RiskyProject Professional 7.2

Project Risk Management Software

User's Guide

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Chapter 1: Introduction to RiskyProject

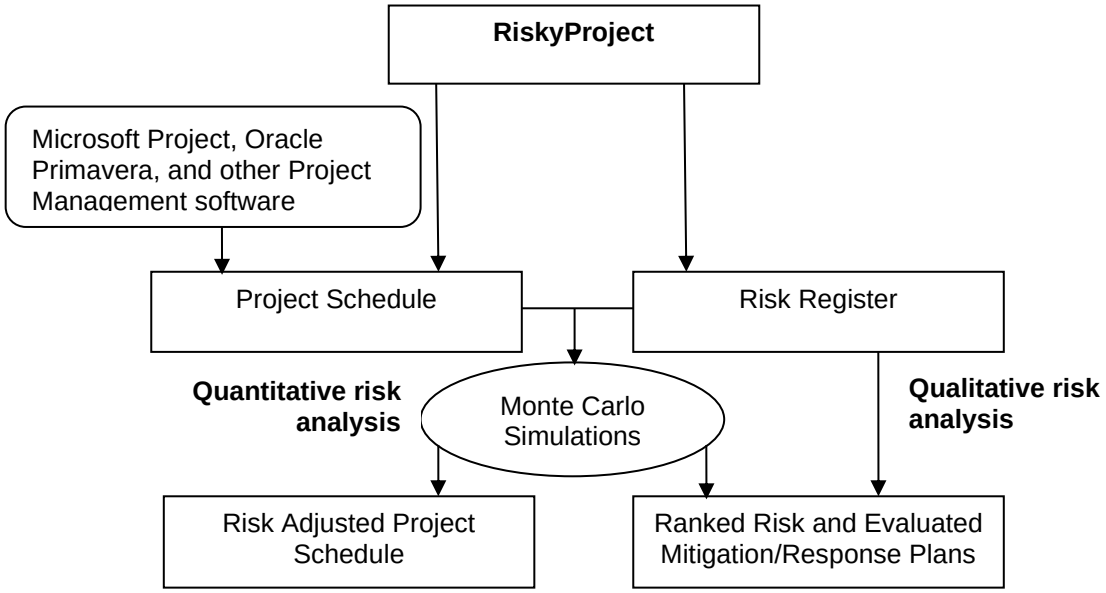
What is RiskyProject?

RiskyProject is advanced project risk management software with integrated risk analysis. Most projects contain many uncertain parameters: task duration, start and finish times, uncertainties in costs and resources, uncertainties in quality, safety, technology, and others. RiskyProject analyzes project schedules with risks and uncertainties, calculates the chance that projects will be completed within a given period of time and budget, ranks risks, and presents the results in formats that are easy to read and understand.

RiskyProject also helps you to perform project risk management:

- identify project risks
- rank risks
- identify mitigation and response plans
- manage risk properties, including descriptions, probabilities and impacts, costs associated with risks, mitigation strategies, and all other information about risks
- facilitate risk reviews, opening and closing risks, conversion of risks to issues and lessons learned
- provide comprehensive risk reporting, save risk history

RiskyProject performs both qualitative and quantitative risk analysis. If both the risk register and project schedule are populated, RiskyProject performs quantitative risk analysis. If there is no project data (cost or schedule), RiskyProject performs qualitative risks analysis.



RiskyProject seamlessly integrates with Microsoft Project or can run as a standalone application. RiskyProject integrates with other project management software such as Oracle Primavera.

RiskyProject employs Event Chain Methodology to analyze project uncertainties defined by multiple risks (events). An example of an event would be a task delay due to the changes in requirements. In many cases, one event can cause another event or multiple events, which can

significantly affect the project schedule. RiskyProject recalculates the project schedule multiple times to compute the distribution of possible outcomes and probabilities of meeting specific objectives.

Who should use RiskyProject?

RiskyProject performs two major functions:

- Risk Management: identification, recording, ranking, and reviewing risks, mitigation and response plans, and all associated risk information.
- Risk Analysis: determining how risks might affect your project.

RiskyProject is beneficial for managers who want to perform risk analysis on their projects without specialist expertise or training in risk analysis. RiskyProject allows managers to quickly analyze a complex project schedule and associated costs, with multiple tasks and dependencies. It is a user-friendly system with an intuitive interface, which hides its advanced mathematical calculations and helps managers make informed decisions.

RiskyProject is useful for managers of research and development projects, including software projects, who run projects with multiple uncertainties using an iterative development process. It is a widely accepted fact that project management best practices and processes emphasize the importance of iterative development and risk tracking, which represents the cornerstone of the RiskyProject workflow.

RiskyProject is used in many industries, including aerospace and defense, IT, engineering and construction, manufacturing, agriculture, pharmaceutical, energy, and mining.

New Features of RiskyProject 7.2

RiskyProject 7.2 is a major software release. It includes multiple improvements for both its project risk management and risk analysis capabilities. The following features are implemented in both desktop version of RiskyProject Professional and Enterprise version:

1. **New Risk Dashboard**: present hundreds of different key performance indicators (KPIs) and charts related to your risks with a fully customizable Risk Dashboard. Dashboards can present data in a variety of ways including charts - line, area, pie, scatter, bar (including frequency histogram), meters, and risk matrixes. You can place them in different areas on the dashboard, and adjust their size, colors, and other properties. Dashboards can be annotated using text, lines, and images. Dashboards can be printed or exported.
2. **Re-Designed Project Dashboard**: The Project Dashboard is a now a customizable view and includes information about projects including results of Monte Carlo simulation, multiple KPIs and charts.
3. **Risk Form**: a fully customizable form to enter risk properties, as well risk probabilities and impacts. You can create any risk properties or select them from the list of predefined properties. Then you can drop them on the form. The form can be annotated with lines and text. Once you design a form it can be used for all future projects.
4. **Inserting Subprojects with Results of Simulations**: you can now create a Summary or Master project schedule using the simulation results of subprojects. In these summary projects, the results of one or more subprojects (statistical results of a Monte Carlo simulation) are inserted as a task(s). This process allows you to analyze the results of projects and also use these analyses, as part of a larger summary project. This significantly reduces the calculation time and helps to simplify the management of large projects or programs.
5. **Using Empirical Data**: if you have empirical data for task duration and cost in Excel or text format, you can use it to generate a custom statistical distribution. You can import results of analysis, performed by other software or use project control data from similar projects or activities.
6. **Risk Mitigation Workflow Improvements**:
    A. **Mitigation plans can now be linked to tasks** or a group of tasks within a project schedule. This linking will read the schedule data into the mitigation plan to calculate costs and planned finish and actuals. You can now manage groups of tasks as mitigation activities. Also, mitigation plans can now have multiple custom fields, which you can use as mitigation plan properties.
    B. **Mitigation burndown structure.** New Mitigation Assignment View helps define and edit mitigation plan assignment to different risks in one view. It shows how risk probability and impact will reduce over time due to mitigation efforts. Mitigation plan assignment now includes information of risk probabilities and impacts for individual categories, such as schedule, cost, technology, etc. In Mitigation Plan Assignment View you can view and modify dates, description, and probabilities and impacts associated with different mitigation steps for all risks.

C. **Import of risk mitigation data from Excel**: in addition to importing Risks Register from Excel, you can now import mitigation plans and as well regular mitigation status update information from Excel. Mapping to Excel fields and RiskyProject properties can be saved for importing of different Excel file with similar structure.

7. **Most Likely Duration and Fixed Cost**: define most likely values for duration and fixed cost. While base duration and fixed cost are deterministic values from original project schedule, most likely duration and fixed cost are distribution parameters. Most likely values are now used in uncertainty bands.
8. **Low and High Cost Results Charts**: present low and high results in the Cost Analysis chart.
9. **Schedule Data Import and Filtering**: filter list of tasks or resources based on certain condition. It helps in managing large schedule. Also you can import more data fields from Microsoft Project and Primavera.
10. **Multiple Risk Response Plans**: define any number of risk response plans assigned to one risk.
11. **Improved Beta Pert Distribution**: The new algorithm better represents uncertainties in the low and high boundaries of the distribution.
12. **Improved User Interface**: Usability has undergone multiple improvements, including introduction of new RiskyProject workflow bar. A number of dialog boxes that have been re-designed for better usability. This also includes a new Risk Trend view and improvements to other views.
13. **Improved Calculation and Data Presentation Performance**: Monte Carlo simulation performance and refresh rate of views, charts, and diagrams has been enhanced.

Exclusive Features for RiskyProject Enterprise

14. **Organizational Units**: Define multiple organizational units, subunits, and security groups. The user can be assigned to different organizational units or security groups. Assign and restrict risks to specific organizational units. Organizational units are properties of risks. It is now possible to filter risk register and any risk reports including risk matrix and risk trend charts based on organizational units.
15. **Integration with Active Directory**: RiskyProject Enterprise can now access Active Directory for information about organizational units, security groups and user and authenticate user based on Active Directory.
16. **Multiple Risk Matrixes**: RiskyProject Enterprise can now allow you to define different risk matrixes for projects and organizational units. Each risk matrix has its own unique name.
17. **Risk Mitigation Projects**: Designate a project within your portfolio as risk mitigation project for specific risk. Such project may also have its own risks and uncertainties. It helps to choose most cost-effective risk mitigation strategy and manage risk mitigation activities for complete portfolio.

For more information about new RiskyProject Enterprise feature, please see the *RiskyProject Enterprise User Guide*.

Qualitative vs. Quantitative Risk Analysis

RiskyProject performs both qualitative and quantitative risk analysis.

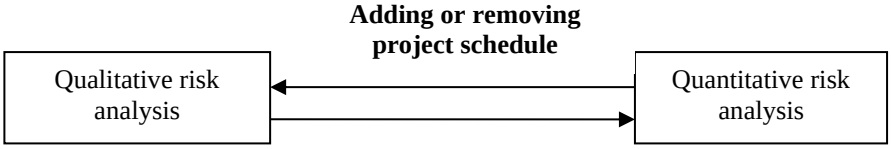
A typical **qualitative risk analysis** workflow is used to:

1. Identify risks and add risks to the risk register.
2. Define risk properties, probabilities, and outcomes.
3. Analyze risks and prioritize risks.
4. Assign mitigation and/or response plans.
5. Update risk properties, probabilities, outcomes as necessary.
6. Review status and properties of the risk and report information about risks.

A typical **quantitative risk analysis** workflow is used to:

1. Create a project schedule.
2. Add risks, uncertainties, and other risk-related information.
3. Run a simulation, perform an analysis and generate a report of the results.
4. Update risks and uncertainties as necessary.
5. During project execution, perform project tracking with risks and uncertainties at key phases or milestones to update forecasts.
6. Report results

If you do not have a schedule for your project, RiskyProject will only perform qualitative risk analysis. However, if you add a schedule by either adding activities or importing a schedule, RiskyProject automatically switches to quantitative analysis. You may switch between qualitative and quantitative analysis by adding or removing a project schedule.



Due to the nature of qualitative and quantitative analysis the results can be different even with the same risks, particularly for schedule-related risks affecting project duration and cost.

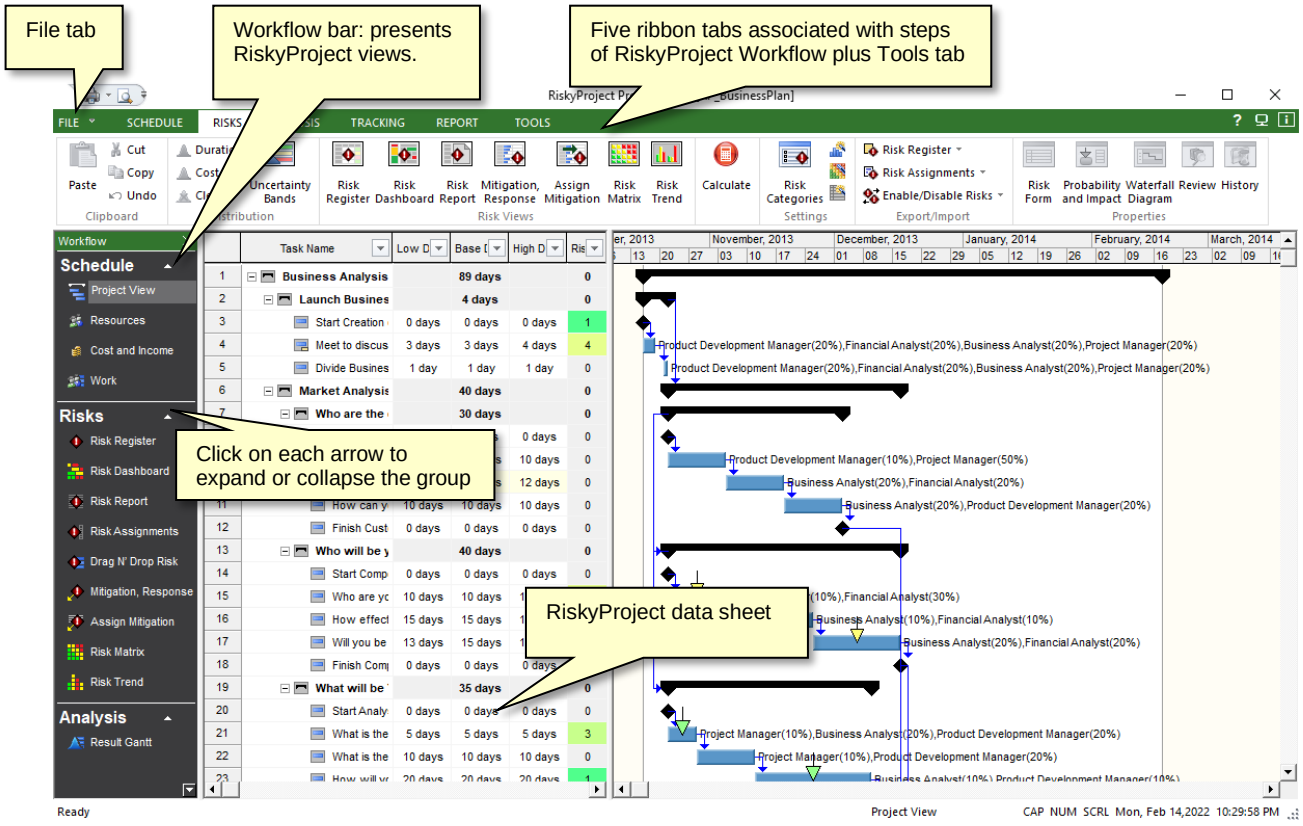
RiskyProject Interface

RiskyProject workflow includes five steps:

1. **Schedule**: Enter or import Schedule, Resources, Cost and Income, and Work
2. **Risks**: includes a Risk Register and Risk Dashboard, Assign risks to tasks and resources, Mitigation/Response plan depository; Risk Matrix and Risk Trend charts
3. **Analysis**: includes a Risk-Adjusted Schedule, Summary of risk analysis results, Cost and Cash flow analysis results, Risk Chart, Success rate and Crucial Tasks
4. **Tracking**: includes a Tracking Gantt Chart and linear Tracking Chart
5. **Reporting**: includes various hard-coded and customizable Risk Reports

Each step has multiple views which are used to enter data or to present the result of analysis. The views are shown in two places: in the ribbon the top and in the workflow bar on the left.

You can open and close multiple project schedules during one session in RiskyProject.



Application Look

You may change the color and style of title bars, toolbars, and status bars, as well as change the theme for the datasheets. The theme is used for any grid including grids inside dialog boxes. Before changing the application look, close all active projects. After you have changed the application look, restart RiskyProject to enable the changes.

To change the application look

1. Click the **Tools** tab.
2. In the **Resources and Settings** group, click **Application Look**.

Customizing Workflow Bar

You may enable and disable views from the Workflow bar. By default some views, including Assign Mitigation and Risk Status are disabled.

To customize Workflow Bar:

1. Click the **Tools** tab.
2. In the **Resources and Settings** group, click **Customize Workflow**.
3. In **Enable/Disable Views from** Workflow Bar dialog select views phases you wish to Enable or Disable.

You can also right click on Workflow bar to be presented with the same dialog.

RiskyProject Data Sheets

All RiskyProject views, except for the Project Summary view and Risk and Project Dashboards contain data sheets. Data sheets are used to enter and present data in a grid format. Grids are also used in some dialog boxes. All data sheets have similar features.

Data sheets are used to display task information, resources, risks, and results of sensitivity analysis. Data sheets are composed of columns and rows. Each column has specific properties, which represent a specific data type. For example, resource name, resource type, etc. You can customize data sheets to display the columns in any order and any with a title in the column header. See the appendix for a full description of each field.

Modifying data sheets

You can modify all the RiskyProject views by inserting, modifying, or hiding columns depending on the type of information you want to view.

1. Open a view and right-click on a column header.
2. From the shortcut menu, choose how you want to modify the column:
   - Hide
   - Insert Column Before or After
   - Modify: Change field type, Title, Title and Data alignment, Width
   - Save Column Layout: current column layout will be saved in the registry for all new projects
   - Restore Default Column Layout: restore column layout predefined in RiskyProject

- This modification is saved in the RiskyProject data file associated with the particular project. Therefore, the next time you open the project, you will see your column modifications. This way you can create a customized data sheet for each view.
- Modifications to data sheets are specific to each view. For example, if you insert a column into the Project View, it will not be reflected in Result Gantt View.

- You cannot hide or modify IDs.
- In the Risk Register view, you can extend the height of rows, add headers that span multiple columns above regular columns and adjust the width of columns based on maximum width of information contained.

Copying, cutting and pasting selected rows

You can copy, cut, and paste selected items in each data sheet except for the results of sensitivity analysis.

1. Select one or multiple rows in a data sheet.
2. Click the **Schedule** tab. In the **Clipboard** group, click **Cut** or **Copy.**
3. Open the data sheet in which you want to paste the data.
4. Select the row in which you want to paste the data.
5. Right-click and click **Paste.**

- The maximum number of rows in RiskyProject is 20,000. You cannot paste items beyond this limit. However, if you import a project from other project management software, the maximum number of tasks will be increased so it can accommodate all tasks in the original project schedule.
- You can paste data *only* to compatible data sheets (e.g. tasks can be pasted to the data sheets containing tasks, and risks can be pasted to data sheets containing risks).
- You cannot paste data copied or cut from another document with the exception of risks.

Inserting and deleting items

You can delete and insert items from, or to, any data sheet except for the results of sensitivity analysis. The quickest way to insert or delete items is to use the Insert and Delete buttons located on the Format toolbar.

To insert items:

1. Select an item or multiple items. New items will be inserted above the uppermost selected item. The number of items to be inserted equals the number items you have selected.
2. Click the **Schedule** tab. In the **Format** group, click the **Insert Item** button.

You can also use right-click on the left column in each data sheet that displays IDs, and use the dropdown menu to insert and delete selected items.

