

Primavera Risk Analysis - Risk Register

Primavera Risk Analysis Risk Register

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

Table of Contents

1.	Risk Register - Tutorial	1-21
2.	Risk Register - Overview	21
3.	Risk Register - Qualitative data	21-28
4.	Risk Register - User Fields	28-30
5.	Risk Register - Risk Matrix	30-31
6.	Risk Register - Risk Scoring	31-35
7.	Risk Register - Manageability and Proximity	35-37
8.	Risk Register - Quantitative Analysis	37-40
9.	Risk Register - Building Risk Plans	40-43
10.	Risk Register - Options dialog	43-45
11.	Risk Register - How risk plans are built	45-48
12.	Risk Register - Report Manager	48-55
13.	Risk Register - Import and Export	55-56
14.	PDF Documentation and Printing Help	56-58


1 Risk Register - Tutorial

Tutorial Overview

This tutorial demonstrates the steps required to use the Risk Register to model the impact of risk on a project schedule.

Open the sample plan

- *Help | Open Samples...*
- Locate and open "ExampleRegister-Cleanup.plan".

 Click Yes if a prompt appears asking if you wish to open the read only file.

View Risk Register

The sample project already has risks entered. These can be viewed in the Risk Register qualitative tab:

- *Risk | Register*. Click on the *Qualitative* tab. This will display the list of risks that have already been entered in the project:

Qualitative		Quantitative													
Risk			Pre-Mitigation (TimeNow = 03/Dec/07)					Mitigation			Post-Mitigation				
ID	T/O	Title	Probability	Schedule	Cost	Performance	Score	Response	Title	Total Cost	Probability	Schedule	Cost	Performance	Score
001	T	Poor ground conditions.	H	H	L	N	28	Reduce		\$0	L	H	L	N	12
002	T	Site Access delayed.	M	M	N	N	10	Reduce		\$0	M	M	N	N	10
003	T	Board approvals delayed.	M	M	N	N	10	Reduce		\$0	L	M	N	N	6
004	T	More contamination than e...	L	VH	VH	N	24	Reduce		\$0	N	VH	VH	N	0
005	T	Specialist operational equip...	VL	H	L	H	4	Reduce		\$0	N	H	L	H	0
006	T	Rework required to pass ex...	M	M	M	N	10	Reduce		\$0	L	M	M	N	6
007	T	Design more complex than ...	M	H	H	H	20	Reduce		\$0	L	H	H	H	12
008	O	Reuse existing safety case.	M	M	M	N	10	Enhance		\$0	VL	VL	VL	VL	1

Figure: Qualitative tab in Risk Register.

Add a risk to the register

- In the first free cell for the *Risk* section, under *Title* enter: "Safety case approval delayed."
- Change the Pre-Mitigation *Probability* to VH (it may already be selected). There is a very high probability of this risk occurring.
- Change the Pre-Mitigation *Schedule*, *Cost* and *Performance* to H, H and N respectively. This will give a pre-mitigated risk score of 36.
- In the *Risk Details* tab below the grid. There are additional fields such as *Cause*, *Description* and *Effect* allowing more qualitative information to be entered about each risk. For the purpose of this exercise we will not fill in any additional information.

Qualitative		Quantitative													
Risk			Pre-Mitigation (TimeNow = 03/Dec/07)					Mitigation			Post-Mitigation				
ID	T/O	Title	Probability	Schedule	Cost	Performance	Score	Response	Title	Total Cost	Probability	Schedule	Cost	Performance	Score
001	T	Poor ground conditions.	H	H	L	N	28	Reduce		\$0	L	H	L	N	12
002	T	Site Access delayed.	M	M	N	N	10	Reduce		\$0	M	M	N	N	10
003	T	Board approvals delayed.	M	M	N	N	10	Reduce		\$0	L	M	N	N	6
004	T	More contamination than e...	L	VH	VH	N	24	Reduce		\$0	N	VH	VH	N	0
005	T	Specialist operational equip...	VL	H	L	H	4	Reduce		\$0	N	H	L	H	0
006	T	Rework required to pass e...	M	M	M	N	10	Reduce		\$0	L	M	M	N	6
007	T	Design more complex than ...	M	H	H	H	20	Reduce		\$0	L	H	H	H	12
008	O	Reuse existing safety case.	M	M	M	N	10	Enhance		\$0	VL	VL	VL	VL	1
009	T	Safety case approval dela...	VH	H	H	N	36	Accept		\$0	VH	H	H	N	36

Add a risk mitigation plan

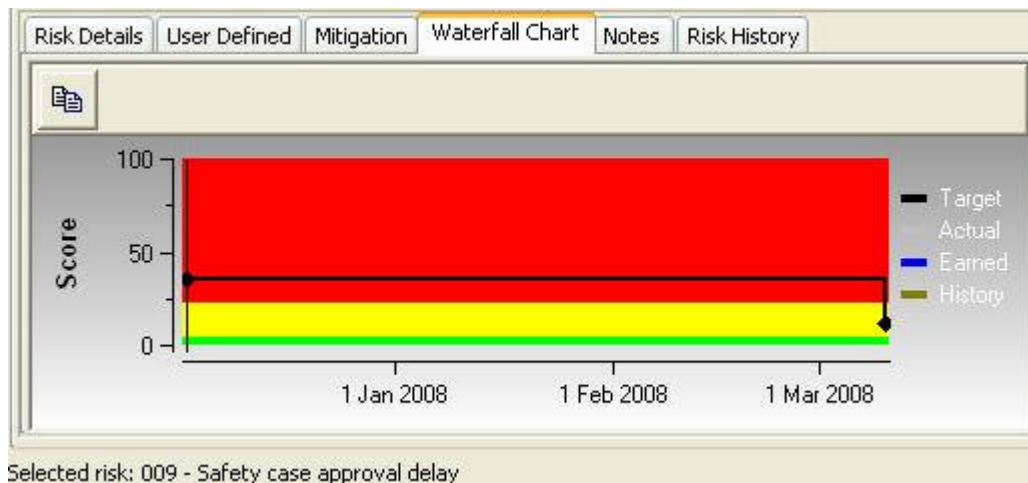
We believe we can reduce the probability that there will be a delay on "Safety case approval delayed" by implementing a mitigation plan. The post-mitigated probability and/or impacts are shown under *Post-Mitigation*.

- Select the "Safety case approval delayed" risk.
- Click on the *Mitigation* tab.
- Change *Response* to *Reduce* using the drop down list in the Mitigation tab.
- Check *Use Detailed Actions*.
- Enter the *Title* as "Improve safety case".
- This mitigation plan is going to have only one action. Enter the following details:
 - Description*: "Employ expert firm to review safety case."
 - Responsibility*: Who is responsible for the mitigation action.
 - Start Date*: 1/Mar/08 - Date the mitigation action starts.
 - Finish Date*: 11/Mar/08 - Date the mitigation action finishes.
 - Baseline Start*: 1/Mar/08 - Used to compare against the *Start* date once the project has been progressed.
 - Baseline Finish*: 11/Mar/08 - Used to compare against the *Finish* date once the project has been progressed.
 - Remaining Cost*: "25,000" - this is the remaining cost of the mitigation action.
 - Actual Cost*: Used to record the actual cost of the mitigation action once it has taken place.
 - Task*: Leave blank - Used when the mitigation action already exists as a task in the plan.
 - Status*: "Proposed" - the action is currently proposed as it has not been sanctioned or implemented in the plan yet.
 - Post-Mitigation Position*: *Probability* = L, *Schedule* = H, *Cost* = M and *Performance* = N. These are the expected values after successful mitigation. This gives a Post-mitigation risk score of 12.

Risk Details	User Defined	Mitigation	Waterfall Chart	Notes	Risk History				
Response:	Reduce	<input checked="" type="checkbox"/> Use Detailed Actions	Title Improve safety case						
Mitigation actions for selected risk: 1 - Poor understanding an...			Task/Work Details						
Description	Responsibil...	Start	Finish	Baseline St...	Baseline Fi...	Remaining Cost	Actual Cost	Task	Status
Employ expert firm to review safety case.	Unassigned	01 Mar 08	11 Mar 08	01 Mar 08	11 Mar 08	\$25,000	\$0		Proposed

Figure: Mitigation tab showing post-mitigation probability, impacts and score.

- Click on *Waterfall Chart* tab. This will display the risk score plotted against time. The mitigation action reduces the risk score and this is shown as a step down on the waterfall chart.



Selected risk: 009 - Safety case approval delay

Figure: Mitigation waterfall chart showing the reduction of the risk score from its pre-mitigation position to its post-mitigation position.

Map Risks to tasks

Having created the risks in the project we can now map these to the tasks they affect. This project already has several risks mapped to tasks.

We will assign the risk added in the previous step to the task "0130 - External approvals."

- Click on the *Quantitative* tab.
- Click on the *Pre-Mitigated* tab (if not already selected).
- Click on the *Risk View* tab (if not already selected).
- Select the risk "Safety case approval delayed."
- In the right hand pane expand "0050 - Feasibility & Design" and check the task "0130 - External approvals". The risk is now mapped to the task:

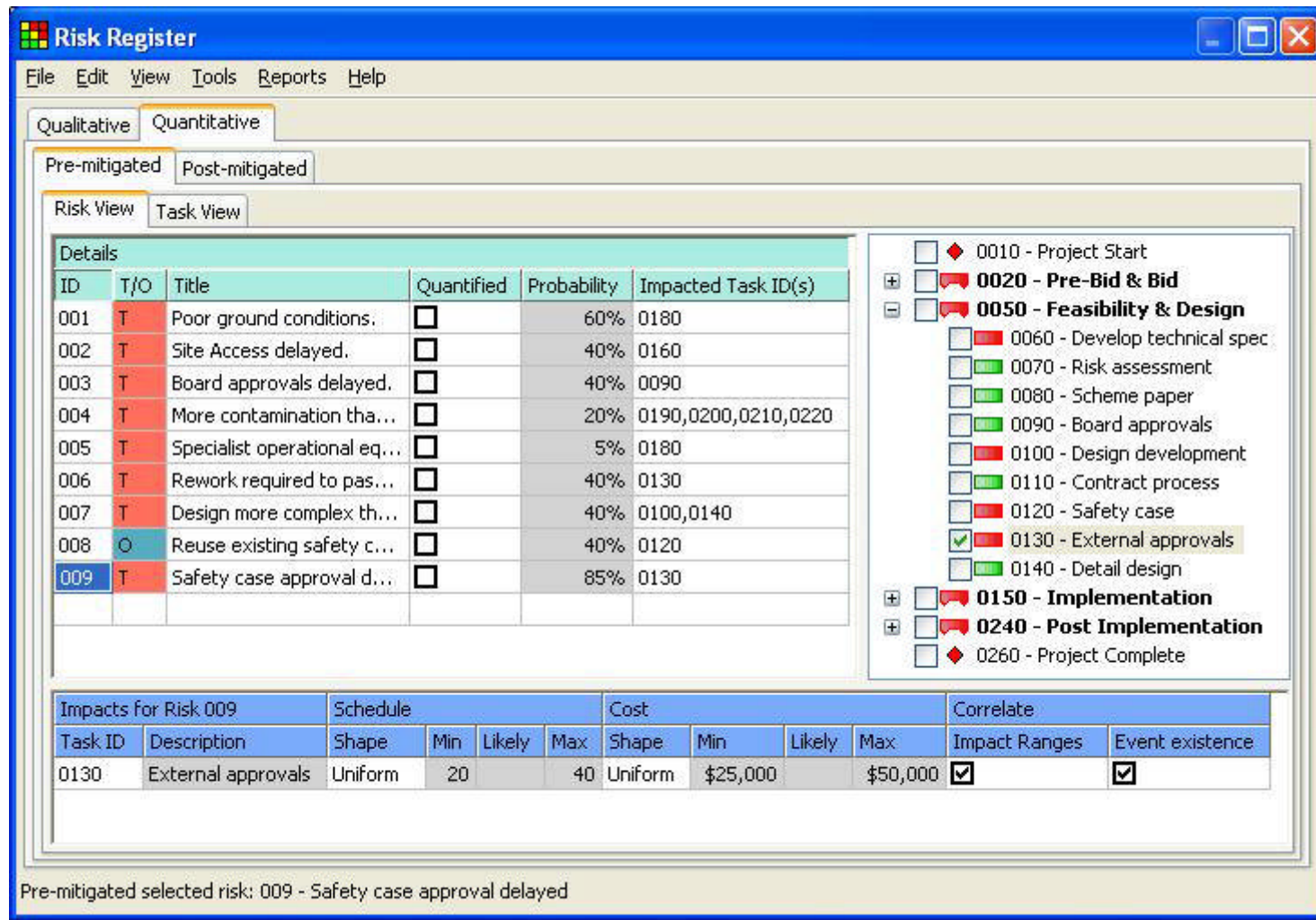


Figure: Risk Register showing a risk mapped to a task and the pre-mitigated impact on the task.

The task mappings in the Pre-Mitigation plan are automatically mapped for the Post-mitigated plan. The only difference is the size of the probability and impacts.

Quantify the risk impact

The risk "Safety case approval delayed" impacts the task "0130 - External approvals" by 20 to 40 days and by \$25,000 to \$50,000. These ranges are based on the ranges set up in the risk scoring:

- *Edit | Risk Scoring.* The risk scoring shows that a 'High' schedule impact is between 20 and 40 days. When we map a risk to a task then this is the impact that is assigned

to the task.

Risk Scoring

Probability Scale

Items in the scale: 5

	Probability
Very High	>70%
High	>50%
Medium	>30%
Low	>10%
Very Low	<=10%

Impact Scales & Types

Add Impact Type Delete Impact Type Items in the scale: 5

Impact Types	Score?	Very Low	Low	Medium	High	Very High
Schedule	<input checked="" type="checkbox"/>	<=5	>5	>10	>20	>40
Cost	<input checked="" type="checkbox"/>	<=\$5,000	>\$5,000	>\$10,000	>\$25,000	>\$50,000
Performance	<input checked="" type="checkbox"/>	Failure to meet a minor acceptance criteria	Failure to meet more than one minor	Shortfall in meeting acceptance criteria	Significant shortfall in meeting acceptance	Failure to meet acceptance criteria

Tolerance Scale

Items in the scale: 3

	Color	Score
High	Red	>23
Medium	Yellow	>5
Low	Green	<=5

Probability and Impact Scoring (PID)

Risk score is based on: ☒ Highest Impact ☐ Average of Impacts ☐ Average of Individual Impact Scores

	Impacts				
	Very Low	Low	Medium	High	Very High
Very High %	5	9	18	36	72
High %	4	7	14	28	56
Medium %	3	5	10	20	40
Low %	2	3	6	12	24
Very Low %	1	1	2	4	8

Print... Manageability and Proximity... Load... Save... OK Cancel

Figure: Risk scoring dialog defining ranges for the qualitative impacts.

- Click OK to close the *Risk Scoring* dialog.

We have more detailed quantitative information about the impact of the risk "Safety case approval delayed".

