

Primavera Risk Analysis for MS Project

Using Primavera Risk Analysis with Microsoft Project

This document is an extract from the Primavera Risk Analysis help file version 8.7 SP5.


Table of Contents

1.	MS Project Risk Tutorial	1
1.1.	MSP Risk Tutorial	1
1.2.	MSP Risk Tutorial - 1. Entering risk data in MS Project	1-4
1.3.	MSP Risk Tutorial - 2. Progress Wizard	4-6
1.4.	MSP Risk Tutorial - 3. Opening MS Project file in Primavera Risk Analysis	6-8
1.5.	MSP Risk Tutorial - 4. Running risk analysis	8-10
1.6.	MSP Risk Tutorial - 5. Viewing the risk results	10-14
1.7.	MSP Risk Tutorial - 6. Risk Report	14-16
1.8.	MSP Risk Tutorial - 7. Updating the risk results to MS Project	16-17
1.9.	MSP Risk Tutorial - 8. Viewing the results in MS Project	17-19
2.	MSP - Opening, saving and updating Microsoft Project files	19-20
3.	MSP - Adding the Primavera Risk Analysis tool bar to MS Project	20-21
4.	PDF Documentation and Printing Help	21-22
1	MS Project Risk Tutorial	

1.1 MSP Risk Tutorial

 To print this tutorial see **Printing Help Topics and Chapters (Section 4)**

This quick tutorial takes you through the steps of opening a sample Microsoft® Project project, running a risk analysis in Primavera Risk Analysis and updating the results back to the Microsoft® Project project.

 Microsoft is a registered trademark of Microsoft Corporation in the United States and/or other countries.

Our aims are

- To find out the chance of completing the project on time and budget given that there is uncertainty in our task durations.
- To include probabilistic events in the model.
- To find a more realistic completion date.
- To identify tasks that are likely to cause the project to be delayed to help us manage our project more effectively.
- To view the 50% and 80% schedules.

Tutorial topics

1. Entering risk data into MS Project
2. Opening project in Primavera Risk Analysis
3. Running risk analysis
4. Viewing the results
5. Creating Risk Report
6. Updating the results to MS Project
7. Viewing the results in MS Project

1.2 MSP Risk Tutorial - 1. Entering risk data in MS Project

Add the Primavera Risk Analysis tool bar to MS Project

The Primavera Risk Analysis tool bar and views can be added to MS Project.



It helps you enter and view risk data in MS Project (e.g. three point estimates, 50% schedule, criticality index).

If the tool bar has not already been added to MS Project it is recommended this is completed now.

See **MSP - Adding the Primavera Risk Analysis tool bar to MS Project (Section 3)**

It is not essential to add the Primavera Risk Analysis tool bar to MS Project. For example you can add the columns for User Duration 1, 2 and 3 to MS Project and use these to enter your three point estimates.

Open the sample project in MS Project

- Start up MS Project.
- *File | Open*. Open the file called House01.mpp located in C:\Program Files\Oracle\Primavera Risk Analysis\Samples
- The sample is read only so save it as another file. *File | Save As*.
- Click *Save*.

The project will look something like this:

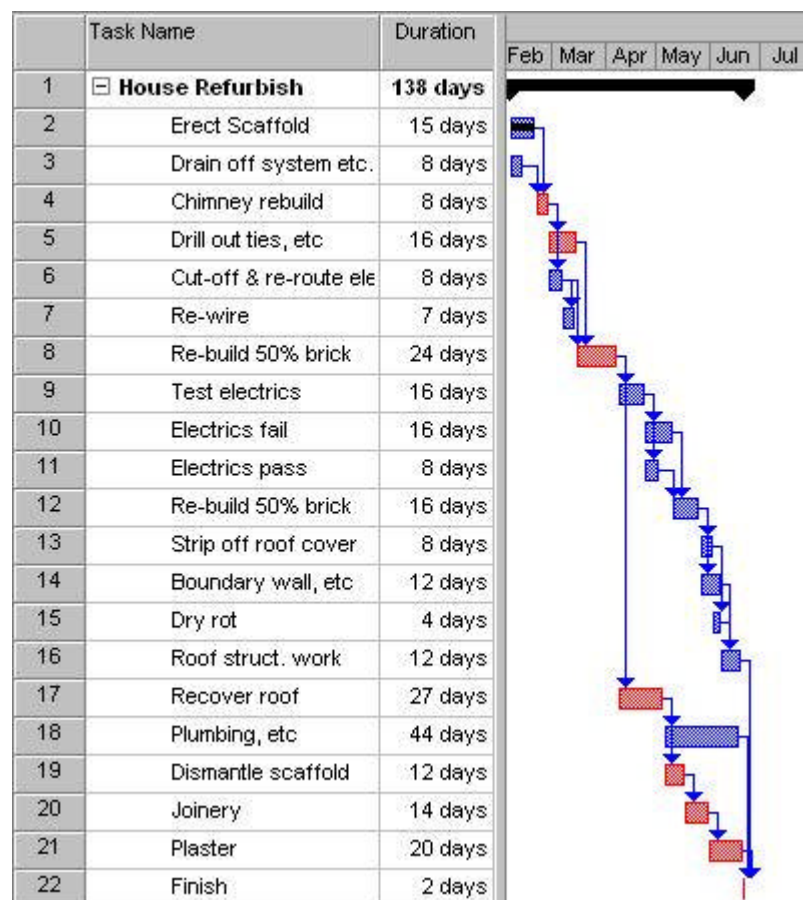



Figure: Tutorial sample project in MS Project.

Entering 3 point duration estimates

- Click on *Duration Inputs* tool bar button 


This displays the columns for entering the Min, Likely and Max durations and Duration Correlation.

Task Name	Remaining Duration	Min Dur	Likely Dur	Max Dur	Duration Function	Co
<input checked="" type="checkbox"/> House Refurbish	130.94 days	0 days	0 days	0 days		
Erect Scaffold	0 days	11 days	15 days	30 days		
Drain off system	8 days	6 days	8 days	12 days		
Chimney rebuild	8 days	6 days	8 days	12 days		

Figure: Three point estimates entered in MS Project.

- To save you time the 3 point estimates have already been entered.



The Quick Risk tool bar button  can be used to automatically populate the *Min Dur*, *Likely Dur* and *Max Dur* fields with values based on a percentage of the remaining duration.

- The *Duration Function* column allows distributions other than triangular. For example if you entered "Uniform(2;10)" you would get a uniform distribution varying from 2 to 10 days.

- The three point estimates are being stored in MS Projects user fields. In this example we are using MS Project user fields: Duration 1, Duration 2 and Duration 3.

Duration Correlation

If the "Lower Brickwork" takes a long time it is likely that the "Upper Brickwork" will take a long time too. Duration Correlation can be used to model this relationship.

Task Name	Duration	Min Dur	Likely Dur	Max Dur	Duration Function	Correlation	Unique ID
Lower brickwork	24 days	18 days	24 days	35 days			9
Test electrics	16 days	12 days	16 days	23 days			10
Electrics fail	16 days	12 days	16 days	23 days			11
Electrics pass	4 days	3 days	4 days	7 days			12
Upper brickwork	16 days	13 days	16 days	23 days		9[85]	13

Figure: Entering "9[85%]" as shown adds an 85% correlation between "Upper Brickwork" and the task with Unique ID "9", i.e. "Lower Brickwork".

Probabilistic branching

"Test electrics" passes 80% of the time and fails the other 20%. A probabilistic branch can be used to model the impact on the schedule depending on the outcome of the test.

- Click on the *Probabilistic and Costs inputs* tool bar button 

This displays the columns for modeling Probabilistic Branching and % Existence.

Task Name	% Exists	Prob Branching	Unique ID	Remaining Cost	Apr	May	Jun
Test electrics	0	12[80%];11[20%]	10	\$950			
Electrics fail	0		11	\$4,500			
Electrics pass	0		12	\$500			

Figure: The probabilistic formula has been entered as "12[80%];11[20%]". The Unique ID's are used to identify the tasks in the probabilistic branch.

Task Existence

After "Strip off roof cover" we believe there is a 15% chance of finding rotten supports. Task Existence can be used to model this uncertainty. During the risk analysis the "Rotten Supports" task will appear 15% of the time. When it appears it will have an impact on the project finish and cost.