Saving column layout

After you modify a column layout, you can save it in the system registry for all new projects created on your computer. You save a column layout by following these steps:

1. Go to **Schedule** and Click on **Project Options** in Settings and Options Group
2. Go to **View** tab
3. Click on **Set Default Column Layout**
4. You can restore the predefined layout of columns for all views by clicking on **Restore Default Column Layout**

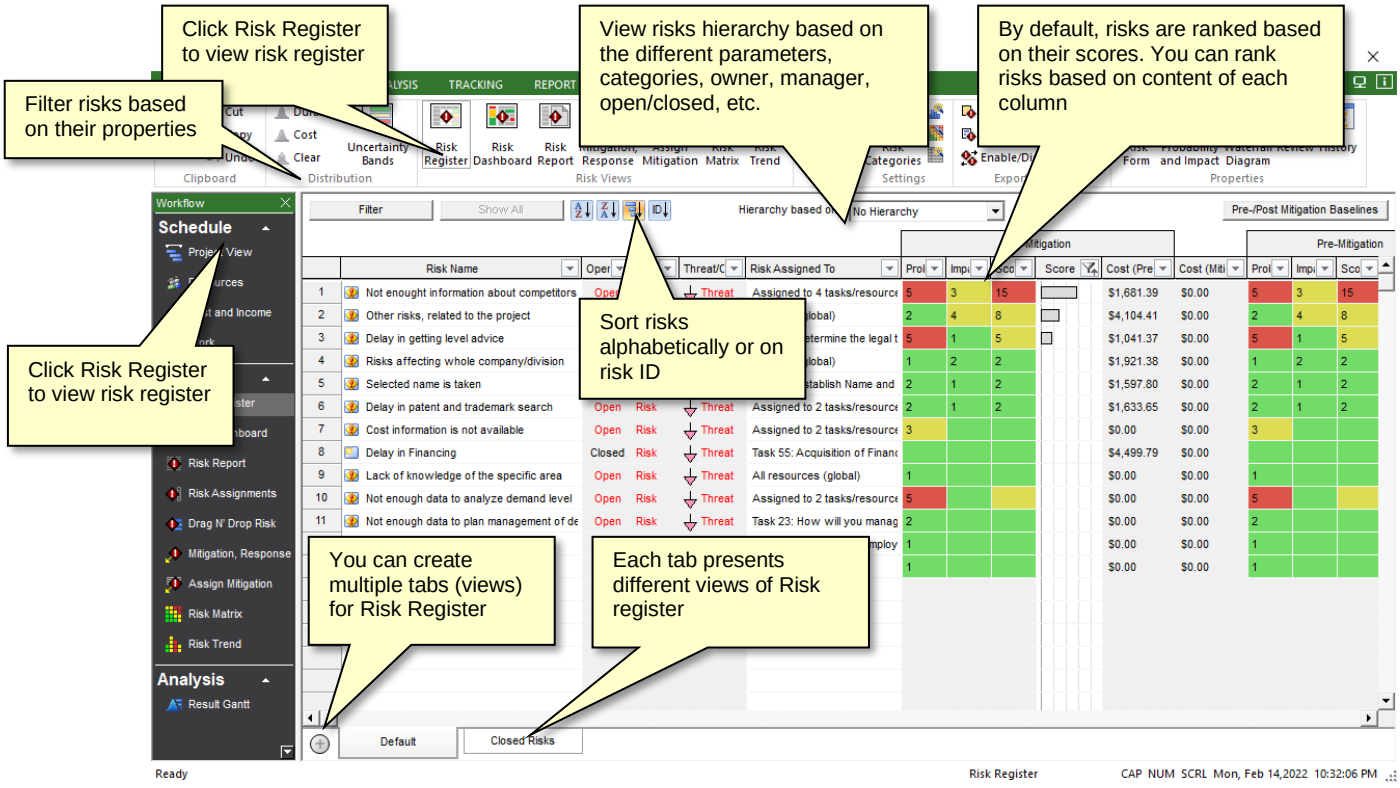
Alternatively, you can right-click on any column in each view and click **Save Column Layout** or **Restore Default Column Layout** from the drop-down menu.

Chapter 2: Qualitative Risk Analysis and Management

Risks in RiskyProject

Risk Register

The Risk Register is a set of all the project risks. You can enter risks in either the **Risk Register** view:

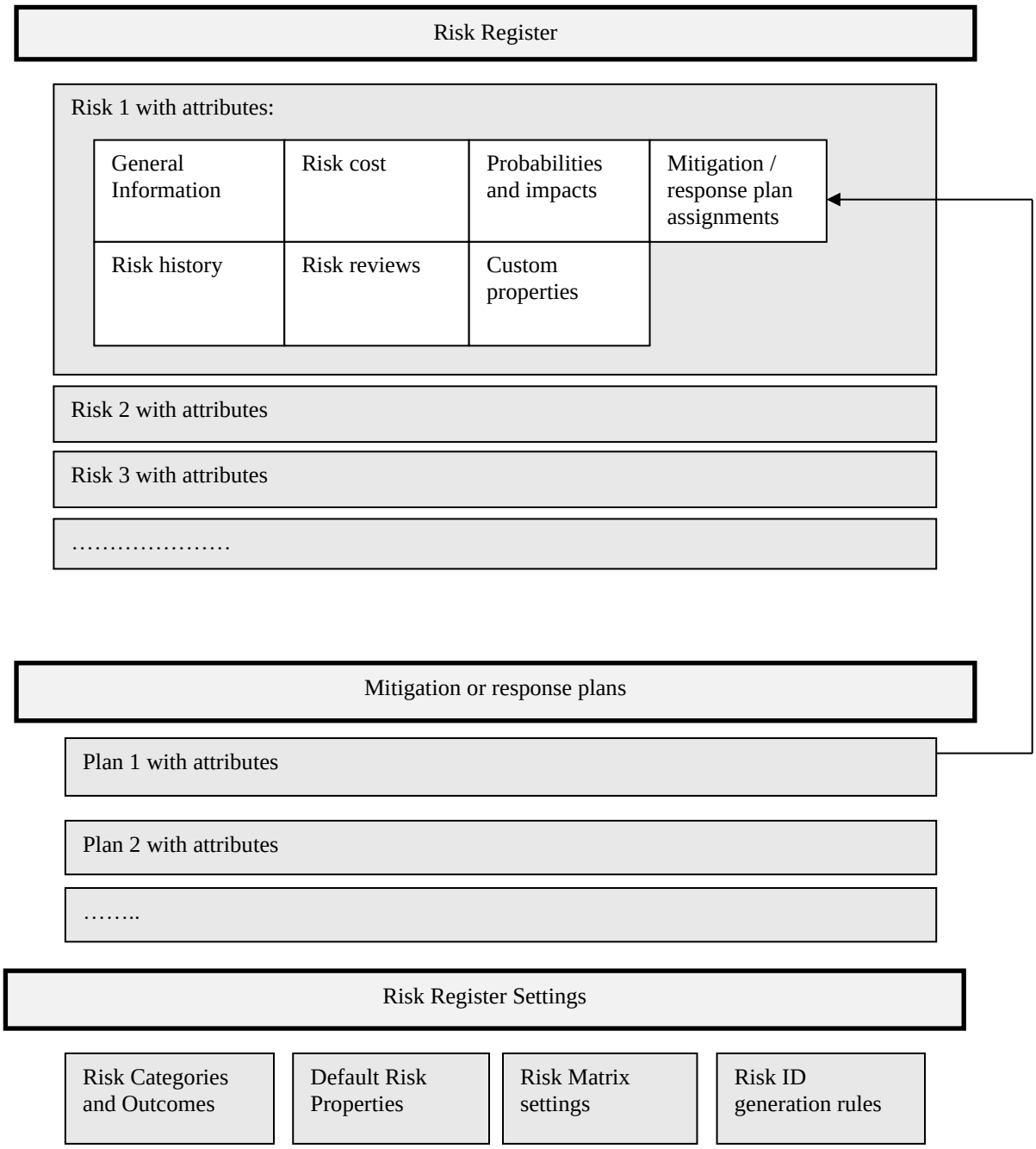


Use the Risk Register to:

1. View risks with their attributes such as probabilities, impacts, scores, and properties.
2. Create a risk register hierarchy based on:
   - Risk categories
   - Open/Closed risks
   - Risk/Issues/Lessons Learned
   - Risks assigned to managers
   - Risks assigned to owners
   - Threat mitigation or opportunity mitigation strategies
   - Assigned/Unassigned Risks (active or inactive)
   - Hidden and Visible risks (available in RiskyProject Enterprise only, see *RiskyProject Enterprise User Guide*)
3. Rank risks based on risk score.
4. Sort risks alphabetically or using risk IDs.

5. Filter risks based on risk properties: Open, Closed, Risk, Issue, or Lessons Learned.

Data for the Risk Register can be subdivided into three categories: risk registry, risk mitigation/response plans, and settings:

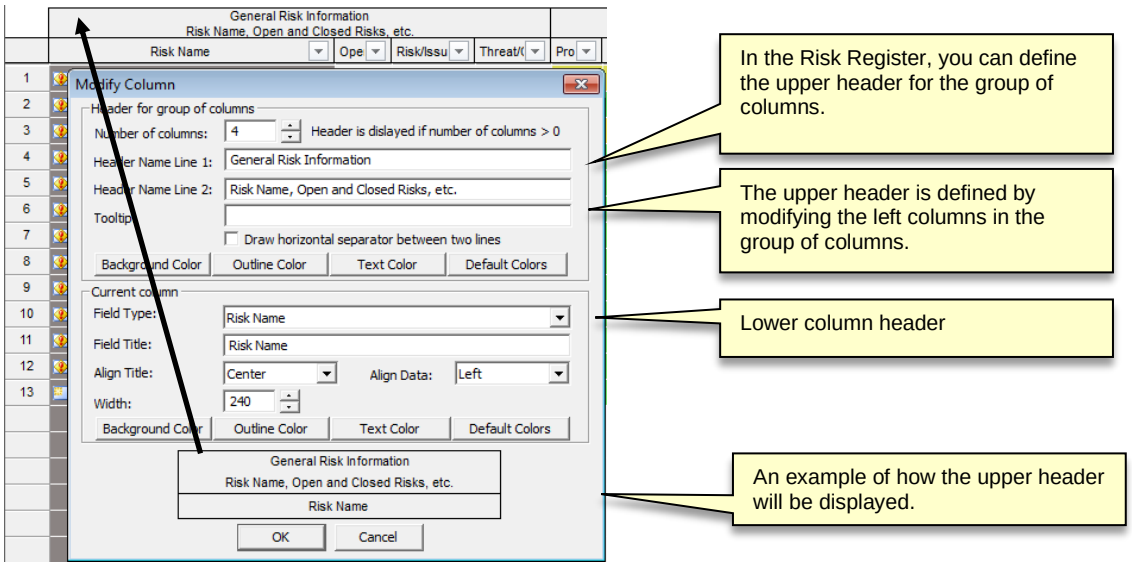


Defining columns for Risk Register

You can modify the Risk Register by inserting, modifying or hiding columns depending on the type of information you would like to view. The Risk Register view allows you to define the

upper header for the group of columns. The upper header can have two rows of text and a tooltip. It can have different background colors, outline colors and text colors. There are two pre-defined upper headers: Pre-mitigation and Post-mitigation.

1. Open the Risk Register and right-click on a column header.
2. From the shortcut menu, choose how you want to modify the column:
   - Hide
   - Insert Column Before or After
   - Modify: field type, field title, title and data alignment, width, upper and lower headers text and color, and number of columns in the group with the same upper header.



Adding risks to the Risk Register

1. Click the **Risks** tab. On the **Risk Views** group, click the **Risk Register.**
2. On the Risk Register, click an empty row.
3. Enter a unique name for the risk. The risk is now added to the register.

Deleting risks from the Risk Register

1. Click the **Risks** tab. On the **Schedule Views** group, click the **Risk Register.**
2. Select the risk you want to delete. You can select a single risk or multiple risks.
3. Right-click on the Risk ID and choose **Delete Risk** from the shortcut menu.

Updating risk properties for individual risks

To modify the risk properties using the Risk Register:

1. Open the Risk Register.
2. Click on the risk properties and make desired changes.

Updating risk properties for a group of risks

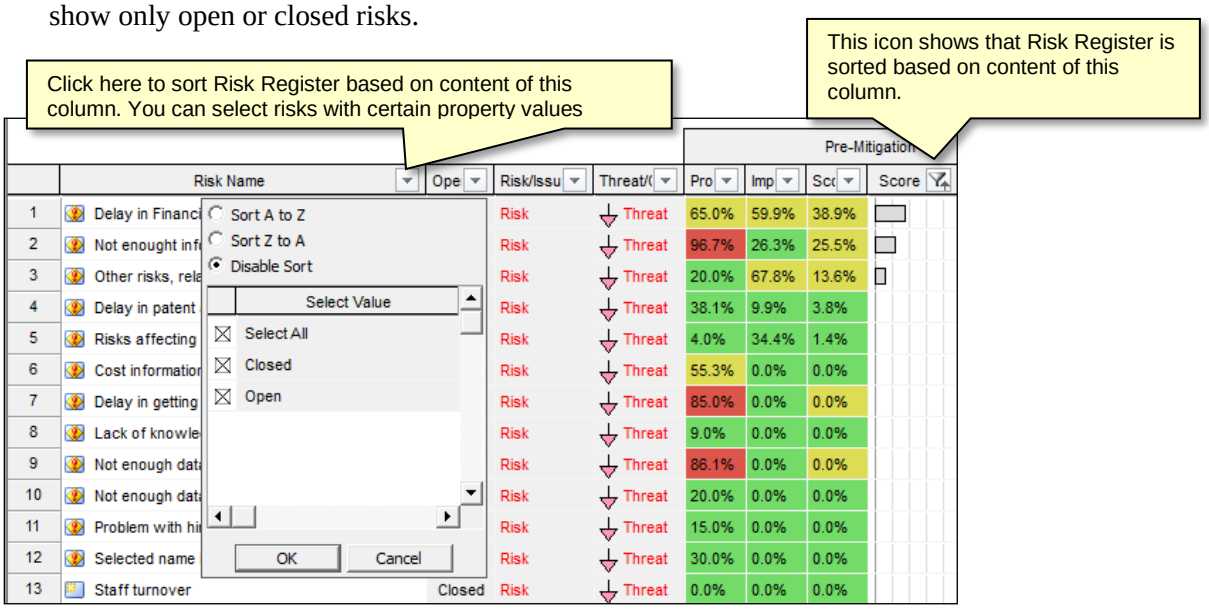
You can define the same risk properties for a group of risks at the same time.

1. Open the Risk Register.
2. Select the risks to which you would like to add properties.
3. Right-click on the risk **ID** and select **Risk Properties**.
4. For each property, add a value as required. If properties are different for the selected risks, you will be shown with ********.

Filtering and sorting risks using the Risk Register

The Risk Register offers powerful tools for filtering and sorting risks:

- Filter and sort the Risk Register based on the content of each column. To filter or sort, click on the box with the arrow to the right of the column name. The Sort dialog box opens. You can sort the alphabetically or select risks with certain property values, e.g. show only open or closed risks.



- Find a risk based on the actual value of a risk property using the Find Risk dialog (Filter button) at the bottom of the Risk Register. You may combine different risk properties using AND or OR.
- Sort the risk register alphabetically using and buttons or based on pre-mitigation risk score using the button. You may also sort the Risk Register based on Risk ID.

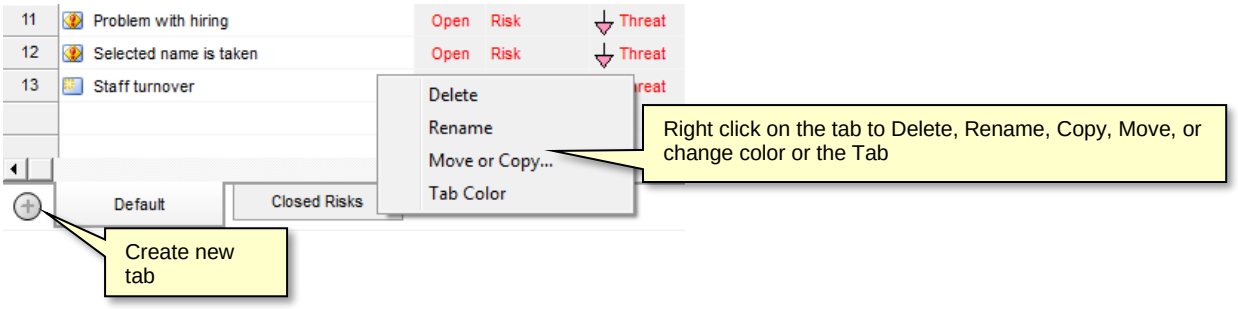
You can filter risks that affect different risk categories. Risks can affect:

- duration
- finish time
- cost
- success rate
- non-schedule risk categories.

RiskyProject calculates the combined impact of risk on all risk categories. Pre-mitigation and post-mitigation risk impact, probability and score are displayed for selected risk categories.

Use tabs to create multiple views of Risk Register

You can create multiple tabs to create different views of the Risk Register. These tabs are shown at the bottom of risk register. Each view may have different set of columns, different headers, or different sorting and filtering settings. For example, in one tab you can show risk names and description sorted alphabetically. In another tab, you can show risk probabilities, impacts, and scored sorted based on risk score. This way you can easily switch between different views of the risk properties. In addition, these views can be used to generate multiple risk register reports.



The Risk Register tab settings are saved for each project. You can also save the current tab settings as the default for all new projects:

- Right-click on any header
- Click on **Save Column Layout**

- With the Risk Register views you can rename risks and copy risk information to the clipboard. You may also copy and paste risks inside the Risk Register.
- You can export the complete risk register or selected risks to Excel by click on **File** > **Export** > **Microsoft Excel**

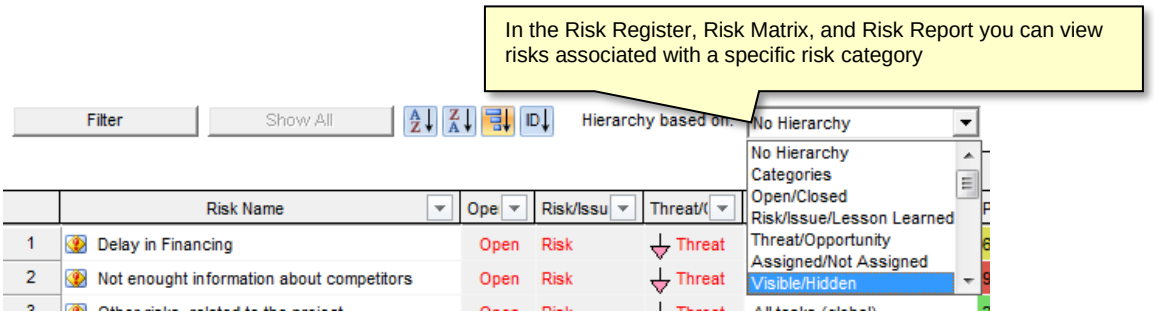
About Risk Categories, Probabilities and Impacts

Risk Categories

Risk Categories are a group of risk outcomes. RiskyProject calculates risk probabilities, impacts and scores for each category. The default risk categories are:

- Duration
- Cost
- Safety
- Environment
- Legal
- Performance
- Technology

RiskyProject calculates the score and rank for all risks in each risk category. You can view risk scores and rankings for each risk category or for all categories.