- Select the risk "Safety case approval delayed" in the *Quantitative* tab and click on the *Quantified* check-box. The probability and the impacts for this risk are now no longer grayed out and can be edited.
- Change the *Pre-Mitigated* impacts to those shown below:

Risk Register

File Edit View Tools Reports Help

Qualitative Quantitative

Pre-mitigated Post-mitigated

Risk View Task View

T/O	Title	Quantified	Probability	Impacted Task ID(s)
T	Poor ground conditions.	<input type="checkbox"/>	60%	0180
T	Site Access delayed.	<input type="checkbox"/>	40%	0160
T	Board approvals delayed.	<input type="checkbox"/>	40%	0090
T	More contamination than expected.	<input type="checkbox"/>	20%	0190,0200,0210,0220
T	Specialist operational equipment ...	<input type="checkbox"/>	5%	0180
T	Rework required to pass external...	<input type="checkbox"/>	40%	0130
T	Design more complex than expec...	<input type="checkbox"/>	40%	0100,0140
O	Reuse existing safety case.	<input type="checkbox"/>	40%	0120
T	Safety case approval delayed.	<input checked="" type="checkbox"/>	85%	0130

Details

- 0010 - Project Start
- 0020 - Pre-Bid & Bid
- 0050 - Feasibility & Design
 - 0060 - Develop technical spec
 - 0070 - Risk assessment
 - 0080 - Scheme paper
 - 0090 - Board approvals
 - 0100 - Design development
 - 0110 - Contract process
 - 0120 - Safety case
 - 0130 - External approvals
 - 0140 - Detail design
- 0150 - Implementation
- 0240 - Post Implementation
- 0260 - Project Complete

Impacts for Risk 009				Schedule				Cost				Correlate	
Description	Shape	Min	Likely	Max	Shape	Min	Likely	Max	Impact Ranges	Event existence			
External approvals	Uniform	40		80	Uniform	\$50,000		\$100,000	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			

Figure: Impact on risk quantified with more detailed ranges.

Quantify the Post-Mitigated impact

We also need to quantify the post mitigate impact estimates:

- Click on the *Post-mitigated* tab.
- Change the *Min Cost* impact to \$10,000.

- Change the *Max Cost* impact to \$30,000.

Create a risk report

Risk Register reports can be created with the Report Manager.

- *Reports | Report Manager.*
- Select "Standard Layout - Qualitative.xrb" report.
- Click *Publish.*

ID	Title		
003	Board approvals delayed.		
Status	Owner		
Open	GB		

RBS	Start Date	End Date	Exposure
	07 Jan 2008	07 Jan 2008	\$0
Cause	Effect		
Due to internal politics	Which would delay the schedule.		
Description			
The board approvals may be delayed.			

Pre-mitigation Score	10	Medium
Post-mitigation Score	6	Medium

	Qualitative	Quantitative			Qualitative
Pre-mitigation	M	40%	Schedule	Pre-mitigation	M
Post-mitigation	L	20%	Cost	Post-mitigation	M
				Pre-mitigation	N
				Post-mitigation	N
			Performance	Pre-mitigation	N
				Post-mitigation	N

Figure: Part of report showing risk details.

Build the impacted Risk Plan

Once the risks have been mapped to the tasks, the impacted risk plans can be built for analysis.

- If open, close the *Primavera Risk Analysis Report Viewer* and *Report Manager*.
- *Tools | Build Impacted Risk Plan(s)*
- Select *Pre-mitigated* and *Post-mitigated*.

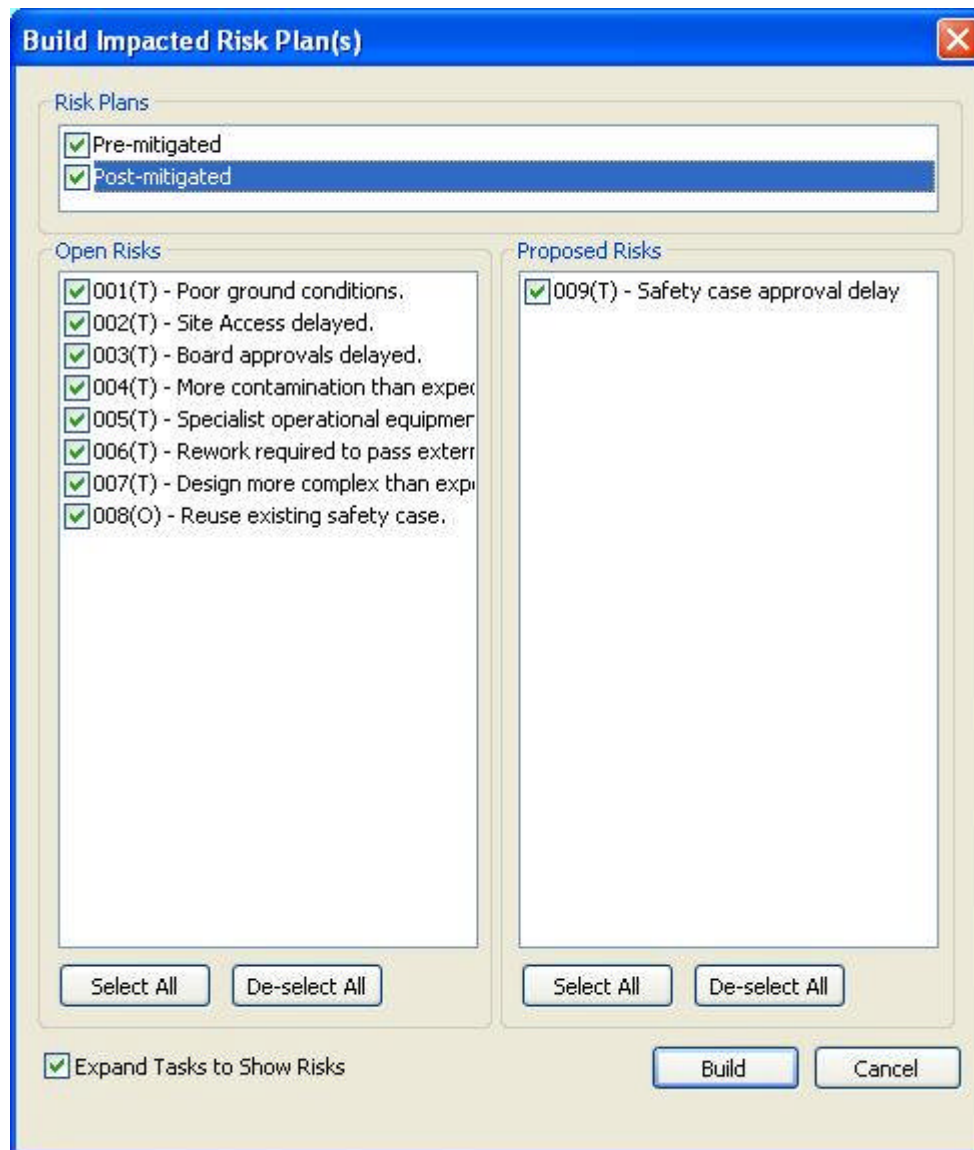


Figure: The Build Impacted Risk Plan(s) dialog.

- All the risks will be selected as the default. We want to analyze the impact of all the risks so we will not uncheck any.
- Click *Build* to create the risk event plan. Choose to replace existing files if requested.
- Drop down the *Window* menu. Three plans will now exist in Primavera Risk Analysis:

Generally you will only make changes to the original plan and re-build the Pre-mitigated and Post-mitigated plans when they are needed. There is then no requirement to keep a copy of the built plans once the reporting has been completed as they can always be reproduced from the original plan containing the risk register.



Run risk analysis on the Post-mitigated plan

- Select the Post-mitigated plan from the *Window* menu.
- *Risk | Run Risk Analysis*.
- During the risk analysis use *Step*. The risks impacting the project for each iteration are colored red for threats and blue for opportunities.
- Click *Complete* to finish the risk analysis.
- Close the results of the risk analysis.

Compare Finish date s-curves for Post-mitigated and Pre-mitigated risk plans

The pre-mitigated and post-mitigated risk plan can be compared in the *Distribution Analyzer*.

The compare project s-curve report will run on each of the plans open in the Window menu.

- *Reports | Distribution Analyzer*.
- If there is existing data then the Distribution Analyzer will be displayed; choose *File | Clear Report* and then *File | Import Data*.
- If there is no existing data in the Distribution Analyzer then choose *Yes* and the *Import data to report* dialog below is displayed.
 - Check the check box to *Import* your three plans.
 - Check the check box for *Finish Dates* and *Cost*.
 - Select *Entire Plan*.

Import data to report

Projects to import data from		
Import	Title	Valid Risk file
<input checked="" type="checkbox"/>	Copy of ExampleRegister-Cleanup.plan	No
<input checked="" type="checkbox"/>	Copy of ExampleRegister-Cleanup-Pre-mitigated.plan	No
<input checked="" type="checkbox"/>	Copy of ExampleRegister-Cleanup-Post-mitigated.plan	Yes

Open Plan

Types of data to import

☒ Finish Dates ☐ Start Dates ☒ Cost ☐ Duration ☐ Float ☐ IRR ☐ NPV

Common Tasks

- 0010 - Project Start
- 0020 - Pre-Bid & Bid
- 0030 - Characterisation
- 0040 - Pre design & optioneering
- 0050 - Feasibility & Design
- 0060 - Develop technical spec
- 0070 - Risk assessment
- 0080 - Scheme paper
- 0090 - Board approvals

Tasks to import data from

Entire Plan

Import Data Cancel

Figure: The Distribution Analyzer import data dialog.

- Click *Import Data*.
- If prompted choose *OK* to risk analyze each plan.
- The report displays a finish date and a cost s-curves for the three projects, i.e.
 - The project with no risks (only estimating uncertainty on duration and cost).
 - The pre-mitigated plan.
 - The post-mitigated plan.

- Select the *Finish Date* tab.
- Click between 80% and 100% along the y-axis to select 90% Cumulative Probability.

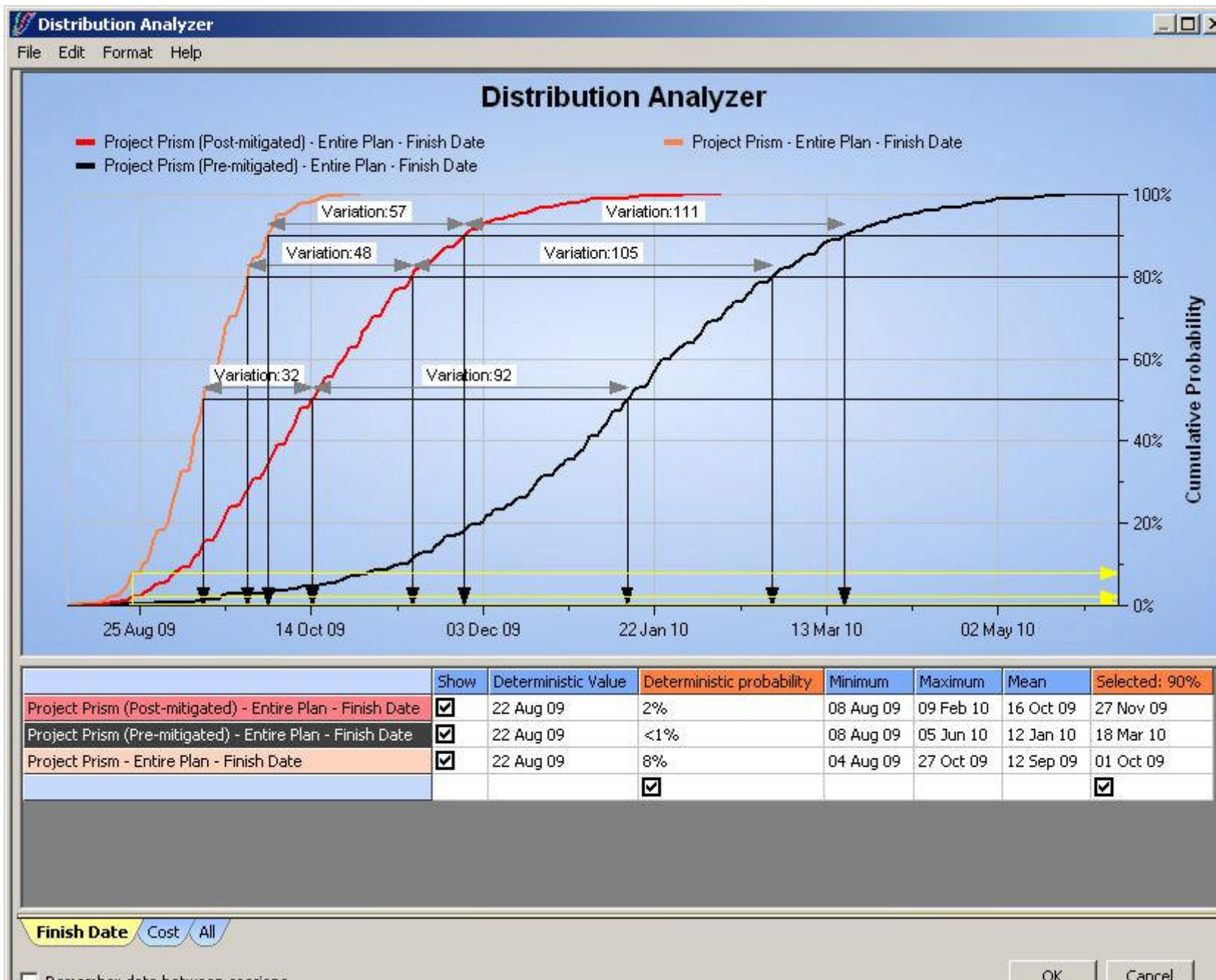


Figure: S-curves report comparing the change in project finish date uncertainty.

Compare Cost s-curves for Post-mitigated and Pre-mitigated risk plans

Following on from previous steps...

- Select the *Cost* tab.



Figure: S-curves report comparing the change in project cost uncertainty.

Analysis of S-curve reports

The finish date s-curve reports shows us that the mitigation actions taken will move the 90% finish date from 18 Mar 2010 to 27 Nov 2009. A good improvement.

The cost s-curve shows a similar improvement in project cost (\$418,238 to \$300,080). At below 10% the cost of the mitigation actions start to outweigh their benefit. At around 10% the benefit to the project completion date is smaller than the benefit at the 90% date.

In this case the effectiveness of the mitigation actions in reducing project cost and completion date would indicate they are worth doing.

The Risks Tornado

The risks tornado can be used to rank the impact of the risks on the project finish (or cost).

Assuming we have decided to proceed with the mitigation actions, we are therefore interested in looking at the post-mitigation position.

- Close the *Distribution Analyzer*.
- *Window* | Select *Post-mitigated* plan.
- *Reports* | *Tornado Graph*.
- Change the display to Risk Mode: *View* | *Risk Mode*.

The risks are then ranked by their sensitivity on the project completion. Management and mitigation strategies can then be focused on the risks with the highest ranking.

