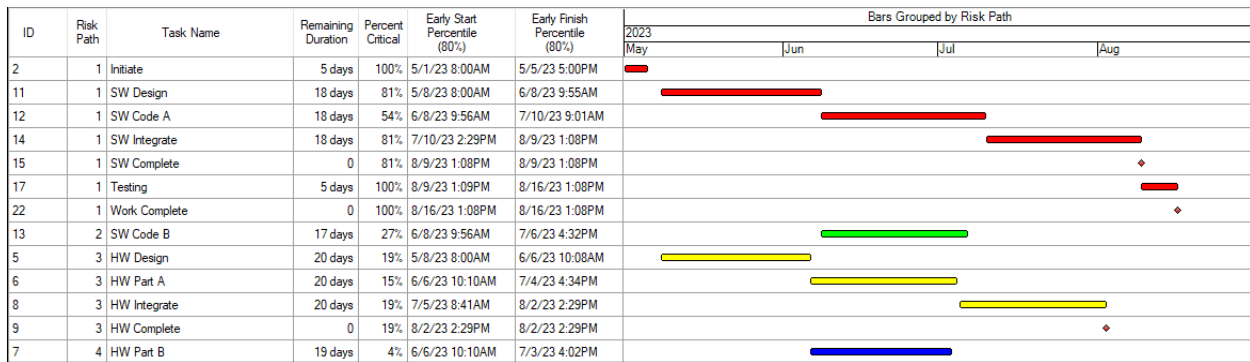| ID	Risk Path	Task Name	Remaining Duration	Percent Critical	Early Start Percentile (80%)	Early Finish Percentile (80%)	Bars Grouped by Risk Path
2	1	Initiate	5 days	100%	5/1/23 8:00AM	5/5/23 5:00PM	
11	1	SW Design	18 days	81%	5/8/23 8:00AM	6/8/23 9:55AM	
12	1	SW Code A	18 days	54%	6/8/23 9:56AM	7/10/23 9:01AM	
14	1	SW Integrate	18 days	81%	7/10/23 2:29PM	8/9/23 1:08PM	
15	1	SW Complete	0	81%	8/9/23 1:08PM	8/9/23 1:08PM	
17	1	Testing	5 days	100%	8/9/23 1:09PM	8/16/23 1:08PM	
22	1	Work Complete	0	100%	8/16/23 1:08PM	8/16/23 1:08PM	
13	2	SW Code B	17 days	27%	6/8/23 9:56AM	7/6/23 4:32PM	
5	3	HW Design	20 days	19%	5/8/23 8:00AM	6/6/23 10:08AM	
6	3	HW Part A	20 days	15%	6/6/23 10:10AM	7/4/23 4:34PM	
8	3	HW Integrate	20 days	19%	7/5/23 8:41AM	8/2/23 2:29PM	
9	3	HW Complete	0	19%	8/2/23 2:29PM	8/2/23 2:29PM	
7	4	HW Part B	19 days	4%	6/6/23 10:10AM	7/3/23 4:02PM	

Figure 6.10

The five tasks on the primary driving path to delivery are shown on Risk Path 1. A minor variation where SW Task 2 drives the project is shown on Path 2 and so on.

Unfortunately, Full Monte does not yet feature logic links or data driven colors for Gantt bars but this is something Microsoft project does well. So, could we draw this chart using Microsoft Project?

The answer is yes thanks to the field mappings that were described in section 2.2. We can save data calculated by Full Monte right back into Microsoft project custom fields.

Close the new view (choosing to save the view). Enter a name and view description.

Now close Full Monte. You will be prompted twice to save information. The first prompt (shown in Figure 6.11) asks if you wish to save Task Data. Choose Yes to save any inputs you made to task uncertainty information.