You can customize the risk categories in the Risk Categories dialog box. For more information about customizing risk categories, read “Managing Risk Categories and Outcomes”**.**

Risk Outcome Types

A Risk Outcome Type is the result if a risk occurs. While every risk category must have a least one outcome, they can have several. For example, one of the default risk categories is Legal. You may want to further define the outcome types as Litigation Risk, International Legal Risk, etc.

You can customize the set of outcome types using the Risk Categories dialog box.

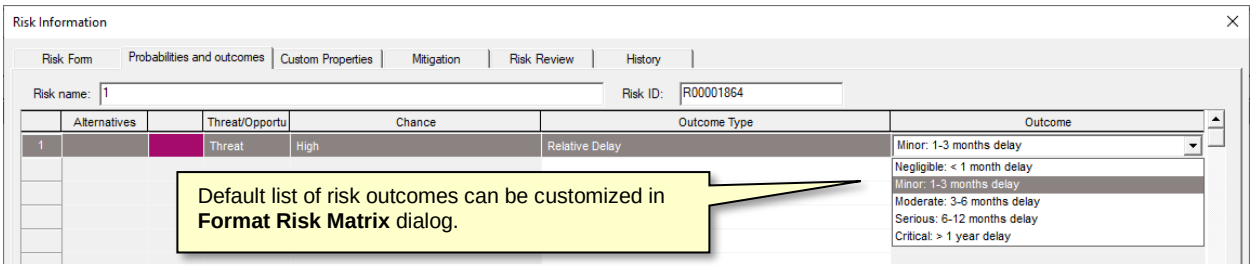
The set of risk outcome types are different for qualitative and quantitative risk analysis. For quantitative risk analysis, RiskyProject automatically adds a number of schedule-specific risk outcomes, such as restart task, fixed cost increase, etc.

Risk Probability and Chance

Risk Probability is the calculated chance that an event will occur. You can view risk probability in the **Risk Matrix**, **Risk Register**, and other views and dialog boxes. Risk Chance is the input parameter for risk probability. Risk chance (input parameter) and risk probability (calculated attribute) can be different; particularly when a risk has multiple mutually exclusive alternatives as risk, chance is an input parameter for each alternative. In these cases, Risk probability is calculated based on the risk chance for each mutually exclusive alternative.

Risk Outcome

Risk Outcomes indicate the severity of a risk event for the specific risk category. You need to enter risk outcomes when you define risk chance and outcome type. For example, here are the default risk outcomes for the risk category **Schedule**:



Outcome types can be a label (e.g. Critical > 1 year delay) or a percentage (e.g. 5%), or a combination of both. You can set how you want to enter and view risk outcomes in the **Format**

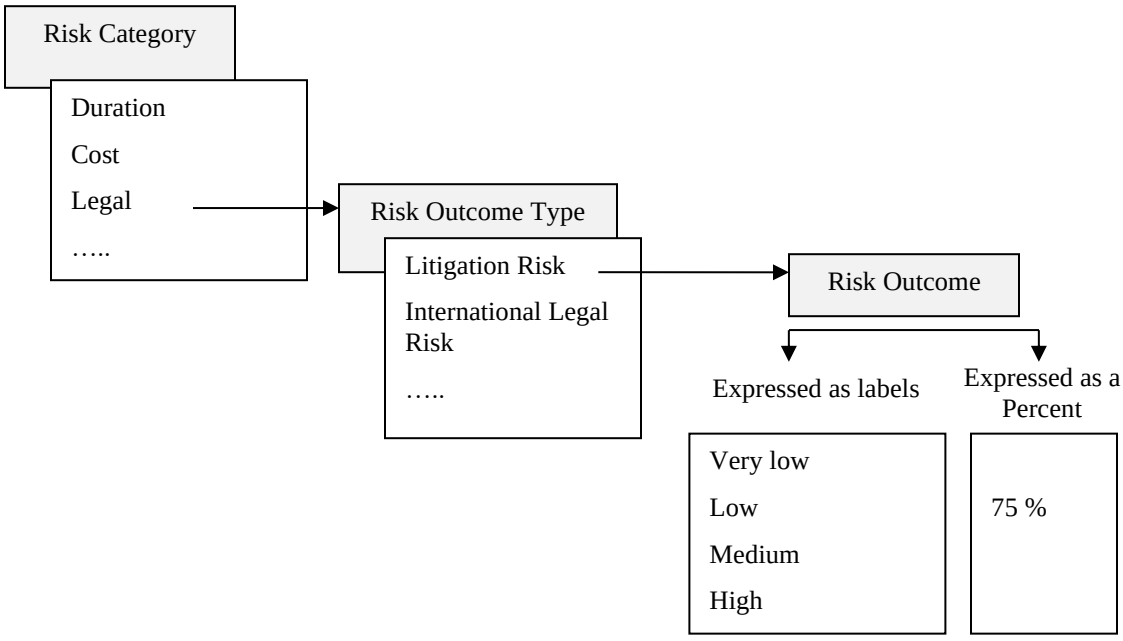
Risk Matrix dialog box. Each label is associated with percentage, which is the midpoint of the interval for each label:

Label	Interval	Midpoint
Negligible: < 1 month delay	From 0% to 20%	10%
Minor: 1-3 month delay	From 20% to 40%	30%
Moderate: 3-6 months delay	From 40% to 60%	50%
Serious: 6-12 months delay	From 60% to 80%	70%
Critical: > 1 year delay	From 80% to 100%	90%

When you define outcome types as a percentage, you can enter it as any number from 0% to 100%. In this scenario, it will be associated with a label based on the interval to which this percentage belongs. For example, 76%, corresponds with the "Serious: 6-12 months delay" outcome type.

In RiskyProject, risk outcome types can be probabilistic. You can define a statistical distribution for outcome types and perform Monte Carlo simulation even it is part of qualitative risk analysis. For more information about probabilistic risk outcome types, read "Uncertainties in Risk Outcomes".

The diagram below shows the relationship between risk categories, risk outcome types, and risk outcomes.



Mutually exclusive alternatives

Mutually exclusive alternatives are used to calculate alternate outcome types for the same risk event that cannot occur at the same time. An alternative risk is similar to using a Boolean "OR" statement. Only one risk alternative can occur at the same time. For example, if you have a fire risk, the fire could be minor or major each with different outcomes. They are the same risk, but unlike other risk events, these alternatives cannot occur at the same time.

In this example, the risk Fire has two alternatives:

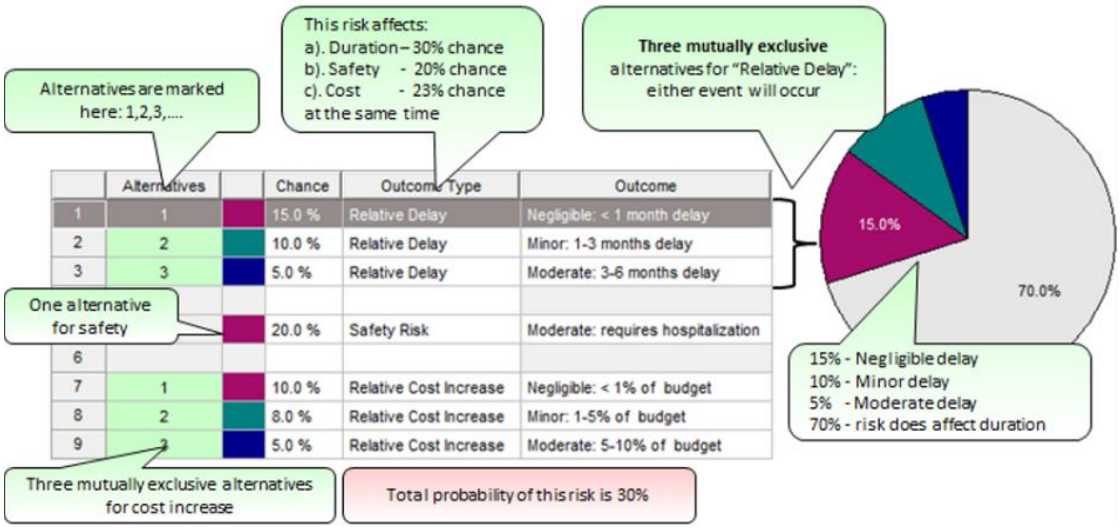
Chance	Outcome Type	Outcome
10%	Relative delay	Negligible: < 1 month
2%	Relative delay	Low: < 1-3 months

When the simulations are run, there is a 12% chance that the risk Fire will occur. 10% of the time the outcome of the minor fire will be calculated, while 2% of the time the outcome of a major fire is calculated, but they are never calculated during the same simulation.

Mutually exclusive alternatives must:

- have the same name,
- not be separated by empty rows, and
- belong to the same category. For example, if you have the same risk "Change in requirements" with outcomes Reduce Quality and Fixed Delay, these outcomes will not be mutually exclusive alternatives as they are different risk categories that have different impacts.

The diagram below illustrates how mutually exclusive alternatives are assigned:



Threats and Opportunities

Risks can be threats, opportunities or both. Threats and opportunities are defined for risk assignment depending on results of the risk outcome. Negative risk outcomes mean opportunities.

Example 1:

risk: Change Requirements

Outcome: Fixed Delay

Result: 2 days

This is a threat

Example 2:

risk: Change of technology

Outcome: Delay in technology introduction

Result: -10% Low

This is an opportunity: a negative number indicates that this is acceleration rather than a delay of the technology introduction

Example 3:

risk: Chance of supplier

Outcome: fixed cost increase

Result for mutually exclusive alternative 1: $30,000

Result for mutually exclusive alternative 2: -$20,000

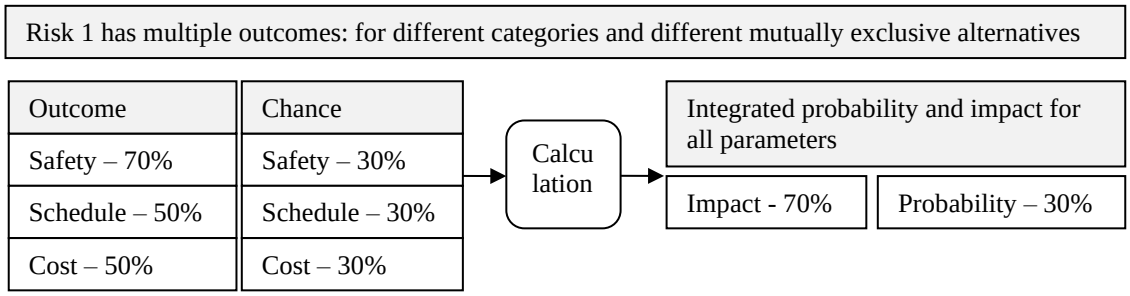
This is both a threat and an opportunity depending upon the supplier.

You can have different sets of labels for threats and opportunities for a risk category. For example, for the risk category Schedule, a threat outcome type can be "Critical > 1 year delay", for an opportunity it can be "Critical > 1 year acceleration". If you want to enter opportunities, you need to enter a negative percentage (e.g. -25%) as the outcome type.

Risk Impact

Risk impact is the calculated result of the risk event. Risk outcome (input parameter) and risk impact (calculated attribute) can be different, particularly when a risk has multiple mutually exclusive alternatives, in which case the risk outcome is a parameter of each alternative. Risk impact is calculated based on the risk chance for each alternative.

The diagram below shows the difference between risk chances and outcomes (input parameters) and risk probabilities and impacts (output parameters):



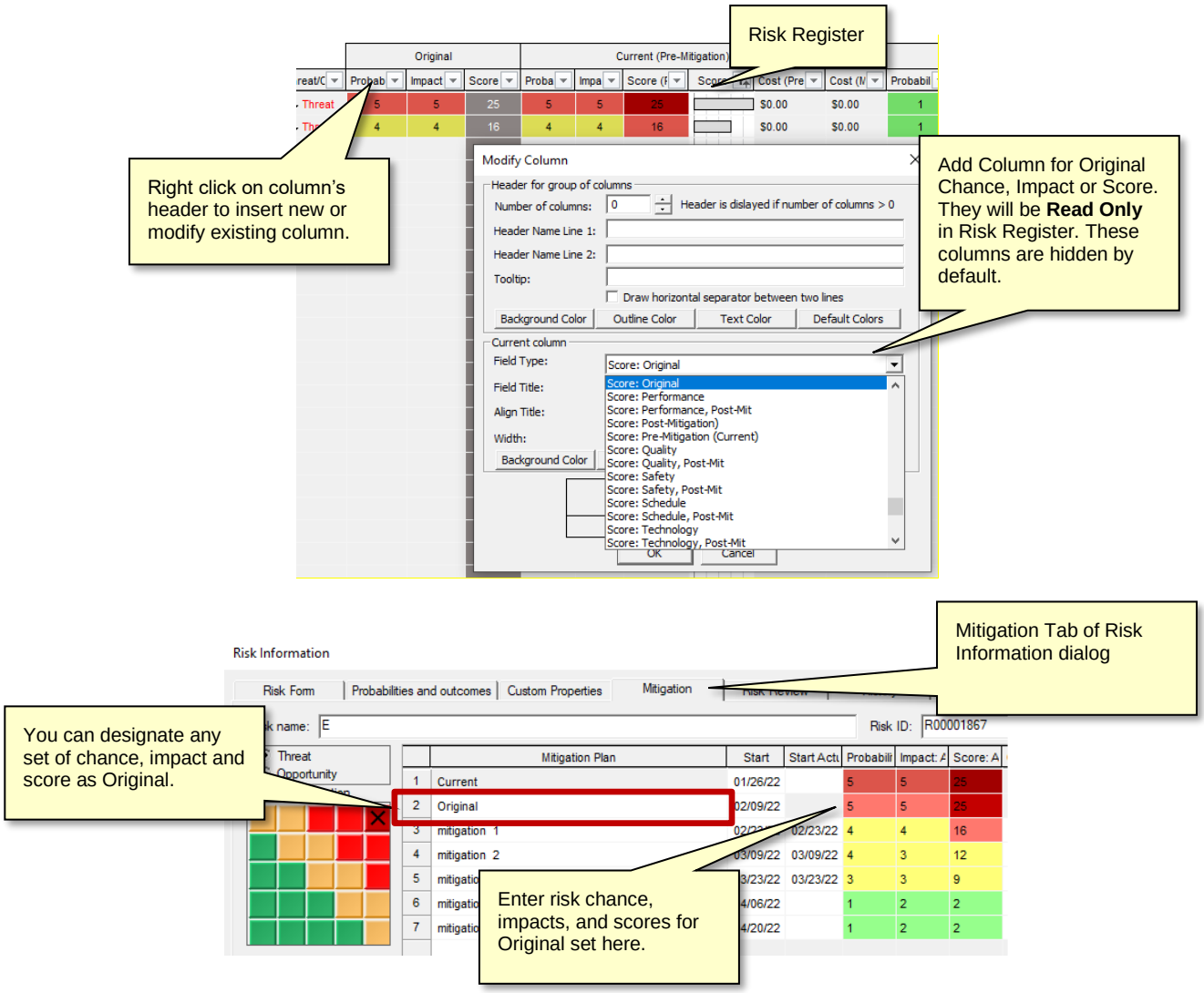
Risk Score

Risk score is a calculated parameter that equals probability multiplied by impact. Risk score is calculated for each risk category as well as all risk categories.

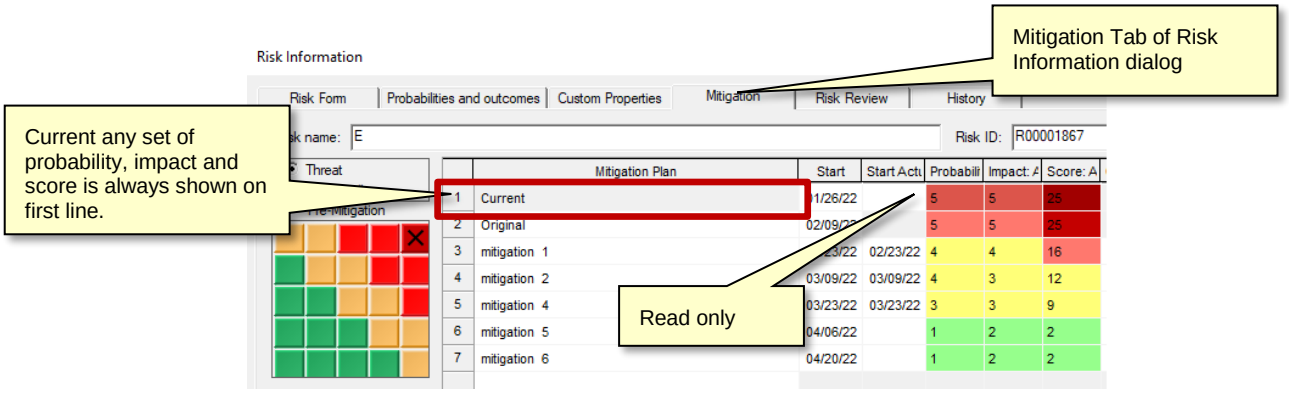
Original, Pre-, and Post-Mitigation Probabilities, Impacts and Scores

RiskyProject calculates three sets of probabilities, impacts and scores for each risk category as well as combined for all categories. You can view these sets in the Risk Register, Mitigation Assignment View, and Mitigation tab of Risk Information Dialog.

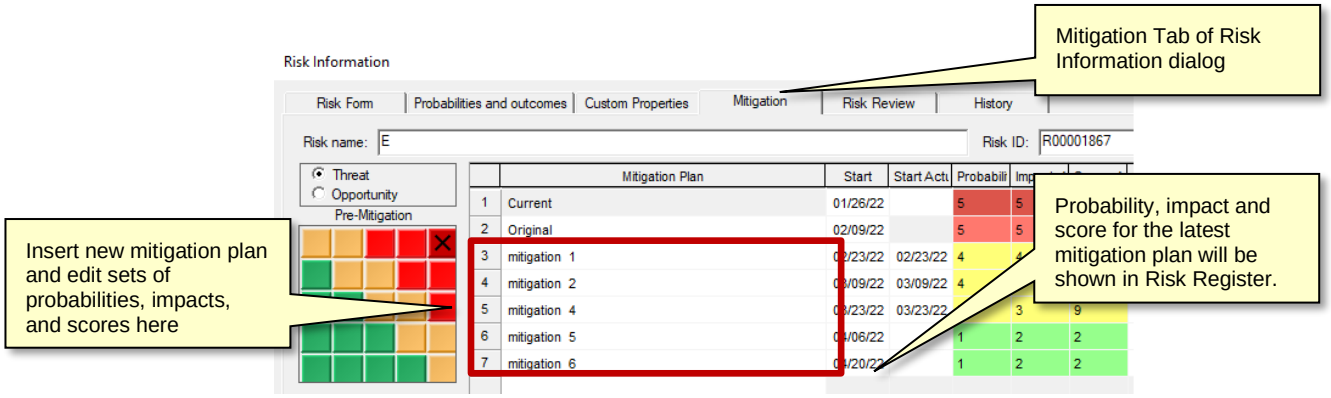
1. **Original**: when risk chance and outcome are defined. This information can be entered in the list of risk mitigation plans in Mitigation tab of Risk Information Dialog. Original chance, outcome and scores can be shown in the Risk Register as **read-only**. RiskyProject can only save one set of original chance, impact, and score per risk.