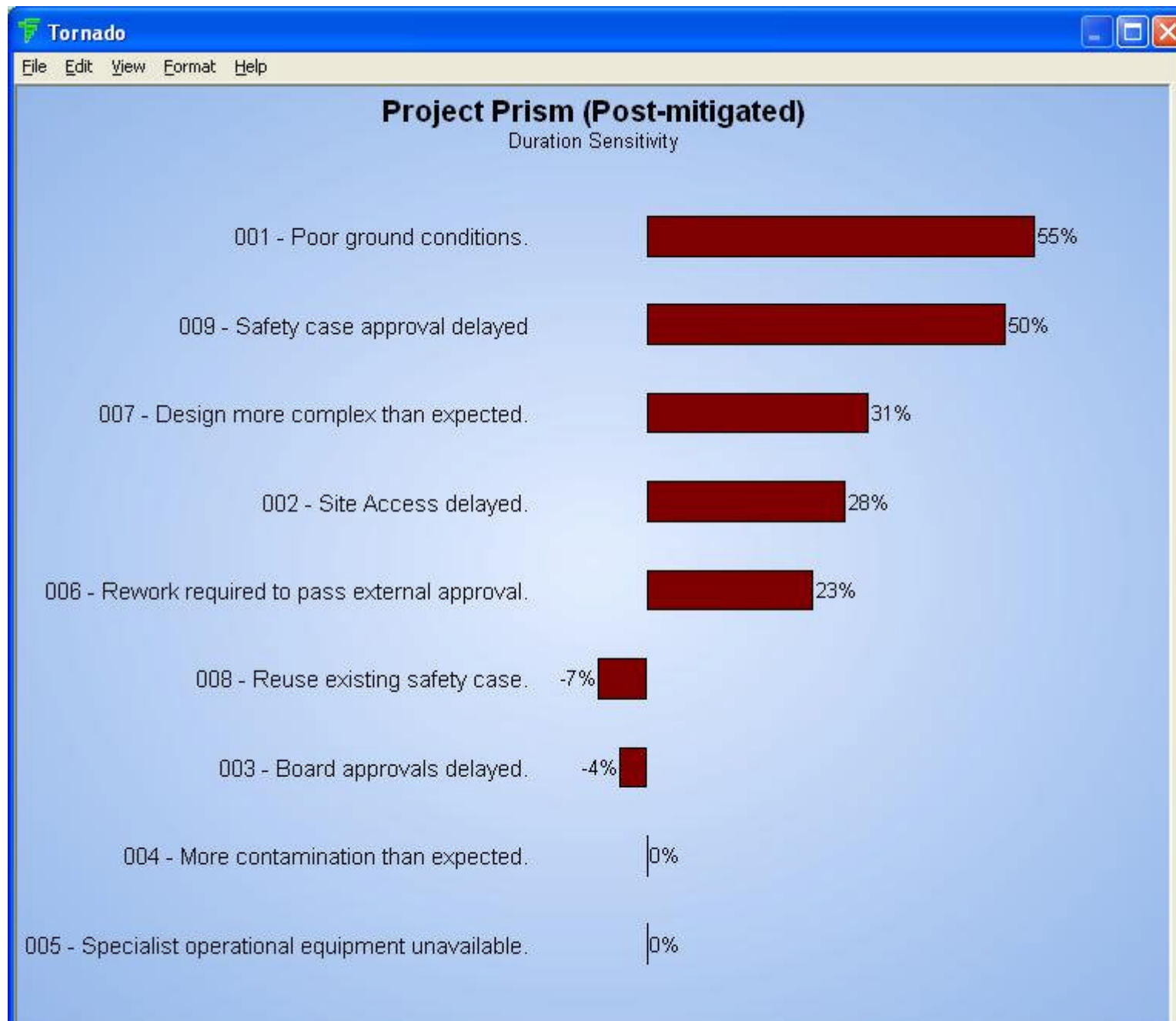


Figure: Risk Tornado (statistics and controls hidden) ranking the risks by their impact on the project completion date.
The Tornado can also be displayed for the cost sensitivity of each risk.

- Click on *Cost Sensitivity* tab.

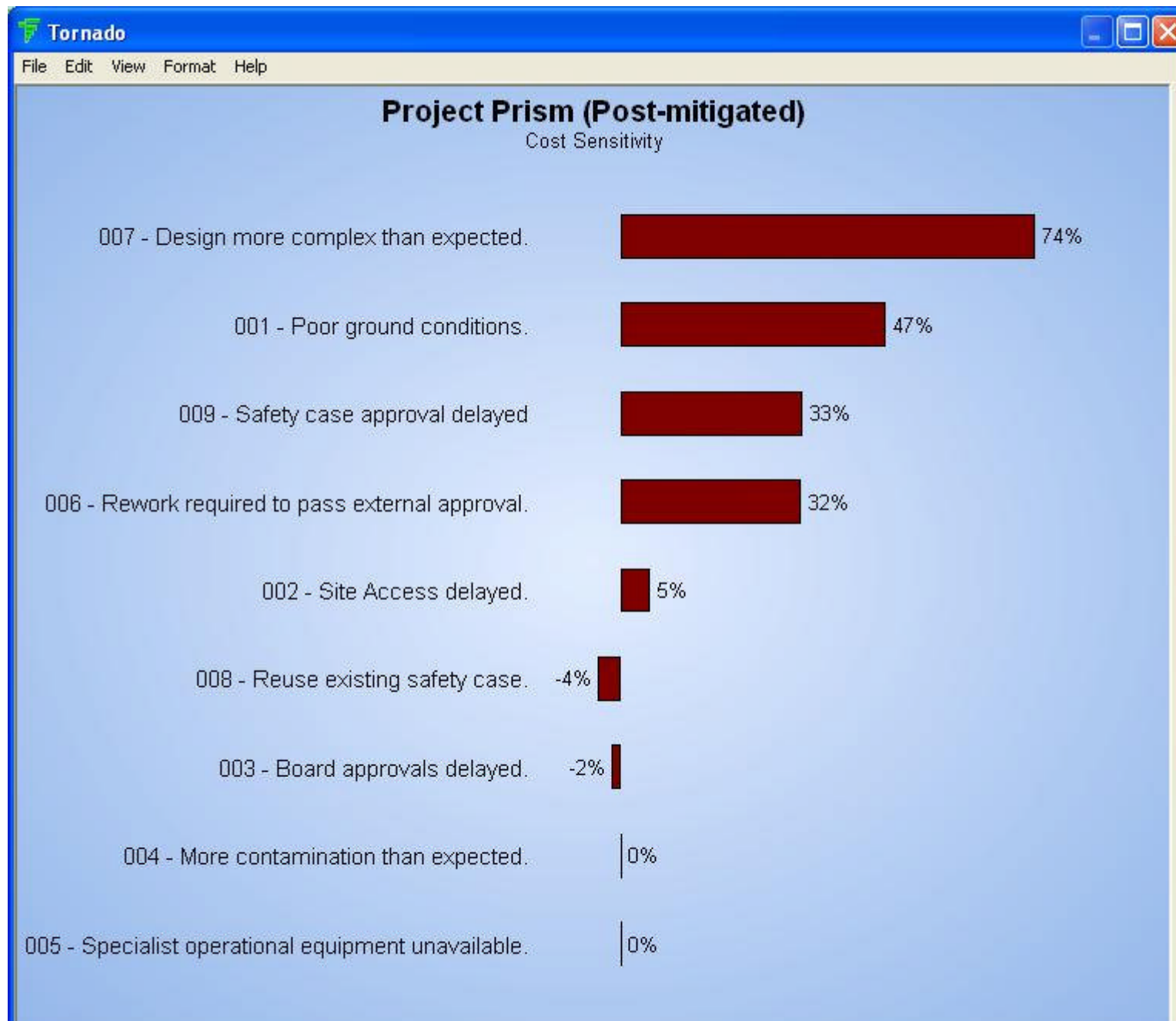


Figure: Risk Tornado (statistics and controls hidden) ranking the risks by their impact on the project cost.

That completes this tutorial. Please do not hesitate to contact us if you have any questions.

 Additional register samples: ExampleRegister-Rocket.plan and ExampleRegister-Rocket-Updated.plan

2 Risk Register - Overview

Overview

Use the Risk Register to:

- Define risks (threat and opportunity) including risk owner, cause, effect, status, probability and cost, time and custom impacts and fields.
- Track any detailed actions used to mitigate the probability and impact of risks using a mitigation plan and waterfall chart.
- Map risks to tasks and WBS items.
- Define the impact a risk has on each task or WBS item it is mapped to.
- Quantify the schedule and cost impact caused by the risks on the project.
- Compare Pre-Mitigation and Post-Mitigation scenarios.
- Create and compare custom risk plans.
- Examine Exposure.

Steps for using Risk Register

1. Create or import a project schedule (e.g. import from Primavera, MS Project, OpenPlan).
2. Create risks: either Run Risk Wizard, enter risks directly or import the risks (e.g. import from ARM, in-house register, spreadsheet, copy and paste).
3. Map the risks to tasks.
4. Build impacted risk plans and run risk analysis.
5. Examine results and make decisions.

3 Risk Register - Qualitative data

Qualitative Tab

Qualitative project risk data can be stored as part of the risk analysis model.

Risks can be created in the spreadsheet style table by typing into the cells, pasting or importing risk data.

Qualitative Quantitative													
Risk			Pre-Mitigation (TimeNow = 12/Oct/05)				Mitigation			Post-Mitigation			
ID	T/O	Title	Probability	Schedule	Cost	Score ▾	Type	Title	Total Cost	Probability	Schedule	Cost	Score
10	O	Reuse previous design work	H	M	H	28	Exploit		\$0	VH	M	H	36
5	T	Delivery overrun	M	H	N	20	Reduce	Source alter...	\$50,000	L	L	N	3
9	T	Design changes	H	M	M	14	Accept		\$0	H	M	M	14
3	T	Contract Delay	H	M	L	14	Reduce	Change for...	\$500,000	L	M	L	6
1	T	Poor understanding and det...	L	H	M	12	Reduce	Introduce p...	\$10,000	L	L	L	3
7	T	Rework required for assem...	M	M	M	10	Reduce	Check manu...	\$200,000	N	M	M	0
2	T	Guidance System failure	VL	VH	VH	8	Reduce	Improve initi...	\$750,000	N	VH	VH	0
4	T	Key resource unavailable	H	L	L	7	Reduce	Change res...	\$300,000	VL	L	L	1
8	T	Testing fails	L	L	L	3	Accept		\$0	L	L	L	3
6	T	Fabrication contractor goes...	N	M	M	0	Accept		\$0	N	M	M	0

Figure: The first half of the Qualitative tab grid.

ID - The ID for the risk. The ID is set when the risk is first created. If no ID is entered then a default ID will be created using the format defined set in *Edit | Edit Next Risk ID*.

T/O - Threat or Opportunity.

Title - The title of the risk.

Pre-Mitigation (Data Date = 12/Oct/05)

Position of the risk as of the project Data Date before any mitigation has taken place.

Probability - The current probability of the risk occurring.

Cost and Schedule - The pre-mitigation risk impacts. Additional impact types can be added.

Score - The pre-mitigation risk score.

Mitigation

Details of the mitigation plan.

Response - The type of mitigation actions to be implemented.


Threats:

Avoid - Change the project so the risk is avoided. This will usually reduce the post-mitigation probability to zero.

Transfer - Transfer the risk to another party.

Reduce - Reduce the probability and/or impact of the risk.

Accept - Accept the risk and take no mitigation action. Post-Mitigation impacts are set to the same values as Pre-Mitigation.

 When *Accept* is chosen the post-mitigation qualitative and quantitative assessments are grayed out and linked to the pre-mitigation assessments.

Opportunities:

Exploit - Actively seek out the opportunity.

Facilitate - Help another party increase the likelihood of the opportunity occurring.

Enhance - Increase the probability and/or impact of the opportunity.


Reject - Reject the opportunity and take no actions.

Title - The title of the mitigation plan.

Total Cost - The total cost of implementing the mitigation actions.

Post-Mitigation

The position of the risk after any mitigation actions have taken place.

 Post-Mitigation cells will be grayed out if the *Use Detailed Actions* option has been checked for the risk. These cells are then populated from the detailed actions in the *Mitigation* tab.

Probability - The post-mitigation probability of the risk occurring.

Cost, Schedule - The post-mitigation risk impacts. Additional impact types can be added.

Score - The post-mitigation risk score.

Details

Details													User Defined	
Owner	Description	Cause	Effect	RBS	Status	Manageability	Proximity	Start Date	End Date	Exposure	Show in ...	Quantified	UserText1	UserText2
TS	It may be possi...	Due to the similar...	Saving time and ...	R.1.1	Open	Easy	Overdue	12/Oct/05	12/Oct/05	\$10,000	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
TR	It may be nece...	Due lack of suitab...	The delivery wou...	R.1.1	Open	Easy	Mid Term	05/Jan/06	05/Jan/06	\$1,000,000	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
LM	The design nee...	Due to client cha...	Which would del...	R.5.2	Open	Difficult	Overdue	12/Oct/05	12/Oct/05	\$50,000	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
DP	Client may wan...	Due to complex n...	Delaying the sign...	R.1.1	Open	Moderate	Imminent	15/Nov/05	15/Nov/05	\$150,000	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
TS	The design is m...	Due to poor unde...	Could delay the ...	R.1.2	Open	Moderate	Distant	01/Nov/06	01/Nov/06	\$200,000	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
BJ	The assembly m...	Due to incorrect t...	Which would del...	R.1.4	Open	Easy	Distant	01/Nov/06	01/Nov/06	\$250,000	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
RB	There may be a...	Due to the novel ...	Guidance system...	R.1.1	Open	Difficult	Mid Term	02/Jan/06	02/Jan/06	\$100,000	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
DP	Key resources ...	Due to other proj...	Delay could occu...	R.1.3	Open	Difficult	Mid Term	07/Jan/06	07/Jan/06	\$150,000	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
LM	Testing fails to ...	Due to problems i...	Rework would be...	R.5.1	Open	Difficult	Overdue	12/Oct/05	12/Oct/05	\$25,000	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
TR	The fabrication ...	Due to poor busin...	A new fabricatio...	R.2.1	Open	Difficult	Overdue	12/Oct/05	12/Oct/05	\$90,000	<input checked="" type="checkbox"/>	<input type="checkbox"/>		

Figure: The second half of the Qualitative tab grid.

Owner - Who is responsible for the risk (optional).

Cause - Details of the cause of the risk (optional).

Description - A description of the risk (optional).

Effect - Details of the effect of the risk (optional).

RBS - Text field for entering Risk Breakdown Structure / Risk Category (optional).

Status - Whether the risk is Proposed, Open, Reject(Closed), Managed(Closed) or Impacted(Closed). A closed risk is not used in the analysis. Open and Propsed risks can be optional included or excluded when building the impacted risk plan.

Manageability - How manageable the risk is. Can be customized in the Risk Scoring and can be used to modify risk scores (optional).

Proximity - How close the risk is. Can be customized in the Risk Scoring (calculated automatically).

Start Date - The date the risk starts.

End Date - The date the risk ends.

Exposure - Used to record the exposure of the risk on the project. See **Risk Register - Exposure Plan ('Risk Register - Risk Exposure Plan' in the on-line documentation)**.

Show in Quantitative - Include the risk in the Quantitative tab. This can be unchecked for any risks you do not intend to map to tasks in the project thereby making the list of risks shorter in the quantitative tab.

Quantified - Check this option to allow the impact of the risk on individual tasks to be customized from the qualitative defaults.

User Defined

Columns showing the user defined fields that have been added. Any number of user fields can be included.

Risk Details Tab

The Risk Details tab gives another method of viewing and editing Risk information for the selected risk in a form.