Task Name	% Exists	Prob Branching	Unique ID	Remaining Cost	May	Jun	Jul
Strip off roof cover	0		14	\$800			
Boundary wall	0		15	\$600			
Rotten supports	15		16	\$7,000			
Roof struct. work	0		17	\$950			

Figure The value "15" indicates the % chance of the task occurring.

Costs

Each task has a remaining cost. This cost is used by Primavera Risk Analysis to model the cost uncertainty. During the risk analysis the cost of a task is increased or reduced proportionally with its duration. Probabilistic tasks will have a zero remaining cost for the iterations they do not exist.

Great. All the risk data has been entered. We will now look at the Progress Wizard.

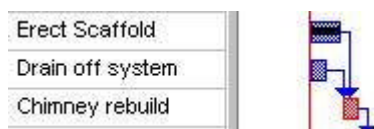
1.3 MSP Risk Tutorial - 2. Progress Wizard

About the Progress Wizard

If a project has progressed then the project uncertainty and risk affects does not affect the completed tasks.


It is possible in MS Project to progress tasks out of line with the Status Date, e.g. a task can be complete and scheduled in the future to the right of the Status Date. The Progress Wizard can be used to identify and optionally adjust these type of tasks.

In the tutorial project the task 'Erect Scaffold' has been progressed but is in front of the Status Date shown as a red line:



We will use the Progress Wizard to identify this task and any others that may not be progressed in line with the Status Date.

Run the Progress Wizard

- Click on the tool bar button  to start the Wizard, or use the menu command *Primavera Risk Analysis | Progress Wizard*.
- Click **OK** to save any unsaved changes if prompted.
- Click **Next** to move to *Setting the Status Date*.



Progress Wizard

Setting the Status Date

Please check the status date set for this project is correct.

February 2006 | February | 2006

Sun	Mon	Tue	Wed	Thu	Fri	Sat
29	30	31	1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	1	2	3	4
5	6	7	8	9	10	11

Status date: 05/02/2006 17:00:00

Cancel Next > Finish

Figure: Checking and optionally setting the project Status Date.

- In the tutorial project the *Status Date* is already set to the "05/02/2006 17:00:00". Leave this date as it is.
- Click *Next* and the Wizard will look for any tasks that are not progressed in line with the Status Date:



Progress Wizard

ID	Name	Actual Start	Actual Finish
2	Erect Scaffold	06/02/2006 08:00	20/02/2006 16:00

The task has an actual start and finish date after the status date

Choose an Action

☐ Remove actual dates
☒ Move actual dates to before status date
☐ Ignore

☐ Apply action to all Tasks.

Consequence

Cancel Next > Finish

Figure: Options for adjusting "Erect Scaffold" which is completed but it is ahead of the Status Date.

The task 'Erect Scaffold' has been completed so it should not be delaying any of the succeeding tasks that are scheduled in the future after the Status Date. To correct this we will use the *Move actual dates to before status date* to schedule the task behind the Status Date.

- Select the option *Move actual dates to before status date*.
- Click *Next*. This will find the next task. As there are no more progress problems the Wizard finishes:

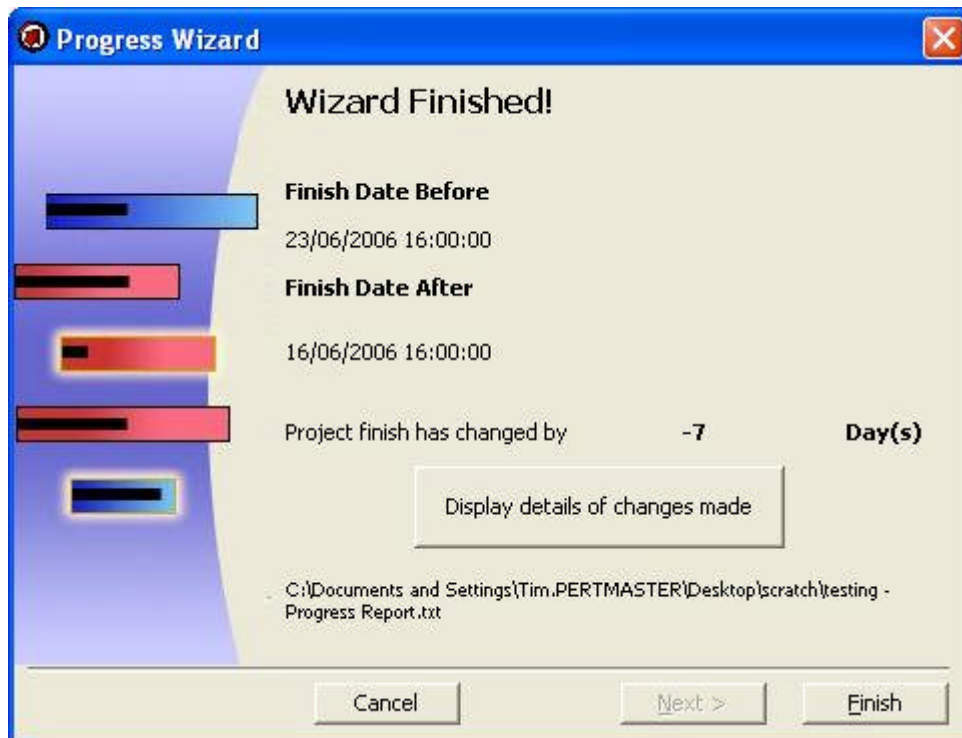
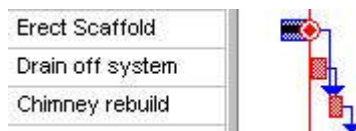


Figure: Wizard finishes and displays the finish date difference and with the option to display the changes made to each task.

- Click *Finish* to complete the Wizard.

The 'Erect Scaffold' task is now behind the Status Date.



Excellent. Next we will open the project in Primavera Risk Analysis.

1.4 MSP Risk Tutorial - 3. Opening MS Project file in Primavera Risk Analysis

Our project has 3 point estimates for the durations and we have also included some additional information to model probabilistic tasks and duration correlation.

We will now open the file in Primavera Risk Analysis ready for the risk analysis.