2. **Current**: reflects most recent changes to probability and impact for each category. If you use qualitative analysis, current chances and impacts are **editable** in Risk Register. You can also edit them in the **Risk Form** or the **Probabilities and Outcomes** tab of the **Risk Information** dialog box. For quantitative analysis (with project schedule) current set of probability, impact, and scores is calculated based on risk assignment to task or resources. Current set of probability, impact, and score is shown as a first line on Mitigation Tab on Risk Information dialog box.



3. **Post-Mitigation**: Post-mitigation probability, impact and score reflect changes to risks due to mitigation plans There can be many mitigation plans assigned to one risk. They are editable in the **Assign Mitigation** view and in **Mitigation** tab of the **Risk Information** dialog box. In the **Risk Register** you can show the latest read-only probability, impact and score, which corresponds to the last line in **Mitigation** tab. In the **Assign Mitigation** view, in addition to editing the post-mitigation probabilities, impacts and scores for all categories, you can also edit values for individual categories, such as cost, duration, quality, technology, etc. Probabilities, impacts and scores for individual categories are not used to calculate combined probabilities, impacts and scores, which should be entered independently. Post-mitigation probabilities, impacts and scores are not affected by quantitative analysis. Also in the Assign Mitigation you can enter both predicted and actual probabilities, impacts and scores.



Risk Properties

Risk Properties are other risk attributes, which include:

- Risk Name, ID, description, statement, objectives, assumption, cause and trigger
- Open/close risk
- Risk life cycle status: Risks, issues, lesson learned
- Risk ownership
- Risk mitigation strategy
- Risk costs
- Risk start and end date
- Other information about risk

Some risk properties are predefined as General Information about risk and Risk Costs. However, you may define any other risk properties.

Risk Mitigation and Response Plans

You can model risk mitigation or response efforts in RiskyProject using the **Mitigation or Response View**. Response plans are activities that are executed when a risk occurs and are used for quantitative risk analysis. Mitigation plans are actions that are performed to minimize risk probability and/or impact and can be visualized using the Risk Mitigation Waterfall diagram.

A mitigation or/and response plan must be assigned to a particular risk. Please read "Assigning Risk Response Plans" and "Assigning Mitigation Plans" for more information.

Creating a mitigation or risk response plan

1. Click the **Risks** tab. In the **Risk Views** group, click **Mitigation/ Response Plans**.
2. Enter the mitigation or response plan name. Summary entries will help you to organize information, but they are not considered a mitigation plan.
3. Select either **Mitigation** or **Response** plan
4. For Response plans, enter an **Outcome Type** and **Outcome** of the response. The outcome types are automatically populated based on the list of outcome types.
5. Enter the **Cost** of the mitigation or response plan
6. For Mitigation plans, enter the default reduction of probability and impact if the mitigation plan is assigned to the risk.
   For example, a mitigation plan reduces probability on 5% and impact on 10%. If a mitigation plan is assigned to the risk that has 45% probability and 30% impact before mitigation, the risk will have 40% probability and 20% impact after mitigation.
7. Enter the mitigation or response plan description. If you double-click on a mitigation/response plan ID, the **Mitigation or Response Plan Description** dialog box will open.

A mitigation or response plan can be assigned to multiple risks. The cost of mitigation or response plans will be included with each risk.

You can use multiple text and number properties in mitigation and response plans to enter additional information. These fields can be accessed by inserting column Text1, Text2, Text3, …. and Number1, Number2, Number 3, … to the Mitigation and Reponse View.

Creating Summary and Sub-plans

Mitigation plans can be composed of Summary plans with associated sub-plans. This can be very useful if your mitigation plans have several activities or steps that have distinct costs and outcomes that you want to monitor items separately.

Summary plans have names only and do not have Plan Type, Outcome Type etc. Summary and sub-plans are defined using the Indent and Outdent commands similar to Summary and Subtasks on the Gantt Chart.

To create a sub-plan:

1. Enter a name for the **Summary** plan.

2. Click the row below the plan
3. Enter a name for the plan.
4. Right-click on the plan and on the shortcut menu click **Indent**. The plan now becomes a sub-plan of the mitigation plan.
5. Enter information for the sub-plan.

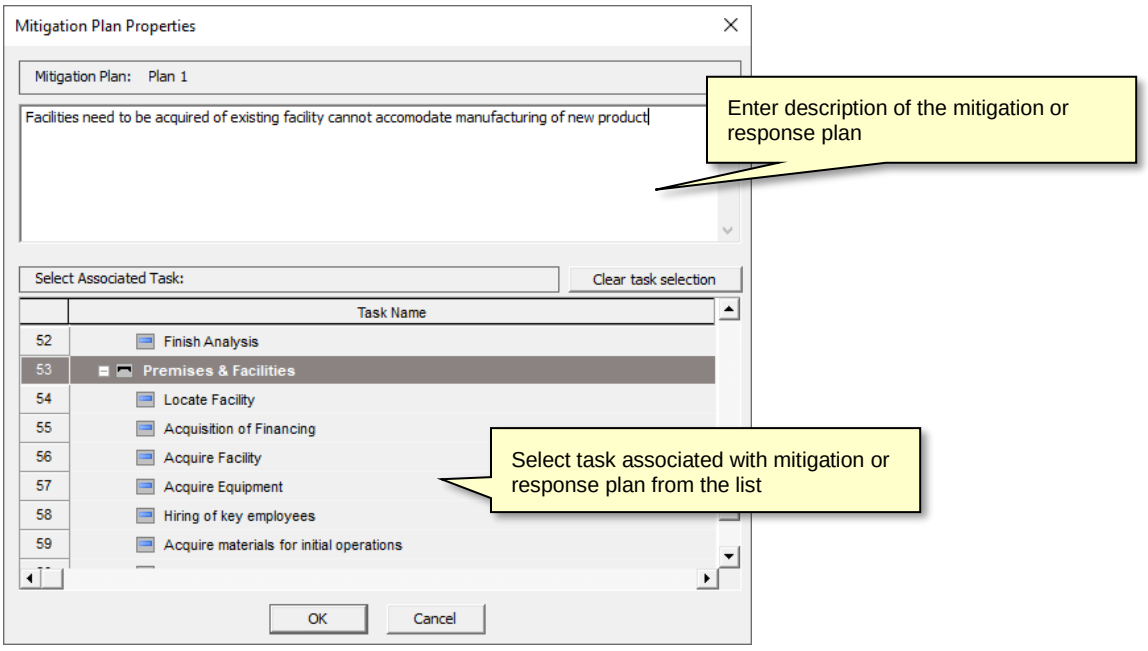
Assign Tasks to Mitigation or Response Plan

As part of mitigation planning, tasks that represent mitigation activities with planned finish times and costs are added to a plan. You assign these activities, including summary tasks, to a mitigation or response plan. In this case cost, actual cost and percent completed of the plan will be calculated based on costs and percent completed of the task. If Monte Carlo simulations are conducted, the cost of a mitigation plan will equal the mean of the task cost. If simulations are not conducted, the cost of a plan equals the original (deterministic) task cost.

The dates of mitigation plan execution shown in Mitigation tab of task information dialog are not associated with the task and should be defined by user. The task associated with mitigation plans will be shown in the risk report. If the plan is associated with a task cost, actual cost, and percent completed of the plan is read only.

To assign a task to a mitigation or response plan:

1. Double click on the Mitigation or Response plan id; the Mitigation or Response Plan dialog box opens.
2. From the list of tasks, select the task that you want to link to the plan. Only one task can be selected.
3. To reset selection of the task, click **Clear task selection.**



Risk Attributes

About Risks

Each risk in RiskyProject can have a number of properties. Common properties are predefined and are found in the **Risk Form** or **Custom Properties** tabs of the **Risk Information** dialog box. The Risk Form is fully customizable: you can define a set of mandatory and optional attributes, which need to be entered as part of your risk management process.

Risk properties include:

- **Risk Name:** the risk name for each risk must be unique. Names are case-sensitive.
- **Open/closed risk:** open risks are active risks that may occur. Closed risks are those risks that are no longer active because of risk response or other factors or measures taken. Closed risks may contain important information and should not be deleted from the risk register.
- **Risks, issues, lessons learned**: risks are events that may or may not occur and have a probability between 0 – 100%. Issues are events that have already occurred and require a response. Lessons learned are events that occurred in the past and have a history associated with them. When you add a new record to the risk register, by default it is a risk.
- **Risk statement, objectives, assumption, cause and trigger:** contain textual information about risks.
- **Risk ownership:** includes risk manager and risk owner. You may define other custom fields for risk reviewer, recorder, and other participants in the risk management process.
- **Risk mitigation strategy:** you can enter mitigation strategies for threats and/or opportunities. Status of threats and/or opportunities are automatically calculated when you enter risk probabilities and impacts. If the risk is only a threat, you will only be able to enter strategies for threats and vice versa. For more information about threats and opportunities, read "Risk Probabilities and Impacts".
- **Risk start and end date (risk sunrise and sunset):** dates between which a particular risk is active.
- **Risk ID:** Risk ID can be automatically generated when you create a new risk. You may sort the Risk Register based on Risk IDs. You can overwrite the automatically generated risk ID. Rules for risk ID generation are defined in **Risk Options**. To view Risk Options, click the **Schedule** tab. In the **Settings** group, click **Options**.

- You can create any other risk properties using **Default Risk Properties** dialog box (**Risk** tab of the ribbon, **Settings** pane). In this dialog you can also define the default risk mitigation strategy and default time between risk sunrise and sunset.
- In the case of quantitative risk analysis, changing a risk from **Open** to **Closed**, from **Risk** to **Issue** or **Lesson Learned** will affect risk probability and impact. For more information about this please read "Assigning Risks to Task and Resources".

Risk Probabilities and Impacts

There are two ways probabilities and impacts can be defined in RiskyProject:

- You can define chance and outcome for each risk in the Probabilities and Outcomes tab of the Risk Information dialog box.
- You can also define risk chance and outcome directly in the Risk Register grid. However, in this case, risk cannot be assigned to any tasks or resources. If risk is already assigned to at least one task or resource, you will not be able to modify chance and outcome using the grid and the Risk Information dialog box will appear. This method is preferable for qualitative risk analysis and risk management.

Defining risk chances and outcomes in the Risk Information dialog box

You must enter the risk chance, outcome type, and outcome for each risk. You may only define one alternative. Please remember that risk chance and outcome may not be equal to calculated risk probabilities and impacts in the following cases:

- For risks with multiple mutually exclusive alternatives
- If you define uncertainties in risk outcome
- In case of quantitative risk analysis (with project schedule)

To define risk chances and outcomes in the Risk Information dialog:

1. Click the **Risk** tab. In the **Risk Views** group, click **Risk Register.**
2. Double- click on a risk ID to open the **Risk information** dialog box.
3. Click the **Probabilities and Outcome** tab.
4. Enter **Chance** that will be used to calculate probability.
5. Select **Outcome Type** from dropdown list.
6. Select **Outcome** label from dropdown list or enter percent.
7. Threat/Opportunity are calculated automatically if you enter a negative outcome.
8. If required, repeat steps 5 -7 for each mutually exclusive alternative.

Use the **Format Risk Matrix** dialog box to toggle between entering risk outcomes as labels, percentages, or both.

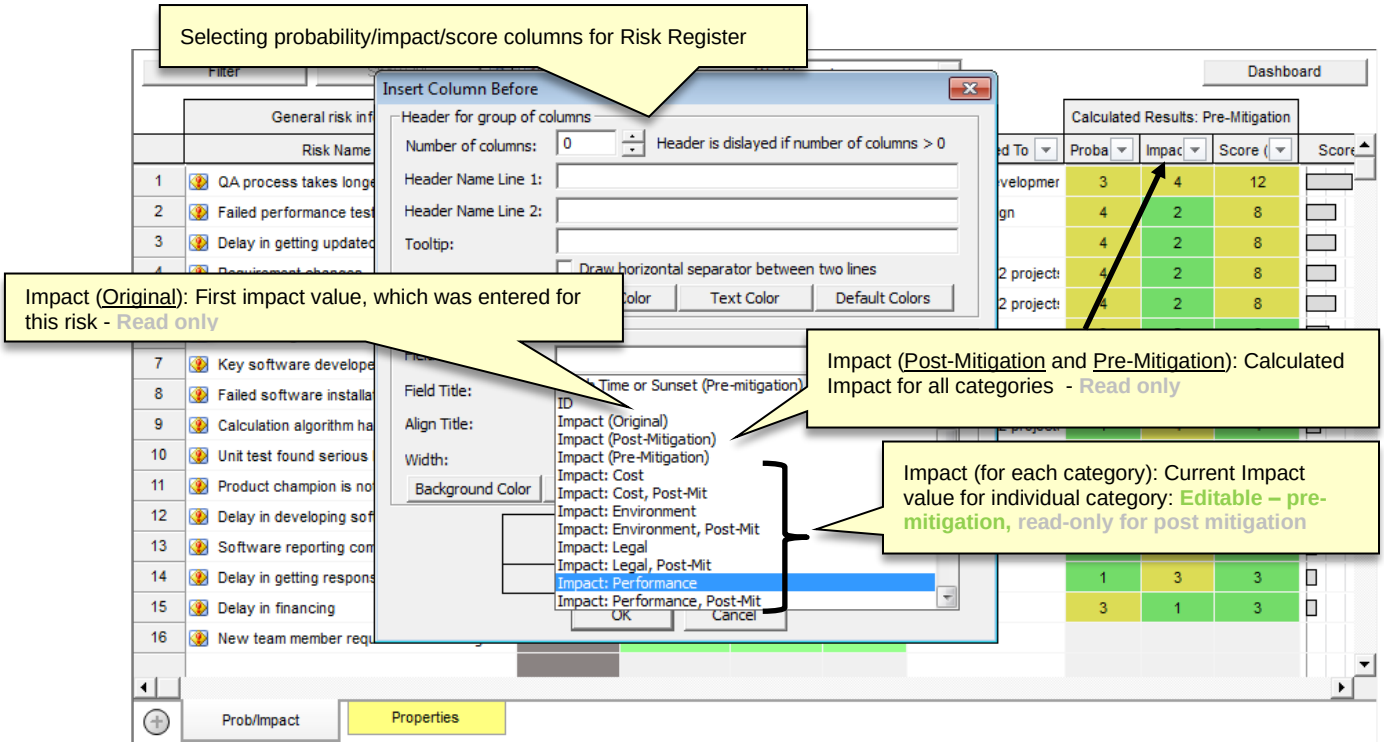
Defining risk chances and outcomes in the Risk Register grid

By default, the Risk Register's columns do not allow you to enter risk chance and outcome directly. You need to define appropriate columns first:

1. Within **Risk, Register** view, right-click on the header of the column next to which you want to define that column in order to enter chances and outcomes.
2. Click on **Insert Column Before** or **Insert Column After**.
3. Select field from the **Field Type** dropdown list. Here is the list of columns which can be presented in the Risk Register:

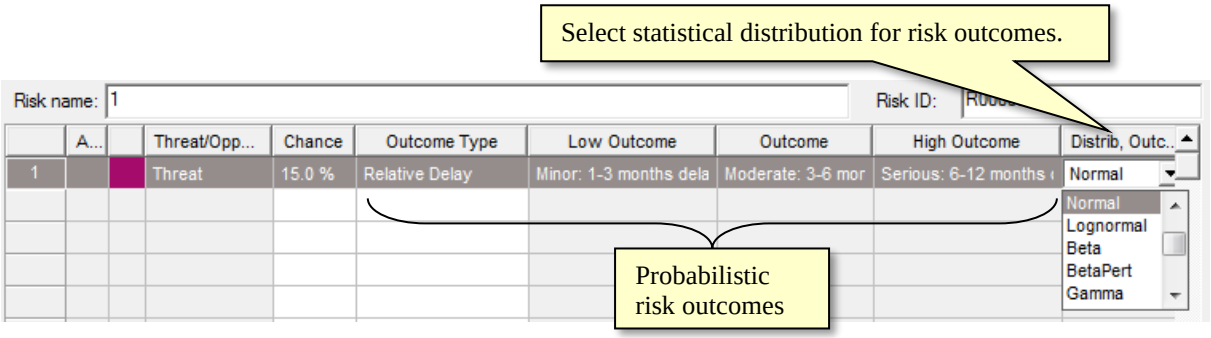
Field	Description	Read Only or Editable in Risk Register View
Impact Original	Impact of risk designated by user as Original	Read Only, defined in Mitigation Tab of Risk Information Dialog
Impact Current (Pre-mitigation)	Calculated risk impact for all categories based on impact of individual risk categories	Read Only, defined in Risk Form or Probabilities and Impacts tab of Risk Information Dialog for individual categories or calculated as a result of quantitative analysis
Impact Post-mitigation	Last line in Mitigation Tab of Risk Information Dialog or in Assign Mitigation view for individual risk	Read Only, defined in Mitigation Tab of Risk Information Dialog or in Assign Mitigation view
Impact: Cost	Current Impact: Cost Category	Editable. Defined in Risk Register or in Risk Information Dialog
Impact: Cost, Post-mitigation	Last line in Mitigation Tab of Risk Information Dialog or in Assign Mitigation view for individual risk related to cost category	Read Only, defined in Mitigation Tab of Risk Information Dialog or in Assign Mitigation view
Impact: Environment	Current Impact: Environment Category	Defined in Risk Register or in Risk Information Dialog
Impact: Environment, Post-mitigation	Last line in Mitigation Tab of Risk Information Dialog or in Assign Mitigation view for individual risk related to Environment category	Read Only, defined in Mitigation Tab of Risk Information Dialog or in Assign Mitigation view
Impact: ….	Current and post mitigation impacts for other risk categories	Defined in Risk Register or in Risk Information Dialog

Columns for Chance (Probability) and Score are defined the same way. After you define appropriate columns, they can then be used to enter the risk chance and outcome for each category.



Uncertainties in Risk Outcomes

You can define risk outcome as a range defined by a statistical distribution:



After you enter probabilistic risk outcomes and click **OK**, RiskyProject will perform Monte Carlo simulations and calculate the risk impact based on the mean of the statistical results.

To enable probabilistic risk outcomes:

1. Click the **Schedule** tab. In the **Settings** group, click **Options**.
2. Click the **Risk** tab.
3. Select the **Enable statistical distribution for risk outcome** checkbox.

Once enabled, this setting is the default for all RiskyProject files on your computer.