The Risk Details tab form displays the following information:

- Tabs:** Risk Details (selected), User Defined, Mitigation, Waterfall Chart, Notes, Risk History.
- ID:** 7
- Title:** Rework required for assembly and integration
- RBS:** R.1.4
- Cause:** Due to incorrect tolerances in manufacturing.
- Description:** The assembly may need to be reworked to allow a satisfactory integration of the components.
- Effect:** Which would delay the time taken to complete the assembly.
- Threat / Opportunity:** Threat
- Manageability:** Easy
- Owner:** BJ
- Status:** Open
- Exposure (Entered):** \$250,000
- Start Date:** 01/Nov/06
- End Date:** 01/Nov/06
- Pre-mitigated position:**

Category	Value	Score
Probability	M (30% to 50%)	10
Schedule	M (20 to 50)	
Cost	M (\$50,000 to \$100,000)	
- Post-mitigated position:**

Category	Value	Score
Probability	N (Negligible)	0
Schedule	M (20 to 50)	
Cost	M (\$50,000 to \$100,000)	
- Overall Impact:** M
- Quantified Risk:** ☐ Quantified Risk
- Show in Quantitative:** ☒ Show in Quantitative

Figure: Risk Details tab.

User Defined Tab

Use this tab to view and enter user defined field values for the risks.

The name of this tab can be changed using *Risk | Risk Register | Edit | User Defined Fields | Tab Name*.

The user defined fields can be customized using *Risk | Risk Register | Edit | User Defined Fields*.

User defined fields can be set up as Text, Integer, Number, Start Date, Finish Date, Code or Cost. The Code type allows pre-defined values to be specified for the user field - only values from the Code list can then be selected for the field.

Overall Impact

The Overall Impact is calculated from the risk impacts using the selected option in the Risk Scoring dialog. It can be the Highest Impact, an Average of the Impacts or based on an Average of the Impacts Scores.

See **Risk Scoring (Section 6)** for details.

Mitigation Tab

Can be used to add detailed mitigation information showing how the Post-Mitigation Probability and Impacts will be achieved.

Multiple mitigation actions can be added. The mitigation action with the latest Finish date (and lowest score where more than one mitigation action has the same date) is used to set the post-mitigation qualitative probability and impacts.

Risk Details	User Defined	Mitigation	Waterfall Chart	Notes	Risk History								
Response:	Reduce	<input checked="" type="checkbox"/> Use Detailed Actions	Title Check manufacturing tolerances										
Mitigation actions for selected risk: 7 - Rework required for ass...			Task/Work Details							Post-Mitigation Position			
Description	Responsibility	Start	Finish	Target Start	Target Finish	Remaining...	Actual Cost	Task	Status	Probability	Schedule	Cost	Score
Check all manufacturing equipment can handle ...	BJ	12/Oct/05	12/Oct/05	01/Nov/05	01/Nov/05	\$200,000	\$0		Proposed	L	M	M	6
Communicate importance of tolerances to man...	BJ	12/Oct/05	12/Oct/05	02/Jan/06	02/Jan/06	\$0	\$0		Proposed	N	M	M	0

Figure: Mitigation tab. The mitigation action highlighted in purple drives the post-mitigation qualitative probability and impacts.

Response: The response to the risk. See above for response types.

Use Detailed Actions

Check this option to enter the detailed mitigation actions that will be taken to mitigate the risk.

When this option is checked the Post-Mitigated probability and impacts for a risk are then linked to the mitigation step with the latest Finish Date. If more than one mitigation action share the latest Finish date then the mitigation action with the lowest score is selected.

☒ If the *Use Detailed Actions* option has been checked for the risk then the mitigation actions entered will determine the Post-Mitigation risk position. The Probability and Impacts are therefore grayed out for the risk in the Risk Details tab and table.

Title - The name of the mitigation plan.

Description - A description of the individual mitigation action.

Responsibility - Who is responsible for completing the mitigation action.

Start Date* - Start date of the mitigation action.

Finish Date* - Finish date of the mitigation action. This date and risk score is plotted on the waterfall chart as actual and earned.

Baseline Dates* - The start and finish date that mitigation action was originally intended to take place. This date and risk score is plotted on the waterfall chart as target.

Remaining Cost* - The remaining cost of completing the mitigation action.

Actual Cost* - The actual cost of the mitigation action so far.

Status* - Whether the mitigation action has taken place. It is either Planned or Complete. Once a mitigation action is marked as complete the Actual/Earned Date reflects the Actual Date the mitigation action took place.

Status* - The status of the action. An action usually goes through a process from being proposed to sanctioned and then if not rejected planned into the project.

Proposed - The default status. Action has been proposed.

Sanctioned - The action has been proposed and sanctioned.

Rejected - The action has been proposed and then rejected. This action is not used to drive the post-mitigation position and its cost is not included in the Total Cost.

Planned - The sanctioned action has been planned into the project. This may involve adding a task to the project to represent the mitigation action.

InProgress - The mitigation action is in progress. I.e. it has started and there is some work still remaining.

Complete - The mitigation action has been completed. I.e. it has started and finished.

Task - The mitigation action can be linked to a task. The fields marked with a * are then populated from the task details.

** When a mitigation action is linked to a task these fields are populated from the linked task's details.*

Post-Mitigation Position

Probability - The probability of the risk occurring after the mitigation action has been completed.

Cost, Schedule - The impact of the risk after the mitigation action has been complete.

Score - The risk score after the mitigation action has been completed.

Waterfall Chart Tab

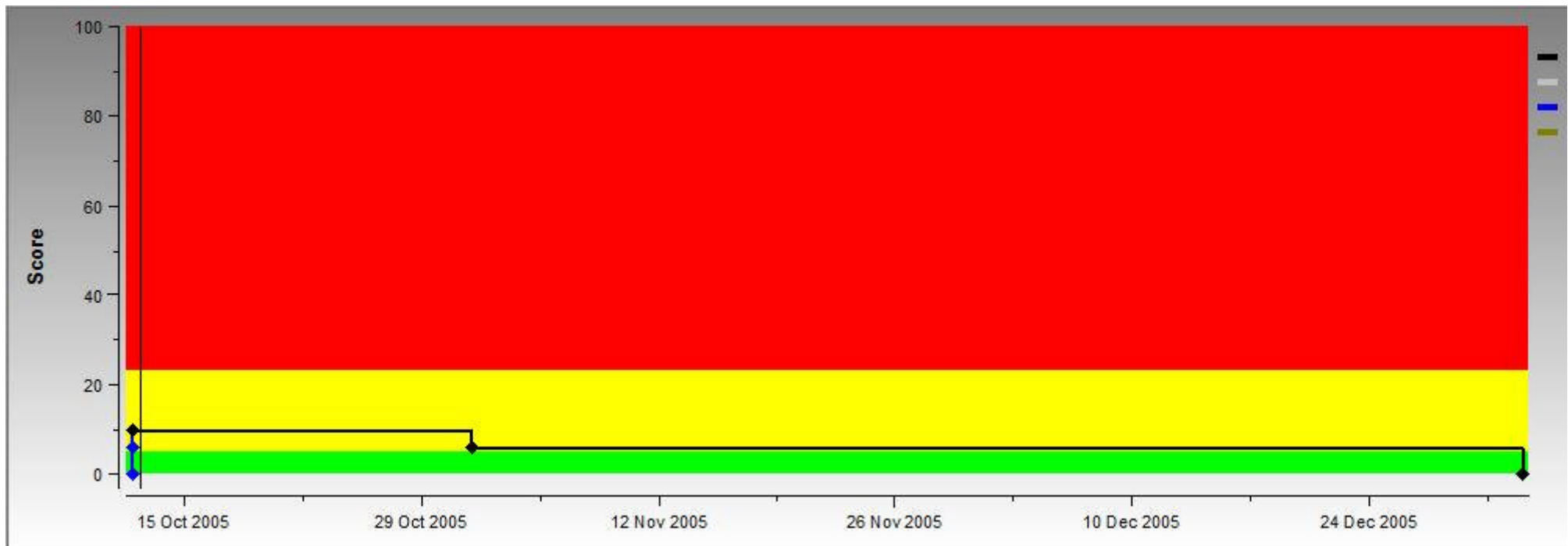


Figure: Waterfall chart showing risk score over time.

Display Options


The vertical line

Baseline - Displays the risk score plotted against the Baseline Finish date for each mitigation action.

Actual - Displays the risk score plotted against the Finish date for each mitigation action with a status set to *Complete*.

Earned - Displays the risk score plotted against the Finish Date for each mitigation action with a status set to *Proposed*, *Sanctioned*, *Planned* or *InProgress*.

History - Displays the risk score plotted against the Finish date stored in the Risk History tab. Each time the Data Date is moved forward, the current risk data is stored in the *Risk History* tab.

 The dates on the horizontal axis of the chart are displayed using the date format in the computer's Regional and Language Settings at the time Primavera Risk Analysis was run.

Notes Tab

Enter notes about the risk in this free form text field.

Risk History Tab


A copy of the current risk position is recorded in the Risk History tab on each occasion the Data Date is moved forward. This allows any changes to the risk to be viewed and tracked. The history of the risk score can be viewed on the waterfall chart tab.

 A new line is only added to the history when the Data Date is moved forward.

Deleting a Risk

A risk can be deleted and then purged.

To delete a risk set the *Status* to *Deleted* or highlight a risk and hit the Delete key.

 You cannot delete a risk using the Delete key if the risk Status is already marked as *Closed*. In this case change the *Status* to *Deleted*.

Risks marked with a *Status* of *Deleted* can be hidden using the *Edit | Filter* command.

Purging Deleted Risks

To completely remove *Deleted* risks use the *Tools | Purge Deleted Risks* command. This will permanently remove any risks that have a status currently set to *Deleted*.

4 Risk Register - User Fields

User fields can be added to the register. As a default 5 text fields for each risk are available.

- *Risk | Risk Register | Edit | User Defined Fields*.

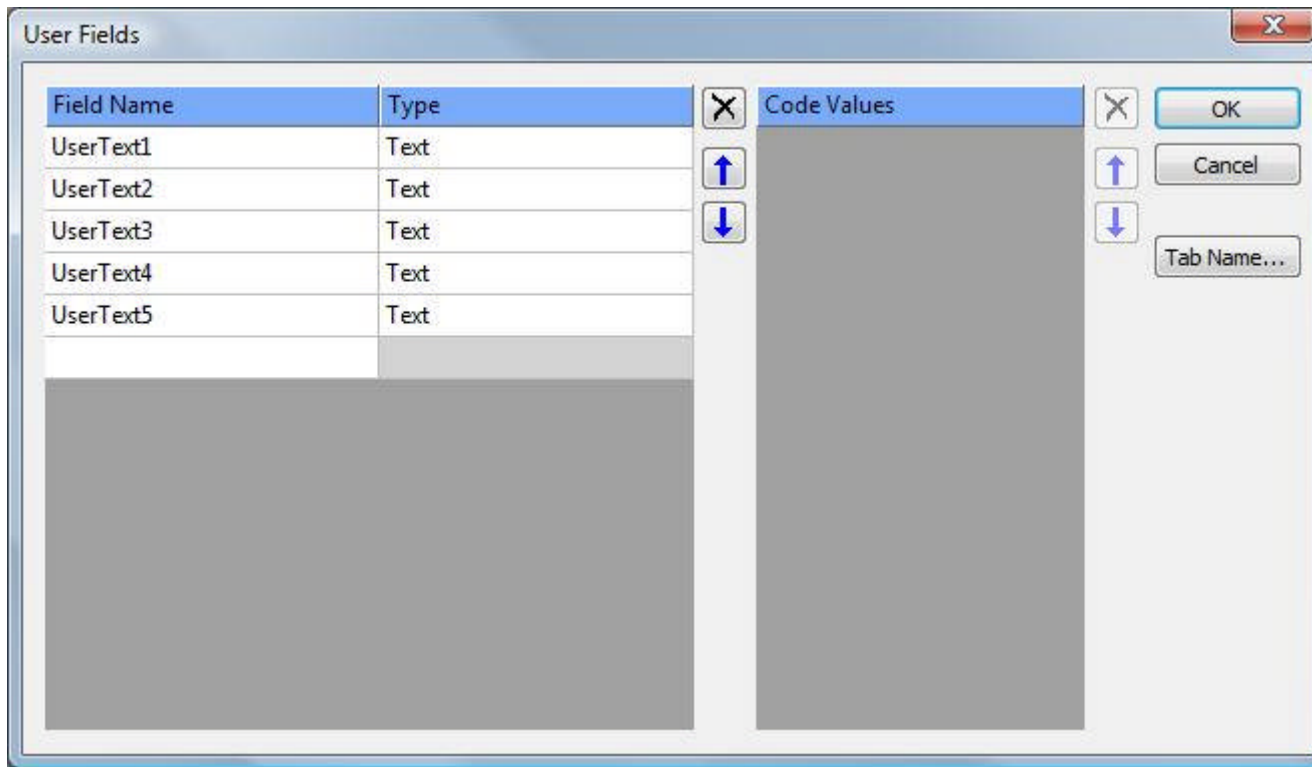


Figure: User fields dialog with example entries.

Code Type

A code type user field can be used to limit the values that can be selected.

Tab Name...

The Tab Name that is displayed in the Risk Register can be changed. In the example below the tab name has been changed from the default *User Fields* to *Further Details*.

- Display the User Fields dialog in the Risk Register. *Edit | User Defined Fields*.
- Click *Tab Name...*

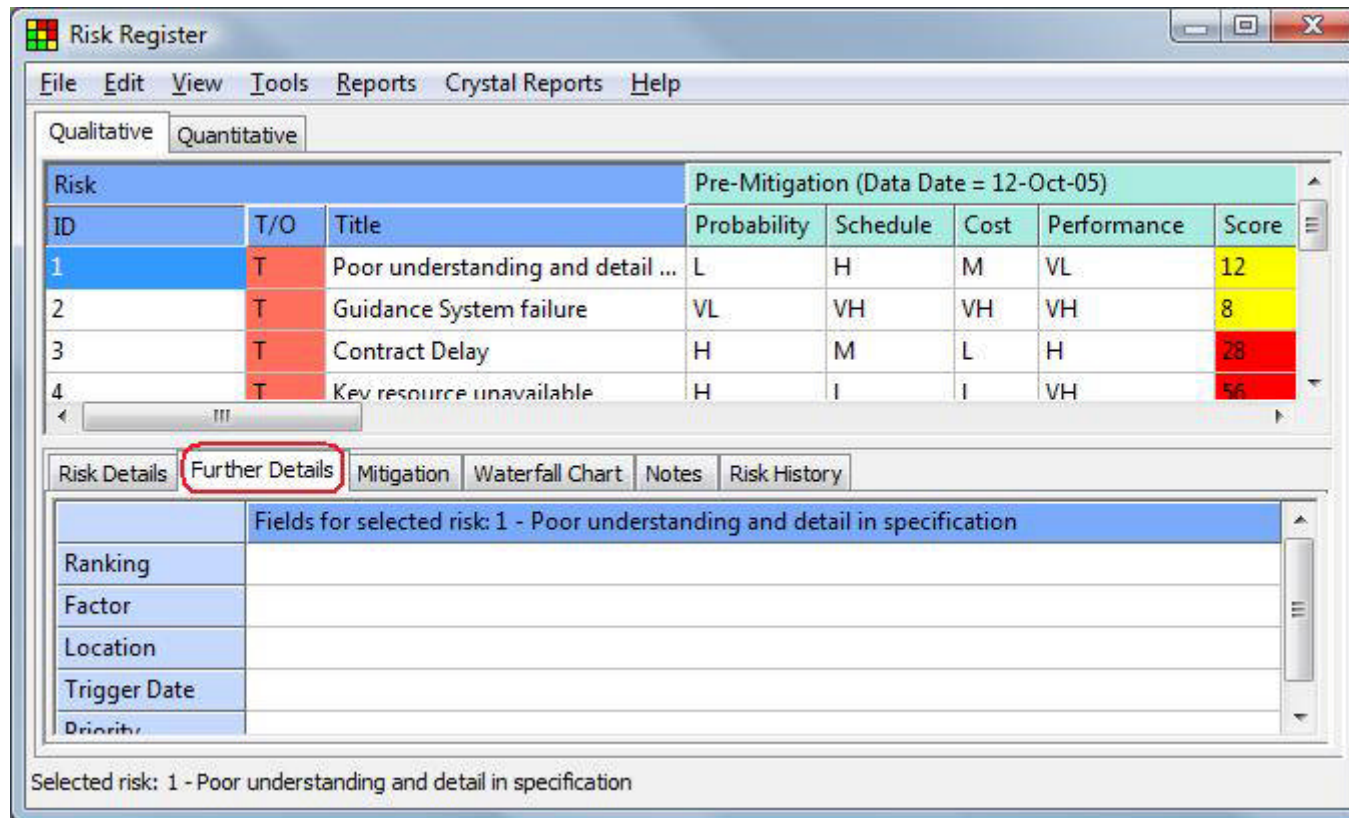


Figure: The user fields tab renamed to "Further details"

5 Risk Register - Risk Matrix

Risk Matrix

Displays the location of each risk on a Probability/Impact diagram based on its probability and *Overall Impact*. See **Risk Scoring (Section 6)** for details on *Overall Impact* calculation.