- Click on the *Open In Primavera Risk Analysis* tool bar button 

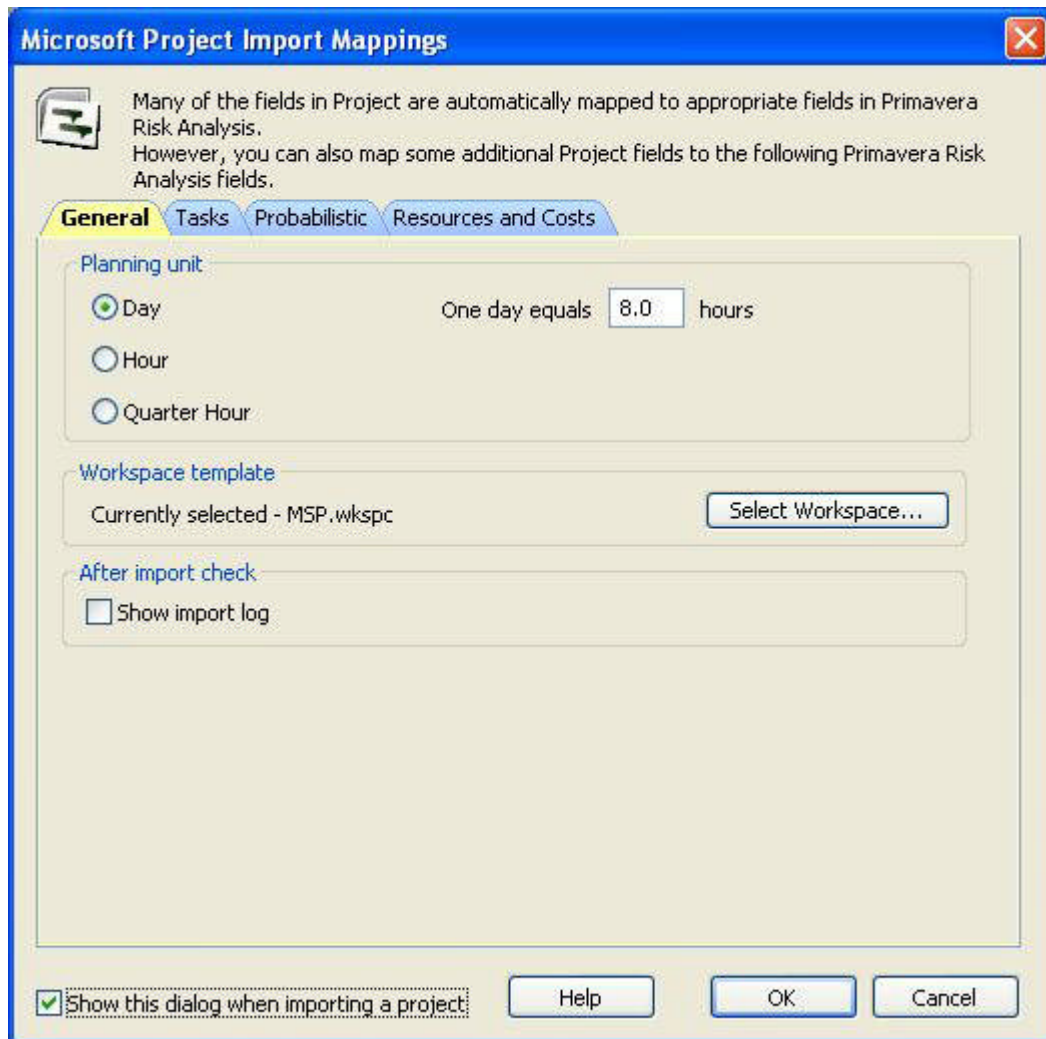


Figure: The *Microsoft Project Import Mappings* dialog is displayed.

- Click *OK* in the *Microsoft Project Import Mappings* dialog to accept the default mappings.
- After file has opened in Primavera Risk Analysis click *Save* when prompted.
- Click on the *Gantt Chart* tab.

The project should look something like this in Primavera Risk Analysis:

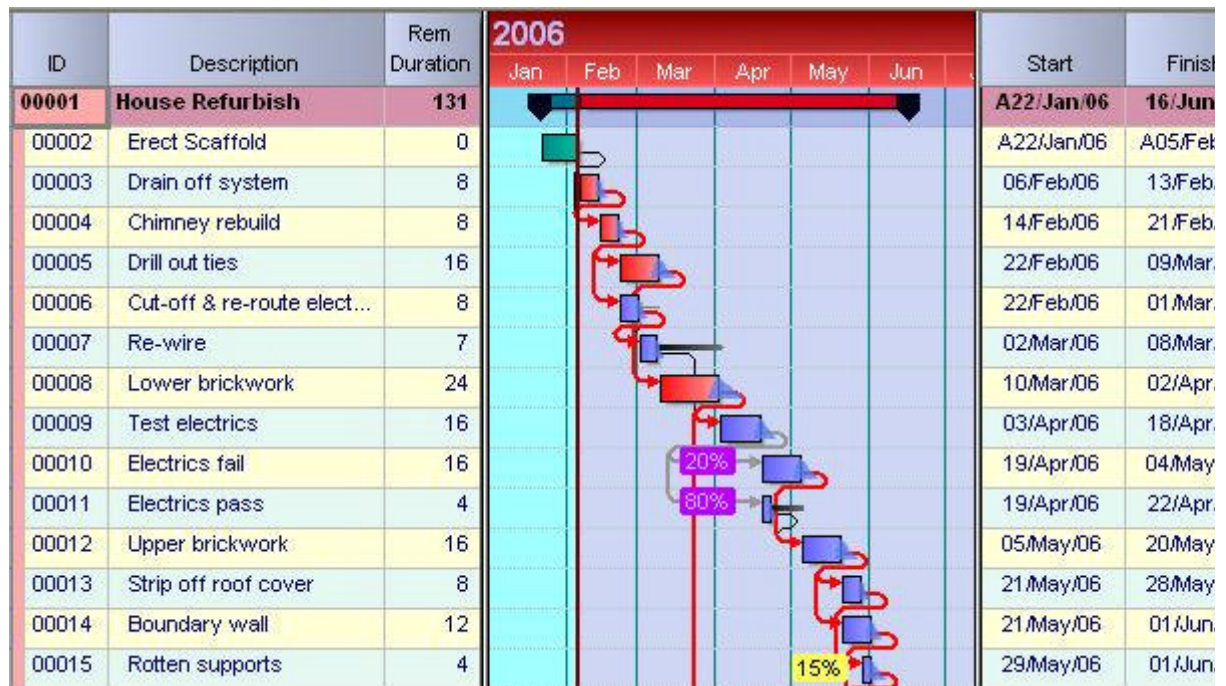


Figure: Project displayed in Primavera Risk Analysis.

Notes

- The *Import Check* tab displays *Start Check* and *Finish Check* columns that display any differences between the MSP and Primavera Risk Analysis schedule. Check the columns for any differences - there maybe differences of a day for milestones or zero duration activities - these will not affect the results.
- On the *MSP Import Check* sheet the grey bars display the *Start Check* and *Finish Check* graphically. The grey bars are the MSP schedule and the bars above them are the Primavera Risk Analysis schedule.

Viewing risk inputs


- To view all the risk inputs for the project - *Risk | Risk Summary*.
- To view individual risk data from the main screen - Click on a task and choose the *Risk and Uncertainty* tab in the *Task Details*.

Good. Now we are ready to run the risk analysis...

1.5 MSP Risk Tutorial - 4. Running risk analysis

After opening the MS Project project in Primavera Risk Analysis a risk analysis can be run.

Run the Risk analysis

- Risk | Run Risk Analysis* or click 
- Click *Options...* to display the *Risk Analysis Options* dialog.
- Change the options to those shown below:

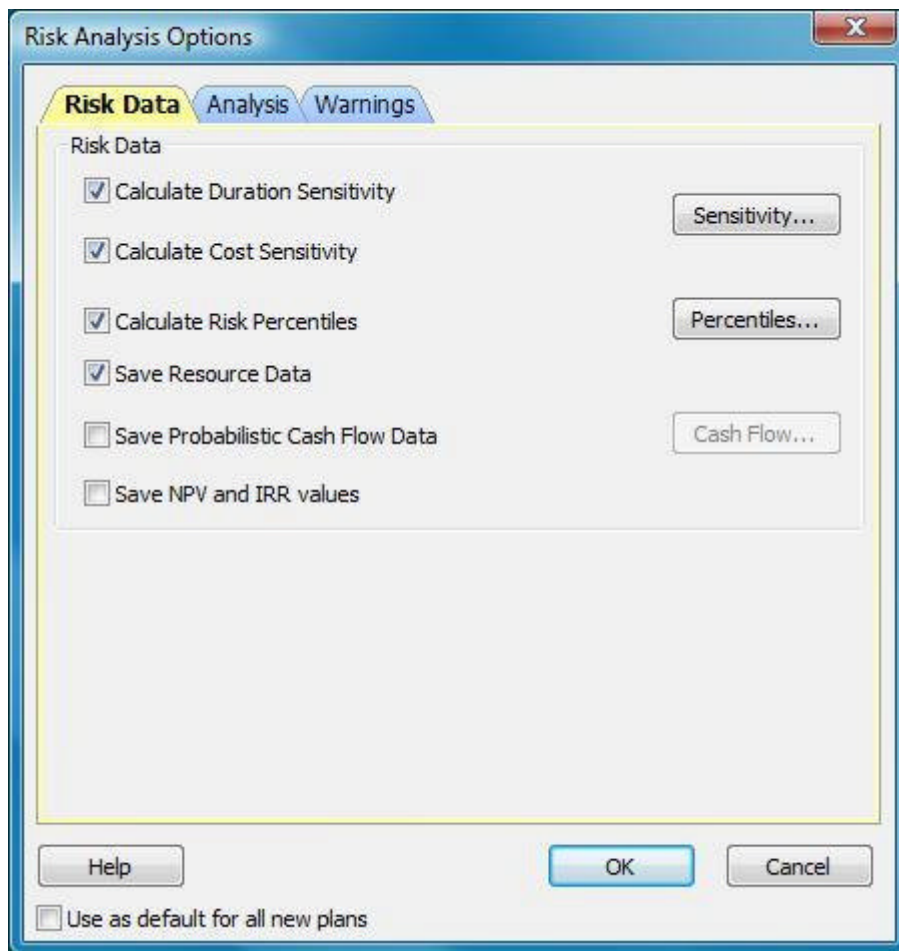


Figure: Risk Analysis options dialog displayed before running analysis.