To define statistical distribution for risk outcomes:

1. Click the **Risks** tab. In the **Risk Views** group, click **Risk Register**.
2. Open the **Risk Information** dialog box.
3. Click the **Probabilities and Outcomes** tab for qualitative risk analysis (if you don't have project schedule) or Assign to tasks or resources for quantitative analysis
4. Right-click on risk alternative ID and select **Distribution of risk outcomes**
5. Select the distribution from the **Distribution** list. If you select **Undefined,** the base value will be used for all iterations.
6. Define the distribution parameters. The Probability Density chart is automatically updated. You can adjust distribution parameters using the sliders.
7. If you use a custom or discrete distribution, a grid opens. The grid will allow you to define points (or intervals for discrete distributions) and associated with each point (interval)
8. If you select **Normal** or **Lognormal**, you must select the **Low** and **High** probability range (P1 and P99, P5 and P95 or P10 and P90). These are "cut-off" parameters; meaning that duration, cost, or start time cannot go beyond these values.

If you perform qualitative risk analysis in Risk Register you can view:

a). Impact (pre-mitigation or post-mitigation) for all categories: it is calculated as mean value of you have for probabilistic risk outcome.

b). Impact for individual categories (e.g. Impact: Cost or Impact: Schedule): it is input base value of Outome

Risk Form: Defining Information About Risks

The Risk Form is part of the Risk Information dialog and is used to define risk attributes. You can customize the Risk Form to create any set to risk attributes which can be entered or edited.

Risk Form has two modes:

1. **Editing Mode**: you can drag and drop different controls to Risk Form and assign properties to them. Controls such as edit boxes, drop down list, frames or static text can be selected from the left side of the Risk Form dialog box and dropped on the form. After this you need to select risk attributes associated with the control from the list of available attributes. For a **Static Text** box you the enter text to be displayed, there are no risk attributes associated with the frame.
2. **Published Mode**: when you complete design of Risk Form, click "Publish Risk Form Layout" to switch to Published Mode. In Published Mode you can no longer edit Risk Form layout, but you can enter risk attributes data. List of controls will be hidden.

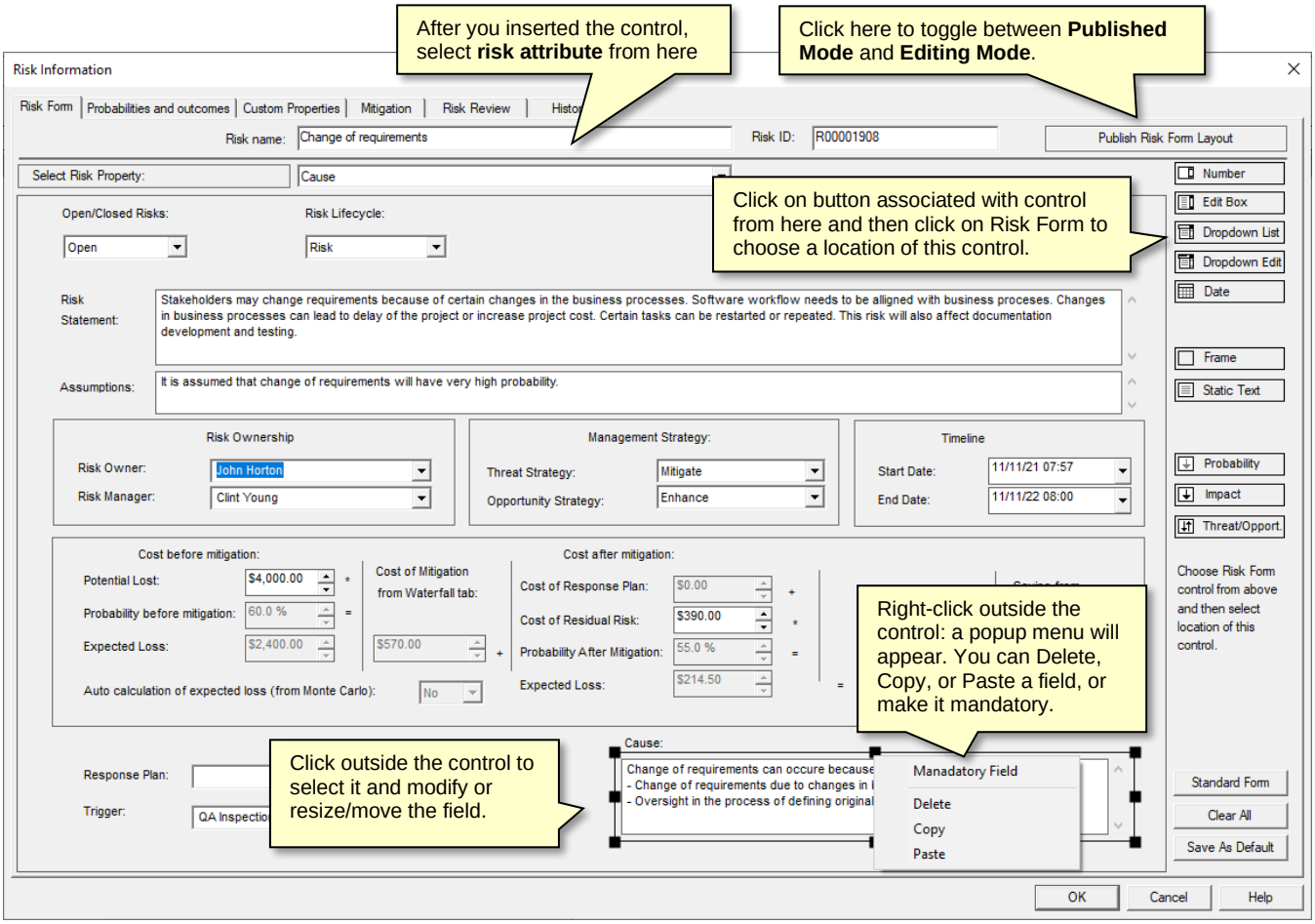
To edit the Risk Form (Editing Mode):

1. Click the **Risk** tab. In the Risk Views group, click **Risk Register**
2. Double- click on risk ID to open the **Risk information** dialog box
3. Go to **Risk Form** tab; default Risk Form will be presented in Published Mode
4. Go to Editing mode by clicking on **Edit Risk Form Layout**
5. Clear controls if required by clicking on **Clear All** button
6. Select control using button on the right side.
7. Click on Risk Form to select the position of the control
8. From the dropdown list above Risk Form select the property associated with selected control
9. Adjust size of the control by dragging its corners
10. Right click outside the control: shortcut menu will come up. You can Delete, Copy, or Paste control, as well as make the property Mandatory. Once in Published Mode, all mandatory fields must be filled to save data.
    - Click **Save as Default** to save newly designed Risk Form for all your new projects
    - Click **Standard Form** to restore standard if required
    - Click **Publish Risk Form Layout** to convert to Published Mode

To use Risk Form (Published Mode):

1. Click the **Risk** tab. In the Risk Views group, click **Risk Register.**
2. Double- click on risk ID to open the **Risk information** dialog box.
3. Enter risk attributes to the **Risk Form**

- You can create any other risk properties using the **Default Risk Properties** dialog box (**Risk** tab of the ribbon, **Settings** pane) and include them to the Risk Form
- Some properties, such as **Expected Loss** are calculated and will be read only
- Risk Form allows you enter probability and impact of the risk. However you cannot use Risk Form to define probability and impact for risk assigned to tasks and resources and risks with multually exclusive alternatives. Therefore it is recommended to use Risk Form to enter probability and impact for qualitative risk analysis only (when there is no schedule).



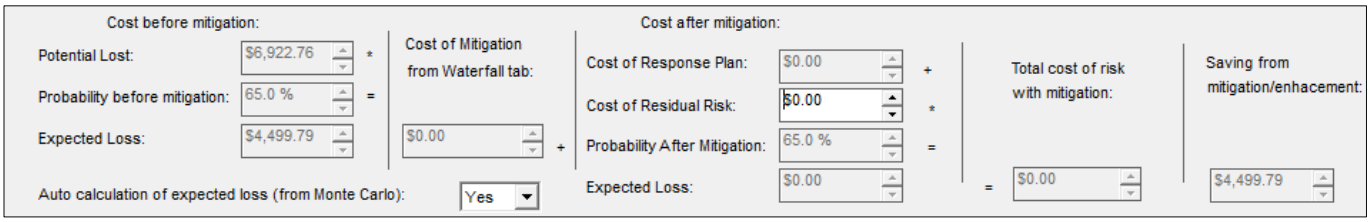
The Risk form has the following fields:

- **Number** –real numbers, integer numbers, or cost properties
- **Edit Box** –string (text) properties and organizational units
- **Dropdown List** –picklist and Yes/No Properties
- **Dropdown Edit Box** –risk, resources, and response plans
- **Date** –date properties
- **Frame** –frame or line separator; it is used to create visual separation between group of control
- **Static Text** –read only text used for prompts and annotations

- **Probability** –risk probabilities belonging to different categories
- **Impact** –risk impacts belonging to different categories
- **Threat/Opport.** –selection of threats and opportunities

About Cost of Risk Calculations

The Cost Risk calculation calculates the total cost of a risk and takes into account the risk mitigation plans linked to the risk. The Risk cost calculation is performed in the **Risk Form** tab of the **Risk Information** dialog box. The **Cost of Residual Risk** and **Potential Loss** are the only values that you can manually enter in the Risk Form. All other cost parameters are calculated. You can modify Risk Form to show or hide different fields.



Risk cost calculation

Cost Before Mitigation

1. **Potential Loss** (property "*Cost before mitigation*"): the loss in monetary terms if the risk occurs. This value can be entered manually if you select No for "*Auto calculation of expected loss (from Monte Carlo)*" or if you don't open a schedule.

   For example, for the risk "low quality component", the potential loss is $50,000. You would incur this cost if a low quality component were supplied.

2. If you don't open a schedule, the **Probability Before Mitigation** value is based on the risk values entered in the **Probabilities and Outcome** tab of **Risk Information** dialog box. See **Risk Probabilities and Impacts** for more information. If you have a schedule **Probability Before Mitigation** comes from results of Monte Carlo simulations.

3. **Expected Loss** (property "*Pre-Mitigation Expected Loss*") takes into account risk probability. It is an indicator that helps you to compare the costs of different risks. Expected loss can be calculated manually or automatically depending on selection "*Auto calculation of expected loss (from Monte Carlo)*".

   a. Manual calculation of Expected Loss: You can manually calculate the expected loss for individual risks by running two simulations: one with the risk open and the other with the risk closed. The difference in the total project costs is the expected cost of the risk.

      Expected loss = Potential Loss * Probability (pre-mitigation)

      For example, probability of risk "low quality component" equals 50%. Potential loss equals $50,000. Expected loss will be $25,000 = $50,000 * 50%.

   b. Automatic calculation of Expected Loss is done based on results of Monte Carlo simulations of project schedule:

Expected loss = (Project Cost with Risks – Project Cost Original) * Correlation Coefficient

The correlation coefficient is calculated using project cost and cost increases due to a specific risk occurring. For example, the project cost with risks and uncertainties is $100,000. Project cost without risks and uncertainties is $90,000. In addition, the correlation coefficient for the specific risk is 0.8. Expected loss will be ($100,000 - $90,000)*0.8 = $8,000.

In RiskyProject minimum correlation coefficient between project cost and duration and instance of risk occurring in defined in Options -> Calculation -> **Minimum Sensitivity Coefficient** (see **Setting up calculation options**). If calculated correlation coefficient is less than this minimum value, it will be equal to zero. Default value of minimum sensitivity coefficient is 0.16. As a result, Expected Loss can be equal to zero even there is a cost outcome for the specific risk. It may occur if there is a weak correlation between project cost and cost increases due to a specific risk occurring. If you have many risks with low cost impact, it is recommended to reduce Minimum Sensitivity Coefficient**.**

Cost Of Mitigation

1. Cost **of Mitigation** is taken from **Mitigation** tab of **Risk Information** dialog box. It is the cost associated with efforts to reduce the probability and impact of the risk.

   For example, mitigation plans will include “Additional QA procedure” and “QA audit of supplier’s operation”, which would cost $10,000 in total.

Cost After Mitigation

1. **Cost of Response Plan**. Even if a mitigation plan is executed as planned, there will still be a cost associated with a risk, as it is possible to reduce risk, but not to eliminate it (an exception is when you are able to avoid the risk). The response plan may be executed if the risk occurs and will be calculated using the cost entered for the response plan associated with this risk. This cost is entered **Mitigation and Response** view.

   For example, if the risk “low quality component” occurs, this component needs to be replaced with a new one, which would cost $20,000.

2. Residual risk may still exist after the risk response and is cost is calculated as the **Cost of Residual Risk**.

   For example, the new component installed as a risk response can still be defective. The residual cost of the risk will be $10,000.

3. **Probability After Mitigation** comes from **Mitigation** tab of **Risk Information** dialog box. See “Risk Mitigation and Response Plans” for more information.

   For example: Risk Probability after mitigation equals 25% because of the execution of the mitigation plan “additional QA procedure”, probability of risk “Low quality component” is reduced two times.

4. **Expected Loss After Mitigation** (property “*Post-mitigation Expected Loss*”) takes in to account the fact that risk may not occur.

   Expected Loss After Mitigation = (Cost of Response Plan + Cost of Residual Risk) * **Probability After Mitigation**

For example, probability of risk “low quality component” after mitigation equals 25%. Expected loss after mitigation will be $7,500 = ($20,000 + $10,000) * 25%.

Other Cost Indicators (Properties)

1. **Cost After Mitigation = Expected Loss After Mitigation + Cost of Mitigation**

   For example: Total cost after mitigation of risk “low quality component” will be $17,500 = $7,500 + $10,000

2. **Saving from Mitigation/Enhancement** is the difference between costs with and without mitigation. If this number is negative mitigation efforts will not lead to cost saving.

   Saving from Mitigation = Expected Loss – Total Risk Cost after Mitigation

   For example, total cost after mitigation of risk “low quality component” will be $17,500. Expected loss $25,000. Saving from Mitigation is $7.500. Because this number is positive, it makes sense to perform mitigation efforts.

Custom Risk Properties

All risks properties including pre-defined risk properties and custom properties can be viewed and edited using the Custom Properties tab of Risk Information dialog box.

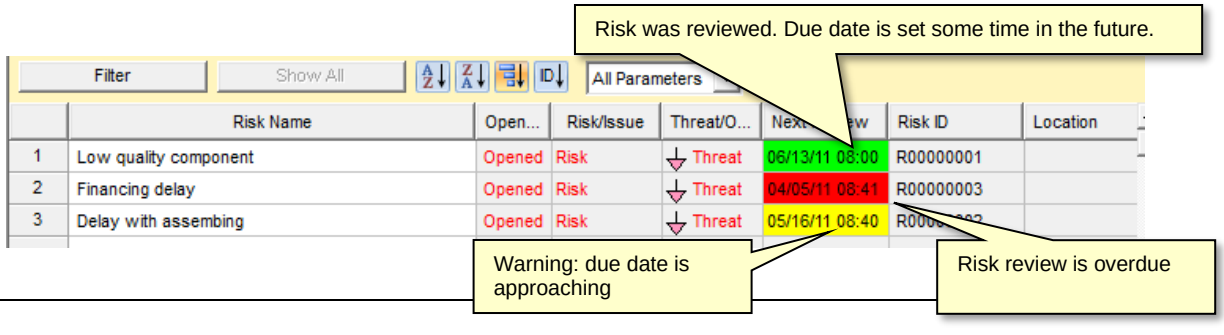
1. Click the **Risks** tab. In the **Risk View** group, click **Risk Register**.
2. Double- click on risk ID to open the **Risk information** dialog box.
3. Use **Custom Properties** tab to enter general information about risk. Enter or update values of properties. You can assign a set of custom risk properties using the **Default Risk Properties** dialog.

Risk Reviews

RiskyProject helps you to facilitate regular risk reviews. You can define the risk review periodicity (weekly, monthly, and quarterly). RiskyProject will notify you before review is scheduled. During the risk review, you may analyze all risk attributes, make necessary changes, and write notes. Risk reviews are important components of the risk management monitoring and control process as the status of risks and their attributes, such as probabilities and impacts, are in constant flux during the course of a project.

Risk review due date

Each risk review can have a scheduled due date. The risk should be reviewed on or before a due date. A few days before due date RiskyProject will notify you regarding the scheduled review. The notification will be presented as a change in color of the **Next Review** property if it is inserted in Risk Register:



You can also view the Next Review date in the **Risk Review** tab of the **Risk Information** dialog box. You can insert a **Next Review** column in the **Risk Register** view.

The default risk review frequency and number of days before incoming risk review is defined in **Default Risk Properties** dialog (**Risk** tab of the ribbon, **Settings** pane).

Entering and viewing risk reviews

You may enter information regarding risk review using **Risk Review** tab of the Risk Information dialog box. The Risk Review tab offers greater flexibility to view all risk reviews for the project, as well as allowing you to modify or delete risk reviews.

To enter a risk review:

1. On the ribbon**,** click **Risk** > **Risk Register**.
2. Double-click on risk ID to open the **Risk information** dialog box.
3. In **Risk Review** dialog box enter who submitted review, review notes, and click OK.
4. If necessary, update due date for the next review using **Next Review** field or update frequency of review for this risk using **Review Frequency** dropdown list.

Assigning Risk Response Plans

Response plans defined in the **Mitigation and Response** view can be assigned to risks.