Note: if you choose No, any data updates you made in Full Monte will be lost and you will not have an opportunity to save the Risk Analysis results.
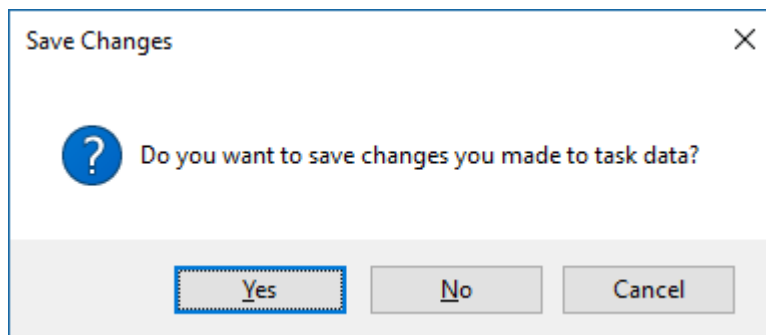

Figure 6.11

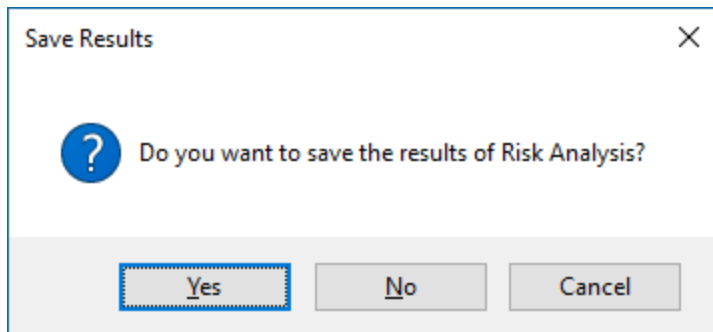You will then be prompted to save the results of Risk Analysis as shown in Figure 6.12.

Figure 6.12

Choosing Yes will save the results of the analysis in several fields and will also update any additional custom fields that were specified in the Filed Mappings dialog.

6.3 Custom Views in Microsoft Project

The Full Monte demonstration project has been preconfigured with several custom views based on Risk Analysis data calculated and saved by Full Monte.

After the demonstration project was analyzed and the results saved in section 3.2 the Microsoft Project Gantt chart will update to show a risk adjusted scheduled based on 80% confidence (aka 80th Percentile or P80 dates) as shown in Figure 6.13.
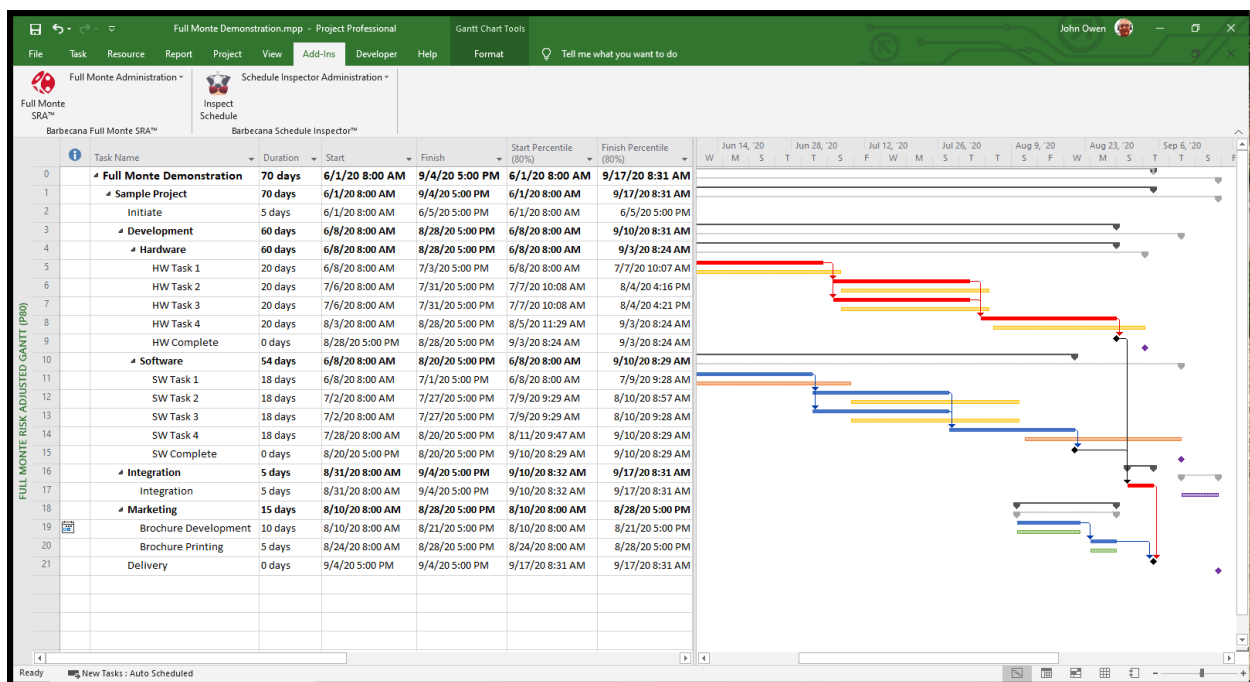