- In the *Risk Analysis Options* dialog click on the *Percentiles...* button.
- Set up the values as shown below (they may already be set up like this):

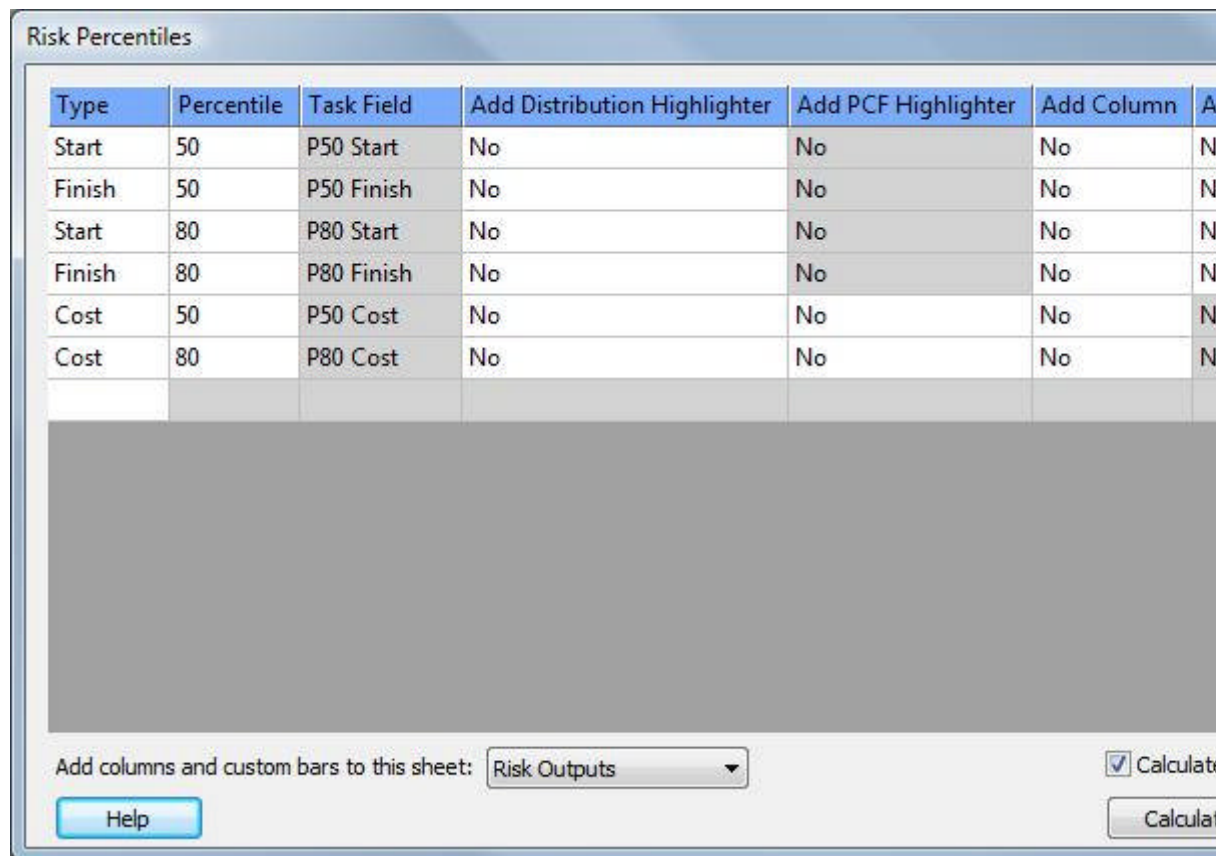




Figure: Setting up risk percentiles to calculate the P50 and P80 dates and costs.

- Click *OK* to close the percentiles dialog.
- Click *OK* to close the *Risk Analysis Options* dialog.
- Click the *Analyze* button.
- Any warnings or errors will be displayed. In this example this usually only happens if one or more of the minimum, most likely or maximum have been incorrectly entered in MS Project (e.g. The minimum duration is greater than the maximum).
- Click on *Step* button to step through individual iterations. The step through allows you to check to see if the analysis is proceeding as expected. Notice as you step through how the activities move around and some move on and off the critical path.

Also notice as you step through how the 'Rotten supports ', 'Electrics fail' and 'Electrics pass' appear and disappear due to the probabilistic values we gave them.

 As you step through each iteration you can scroll around and format the Gantt Chart area.

- Use the *Complete* button to run analysis without re-drawing each step.

 Using *Step* and *Go* require Primavera Risk Analysis to redraw after each iteration - this can significantly increase the time taken to complete the risk analysis. Once you are happy that the risk analysis is proceeding as expected, use the *Complete* button and it will be a lot faster!

1.6 MSP Risk Tutorial - 5. Viewing the risk results

After the risk analysis has been run the Distribution Graph is displayed.

The Distribution Graph can be used to display distributions for Finish Dates, Start Dates, Durations, Total Float, Resources or Costs for any of the tasks in the plan or for the entire plan.

The name of the selected distribution is displayed in the graph title.

The chance of completing the project on time

- Select the *Finish Date* tab if not already selected.
- On the right hand side under *Highlighters* read the *Deterministic* probability (21%).

- On right hand side read the 80% date (29/Jun/06).

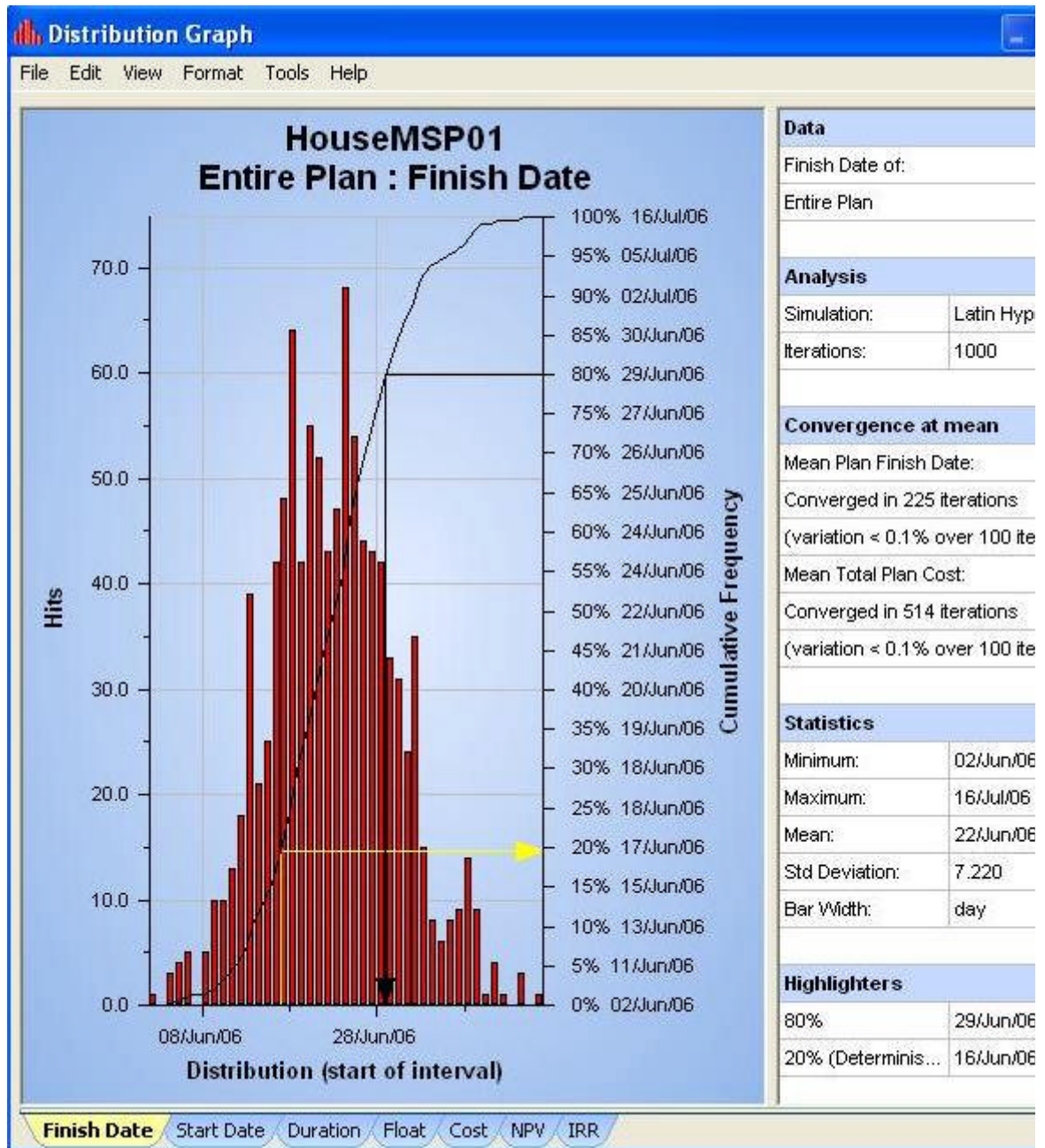


Figure: Finish date distribution for the entire plan.