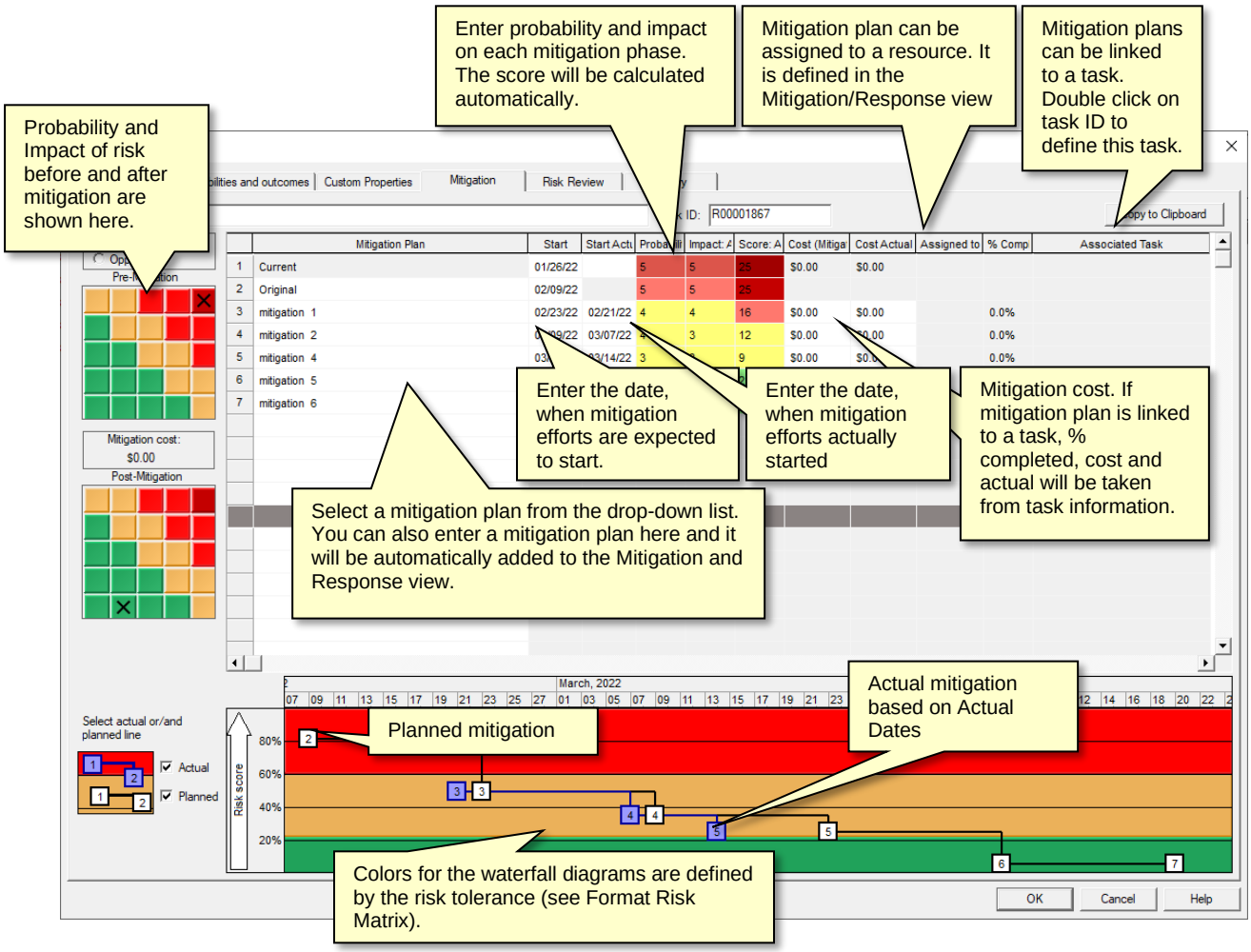
Assigning Response Plan:

1. Click the **Risks** tab. In the **Risks View** group, click **Risk Register**.
2. Double- click on risk ID to open the **Risk information** dialog box.
3. Click the **Risk Form** tab
4. In the default Risk Form select a response plan from **Response Plan** dropdown list. These response plans are defined in Mitigation/Response view.
5. If you are not using the default Risk Form, you can add the response plan dropdown list using **Dropdown Edit** button in Editing Mode of Risk Form. See *Risk Form* for more information.
6. If you don't see your response plan in the dropdown list, it means that the response plan is not defined in the **Mitigation/Response** view. You still can enter Response plan name in RiskyProject, but it will not be used for risk cost calculation.

Assign Mitigation Plans Using the Mitigation Tab

You can assign mitigation plans defined in the **Mitigation and Response** view to your risks. One risk may have multiple sequential mitigation plans. They can be shown as a Waterfall diagram.

Waterfall diagrams can be used to visualize the timing of mitigation efforts over the course of the project.



- Pre-mitigation probability and impact are the results of calculation. Therefore, they cannot be updated in the waterfall tab.
- Probability, impact, and score for the last mitigation effort are converted into the post-mitigation probability, impact, and score and will be shown in the Risk Register.
- You can view Planned and Actual risk mitigation efforts. Actual mitigation efforts are shown based on actual dates entered the table above.

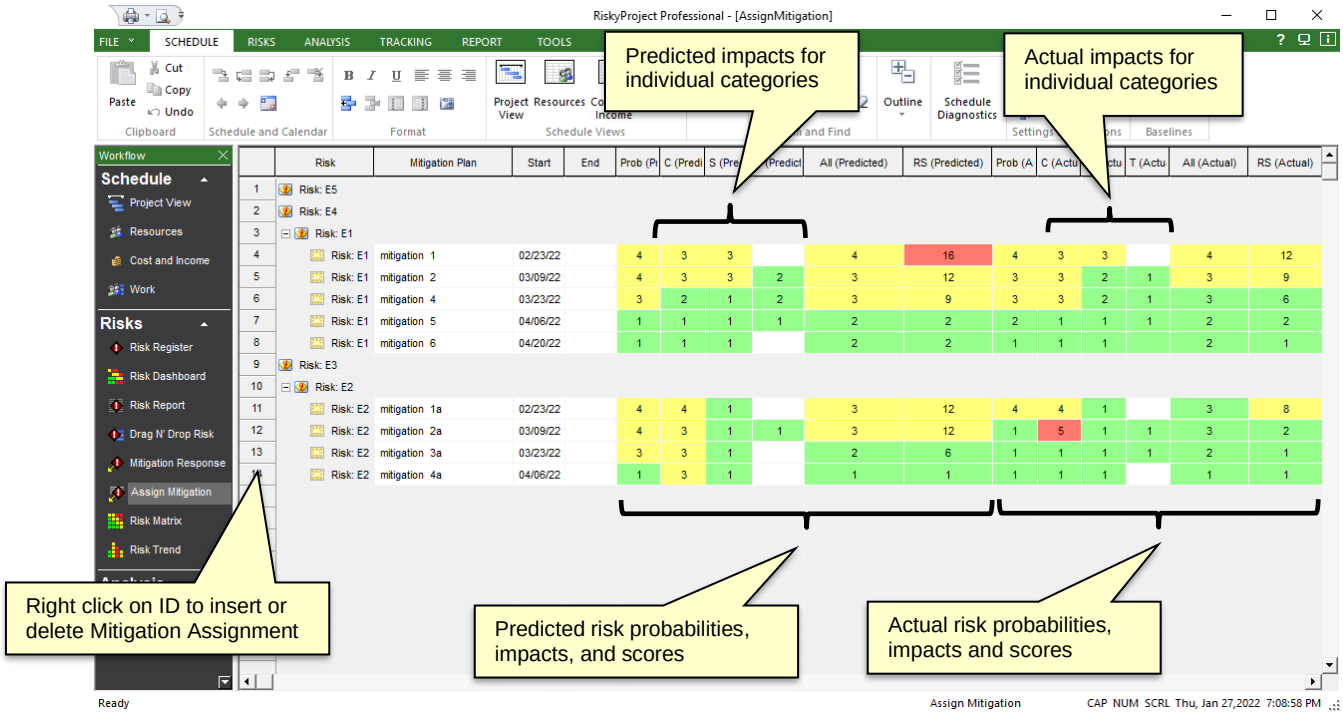
Viewing and editing waterfall diagrams:

1. Open the **Risk Register** view.
2. Double-click on Risk ID. The **Risk Information** dialog box opens.
3. Click the **Mitigation (Waterfall diagram)** tab.
4. Enable or disable Actual and Planned mitigation lines using check boxes on the left bottom corner.
5. Double click on Mitigation Plan ID; the Mitigation Plan Properties dialog box opens.
6. Enter a mitigation description.

7. Select the task or summary task to assign it the mitigation plan. If mitigation plan is linked to the task, cost, actual cost, and percent completed of the mitigation plan will taken from task.
8. To delete the task assignment, click **Clear task selection**.

Assign Mitigation View

You can use Assign Mitigation view to assign sequential mitigation plans to the risks. It allows to see all plans assigned to all Risk in one place. Alternatively, you can see mitigation plans assigned to individual risks in the Mitigation Tab of the Risk Information dialog box.



To assign a mitigation plan to a risk:

1. On the Workflow bar, click **Assign Mitigation** view
2. Add columns for probabilities, impacts and scores for individual as required. By default, only the columns for probabilities, impacts and scores for all categories are shown. Assign Mitigation view also include columns for other risk mitigation properties, as well as five text and five numerical fields that can be used to enter additional information.
3. Right click on the plan ID and from the shortcut menu, click New Plan to insert a mitigation plan assignment.
4. Select a mitigation plan from dropdown list. The dropdown list is populated with mitigation plans from the Mitigation View.
5. Enter probabilities and impacts, as well as other properties of the mitigation assignment; scores are calculated as Probability * Impact.
6. To delete plan right click on the ID and from the shortcut menu click **Delete Plan**.

- You cannot use this view to modify risks or insert more risks
- Assign Mitigation view does not show original and current sets of probabilities, impacts, and scores, only post-mitigation probabilities, impacts, and scores
- Probabilities, impacts and scores for individual categories are not used to calculate post-mitigation probabilities, impacts and scores for all categories, which need to entered separatelly
- If you want probabilities for all categories be the same, enter probability in "Probability: All Categories" or "Probability Actual: All Categories" columns
- You can import data from Excel to Assign Mitigation view using File -> Import -> Import Risks from Excel

Risk Status View

You can use Risk Status View as a depository of changes to risk probability and impact. It is similar to **Risk History**, but contains more information, while can be edited, printed and exported to Excel. Each time risk probability and impact are changed, the record will be added to the Risk Status view. The main purpose of this view is to show how probability, impact, and changing over time for all risks. The record includes:

1. Risk name and Risk Unique ID, associated with the record
2. Date of the change
3. Description of the change
4. Pre-mitigation probability, impact, and score for all categories. It can be used as predicted probability, impact, and score. They are generated automatically based on what is defined in Risk Register view, but can be modified by the user
5. Actual probability, impact, and score for all categories. They are user defined in Risk Status view
6. Pre-mitigation and actual probability, impact, and scores for individual categories. They are user defined in Risk Status view for each status record and may not correspond with probability, impact, and scores for individual categories in Risk Register view. Columns for this data are hidden by default.
7. Additional information, which can be recorded in five custom text fields and five custom number fields for each record. Columns for additional information are hidden by default.

To enabled automatic saving of changes in risk probability and impact as Risk Status record:

1. On **Schedule** tab click on Project Options in Settings in Options group
2. Go to **Risk** tab
3. Select Update Risk Status when risk probability/impact are changed

- You can modify, delete, or insert Risk Status records. To delete and insert record right click on Risk Status record ID and select Delete Risk Status or New Risk Status from drop down menu.

- You can import data from Excel to Risk Status view using File -> Import -> Import Risks from Excel
- You cannot use this view to modify risks or insert more risks
- Probabilities, impacts and scores for individual categories are not used to calculate pre-mitigation and actual probabilities, impacts and scores for all categories, which need to entered separatelly

Risk History

The Risk History records any changes made to the risk over time. Risk history is automatically updated when you save the project.

View a risk history:

1. Click the **Risks** tab. In the **Risk Views** group, click **Risk Register**.
2. Double- click on a risk ID to open the **Risk information** dialog box.
3. Click the **History** tab to view risk history
4. To copy a risk history record to the clipboard, Right-click on a record ID and select **Copy Data**.
5. To delete record, Right-click on record ID and select **Delete Item.**

- You can modify the date of the history record. Other fields are read-only, so you cannot modify them, but you can delete the risk history record.
- Risk history is used to present the history on the Risk Matrix, as well as to determine the Original risk probability and impact.

Risk Matrix and Risk Trend Chart

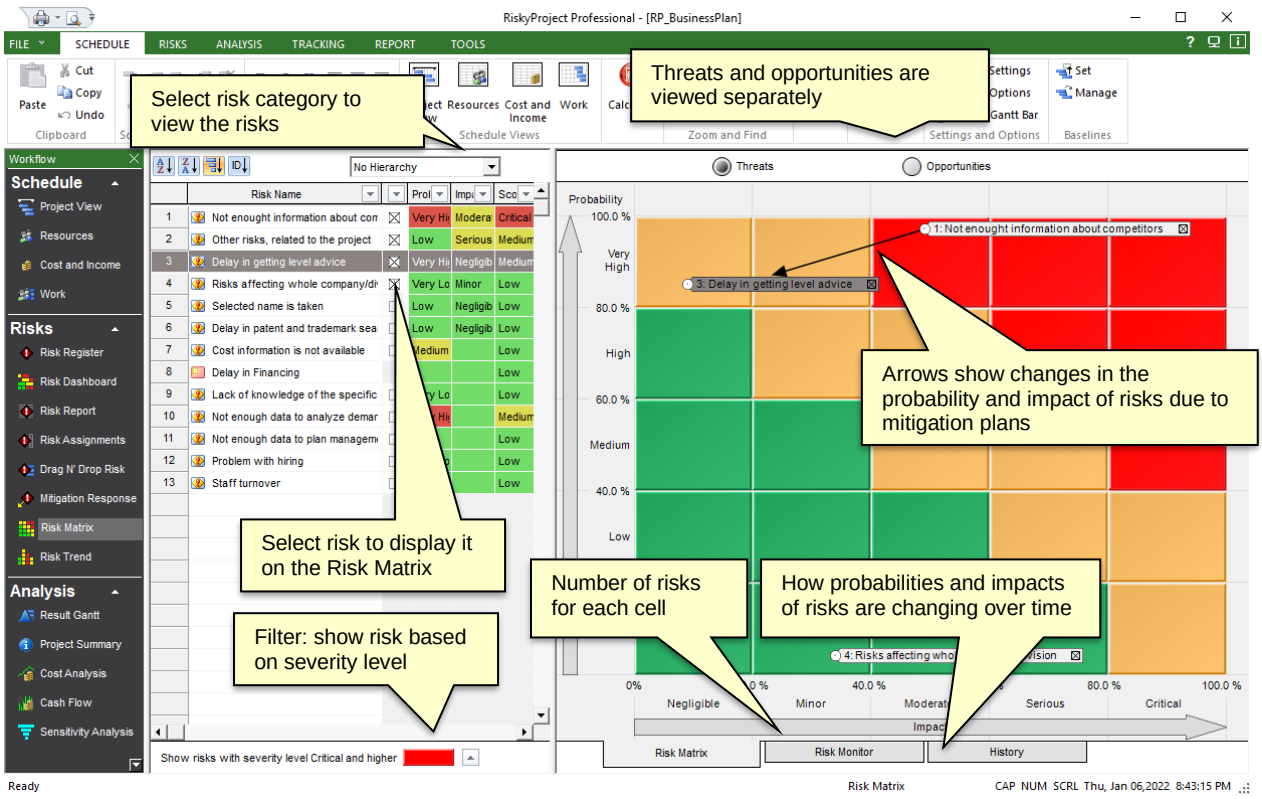
Risk Matrix and Risk Trend views allow you to determine the severity of a risk and analyze how risks are changing over time:

- The **Risk Matrix** is a tool that allows you to determine the severity of a risk. The Risk Matrix view shows this using the risk probability (y-axis) vs. calculated risk impact (x-axis) of the project risks. The Risk Matrix view is divided into two sections: a table with a list of risks with their actual calculated values for probability, impact, and score. When you select these risks, they are shown visually on a matrix, which provides a visual comparison of this data put as well as putting each risk into the context of your organization's risk tolerance. Changes in probability and impact due to mitigation plans added to a risk's mitigation waterfall chart will automatically be displayed in the Risk Matrix.
- The **Risk History** shows how the probability and impact of an individual risk has changed over time.
- The **Risk Monitor** shows the number of risks per cell in the risk matrix.
- The **Risk Trend** shows how project risk change over time. The Risk Trend can be presented as bar chart or in table format (**Total Risks**).

Viewing the Risk Matrix

1. Click the **Risks** tab. In the **Risk Views** group, click **Risk Matrix**.
2. Select type of chart you want to view at the bottom of risk matrix.
3. Select the **Threats** or **Opportunities** option at the top of the matrix. You cannot view Threats and Opportunities at the same time
4. Risk scores can be shown on the Risk Matrix based on overall score (No Hierarchy) or a selected risk category which are shown in the **Hierarchy based on** dropdown list. Lists of all risks associated with the selection are shown in the table. Select **No Hierarchy** to view the overall risk score (sum of all risk categories) for selected risks.
5. Select the check boxes beside the risk names to view the risks on the Risk Matrix. To hide a risk, clear the check box. By default, risks with zero impact cannot be selected. Use the filter at the bottom of the list ("Hide a risk if Score is < " or "Show risks with severity level…") to show/hide risks below the entered threshold. Severity level is defined in **Risk Trend Chart Settings** dialog. Essentially in the color of risk matrix.

To format the Risk Matrix, right-click on the **matrix** and choose **Format Risk Matrix**. For more information about formatting the Risk Matrix, read, "Format the Risk Matrix and Risk Trend Chart".

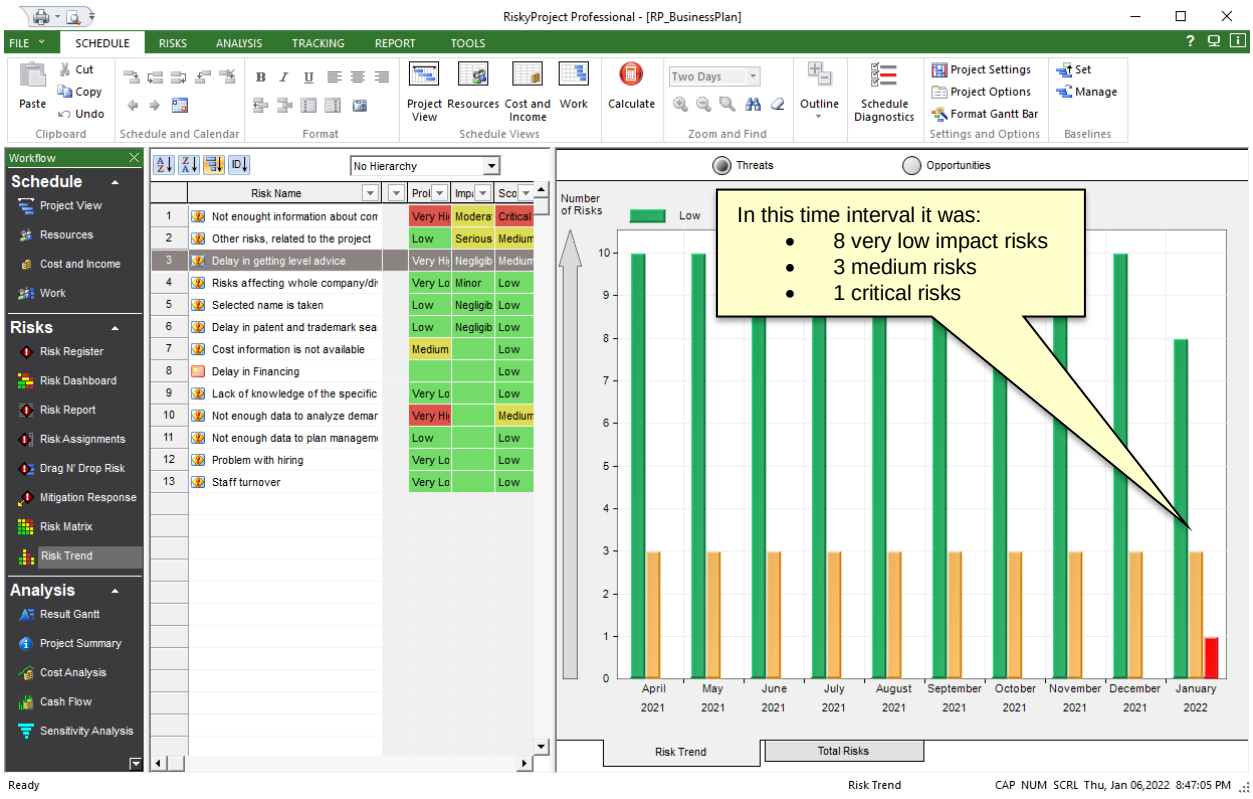


Viewing the Risk Trend Chart

Risk Trend shows how many risks belonging to different severity levels (colors) existed in a certain time period. To view Risk Trend Chart:

1. Click the **Risks** tab. In the **Risk Views** group, click **Risk Trend**.
2. Select a chart type from the tabs at the bottom of the of chart.
3. Select the **Threats** or **Opportunities** option at the top of the chart. You cannot view Threats and Opportunities at the same time
4. Select a No Hierarchy or a specific risk category from the **Hierarchy based on** dropdown list. Lists of all risks associated with the selection are shown in the table. **No Hierarchy** shows the calculated overall risk score (sum of all risk categories) for selected risks.