The Risk Matrix can be displayed as a report or as a floating dialog.

Risk Matrix report

- Risk | Risk Register | Reports | Risk Matrix

Risk Matrix floating dialog

- Risk | Risk Register | View | Show Risk Matrix



Figure: Risk Matrix showing distribution of risks according to position in the probability impact diagram.

Pre-mitigated / Post-mitigated

Select to display either the Pre-Mitigation or Post-Mitigation risk score for each risk.

Risk ID's / Count / XXX's

Choose how the information is displayed.

6 Risk Register - Risk Scoring


How a risk is scored

A *Risk Score* is based on the following:

- Risk Scoring options.
- The scores entered in the *Probability and Impact Scoring* grid.
- The Risk Probability.
- Each Risk Impacts that has the *Score?* option checked.

- The Risk Manageability (if being used).
- The Risk Proximity (if being used).

Risk Scoring Options

 *Impact Types* with the *Score?* option unchecked are ignored for the purpose of scoring.

Overall Impact

The *Overall Impact* is a single impact value that is calculated from the multiple *Impact Types* assigned to a risk. It is not visible in the software but is used when determining where each risk appears in the *Risk Matrix* and each risk's *Risk Score*.

Highest Impact option selected

The *Overall Impact* for a risk is set to the highest of all the impacts.

The *Overall Impact* is then combined with the *Probability* to select the *Risk Score* from the *Probability and Impact Scoring grid*.

The *Risk Score* is then adjusted by the *Manageability* and/or *Proximity* settings if these options are being used.

Average of Impacts option selected

When using *Average of Impacts* option each risk impact is given a numeric value: Negligible=0, VL=1, L=2, M=3, H=4, VH=5). The average of these is used to determine the *Overall Impact*.

E.g. A risk register has 3 *Impact Types* and 5 impact values (VL, L, M, H and VH). A risk is assessed as follows:

Cost impact = L

Schedule impact = M

Performance impact = VH

Average numerical impact = $(2 + 3 + 5) / 3 = 3.33$

3.33 rounds to a value of 3. This equates to M so the *Overall Impact* is set to M.

The *Overall Impact* is then combined with the *Probability* to select the risk *Risk Score* from the *Probability and Impact Scoring grid*.

E.g. If the *Probability* of the risk above was M then the *Risk Score* would be 10 (based on grid in screenshot below).

The *Risk Score* is then adjusted by the *Manageability* and/or *Proximity* settings if these options are being used.

Average of Individual Impact Scores option selected

When using *Average of Individual Impact Scores* each *Impact Type* is combined with the *Probability* to select a *Score* from the *Probability and Impact Scoring grid*. The *Risk Score* is then average of all these scores.

The *Risk Score* is then adjusted by the *Manageability* and/or *Proximity* settings if these options are being used.

The *Overall Impact* is determined by choosing the row that refers to the risk *Probability* in the *Probability and Impact Scoring grid* and choosing the cell in that row that is closest to the *Risk Score*.

E.g. A Risk has been assessed as follows: Probability = H, Cost = L, Schedule = M and Performance = VH.

Risk Scores from *Probability and Impact Scoring grid* (see grid in screenshot below):

Referencing the *Probability and Impact Scoring grid* the Cost impact for H and L has a score 7


Referencing the *Probability and Impact Scoring grid* the Schedule impact for H and M has a score 14

Referencing the *Probability and Impact Scoring* grid the Performance impact for H and VH has a score 56

Average impact score = $(7 + 14 + 56) / 3 = 26$

The *Risk Score* is then adjusted by the *Manageability* and/or *Proximity* settings if used (for this example assume they are not being used)

Overall Impact = M (as M covers the range from 14 to 27 in the High % probability row).

 For *Average of Individual Impact Scores* method the *Manageability* and *Proximity* can affect where risks appear in the *Risk Matrix* as the *Overall Impact* is determined after *Manageability* and *Proximity* settings have been applied.

Risk Matrix

The *Overall Impact* (as defined in the above three scoring options) is used with the risk *Probability* to determine the location of the risk in the **Risk Matrix (Section 5)** report.

Risk Scoring dialog

Risk | *Risk Register* | *Edit* | *Risk Scoring*


The Risk Scoring dialog is used for:

- Setting the size of the probability and impact grid, e.g. 5x5, 5x4, 3x3.
- Adding additional impact types, e.g. reputation, health and safety.
- Modifying the probability and impact ranges. For example a probability of VH could be defined as being >70% and a schedule impact of M defined as between 20 and 50 days.
- Choosing the options used to calculate the *Risk Score*.
- Modifying the risk scores for each combination of probability and impact if required.
- Defining *Manageability* and *Proximity*.

The Risk Scoring dialog is populated with default quantitative ranges. These ranges, in particular the impacts, may not be suitable for your project and you may wish to modify them. For example in a very short project such as a maintenance or turnaround, a High (H) schedule impact may be between 5 and 10 days. But a High (H) schedule impact may be 30 to 50 days for a project with a longer duration.

The default Probability and Impact Scoring values have been calculated using probability factors from VL to VH as 1,3,5,7 and 9, and impact factors from VL to VH as 0.5,1,2,4 and 8 with the factors rounded up to the nearest whole number. These are based on the APM PRAM and PMIBOK P-I grid scores.

For example a risk with a probability of M and a impact of M has been given the default score of $5 \times 2 = 10$.

 Each project can have a different risk scoring if required. The *Load* and *Save* buttons can be used to create a library of suitable risk scoring setups for different project types.

Risk Scoring

Probability Scale

Items in the scale: 5

	Probability
Very High	>70%
High	>50%
Medium	>30%
Low	>10%
Very Low	<=10%

Tolerance Scale

Items in the scale: 3

	Color	Score
High	Red	>23
Medium	Yellow	>5
Low	Green	<=5

Impact Scales & Types

Add Impact Type Delete Impact Type Items in the scale: 5

Impact Types	Score?	Very Low	Low	Medium	High	Very High
Schedule	<input checked="" type="checkbox"/>	<=5	>5	>10	>20	>40
Cost	<input checked="" type="checkbox"/>	<=£30,000	>£30,000	>£75,000	>£150,000	>£600,000
Performance	<input checked="" type="checkbox"/>	Failure to meet a minor acceptance	Failure to meet more than one minor	Shortfall in meeting acceptance criteria	Significant shortfall in meeting acceptance	Failure to meet acceptance criteria

Probability and Impact Scoring (PID)

Risk score is based on: ☒ Highest Impact ☐ Average of Impacts ☐ Average of Individual Impact Scores

	Impacts				
	Very Low	Low	Medium	High	Very High
Very High %	6	12	18	36	72
High %	4	7	14	28	56
Medium %	3	5	10	20	40
Low %	2	3	6	12	24
Very Low %	1	1	2	4	8

Print Manageability and Proximity... Load... Save... OK Cancel

Figure: Risk Scoring dialog used for setting up the qualitative ranges.

Probability Scale

Items in the scale - Defines the number of probabilities available in the PID (probability impact diagram).

... button - Click to customize the wording and colors used for the probability ranges.

Probability - Defines the probability ranges. The probability range for each band is defined by its minimum value and the minimum value for the band above. For example in the example above the probability range for the Medium (M) is from 20% to 50%. The maximum probability value for VH is automatically set to 100%.

 These are qualitative settings and the exact probability can be quantified on the *Quantitative* tab if necessary.


Impact Scales and Types

Add / Delete Impact Type - Click to add or delete an impact type.

Items in the scale - Defines the number of impacts available in the PID (probability impact diagram).

... button - Click to customize the wording and colors used for the impact ranges.

Cost, Schedule, Performance - The default impact types. The *maximum* schedule and cost impact for VH is set to twice its *minimum* value as a default - the factor used to calculate the maximum can be changed using *Edit | Options*. For performance a descriptive indication of the possible impact on the project is entered.

 Only Cost and Schedule have an impact on the quantitative analysis.

Score? - Choose which impacts are used when calculating the risk score. When this is unchecked the impact is not included when determine the highest impact.

Probability and Impact Scoring (PID)

Highest Impact, Average of Impacts and **Average of Individual Impact Scores** - See *Risk Scoring Options* above for details.

Used to define the scores for different combinations of probability and impact. The probability and the highest impact are used to score the risk using the values in this grid. These risk scores can be changed if required by typing over the existing values.

The risk coloring ranges can be adjusted with the Tolerance Scale. The default is for scores of 6 or less to be green and scores of 24 or more to be red.

Tolerance Scale - Used to define how the scores are colored.

Print - Display the current scoring in a report.

Manageability and Proximity - see **Manageability and Proximity (Section 7)**

Save... Saves the setup of the current Risk Scoring. Use to save and load pre-defined scoring systems.

Load... Loads details previously saved Risk Scoring data.

7

Risk Register - Manageability and Proximity

Manageability

Field that can be used to define how easy a risk is to manage on a pre-defined scale.

This is useful when deciding the order in which to manage risks.

Easy to manage	Large impact	Manage First
Difficult to manage	Large impact	Manage Second
Easy to manage	Small impact	Manage Third
Difficult to manage	Small impact	Do it last / do not bother

Proximity

Indicates how near the Start Date of the risk is to the project Data Date. This is useful when deciding the order in which to manage risks.

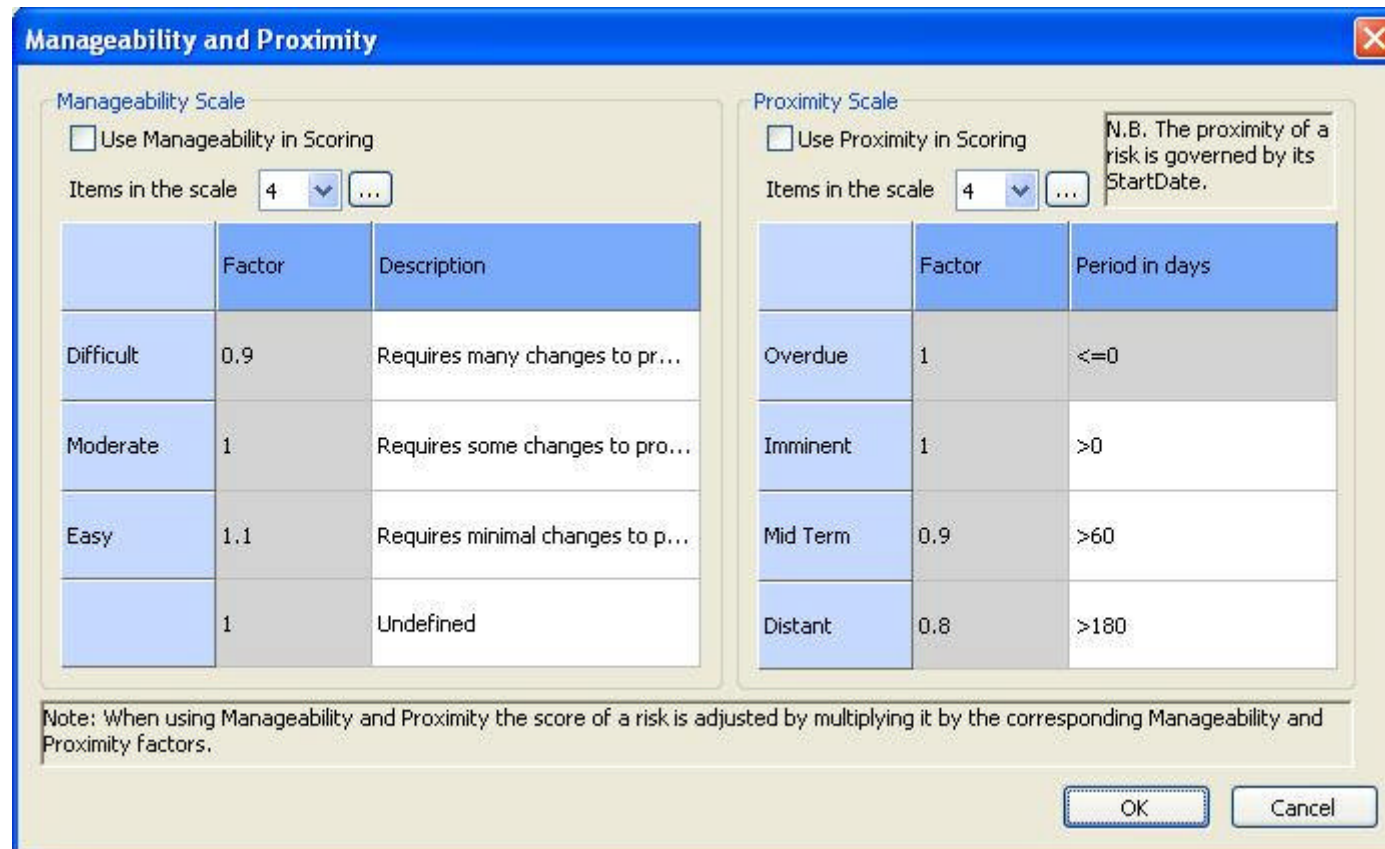
Risk Scoring Factor

The *Factor* assigned to each item in the Manageability and Proximity scale can be optionally used to weight risk score.

For example a risk that had a score of 20 would have its score increased to 22 if its manageability was set to Easy which has a default factor of 1.1.

 The Factor is only used to modify the risk scores when *Use Manageability in Scoring* and/or *Use Proximity in Scoring* is checked. As a default they are unchecked.

See **Risk Scoring (Section 6)** for more details on how *Manageability* and *Proximity* affect the score.