The chance of completing a selected task on time

After the risk analysis the default is to display the distribution for the 'Entire Plan'. However during the analysis distributions for every task are stored. When the analysis is complete it is possible to view the distribution for any selected task.

- Select '00017 - Recover roof' from the task tree on the left of the Distribution Graph.

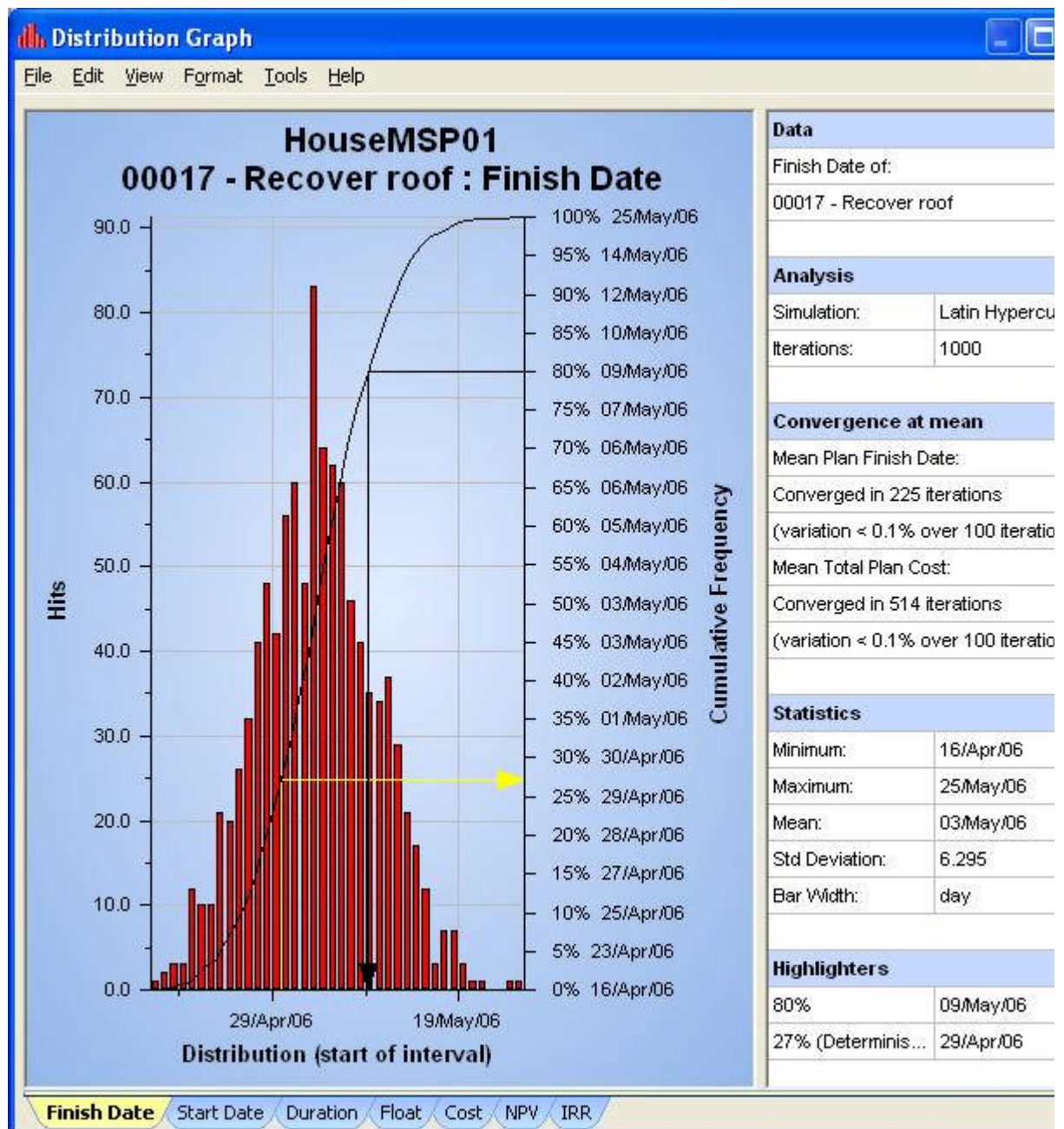


Figure: Finish data distribution for a selected task.

Cost distribution

First we need to change back to the Entire Plan.

- Select '<Entire Plan>' from the task tree on the left of the Distribution Graph.

Now display the Cost distribution.

- Select *Cost* tab: Read the *Deterministic Cost* probability.
- On right hand side read the 80% cost.

Return to the Gantt Chart

- Close the Distribution Graph.

Criticality Index

The sample project has activities in parallel. It is therefore likely that the critical path may vary due to the uncertainty on the task durations. We can use the criticality index to identify which tasks are likely to be on the critical path. The criticality index is a measure of how often a task appeared on the critical path

during the risk analysis.

- Click on the *Risk Outputs* sheet.

The criticality index is displayed in one of the columns on the right hand side. The criticality index helps identify those tasks that are likely to cause a delay to the project. You will notice that some of the critical tasks in the project have a lower criticality index than those that are not critical. This shows us that the traditional critical path does not necessarily give us a true indication of which are the most important tasks, but the criticality index does.


- Right click on the *Criticality Index* column heading and choose *Sort Descending*.

Which tasks are likely to delay the project?

Intuitively we know that the tasks likely to delay the project most often are those on the critical path with a large amount of uncertainty. If we can find a strong positive correlation between the duration of a task and the duration of the project we will know that the task is influencing the project duration.

Duration Sensitivity is a measure of this correlation and can be used to identify tasks that influence the project duration. The correlation between each task and the project duration is calculated as a value between -100% and +100%. The task with the highest positive value is the task that influences the project duration the most.

After running a risk analysis the *Duration Sensitivity* values can be displayed on a Tornado Chart.

- Click on the Tornado icon  to display the Tornado chart.
- Click on the *Duration Sensitivity* tab if not already selected.
- Check the *Ignore negative values* option.