To format the Risk Trend chart, right-click on the chart and choose **Format Trend Chart**. For more information about formatting the Risk Trend Chart, read, “Format the Risk Matrix and Risk Trend Chart”.



Copy the risk matrix and risk trend chart to the clipboard or save as a JPEG file

1. Right-click on the **Risk Matrix** or **Risk Trend**
2. Choose **Copy to Clipboard** or **Copy Chart to File (JPEG, PNG, GIF…)**.
3. If you chose to create a file, you will be prompted to select file format and save it to a directory.

Risk Report

The Risk Report is a view the includes the selected attributes of selected risks. The report for one risk may contain one or many pages. The total number of pages per report equals the number of selected risks multiplied by the number of pages per risk. The Risk Report includes seven sections:

1. General Properties
2. Pre- and post- mitigation probabilities, impact and score
3. Cost of Risk
4. Custom Properties
5. Waterfall Chart
6. Mitigation Plans
7. Risk Reviews

Each page of the risk report contains a header and footer. The header and footer may include up to three lines of text and a logo located on the left or right side.

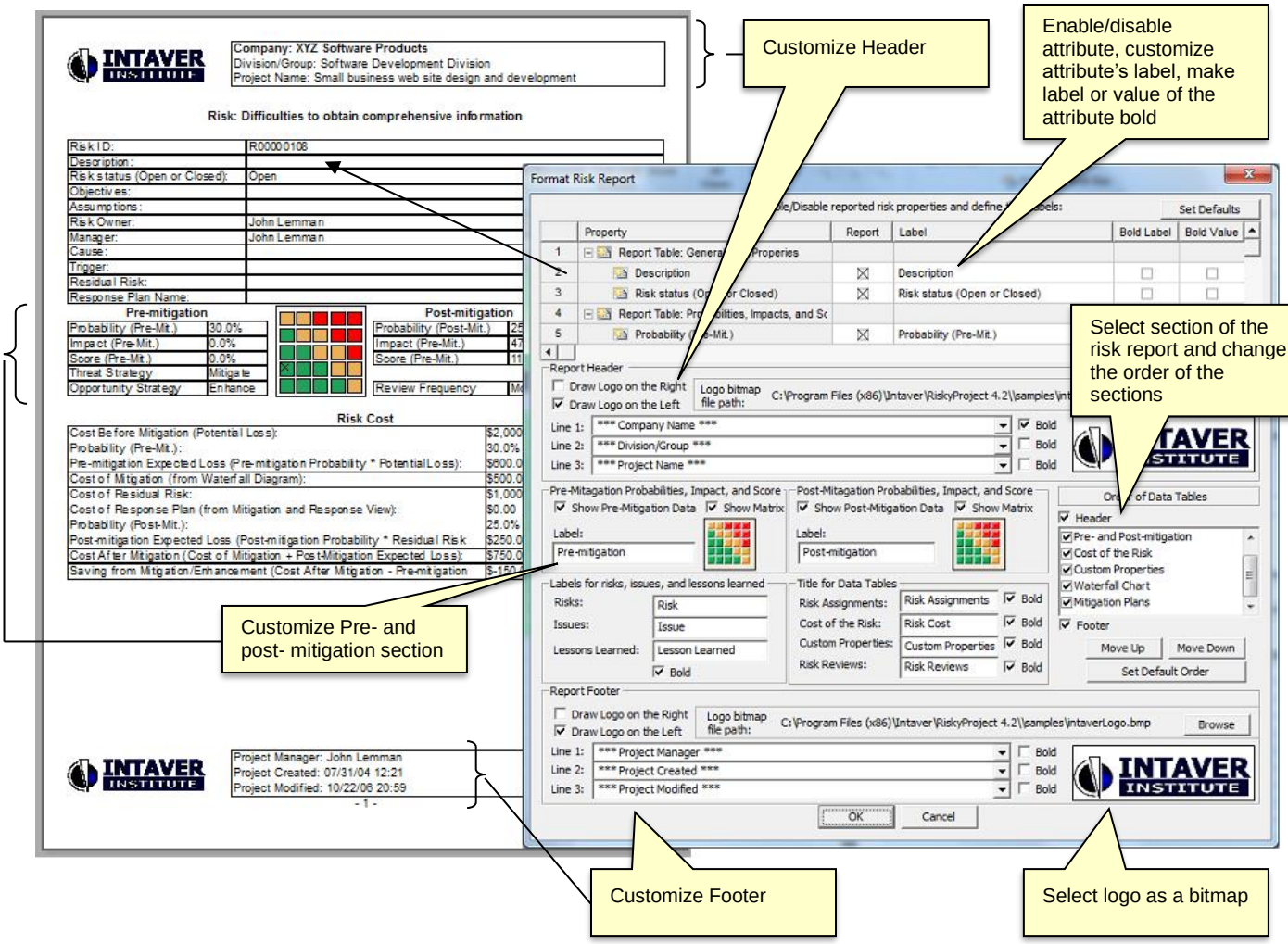
Customize the Risk Report

You can customize the Risk Report in the following ways:

- Select the order and turn on and off any section of the report
- Customize any particular section by enabling or disabling any attribute and customizing labels of the attribute. For example, by default the label for risk detailed description is called “Description”. Instead, you may use “Information about risk”.
- Customize headers and footers. Specifically, you can select a logo (company) that can be placed in the header and/or footer.
- Modify attribute values or labels.

To customize the risk report

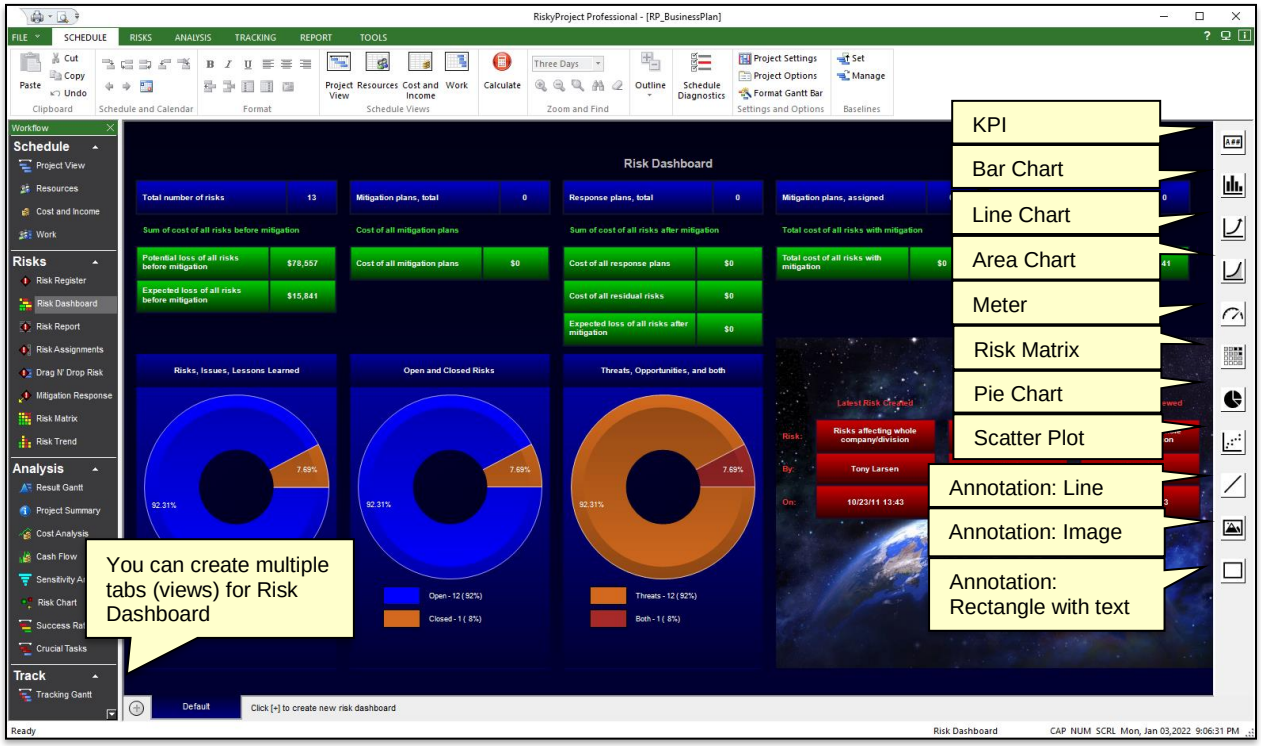
1. On the **Risks** tab, click **Risk Report**.
2. At the bottom of the view, click **Customize Risk Report**.
3. Enable/disable attributes, customize attribute’s label, make label or value of the attribute bold
4. In the **Order of Data Tables**, select the data tables you want to include in the report and use the **Move Up** and **Move Down** buttons to change the order of the sections
5. For “Pre- and post- mitigation probabilities, impact and score” of the report enable or disable pre and post mitigation matrixes.
6. Click **OK**. The report will be regenerated to reflect the changes.


Customize Header
Enable/disable attribute, customize attribute's label, make label or value of the attribute bold
Select section of the risk report and change the order of the sections
Customize Pre- and post- mitigation section
Customize Footer
Select logo as a bitmap
Format Risk Report
Company: XYZ Software Products
Division/Group: Software Development Division
Project Name: Small business web site design and development
Risk: Difficulties to obtain comprehensive information
Project Manager: John Lemman
Project Created: 07/31/04 12:21
Project Modified: 10/22/06 20:59
- 1 -
Report Header
Report Footer
Draw Logo on the Right
Draw Logo on the Left
Logo bitmap file path:
Browse
Pre-Mitagation Probabilities, Impact, and Score
Post-Mitagation Probabilities, Impact, and Score
Show Pre-Mitigation Data
Show Matrix
Show Post-Mitigation Data
Labels for risks, issues, and lessons learned
Title for Data Tables
Move Up
Move Down
Set Default Order
Set Defaults
OK
Cancel

Risk Dashboard

The fully customizable Risk Dashboard allows you to present hundreds of different KPIs and charts related to your risks. You can create any number of dashboards with different information, which are shown as different tabs within Risk Dashboard View. You can select from 7 types of charts: line, area, pie, scatter, bar (including frequency histogram), different types of meters, and risk matrixes. You can place them in different areas on the dashboard, adjust their size, colors, and other properties. You can also annotate your dashboard with text, lines, and images.

When you modify your risk data, the charts and KPIs are automatically updated. This date includes risk properties, mitigation and response plans, and project schedules. Annotation is not updated when we update risk data.



To add a chart, KPI, or annotation to the Risk Dashboard:

1. Select the type of chart or KPI from the toolbar on the right side.
2. Click on the dashboard and drag the line or rectangle to select the position of the chart, KPI, or Properties annotation.
3. Right click on chart, KPI, or annotation.
4. Select **Properties** from shortcut menu; **Properties** dialog opens.
5. Enter properties of the chart, KPI, or annotation; it includes type of chart or what type of data this chart, KPI or annotation will represent as well as graphic properties.
6. Click **Close** to close the Properties dialog box.

To modify a chart, KPI, or annotation

1. Click on the chart, KPI, or annotation; chart, KPI, or annotation you want to modify.

2. Move or expand the area to adjust size or position of the chart, KPI, or annotation
3. Right click on chart, KPI, or annotation and click **Properties** from shortcut menu; **Properties** dialog opens.
4. Modify properties of the chart, KPI, or annotation; it includes type of chart or what type of data this chart, KPI or annotation will represent as well as graphic properties.
5. Click **Close** to close the Properties dialog box.
6. To enter text or update font and alignment, right click on KPI and Annotation rectangle and select **Edit or Format Text** within a shortcut menu.

To export dashboard

1. Right click in any place of dashboard, and from the shortcut menu click **Copy Dashboard to Clipboard** or **Copy Dashboard to File**.
2. In you export dashboard to file, you can select file format: JPEG, PNG, GIF, BMP, or TIFF

- Many KPIs and charts are based on results of Monte Carlo simulations. Therefore you need to perform calculation to see results of analysis on the dashboard.
- RiskyProject comes with default dashboard. To Generate default dashboard right click in any place of dashboard and select Create Standard Dashboard from shortcut menu.
- To completely clear dashboard click in any place and select Clear Dashboard from shortcut menu
- You can save dashboard in system registry for all new project. To do then click in any place and select Save Dashboard as Default from shortcut menu
- You can modify background color of dashboard by clicking in any place and selecting Dashboard Setting from shortcut menu
- You can copy and paste selected chart, KPI, or annotation. To do that right click on any selected chart, KPI or annonation, and select Copy from shortcut menu. Then right click on any area of dashboard where you want to paste it and select Paste from shortcut menu.
- Risk Dashboard can be printed. To Print dashnoard click on File > Print

Setting up Defaults for Qualitative Risk Analysis

Risk ID Settings

You can generate Risk IDs automatically. Alternatively, you can enter the Risk IDs manually, in the same manner as you enter any other risk property. If a Risk ID is generated automatically, you can overwrite it manually. Risk IDs will be incremented each time you enter new risk.

Risk IDs may include four components

1. **Prefix** – any symbols (optional)
2. **Number** – from 4 to 16 digits (optional)
3. **Suffix** – any symbols (optional)
4. **Date** – date format can be defined (optional)

Risk ID can be unique for all projects on your computer or unique only for a particular schedule. For example, if Risk ID is unique for all projects on your computer:

- Project A will have risks R0001, R0002, R0003, R0004
- Project B will have risks R0005, R0006, R0007

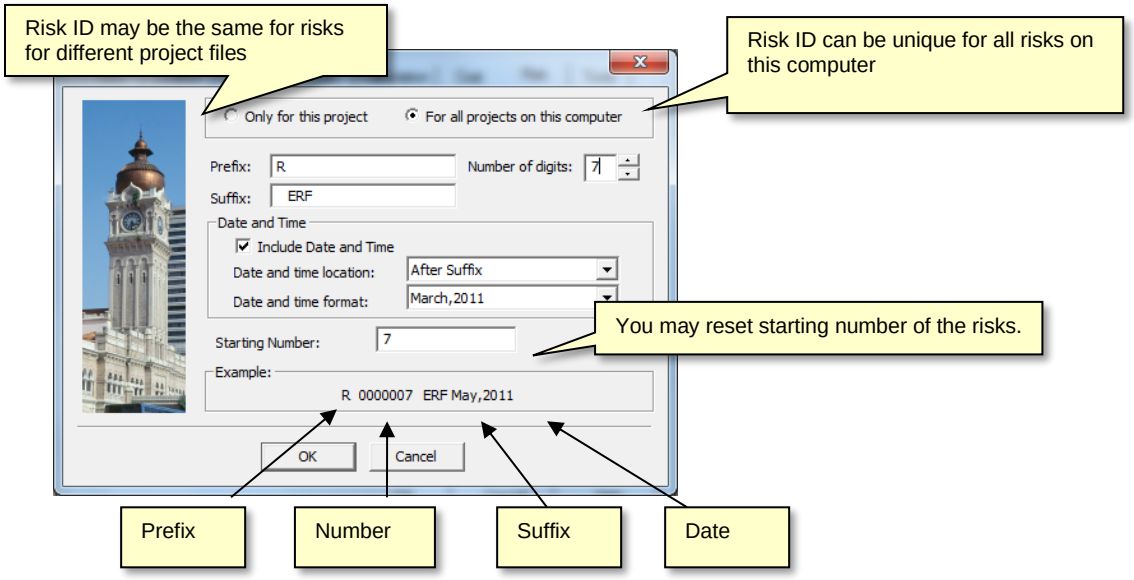
If Risk ID unique only for the particular schedule:

- Project A will have risks R0001, R0002, R0003, R0004
- Project B will have risks R0001, R0002, R0003

You can always reset the starting number. The starting number only affects new risks and does not affect risks, which had been previously entered. However, if you update the starting number the Risk ID may not be unique. In addition, the Risk ID may be not unique if you manually overwrite automatically generated risk ID.

To enable automatic generation of Risk ID and define format of Risk ID:

1. Click the **Schedule** tab. In the Settings group, click **Options**.
2. Click the **Risk** tab.
3. Select the **Generate Risk ID automatically** check box.
4. Click on **Risk ID Format** to define rule of Risk ID automatic generation; **Risk ID Format** dialog box opens.
5. In the **Risk ID Format** dialog, select how Risk ID will be generated: for particular project or for all projects on your computer.
6. Define the Risk ID prefix and suffix.
7. Define the number of digits for Risk ID generation.
8. Enable / disable date as part of the Risk ID format.
9. If date is enabled, define the date format and position.
10. Define the starting number for generating Risk IDs.



Managing Risk Categories and Outcome Types

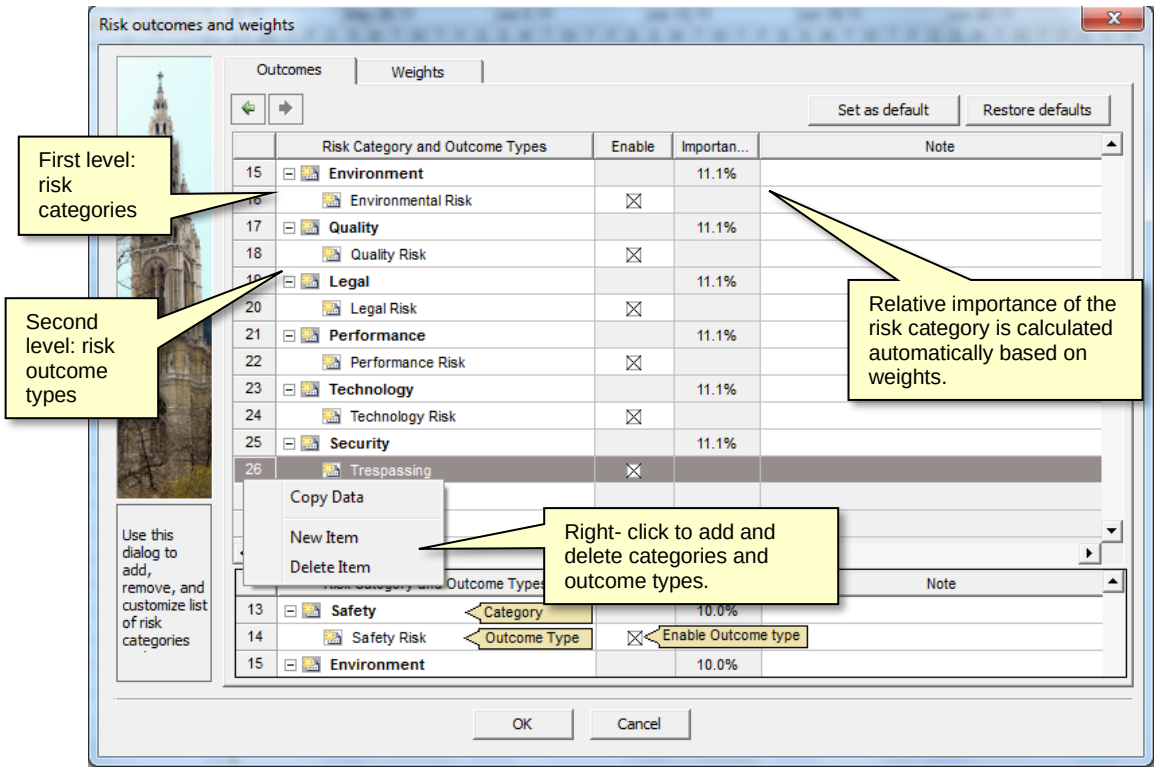
RiskyProject has a default list of risk categories and outcome types. You may customize risk categories and outcome types: add new outcomes or delete existing categories or outcome types.