Figure 6.13

The original bars based on the Early Start/Early Finish calculated by Microsoft Project are the Red/Blue bars and underneath each of these is a color-coded bar showing the 80% confidence dates. The Bar Styles are defined as shown in Figure 6.14.
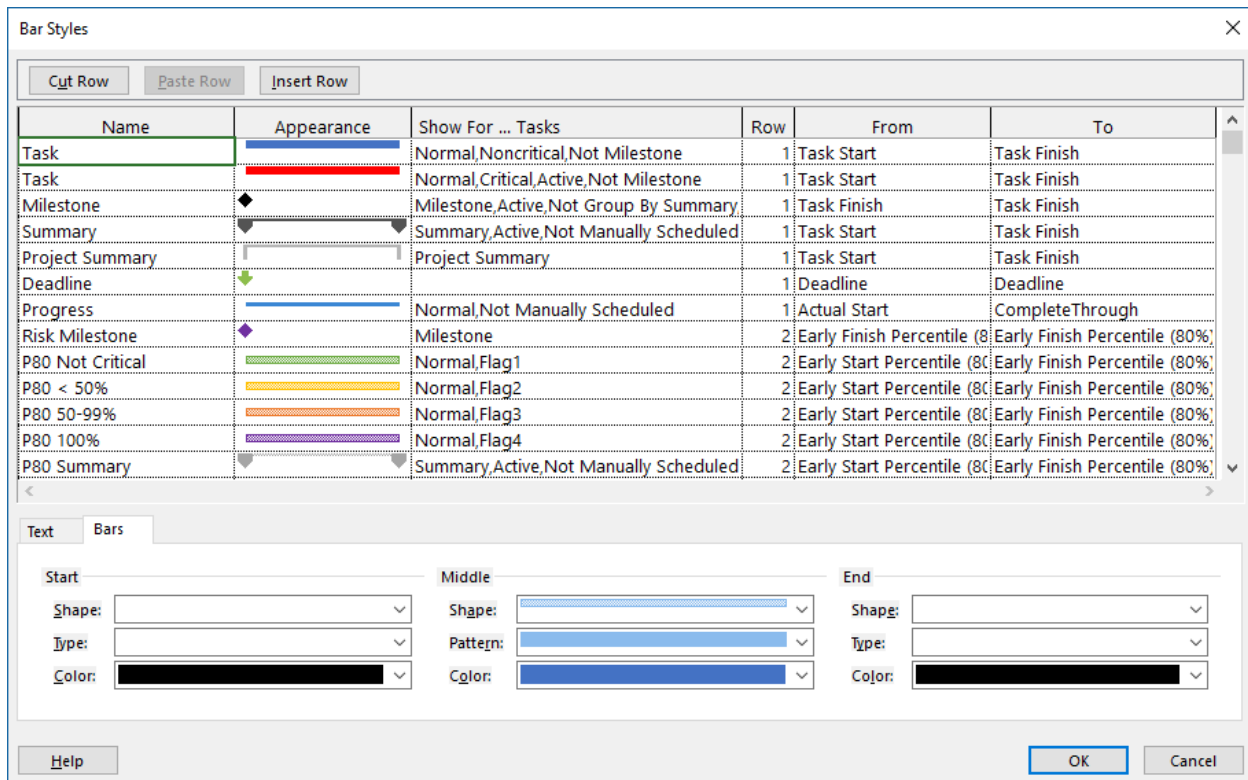
Figure 6.14