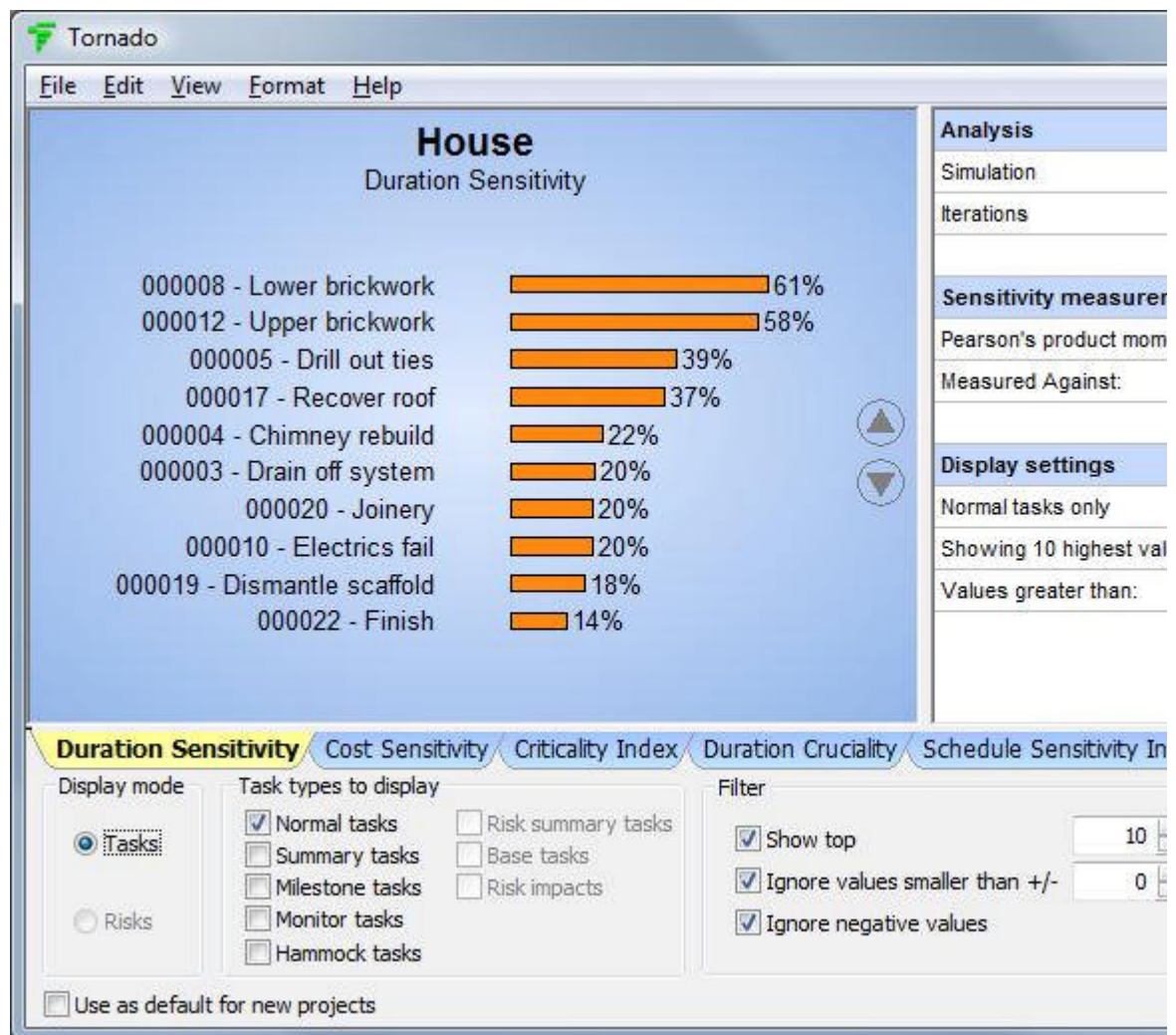


Figure: Duration Sensitivity formatted to display the top 10 tasks.

Great. We now know more about the risk and uncertainty in our project. Now we will create a risk report...

1.7 MSP Risk Tutorial - 6. Risk Report

Primavera Risk Analysis can create a report using the Summary Risk Report.

The report includes distributions and tornado charts for the project cost and finish.

Additional distributions and tornado charts can be created for selected Key Tasks in the project. This option allows Key Tasks other than the Finish Date to be selected and reported on. In this example below we have added 'Recover roof' to the report as we are worried that we may not recover the roof in time for the start of the monsoon season!

The assumptions for each task (e.g. three point estimate, task existence) can also be included at the end of the report.

- If the *Tornado Chart* is still open, close it now.
- *Reports | Summary Risk Report*
- Select the options for *Risk Inputs* and *Risk Outputs* shown below.

Include the selection for '00017 - Recover roof' so its Distribution and Tornado chart are added to the report.

Summary Risk Report

The Summary Risk Report allows you to create a report summarizing the risk inputs, risk outputs and any risk register information in your plan.

Risk Inputs Risk Outputs Risk Register

Plan

Plan data in report:

☒ Templated Quick Risk ☒ Resource Costs

☒ Probabilistic Calendars ☒ Resource Escalation

Tasks

☐ All Tasks ☐ Filtered Tasks ☒ Selected Tasks

Select Tasks...

ID	Description
000017	Recover roof

Task data in report:

☒ Duration Uncertainty ☒ Probabilistic Branching

☒ Existence Risk ☒ Probabilistic Links

☒ Resource Uncertainty ☒ Correlation

Help Build Report Cancel

Summary Risk Report

The Summary Risk Report allows you to create a report summarizing the risk inputs, risk outputs and any risk register information in your plan.

Risk Inputs **Risk Outputs** Risk Register

Plan

Plan Distribution Graph data in report:

☒ Finish ☐ Net Present Value

☒ Cost ☐ Internal Rate of Return

Plan Tornado Graph data in report:

☒ Duration Sensitivity ☒ Cost Sensitivity

☒ Schedule Sensitivity Index ☒ Criticality

☒ Cruciality

Tasks

Select Tasks...

Distribution Graph Tornado Graph

Figure: Risk Summary report dialog with options and tasks selected.

- Click *Build Report* and your HTML Summary Risk Report is created.

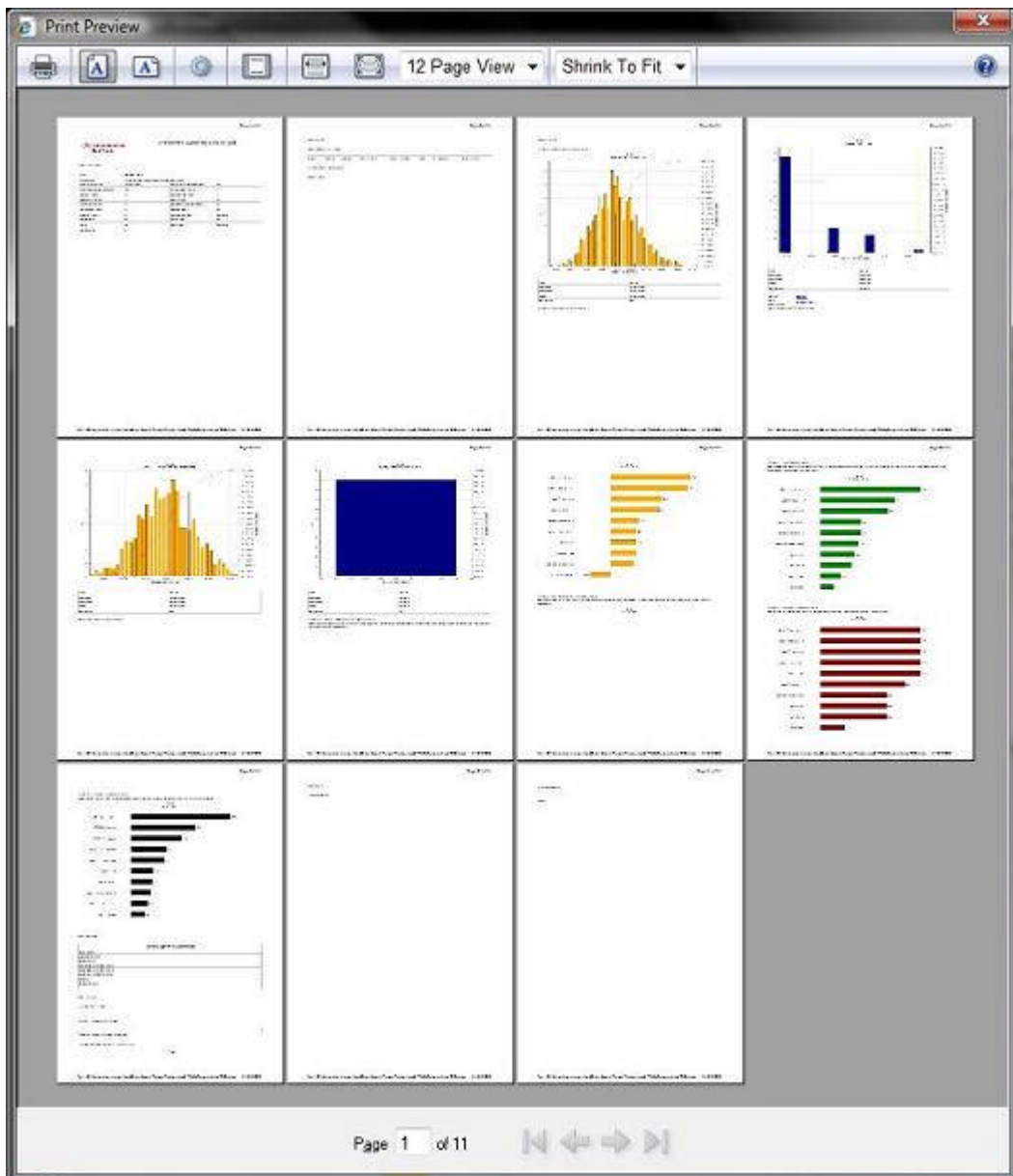


Figure: The Summary Risk Report.