Manageability and Proximity

Manageability Scale

☐ Use Manageability in Scoring

Items in the scale: 4

	Factor	Description
Difficult	0.9	Requires many changes to pr...
Moderate	1	Requires some changes to pro...
Easy	1.1	Requires minimal changes to p...
	1	Undefined

Proximity Scale

☐ Use Proximity in Scoring

Items in the scale: 4

N.B. The proximity of a risk is governed by its StartDate.

	Factor	Period in days
Overdue	1	<=0
Imminent	1	>0
Mid Term	0.9	>60
Distant	0.8	>180

Note: When using Manageability and Proximity the score of a risk is adjusted by multiplying it by the corresponding Manageability and Proximity factors.

OK Cancel

Figure: The default Manageability and Proximity setup.

8 Risk Register - Quantitative Analysis

Analysis (Quantitative) Tab

If a risk occurs it may have a quantifiable schedule and/or cost impact on the project.

The impact can be modeled by mapping risks to tasks. The overall cost and schedule impact of all the risks on the project can then be quantified.

Risk Register

File Edit View Tools Reports Crystal Reports Help

Qualitative Quantitative

Pre-mitigated Post-mitigated

Risk View Task View

Details					
ID	T/O	Title	Quantified	Probability	Impacted Task ID(s)
1	T	Poor understanding and detail ...	<input type="checkbox"/>	20%	A080,A110,A100,A120
2	T	Guidance System failure	<input type="checkbox"/>	5%	A200
3	T	Contract Delay	<input type="checkbox"/>	60%	A030
4	T	Key resource unavailable	<input type="checkbox"/>	60%	A190,A130,A070
5	T	Delivery overrun	<input type="checkbox"/>	40%	A230
6	T	Fabrication contractor goes bust	<input type="checkbox"/>	0%	A160
7	T	Rework required for assembly ...	<input type="checkbox"/>	40%	A170
8	T	Testing fails	<input type="checkbox"/>	20%	A210
9	T	Design changes	<input type="checkbox"/>	60%	A130
10	O	Reuse previous design work	<input type="checkbox"/>	60%	A070

Search

- A010 - Project Start
- A020 - Preliminaries
- A060 - Design
 - A070 - Initial design
 - A080 - Design guidance
 - A090 - Select configurat
 - A100 - Design fuel syste
 - A110 - Design rocket en
 - A120 - Design frame
 - A130 - Final design
- A140 - Fabrication
- A180 - Testing
 - A190 - Test frame, fuel :

Impacts for Risk 4		Schedule			Cost				Correlate		
Task ID	Description	Shape	Min	Likely	Max	Shape	Min	Likely	Max	Impact Ranges	Event existence
A190	Test frame, fuel syste...	Triangle	3	5	6	Triangle	\$3,333	\$10,000	\$16,667	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
A130	Final design	Triangle	3	5	6	Triangle	\$3,333	\$10,000	\$16,667	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
A070	Initial design	Triangle	3	5	6	Triangle	\$3,333	\$10,000	\$16,667	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>


Pre-mitigated selected risk: 4 - Key resource unavailable

Figure: The Risks View tab displaying the risk "Key resource unavailable" mapped to 3 tasks and the corresponding impacts.

Pre-Mitigated and Post-Mitigated Tabs

These tabs are used to map and quantify the probability and impact of each risk for the pre and post mitigation scenarios.

Once the pre-mitigated and post-mitigated positions have been populated a risk analysis can be run to compare the two positions.

 It is not possible to change the post-mitigation values on a risk if the *Mitigation Response* is set to *Accept*. Accept implies that the post-mitigation position will be the same pre-mitigation position.

Risks View tab

Use this tab to view and edit the tasks mapped to a selected risk.

The left hand pane shows a list of the project risks and the right hand pane shows the list of project tasks.

ID - Risk ID.

T/O - Threat or Opportunity.

Title - Risk Title.

Quantified - Check this to override the probability and impacts that are based on the qualitative assessment and scoring. For example if the qualitative range for the schedule impact gave 50 to 150 days this could be quantified as 60 to 120 days. For a *Quantified* risk the probability and the mean of the schedule and cost impacts are used to update the qualitative risk scoring. Once a risk has been marked as *Quantified*, it is no longer possible to change its Qualitative assessments directly and they are grayed out on the *Qualitative* tab.

Probability - Probability that the risk will occur. As a default the probability will be grayed out and displayed as the mid point between the lower and higher probability for the qualitative probability selected. It is possible to override the default probability by checking the *Quantified* option. Entering a probability will also change the qualitative probability to the setting that contains the value in its range. For example: if the *Low* range is between 10% and 30%, entering 12% would select *Low* in the qualitative data.

Impacted Tasks

List of task ID's that have been mapped to the risk.

Mitigation Cost (Post-mitigated tab only)

The cost of mitigating the risk as defined in the qualitative data. If the risk has a *Detailed Mitigation Plan* this value will be grayed out and can then only be modified from the qualitative Mitigation tab.

Mitigation Response Title (Post-mitigated tab only)

The title of the Detailed Mitigation Plan as defined in the qualitative data.

Tasks View tab

This is the same information as the *Risks View* tab but re-ordered so the tasks are on the left and the risks mapped to the selected task are on the right. This view allows the *Link in Series* option to be accessed.

Mappings

Risks can be mapped to any task, milestone or summary task.

When a risk is mapped to a task the details of the mapping are displayed in the lower pane.

Task ID / Risk ID - The ID's of any tasks/risks that are mapped to the selected risk/task.

Description - The descriptions of any tasks/risks that are mapped to the selected risk/task.

Schedule Shape - The shape of the distribution used to define the duration impact of a risk on a task.

Min, Likely, Max - The parameters for the duration distribution shape (grayed out if linked to qualitative data).

Cost Shape - The shape of the distribution used to define the cost impact of a risk on a task.


Min, Likely, Max - The parameters for the cost distribution shape (grayed out if linked to qualitative data). Values can be positive or negative.

Correlate - Impact Ranges (only available in Risks View tab)

The correlate impact ranges check boxes option on this tab allows the schedule and cost impacts of a risk to be correlated for each impact. When a risk impacts more than one task during the risk analysis the impacts on each task set with this option are correlated.

Correlate - Event Existence (only available in Risks View tab)

The *Event Existence* option on this tab gives the option to allow the risk to impact a task independently of the others. The default is for the existence of all the impacts to be correlated, i.e. if the risk occurs then all the tasks are impacted. Unchecking this option for a task impact means its probability of occurrence is then sampled independently from the other impacts.

 It is not possible to have different probabilities for each impact. To model this it is necessary to have a risk for each different probability.

Link in Series (only available in Tasks View tab)

The link in series option on this tab allows the schedule impacts due to multiple risks to be linked in series, i.e. for each iteration a task with multiple risks is extended by the sum of all the risk durations. The default is for this option to not be checked and therefore treat multiple schedule impacts in parallel, i.e. for each iteration a task with multiple risks assigned is extended by the duration of the risk with the largest schedule impact.

Mapping Risks to Summary Tasks

Risks can be mapped to summary tasks (WBS items). When a risk impacts a summary task the duration and cost of the final task (the task finishing last) under the summary task is impacted as if the risk had been mapped directly to it.

9

Risk Register - Building Risk Plans

After mapping risks to the tasks in the project the Pre-mitigated and Post-mitigated risk plans can be built. Building a risk plan creates a new schedule that contains the cost and schedule impacts. The new schedule can then be risk analyzed in the usual way.

Building Impacted Risk Plans

- Risk | Risk Register | Tools | Build Impacted Risk Plan(s)

Risk Plans - Choose whether to build the Pre-mitigated or Post-mitigated risk model. The Pre-mitigated model is built using the probabilities and impacts associated with the Pre-mitigated mappings and Post-mitigated model is built using the probabilities and impacts associated with the Post-mitigated mappings.

Risks - If required risks can be omitted from the risk event plan. The omitted risks will not impact the schedule during the analysis. Risks are sorted as either Open or Proposed.

Build Impacted Risk Plan(s)

Risk Plans

☒ Pre-mitigated
☐ Post-mitigated

Open Risks

- ☒ 1(T) - Poor understanding and detail in s
- ☒ 2(T) - Guidance System failure
- ☒ 3(T) - Contract Delay
- ☒ 4(T) - Key resource unavailable
- ☒ 5(T) - Delivery overrun
- ☒ 6(T) - Fabrication contractor goes bust
- ☒ 7(T) - Rework required for assembly and
- ☒ 8(T) - Testing fails

Proposed Risks

- ☒ 9(T) - Design changes
- ☒ 10(O) - Reuse previous design work

☒ Expand Tasks to Show Risks

Figure: Dialog for building the Pre-mitigated and Post-mitigated risk plans.

Mitigation Actions

When a risk plan is built the mitigation actions are added as new tasks to the built risk plan.

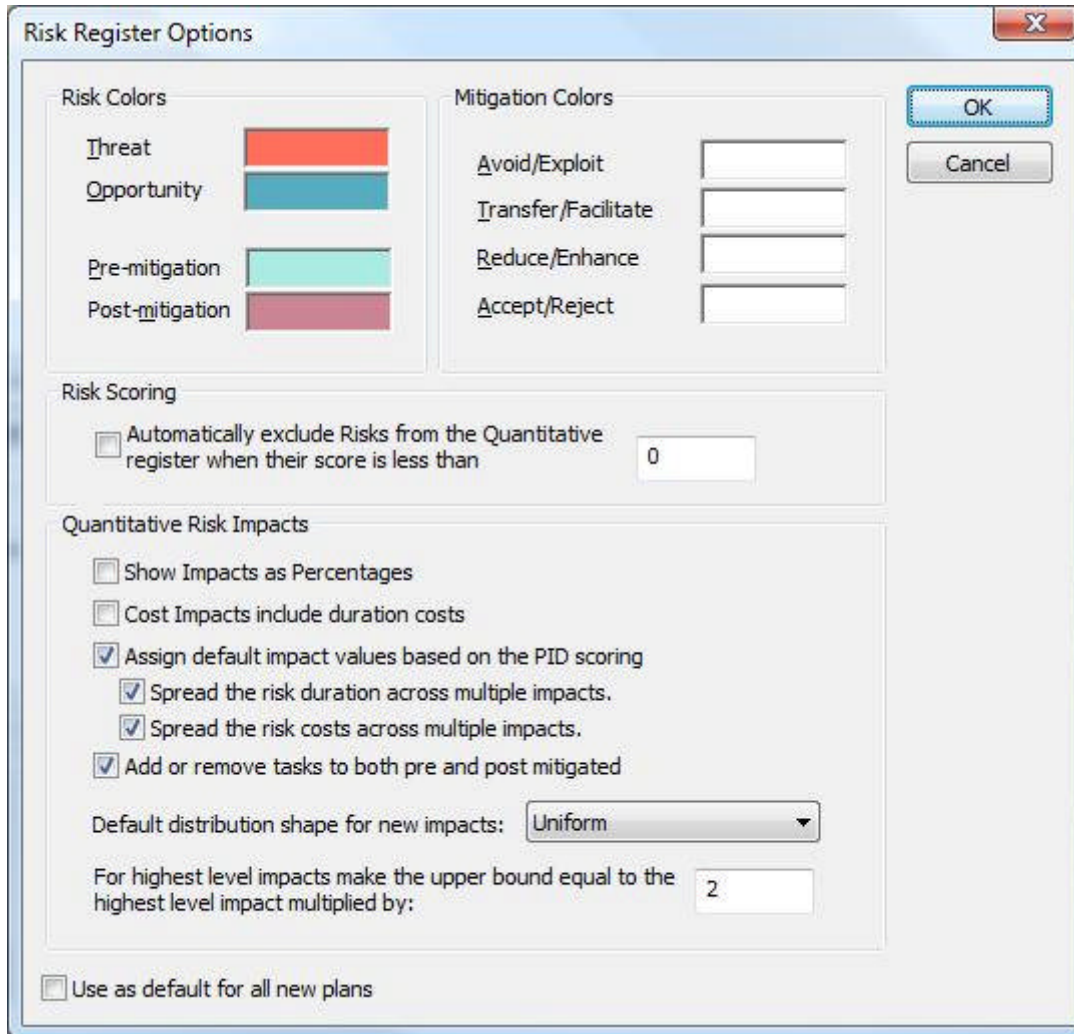
If a mitigation action is linked to a specific task then it will **not** be added to the pre-mitigation or post-mitigation built risk plan.

Proposed mitigation actions are **only** added to the post-mitigation built plan.

Mitigation Action Status	Description	New task added to represent mitigation action?	
		Pre-Mitigated built plan	Post-Mitigated built plan
Proposed	Mitigation action has not been sanctioned and therefore only appears in the post-mitigated risk plan.	Never	Always
Sanctioned	Mitigation action has been sanctioned and will definitely take place.	Always	Always
Rejected	Mitigation action has been rejected and will not take place.	Never	Never
In Progress Linked to a task	The task the mitigation action is linked to is in progress.	Never	Never
In Progress NOT linked to a task	The mitigation action was sanctioned and has now started.	Always	Always
Complete Linked to a task	The task the mitigation action is linked to is complete.	Never	Never
Complete NOT linked to a task	The mitigation action was sanctioned and is now complete.	Always	Always

10 Risk Register - Options dialog

- Risk | Risk Register | Tools | Options



The Risk Register Options dialog box is shown with the following settings:

- Risk Colors:**
 - Threat: Red
 - Opportunity: Blue
 - Pre-mitigation: Light Green
 - Post-mitigation: Maroon
- Mitigation Colors:**
 - Avoid/Exploit: White
 - Transfer/Facilitate: White
 - Reduce/Enhance: White
 - Accept/Reject: White
- Risk Scoring:**
 - ☐ Automatically exclude Risks from the Quantitative register when their score is less than 0
- Quantitative Risk Impacts:**
 - ☐ Show Impacts as Percentages
 - ☐ Cost Impacts include duration costs
 - ☒ Assign default impact values based on the PID scoring
 - ☒ Spread the risk duration across multiple impacts.
 - ☒ Spread the risk costs across multiple impacts.
 - ☒ Add or remove tasks to both pre and post mitigated
- Default distribution shape for new impacts:** Uniform
- For highest level impacts make the upper bound equal to the highest level impact multiplied by:** 2
- ☐ Use as default for all new plans

Buttons: OK, Cancel

Figure: Risk Register Options dialog.

Risk Colors

Threat - color used for tasks modeling threats in the built risk plan.

Opportunity - color used for tasks modeling opportunities in the built risk plan.

Pre-mitigation - color used to identify Pre-mitigation data in the risk register (e.g. column heading color).

Post-mitigation - color used to identify Post-mitigation data in the risk register.

Mitigation Colors

Colors can be set up to identify the different types of mitigation response. As a default these are all white.

Risk Scoring


Automatically exclude Risks from the Quantitative register when their score is less than

When this option is selected any risks with low qualitative risk scores are automatically hidden on the *Quantitative* tab. These risks are also not included when the impact risk plans are built if they had been previously mapped to tasks (e.g. before the option was selected or when the risk had a higher score).

Quantitative Risk Impacts

Show Impacts as Percentages

Display the risk impacts on the tasks as a percentage of the task deterministic duration or cost. For example a 10 day task would display an impact of 5 days as 50%

 If the task duration or cost is zero then the impact is not shown as a percentage.

Cost Impacts include duration costs

Check this option to prevent any existing time dependent costs being increased when a risk impacts.