Note: *Flag fields have been used to control when the various color bars are displayed based on the criticality of the tasks in the risk analysis. The criticality information was saved to Number1 by Full Monte. See an example in Figure 6.15.*
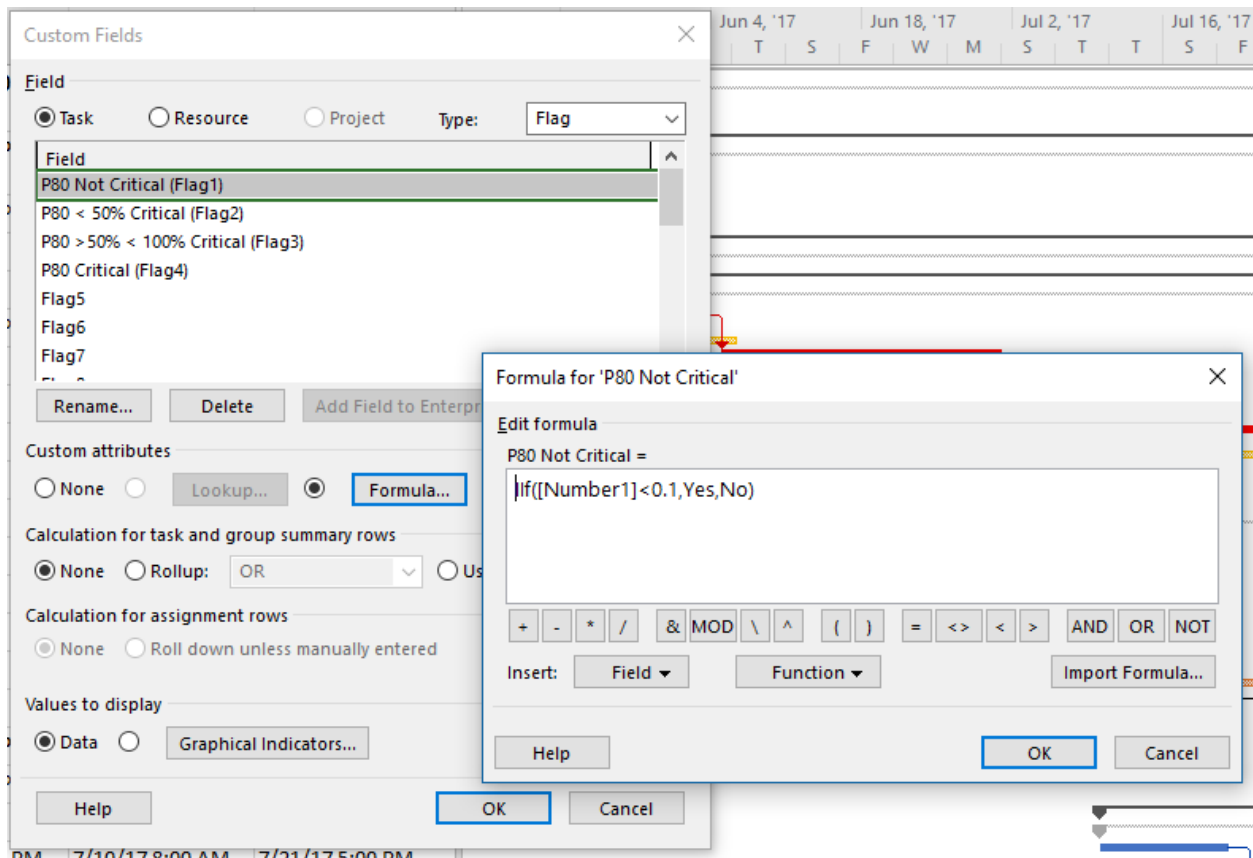
Figure 6.15