Excellent. Now we will look at updating risk analysis results back to MS Project...

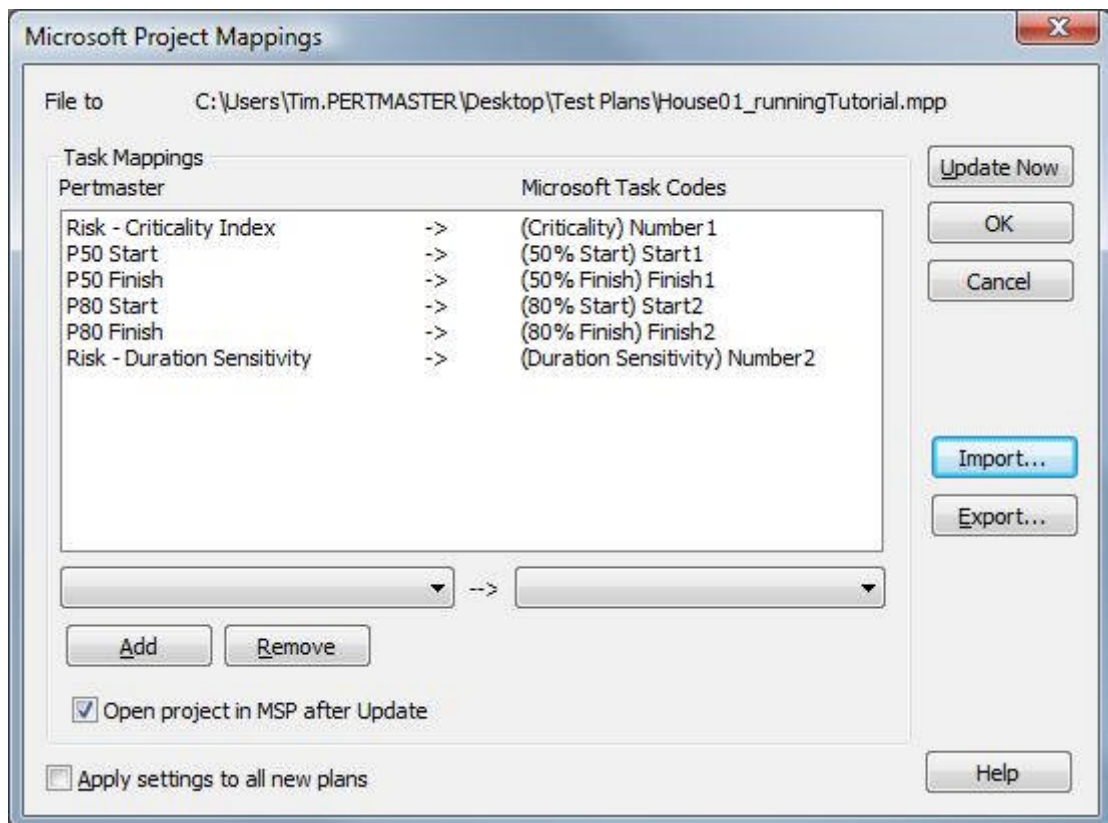
1.8 MSP Risk Tutorial - 7. Updating the risk results to MS Project

The risk analysis results in Primavera Risk Analysis can be updated to the MS Project plan. The MS Project user fields are used to store these results.

We can also update risk inputs such as the minimum and maximum durations. This allows any changes that were made to these values while in Primavera Risk Analysis to be updated in the MS Project project.

Update the risk results to MS Project

- In Primavera Risk Analysis select *File | Microsoft Project | Update Project...*
- Click the *Load* button, select 'MSPMappings01' and click *OK*.




- As well as the criticality index and duration sensitivity we are also mapping across the P50 and P80 dates.
- Click *Update Now*.
- The results are then automatically updated to the MS Project plan.

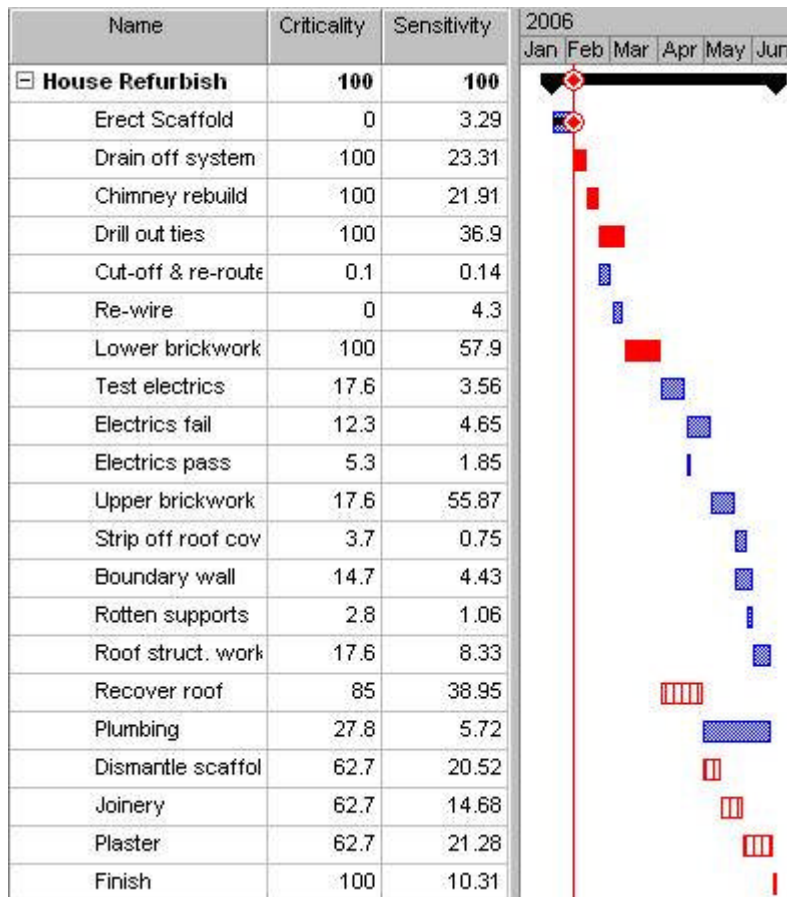
Great. We will now view the results in MS Project...

1.9 MSP Risk Tutorial - 8. Viewing the results in MS Project

After the risk analysis results have been updated in the MS Project plan they can be viewed in the MS Project.




Displaying the criticality in MS Project

- Return to MS Project.
- Click on the *Criticality and Sensitivity Output* tool bar button 



- This view has bars that are colored based on their criticality - blue if less than 50%, light red if between 50% and 89% and dark red if greater than 90%. These ranges can be changed using the options available in MS Project. Also displayed are the duration sensitivity values (low values and negative values are due to random correlation between the task duration and the project duration and should be ignored).
- The important tasks that are likely to delay the project are immediately visible.