In the example below a risk has been mapped to a task A070 and the task has an existing \$100 per day cost assigned. During the risk analysis when the risk occurs the additional time added by the risk can include or not include the \$100 per day.

	Name	Description	Rem Duration	16	17	18	19	20	21	22	23	Total Cost	Minimum Duration	Most Likely	Maximum Duration	Resources
-	A260	Initial missile design	6									\$10,500				
	A270	Initial missile design	5									\$500	4	5	7	ENG[100]
	A280	Design changes	1									\$10,000	1	2	3	ZCRI[10000]

Figure: Option selected. The daily cost due to the engineer resource (ENG) is assigned to the base task. No additional cost is added for the 1 day of design changes.

	Name	Description	Rem Duration	16	17	18	19	20	21	22	23	Total Cost	Minimum Duration	Most Likely	Maximum Duration	Resources
-	A070	Initial missile design	6									\$10,600				ENG[100]
	A070: B	Initial missile design	5									\$0	4	5	7	
	A070:RISK9	Design changes	1									\$10,000	1	2	3	ZCRI[10000]

Figure: Option NOT selected. The daily cost due to the engineer resource (ENG) is assigned to the summary task therefore an extra \$100 is added for the 1 day of design changes.

With reference to the example above; if the impact of \$10,000 already includes an allowance for the additional time spent by the engineer resource then the option should be selected.

Assign default impact values based on the PID scoring

When a risk is mapped to a task the impacts default to those defined in the qualitative risk scoring. For example if a medium schedule impact is defined as between 20 and 50 days the default impact will be between 20 and 50. If this option is unchecked the default impact will be zero and in this case it is necessary to enter the impacts for each mapping.

Spread the risk duration across multiple impacts.

If the default impact values are based on the qualitative risk scoring then this option will spread the total duration impact across all the tasks the risk is mapped to. For example if a risk has a total schedule impact of 20 to 60 days and the risk is mapped to 4 tasks the impact on each task will be 5 to 15 days.



The spread duration values calculated for each impact will be set to a minimum value equal to the planning unit (i.e. day, hour, quarter hour).

This can mean that the total of all the impact values can total more than the original value.

This will usually only be an issue when a risk is mapped to many tasks and has an impact that is close to the planning unit, for example:

A risk has an impact of Uniform (1, 2). It is mapped to 100 tasks AND the planning unit is set to days.

Each task will have an impact of Uniform (1, 1) which means the total of all the impacts is up to 100 days, significantly more than the original impact of Uniform (1, 2).

Spread the risk costs across multiple impacts.

If the default impact values are based on the qualitative risk scoring then this option will spread the total cost impact across all the tasks the risk is mapped to. For example if a risk has a total cost impact of \$100 to \$400 and the risk is mapped to 4 tasks the impact on each task will be \$25 to \$100.

Add or remove tasks to both pre and post mitigated

If this option is checked then mapping a risk to a task in the Pre-mitigation tab also maps the same risk and task in the Post-mitigation tab and vice versa. If the mitigation actions reduce the risk probability to zero then the risk can still be mapped to the tasks but will have no impact as it will never exist during the analysis.

Default distribution shape for new impacts:

When a risk is mapped to a task this is the shape that will be used as the default.

For VH impacts, make the upper value x times the VH threshold

When a risk has a VH impact the lower threshold for the impact will be that defined in the *Risk Scoring* dialog. The upper threshold is calculated from the lower threshold using the value set here.

11 Risk Register - How risk plans are built

Overview

Building the pre- or post-mitigated impacted risk plan creates a copy of the existing schedule and automatically add tasks to model the impact of the risks that have been mapped to the schedule.

There are three types of task:

Risk summary task - Shown below with a yellow background. This task maintains the original logic and summarizes the cost and duration of the base task plus the risk impact tasks.

Base task - Shown below with a grey background. This task maintains the duration of the original task.

Risk impact tasks - Shown below with a red background. These tasks model the impact of a risk on the original task adding additional time and / or cost.

How risks are modeled

Each risk in the project has a pre- and post-mitigated probability. When the risk plan is built, Primavera Risk Analysis creates a risk impact task for each impact and assigns the probability using the Task Existence.

When the risk analysis is run the risk impact tasks will exist or not exist based on the *Task Existence* percentage assigned.

Task Existence Correlation is used to ensure that a risk mapped to more than one task always impacts all the tasks in any one iteration.

 *Task Existence Correlation* is not used if an impact has had the *Event Existence* unchecked in the Quantitative tab of the Risk Register.

How duration impacts are modeled

When the risk plan is built additional risk impact tasks are added to model the duration impacts.

If a task has more than one risk assigned then a risk impact task is added for each risk.

In the figure below the task "0130 Final missile design" has been assigned two risks (RISK1 and RISK2). After building the risk plan there are three additional tasks: The base task (TASK A) and the two risk impact task (RISK 1 and RISK 2).

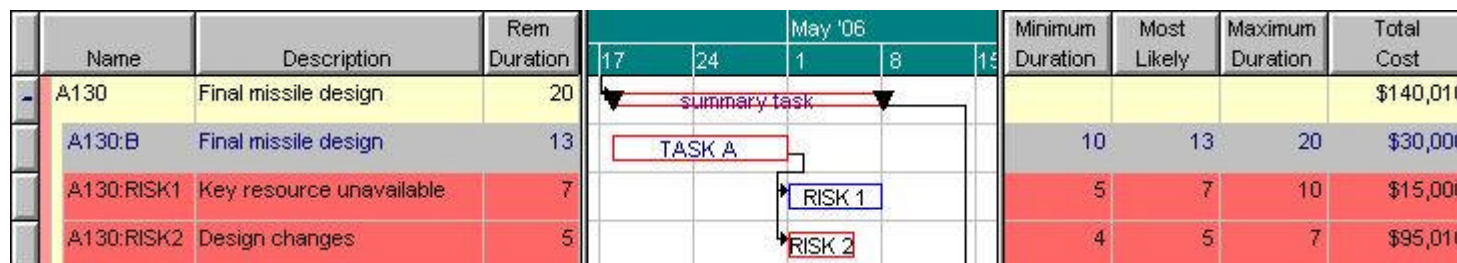


Figure: Duration impacts modeled in **parallel**. In this iteration both risks occurred. Existing logic runs through summary task.

As a default the duration impacts are in parallel (i.e. the longest impact delays the project). Alternatively a task can have the impacts linked in series using the *Link Risks in Series* option in the *Assign Risks* dialog. This option can be set on a per task basis from the *Risks mapped to Tasks* tab.

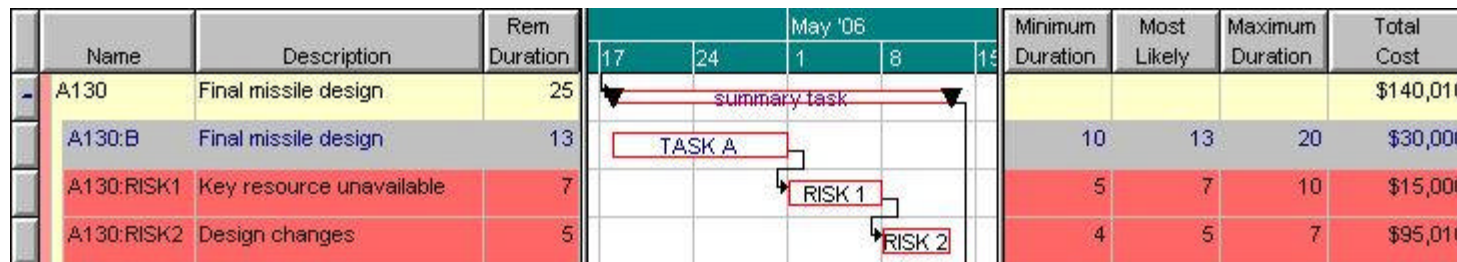


Figure: Duration impacts modeled in *series*. In this iteration both risk occurred.

If there are schedule opportunities (i.e. the possibility of saving time on a task) then these are modeled using an additional milestone and hammock task. The milestone handles the logic from any preceding activities and the hammock calculates the duration of the task after the opportunity has been applied. The example below shows an iteration where a 5 day opportunity and a 7 day threat impact a task with a 15 day duration. The resulting duration tracked by the hammock is then 17 days (i.e. $(15 - 5) + 7$). The opportunity and risk cost impacts are also rolled up into the total cost of the impacted task "Initial missile design".

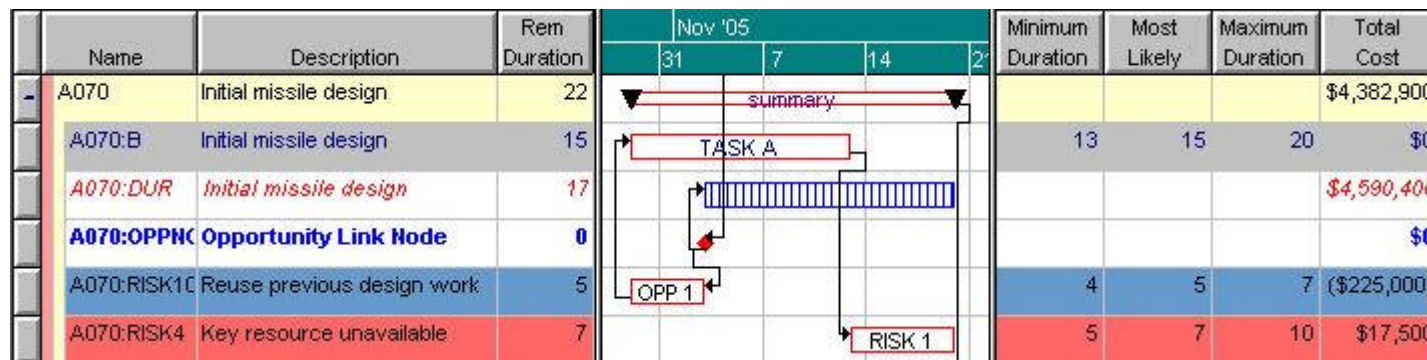


Figure: Modeling schedule and cost opportunities.

The "Opportunity Link Node" is the milestone that is added when opportunities are modeled. It is used to handle the links to the impacted task from all predecessors.

Maintaining logic

The existing logic (e.g. FS, SS, SF and FF) is maintained by creating a risk summary task that summarizes the duration and cost of the base task plus the risk impact tasks. The original logic then flows through the risk summary task. When the base task is impacted the duration of the summary task increases and the succeeding tasks are therefore delayed.

How cost impact is modeled

The cost impact of a risk is modeled by assigning a cost resource with the appropriate distribution. The resource is assigned to the risk impact task. e.g. the cost impact of RISK 1 is assigned to the task "Key resource unavailable".

📌 Opportunity costs are entered using positive values and when the risk plan is built they are converted and modeled as negative values.

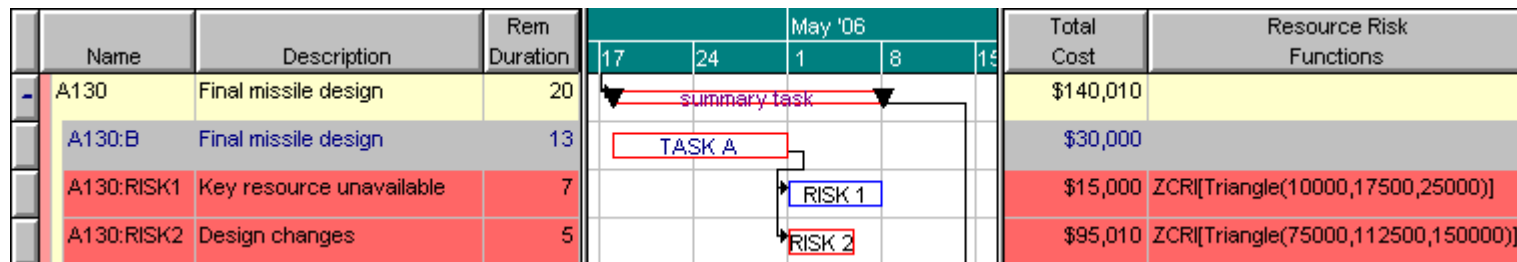


Figure: RISK 1 and RISK 2 have cost impact modeled using a resource assignment of ZCRI with a distribution.

Existing task costs and resources

If the original task has resources and costs assigned then these are assigned to the base task as the default. This means that any schedule impact does not increase the quantity of resources and costs assigned to the impacted task.

Alternatively the resources and costs can be assigned to the summary task. In this case the quantity of any duration dependent resources will increase when the risk impacts the task, i.e. the cost impact does not include an amount to cover the increase in the impacted task duration. To select this behavior uncheck the option *Risk | Risk Register | Tools | Options | Cost Impacts include duration costs*. See **Register Options dialog (Section 10)** for more details.

Built Plan User Fields

When a plan is built user task fields are added and populated with risk details. Most are simply a copy of the data from the risk register and are self explanatory and others are detailed below:

RiskID: Only assigned to Risk impact tasks. Shows the ID of the risk that corresponds to the impact.

RiskImpacts: Only assigned to Risk summary tasks. Shows the ID's of ALL the risks mapped to that task.

RiskFirstEvent: Only assigned to Risk impact tasks. If the risk impacts more than one task, the impact that all the other risks are correlated to is marked with 'Yes'.

RiskEventCounter: Only assigned to Risk summary tasks. The number of risks mapped to the task.

RiskTaskType:

Risk summary task: RiskTaskType = **realTask**

Base task: RiskTaskType = **baseTask**

Risk impact task: RiskTaskType = **riskImpact**

Mitigation action: RiskTaskType = **Mitigation Task - (detailed)**

Mitigation summary: RiskTaskType = **Mitigation Task - (high level)**

Risk Register reports can be generated from the Report Manager.

The Report Manager can be accessed from the Risk Register *Reports* menu or from the *Reports* menu in the main application.

The order of the risks in the report is the same as the current order in the Risk Register.