We can use the same techniques to draw a nice Risk Path Gantt chart. In our Field Mapping's Full Monte save the risk path to custom field Number2.

We can use some more Flag fields to control the color of the bars based on the Risk Path number as shown in Figure 6.16.
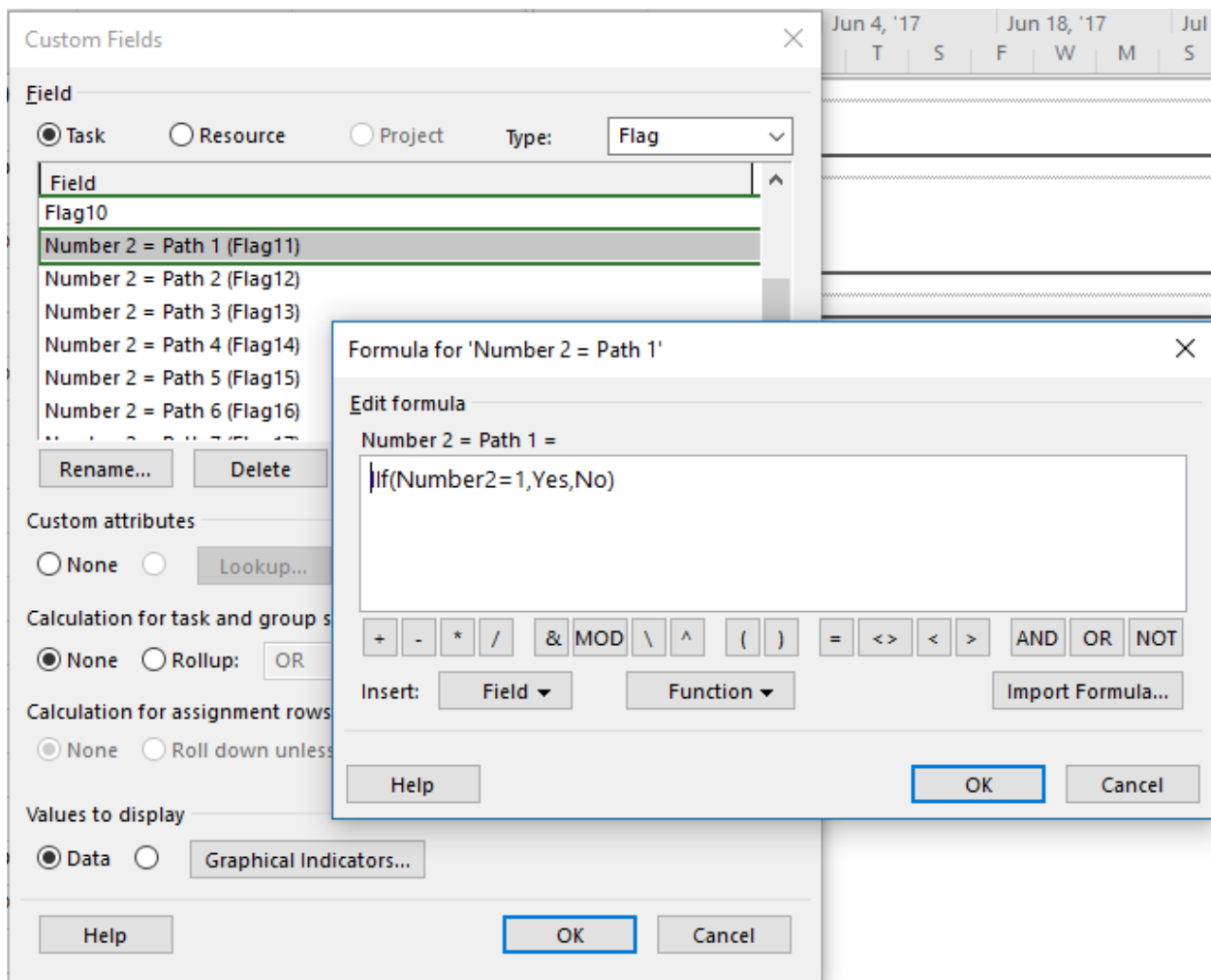
Figure 6.16