Displaying P50 and P80 bars in MS Project

- The P50 and P80 schedule give a indication of when each task is likely to take place given the uncertainty in the project. They are useful as they are a more realistic date for the start and finish of each task. Sometimes the P50 date is used as the internal company baseline and the P80 date used as the client baseline.
- Click on one of the output tool bar buttons:  P50 Schedule  P80 Schedule or  P50 and P80 Finish Dates

Samples of the reports displayed are shown below:

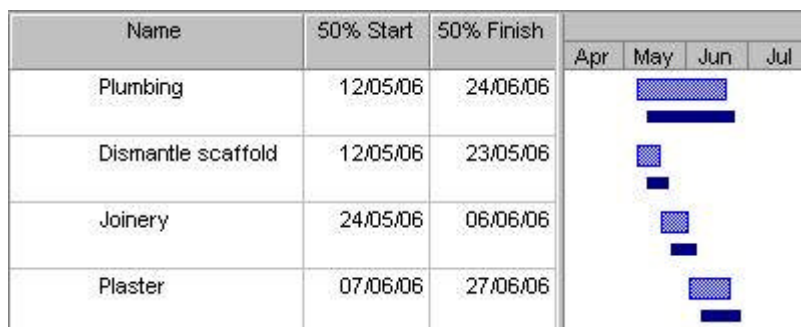


Figure: P50 Schedule in MS Project

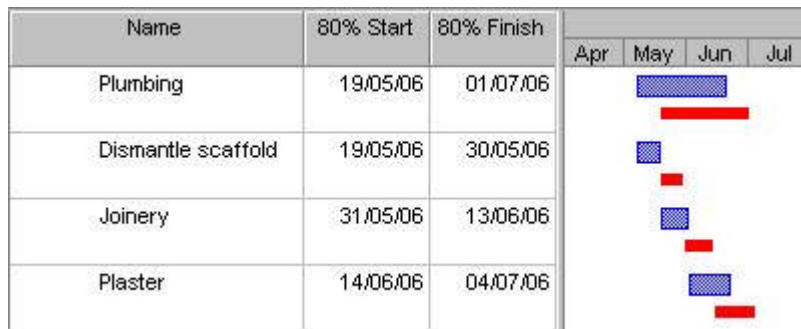


Figure: P80 Schedule in MS Project

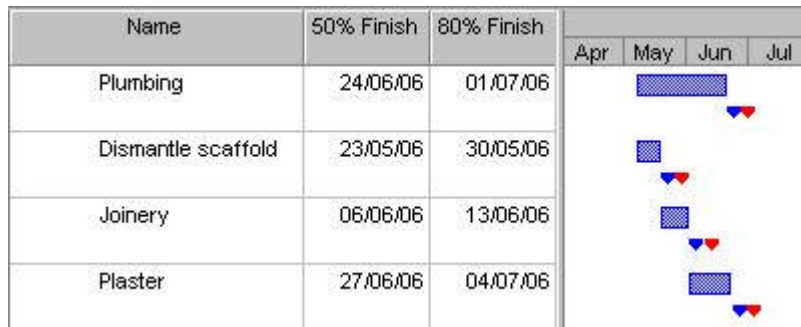


Figure: P50 and P80 Finish Dates in MS Project

Well done!

That completes the risk tutorial, we hope you have found it useful and informative.

2 MSP - Opening, saving and updating Microsoft Project files

Primavera Risk Analysis can open .mpp, .mpd, and .xml MS Project files.

Opening a .mpp file requires a copy of MS Project 2000 or later to be installed on the PC.

To open a Microsoft Project file in Primavera Risk Analysis

1. *File | Microsoft Project | Open Project...*
2. Locate the required file and click *Open*.
3. A dialog is displayed that allows import mappings to be defined. For example you can map Duration 1, 2 and 3 to the minimum, most likely and maximum risk durations.
4. Set up any required mappings and click *OK*.
5. Primavera Risk Analysis displays the workspace selected in the import mappings dialog (default workspace selected is MSP.wkspc).

2.1 Saving Microsoft Project files in Primavera Risk Analysis

Primavera Risk Analysis can save plans in the Microsoft Project format .mpp

Saving a plan as a .mpp requires a copy of MS Project 2000 or later to be installed on the PC.


To save a file as a Microsoft Project

1. *File | Microsoft Project | Export to .mpp*.
 Saving a plan as a .mpp requires an installation of MS Project 2000 or later on the PC.
2. Enter the file name.
3. Click *Save*.

2.2 Updating Microsoft Project files with risk results and inputs

Results and inputs from a Primavera Risk Analysis plan can be updated in MS Project.

To use the MS Project update the file must have been saved in MS Project as a .mpd or a .mpp file and then opened in Primavera Risk Analysis.


 Updating a .mpp file requires an installation of MS Project 2000 or later on the PC.

To update a .mpd or .mpp MS Project file

1. Open the MSP file in Primavera Risk Analysis.
2. Enter uncertainty on your activities. For example run a Duration Quick Risk to quickly enter minimum, most likely and maximum durations (*Risk | Duration Quick Risk*).
3. Run a risk analysis (*Risk | Run Risk Analysis*).
4. Close any reports that are opened.
5. *File | Microsoft Project | Update Project...*
6. In the *Microsoft Project Mappings* dialog use the drop down lists and Add button to choose which Primavera Risk Analysis fields are mapped to which MS Project fields.
7. Click *Update Now*.

MSPProject Errors

An error file called 'MSP_Error_Log.txt' is created in the Primavera Risk Analysis application folder containing any errors generated by MS Project.

 One error will usually always exist when exporting as .mpp - this is caused when Primavera Risk Analysis tries to create the 'Standard' calendar in MSP but because the calendar already exists an error is thrown.

3 MSP - Adding the Primavera Risk Analysis tool bar to MS Project

A Primavera Risk Analysis tool bar can be added to MS Project. This gives access to risk input/output views and wizards.



Launches Duration Quick Risk wizard for applying three point estimates to tasks.



Runs the Progress Wizard to identify and optionally adjust tasks that have not been progressed in line with the project Status Date.



Opens currently open MSP project in Primavera Risk Analysis.



Displays a view in MS Project with duration uncertainty and correlation inputs.



Displays a view in MS Project with Probabilistic and Cost inputs.



Displays a view in MS project with criticality and sensitivity outputs.



Displays a view in MS project with P50 schedule outputs.



Displays a view in MS project with P80 schedule outputs.




Displays a view in MS project with P50 and P80 finish dates.

To add or update the Primavera Risk Analysis MS Project tool bar

The tool bar requires a number of custom Views, Tables and Fields in MS Project.

The tool bar and these items can be added to MS Project if they are deleted or are missing.

 You must have MS Project 2000 or later installed and have write access to the Global Project Template (Global.mpt)

- Run Primavera Risk Analysis.
- *File | Microsoft Project | Add Toolbar and Views to Project...*
- Click Yes in the message box.
- If requested click *Enable Macros* - this allows Primavera Risk Analysis to access the MS Project Global Template and add the tool bars, views and fields.
- MS Project will be started and the tool bar is registered as an add-in and the views, tables and fields are added to the MS Project Global Template.

4 PDF Documentation and Printing Help

PDF Documentation

Some of the on-line help (e.g. tutorials) can be found in the *Documentation* folder that is created when the Primavera Risk Analysis software is installed. The documentation is saved in the Adobe PDF format.

The default installation folder for the documentation is:

C:\Program Files\Oracle\Primavera Risk Analysis\Documentation

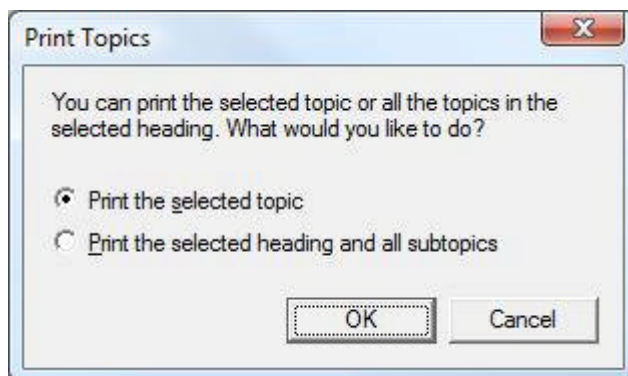
Printing an individual help topic

- After printing a help topic, Windows can sometimes freeze the help file. If this occurs, right-click on the Primavera Risk Analysis help application icon in Windows Start menu Taskbar (usually located at the bottom of the screen) and choose *Restore*.

1. Select the required topic.
2. Click on the *Print* button.



3. Choose *Print the selected topic*.



Printing a chapter of the help

- After printing a chapter of the help, Windows can sometimes freeze the help file. If this occurs right-click on the Primavera Risk Analysis help application icon in Windows Start menu Taskbar (usually located at the bottom of the screen) and choose *Restore*.

1. Select the required chapter.
2. Click on the *Print* button
3. Choose *Print the selected heading and all the subtopics*.

The example below has the Risk Tutorial - Part 1 selected. Clicking on the *Print* button and selecting *Print the selected heading and all the subtopics* will print out the whole of the 'Risk Tutorial - Part 1'.