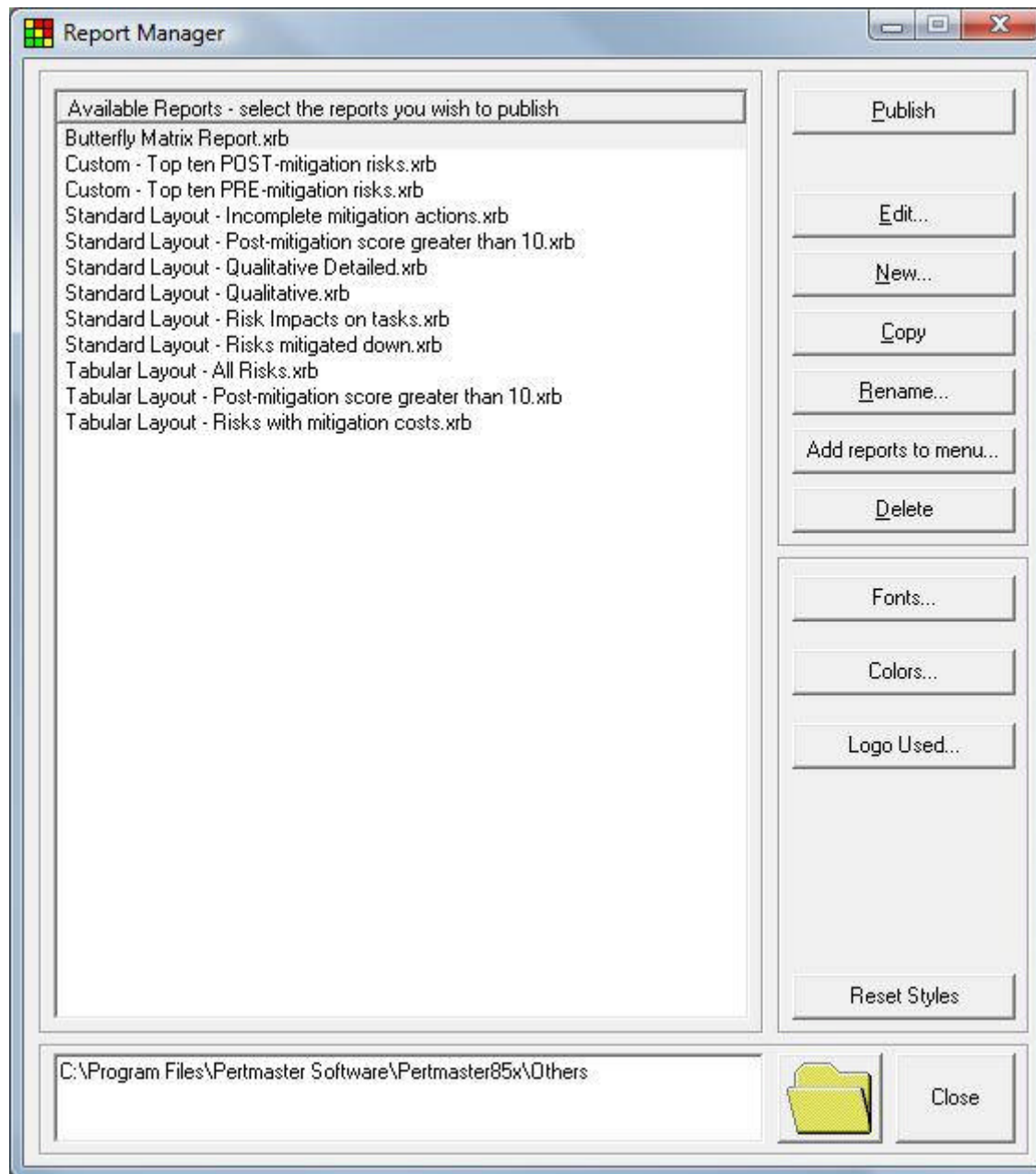


Figure: Report Manager dialog for publishing and editing risk register reports.

Publish - Publishes the selected report to html and opens it in your default html browser. Risks are displayed in the same order they appear in the Qualitative tab of the Risk Register.

Edit - Allows the Layout and Filter of the selected report to be modified.

New.. - Creates a new report template file (.xrb). A save dialog is displayed when clicked. After entering a name and location for the new report template file the Report Builder dialog is displayed allowing the Layout and Filter of the new report to be modified.

Copy - Makes a copy of the selected report template file.

Rename... - Renames the selected report.

Add reports to menu... - Allows selected reports to be displayed directly on the reports menu.

Delete - Deletes the selected report template file.

Fonts... - Sets the fonts for every report.

Colors... Sets the colors for every report.

Logo Used... - Sets the logo used on every report.

Reset Styles - Resets the fonts and colors to their default settings.

Folder button - Allows the location of the report template files to be chosen.

Report Builder

The Report Builder dialog is displayed when the *Edit* or *New* buttons are clicked. It is used to create new reports or edit existing.

Report Builder - Layout Tab

Choose the required layout. Standard (non-tabular) and tabular layouts are available. Additionally a custom layout can be created using a custom stylesheet.

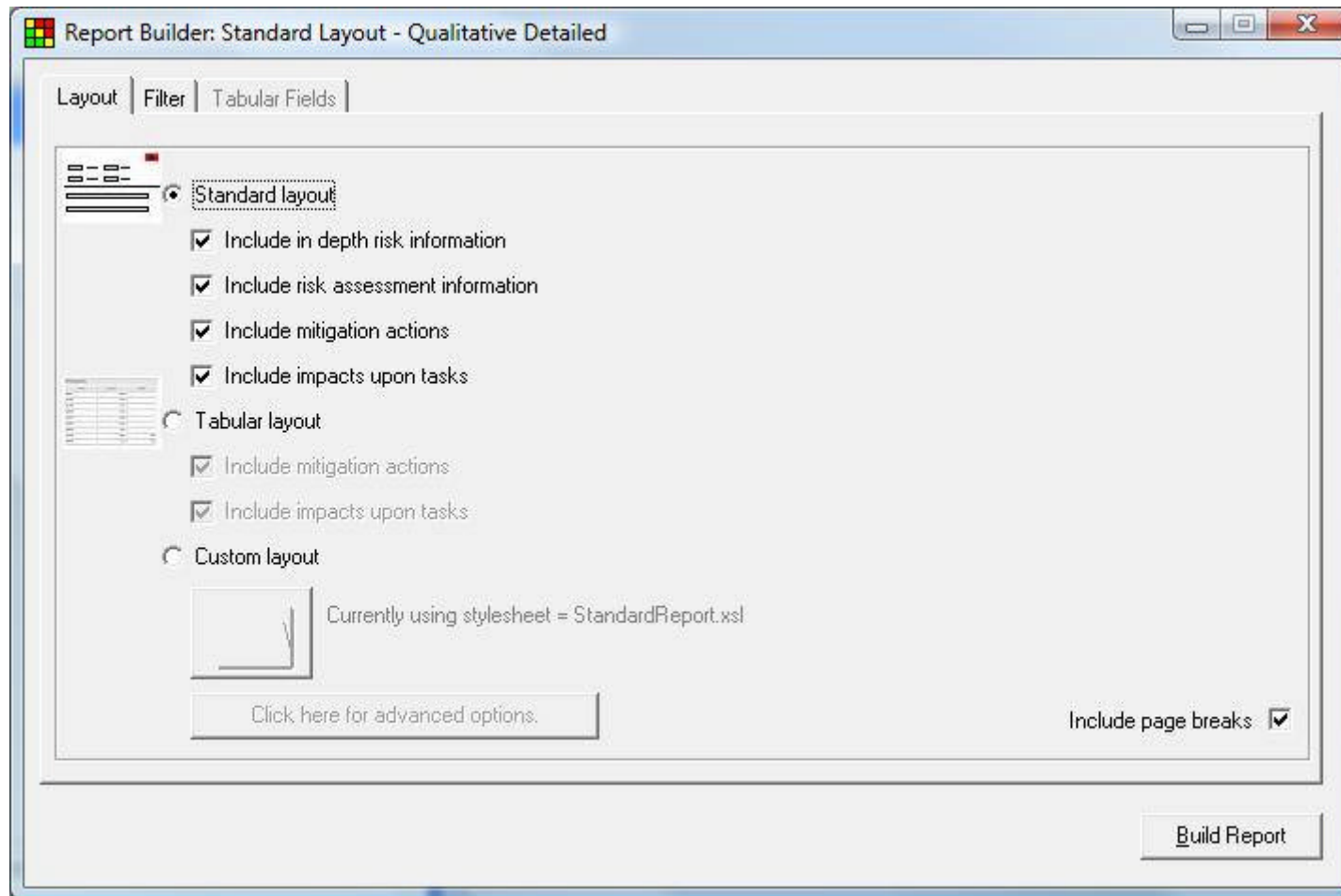


Figure: The report builder layout dialog for customizing the risk register report.

Standard layout


This formats the report in a general purpose layout based on the XML stylesheet StandardReport.xsl.

Include in depth risk information - When unchecked only the Risk ID, Title, Status and Owner are included in the report. When checked then RBS, Start Date, End Date, Exposure, Cause, Effect and Description are also included.

Include risk assessment information - When checked the qualitative Pre-mitigation and Post-mitigation details are added to the report.

Include mitigation actions - When checked the mitigation actions are added to the report.

Include impacts on tasks - When checked details of the task impact each risk has is added to the report.

 The standard layout is based on the StandardReport.xml stylesheet. When the standard layout does not provide you with the report you need then a custom XML stylesheet can be created and used. See *Custom Layout* below.

Tabular layout

This formats the report in a tabular layout based on the XML stylesheet DynamicTable.xml.

Include mitigation actions - When checked the mitigation actions are added to the report.

Include impacts on tasks - When checked details of the task impact each risk has is added to the report.

When this option is chosen the Tabular Fields tab is then active - see below.

Custom Layout

This formats the report in the style of the selected XML stylesheet. This effectively allows any required report style to be created and then published with the risk register data. XML stylesheets are text based and can be created using an XML editor. Further details on creating XML stylesheets can be found on the web. The Risk Register XML schema file is located in the Risk Register folder as *RiskRegister.xsd*.

Report Builder - Tabular Fields tab

When the Tabular layout is chosen on the *Layout* tab the *Tabular Fields* tab is then available. The risk fields included in the tabular report are selected here.

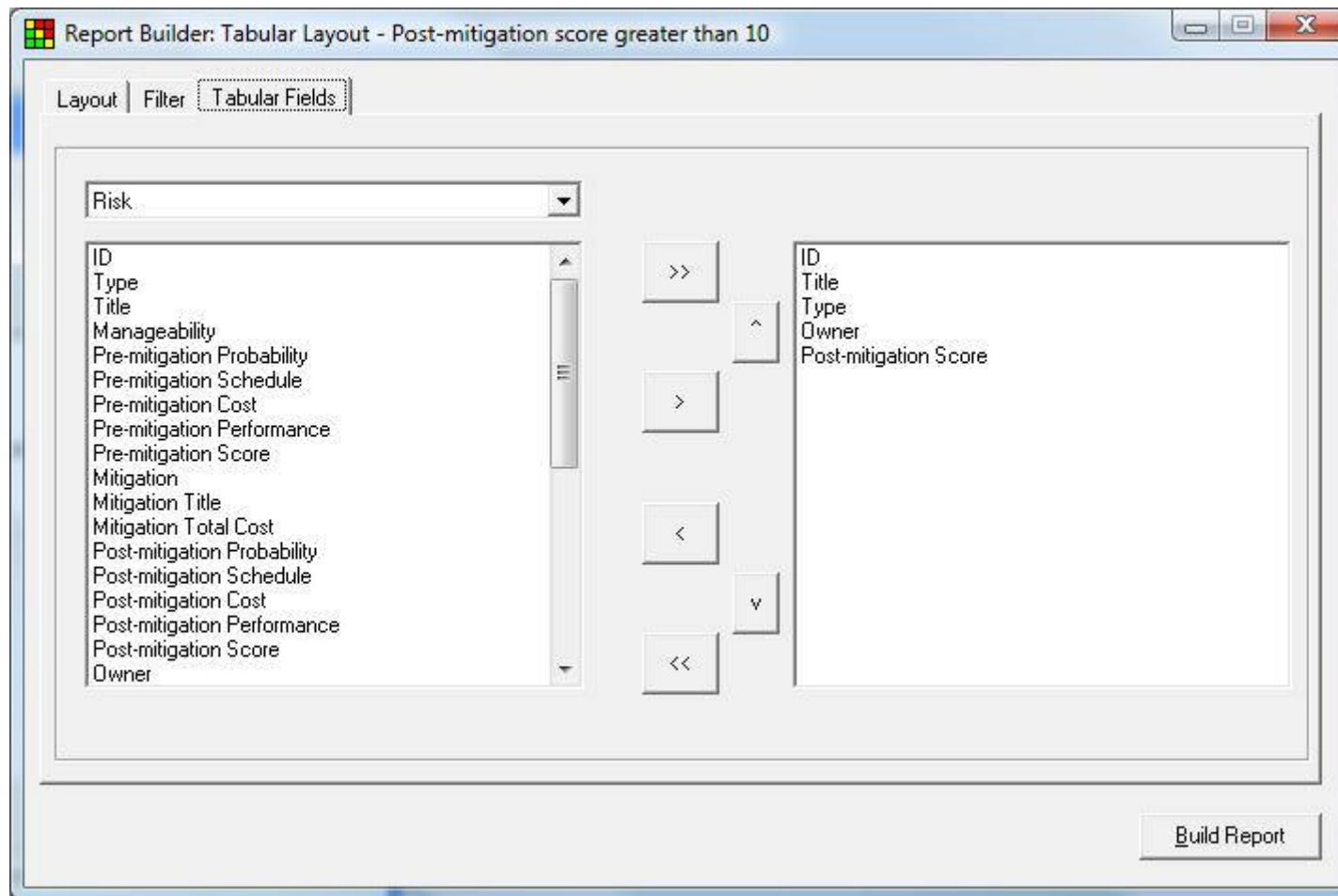


Figure: Tabular Fields tab for adding risk data to a tabular report.

Report Builder - Filter Tab

Use this tab to set up a filter that applied when the report is published. For example only display risks that have a Pre-mitigation risk score of greater than or equal to 10.

Report Builder: Tabular Layout - Post-mitigation score greater than 10

Layout | Filter | Tabular Fields

Logic	Field	Operator	Value
	RISK..Post-mitigation Score	>=	10

"And" where ANY

Logic	Field	Operator	Value

Build Report

Figure: Filter tab in the Report Builder that allows the contents of the report to be limited to the filtered risks.

Printing reports

Reports are created in html and can be viewed and printed from your browser (e.g. Internet Explorer).


For some browsers, e.g. Microsoft Internet Explorer, it is necessary to turn on the colors and pictures before they will print. To do this in Internet Explorer go to the Internet Options and check the option "Print background colors and images".

Tools | Internet Options | Advanced | Printing | Print background colors and images.

13 Risk Register - Import and Export

Export Risk Register Data

The risk data and impact mappings can all be exported as an MS Excel (.xls), XML file or MS Access database file (.mdb).

 Microsoft Office 2003 and 2007 are both supported.

XML and XLS export

- *Risk | Risk Register*
- *File | Export Register As...*
- Choose to export as:
 - Risk Register data (.rrx)
 - Microsoft Office Excel File (.xls)
- Click *Save*.

 Risk Register data (.rrx) saves in XML

MS Access database file (.mdb)

- *Risk | Risk Register*
- *File | Export to Database...*
- Choose file name and click *Save*.

Import Risk Register data

Risk data and impact mappings can be imported.

- *Risk | Risk Register.*
- *File | Import Risk Register.*
- Choose to import:
 - Risk Register (.rrx)
 - Excel Risk Register (.xls)
 - 7.81 Risk Register (*.txt)
 - ARM Risk Register (.xls)
- Click *Open*.

14 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

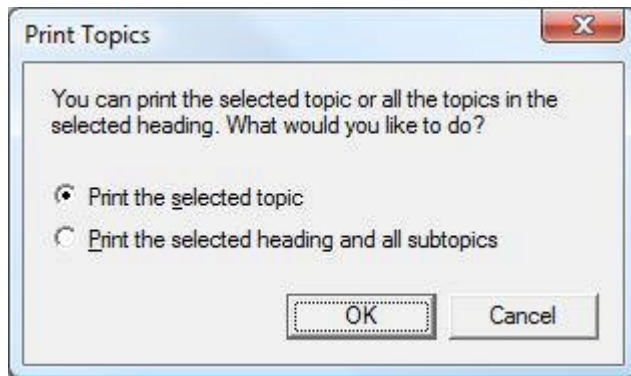
Printing an individual help topic

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'.