The resultant Gantt view in Microsoft project is shown in Figure 6.17.
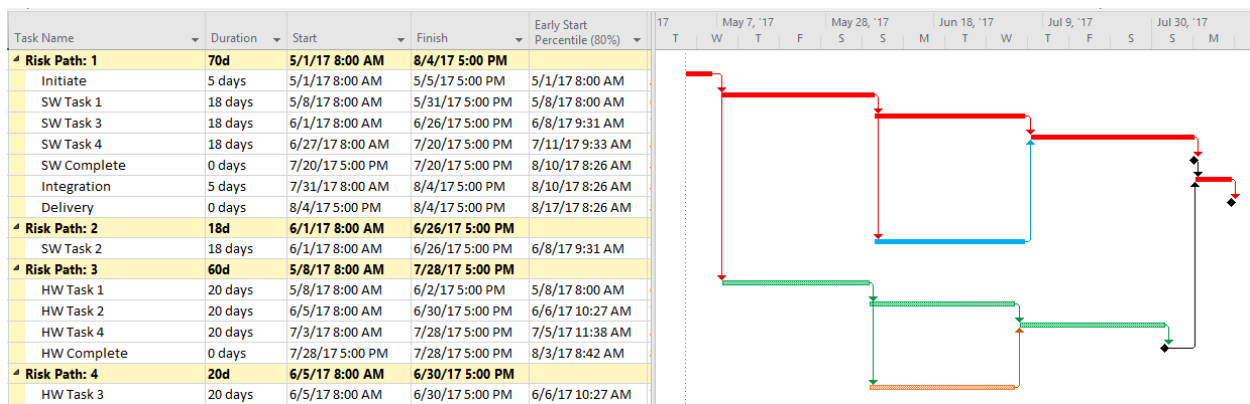

Figure 6.17

Note: The Gantt chart has been grouped by Risk Path as shown in Figure 6.18.

Group Definition in 'Full Monte Demonstration'   ✕

Name: FM Risk Path   ☑ Show in menu

	Field Name	Field Type	Order	^
Group By	Risk Path ⌄	Task	Ascending	
Then By				
Then By				⌄

☐ Group assignments, not tasks

Group by setting for Risk Path

Font: Segoe UI 10 pt, Bold   Font...

Cell background: [   ] ⌄

Pattern: [████████████████████] ⌄

Define Group Intervals...

☐ Show summary tasks
☐ Maintain hierarchy

Help   Save   Cancel

Figure 6.18

Summary

This 'getting Started' guide is a quick introduction to using Full Monte to satisfy the requirement for project Schedule Risk Assessments.

It has attempted to show various ways the tool can be used to suit different customer needs.

There are many more features in the product compared to the few shown here. Please consult the **Full Monte SRA Installation Guide for Microsoft Project** for advanced topics on software configuration and the **Full Monte SRA User Guide** for details on other product features such as shared influencing factors with Correlation and diagnostic tools to help explain results.

Thank you for using our software.

Barbecana.