For example, you add the category Security, which is not in the list of predefined categories:

Category:	**Security**
Outcome Type 1:	Trespassing
Outcome Type 2:	Information Security Failure

Categories are shown at the top of Risk Register, Risk Matrix, and Risk Report views. You are able to filter risks based on category. Outcome types are filtered based on the risk probabilities and outcomes. For example, you enter the risk “Failure of security procedure.” It will have probability 60%, outcome type “Information Security Failure” and outcome “Low.”

Risk categories related to project duration are referred to as “Schedule and Scope.” This category is shown Risk Register as the “Duration” category. Risk categories related to project cost are referred to as “Cost and income” and are shown in the risk register as the “Cost” category. Under both these categories, you will find a number of outcome types. Most of these outcome types are reserved for quantitative risk analysis (read “Quantitative Risk Analysis” for more information). For qualitative risk analysis only two outcome types are available: “Relative Delay” for “Schedule and Scope” and “Relative Cost Increase” for “Cost and income category.”



- One risk may have different outcomes type and categories. For example, "Low quality supplies" can affect quality and safety. RiskyProject will calculate the impact of this risk on safety and quality separately, and the combined impact on all risk categories.
- You can enable/disable risk outcomes. Once disabled, risk outcomes will no longer be available on the **Probabilities and Outcome** tab of **Risk Information** dialog box.
- You may save a customized set of risk categories and outcome types to the system registry for all future projects on your computer by clicking the **Set as Default** button. This new default set of risk categories and outcome types will not affect existing projects. You may also restore a pre-defined set of categories and outcome types by clicking the **Restore Defaults** button.
- You may copy the risk category and outcome type data to the clipboard. To do this, select a row under which you want to add a copy risk outcome, right-click on the row number and choose Copy Data

Adding risk categories

1. Click the **Risks** tab. In the **Settings** group, click **Categories and Outcomes**.
2. Click the **Outcomes** tab.
3. Select a row above where you want to add a new risk category.
4. Right-click on the row number and choose New Item.
5. Provide a name.

6. Click the **Outdent** arrow. By default, all new rows are considered risk outcomes, by moving the outcome to the left the outcome is converted into a risk category. This is indicated when the name is bolded, and the Task and Resource check boxes disappear.

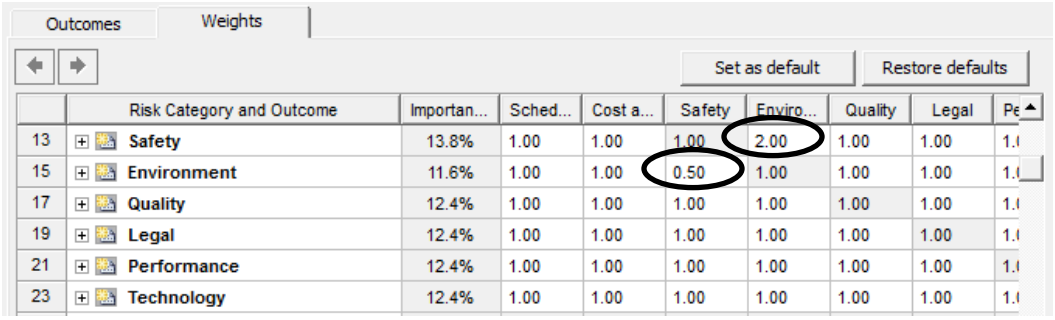
Risk Weighting

Risk Weighting is a method of assigning the relative importance of a particular risk category to an organization and is important when dealing with multi-criteria decision-making. RiskyProject uses a form of the Analytical Hierarchy Process (AHP) to weigh the relative importance of one risk category over another. By default, weights for all risk categories are equal.

AHP is a two-step process:

1. Develop a list of your risk categories and criteria.
2. Perform a pair-wise comparison to establish consistent ranking or priorities for each risk category.

For example, after determining your organization's risk preferences, you determine that Safety risk is twice as important as Environment; you would enter a 2 into the cell where the Environment category row intersects the Safety column.



	Risk Category and Outcome	Importan...	Sched...	Cost a...	Safety	Enviro...	Quality	Legal	Pe
13	Safety	13.8%	1.00	1.00	1.00	2.00	1.00	1.00	1.(
15	Environment	11.6%	1.00	1.00	0.50	1.00	1.00	1.00	1.(
17	Quality	12.4%	1.00	1.00	1.00	1.00	1.00	1.00	1.(
19	Legal	12.4%	1.00	1.00	1.00	1.00	1.00	1.00	1.(
21	Performance	12.4%	1.00	1.00	1.00	1.00	1.00	1.00	1.(
23	Technology	12.4%	1.00	1.00	1.00	1.00	1.00	1.00	1.(

Notice that the relative importance of the Safety Category has increased to 13.8 while the rest of the categories have decreased.

These weights will be used in the calculation of the risk impact on all categories.

Weighting risk categories

Before you can add risk weights, you should perform a risk weighting analysis to determine the relative importance of each risk category to your organization.

1. Click **Risks** tab. In the **Settings** group, click **Categories and Outcomes**.
2. Click the **Weights** tab.
3. Select the risk category to which you want to add the weighting factors.
4. Enter the risk-weighting factor for each risk category (column).
5. Repeat Steps 3 and 4 for each risk category.

Managing Default Risk Properties

Risk Properties

Each risk may have risk properties. These properties are useful for storing any information about the risk. You can use risk properties to search and filter the Risk Register. Risk properties can be different types:

- String – text information
- Integer number
- Real number
- Resource – can be taken from list of resources
- Date
- Picklist: dropdown list with values
- Mitigation Action: used to import data from Excel, see "Importing Risk Register from Microsoft Excel"
- Threats or Opportunities: used to import data from Excel, see "Importing Risk Register from Microsoft Excel"
- Response Plan: by using this property type you can define multiple response plans
- Yes/No

Integer numbers and real numbers have maximum and minimum values.

The list of risk properties is hierarchical; the risk properties are subdivided into separate groups.

Editing the default risk properties

1. Click the **Risks** tab. In the **Settings** group, click **Default Properties**.
2. Select a row under which you want to add a new risk outcome.
3. Right-click on the row number and choose **New Property** Item
4. Type in the name.
5. Select type, maximum and minimum values for the new property.
6. Use the **Indent** and **Outdent** arrows to create groups of risk properties.
7. If you have Picklist type risk property double-click on risk property ID; Picklist dialog box will open where you can enter the list of values.

Default risk properties are automatically saved in the system registry and can be used for all projects. You may use the **Restore Default** button to overwrite changes in default risk properties you made with standard set of risk properties.

Format the Risk Matrix and Risk Trend Chart

You can modify the Risk Matrix to define the risk matrix's number of row and columns, define labels and the risk tolerance display. These settings will be used in Risk Matrix view.

Risk Tolerance

The level of risk tolerance is displayed using color-coding (for threats: green: low risk, yellow: medium risk, red: high risk). A high number of green cells on the chart indicates a high-risk tolerance. A high number of red cells on the chart indicates a low risk tolerance. Color-coding for opportunities is the opposite.

Number of Rows and Columns, Labels for Probabilities and Impacts

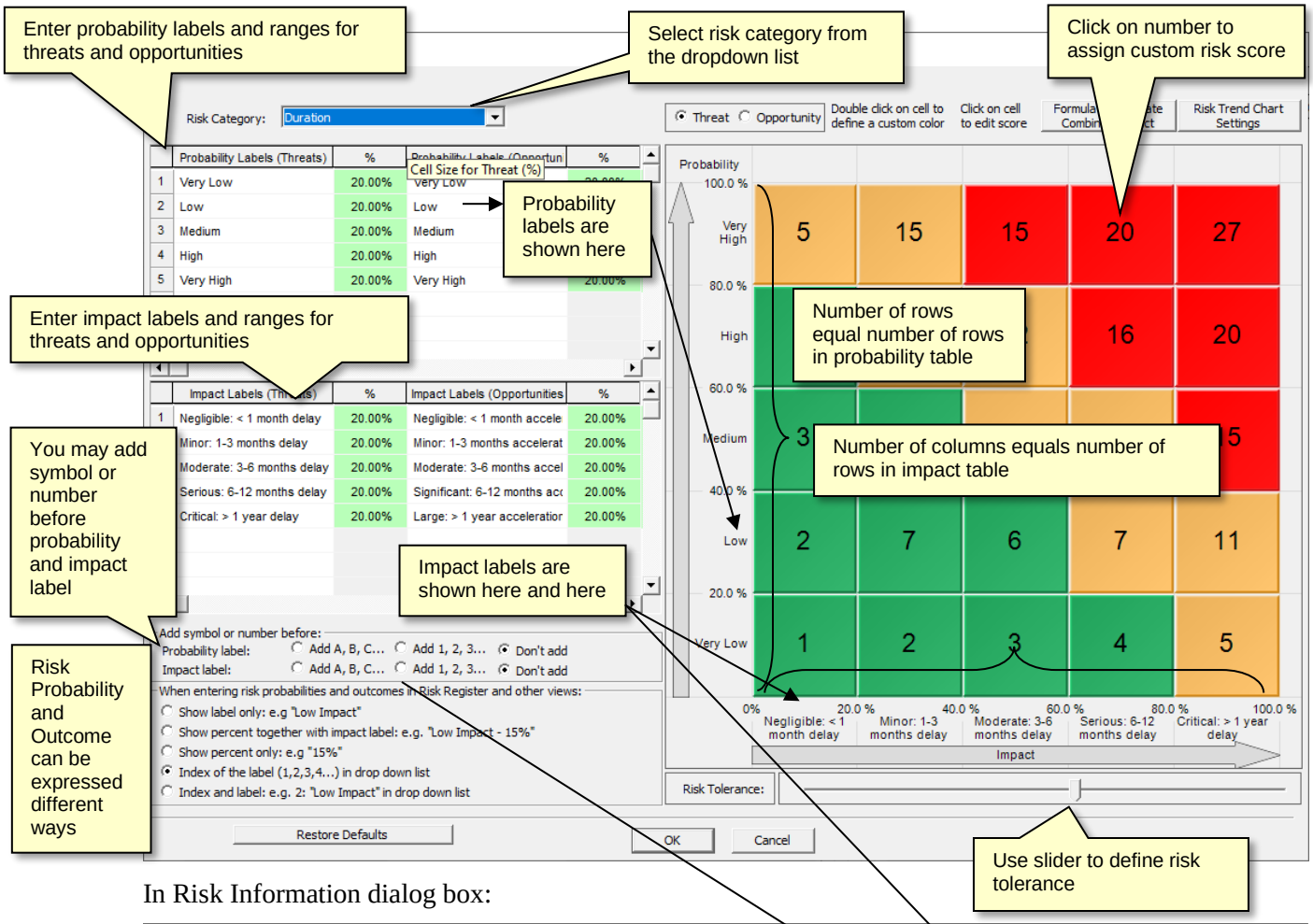
In the Format Risk Matrix dialog box, the number of rows in the Probability table corresponds with number of rows of the risk matrix, and the number of rows in the Impact table corresponds with the number of columns in the risk matrix. Therefore, to add or remove a row or column in the risk matrix, simply add or remove the label in the probability or impact table.

You may define probability and impact for different labels for each risk category. In addition, you may define different labels for threats and opportunities.

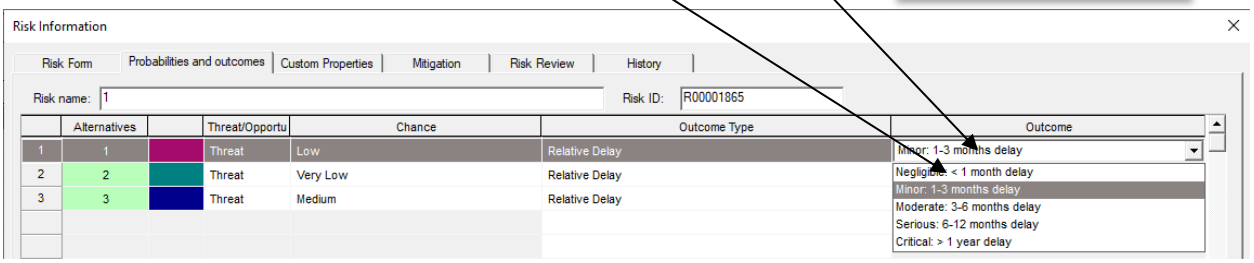
For example, if, in the Duration category, the impact label for “Threats” is “Low: 1 month delay”, the impact label for the opportunity in the same category is “Low: 1 month acceleration”. If you do not define labels for a risk category, the default set of labels will be used. You may modify the default set of labels by selecting “Default” from the dropdown list and then editing as required.

Probability labels are used only in the Risk Matrix; impact labels used appear in the Risk Matrix as well as to define outcomes of each risk in the **Probabilities and outcomes** tab of the **Risk Information** dialog box.

For example, an impact label “Low: 1 month delay” will be shown on the horizontal axis of the Risk Matrix. In addition, when you define the impact of a risk, which has an outcome type “Relative delay”, you will be able to select the outcome “Low: 1 month delay”.



In Risk Information dialog box:



Define Custom risk scores

Risk scores are usually calculated as Probability * Outcome. However, if you have risk probabilities and outcomes expresses as index (1,2,3,4….) index and label (2: "Low Impact") in the drop down list you may define custom nonlinear scores. These scores are shown in Risk Matrix in **Format Risk Matrix** dialog as number from 1 to 99 on each cell. For example,

- index of low probability is 2 - second row from the bottom of risk matrix
- index of critical outcome is 5 - last columns of risk matrix
- score based on these indexes equal 2*5 = 10
- it is possible to assign a number to this cell different than 10. To do just click on number and enter different number, for example 11.

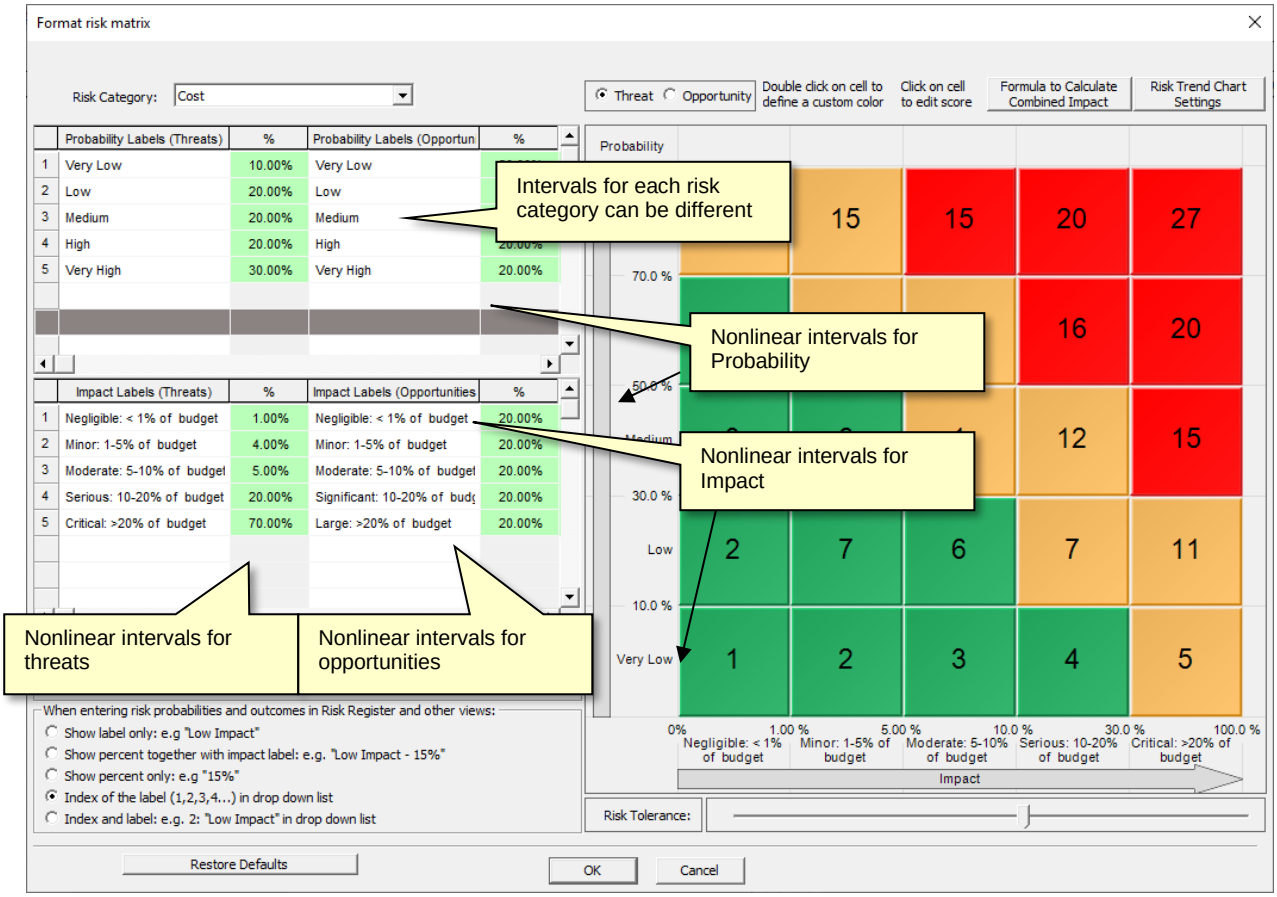
Nonlinear intervals for probability and impact

In standard risk impact and probability matrixes, intervals can be non-linear. For example, in some 5x5 risk matrixes, Very High probability often indicates a probability of 10 - 70%, High 70 -50%, Moderate 50-30 %, Low 30-20% and Very Low is >10%. The risk matrix can be setup so that the matrix "intervals" can be modified so that each interval can represent a different scale for both probability and impact. The sum of all intervals must be equal to 100%. When you are modifying the ranges, if the sum is not equal to 100%, the background color will be pink. Once the sum equals 100%, the color changes to green.

Very Low	10%
Low	20%
Medium	20%
High	20%
Very High	30%

The same process can be used to customize your impact matrix

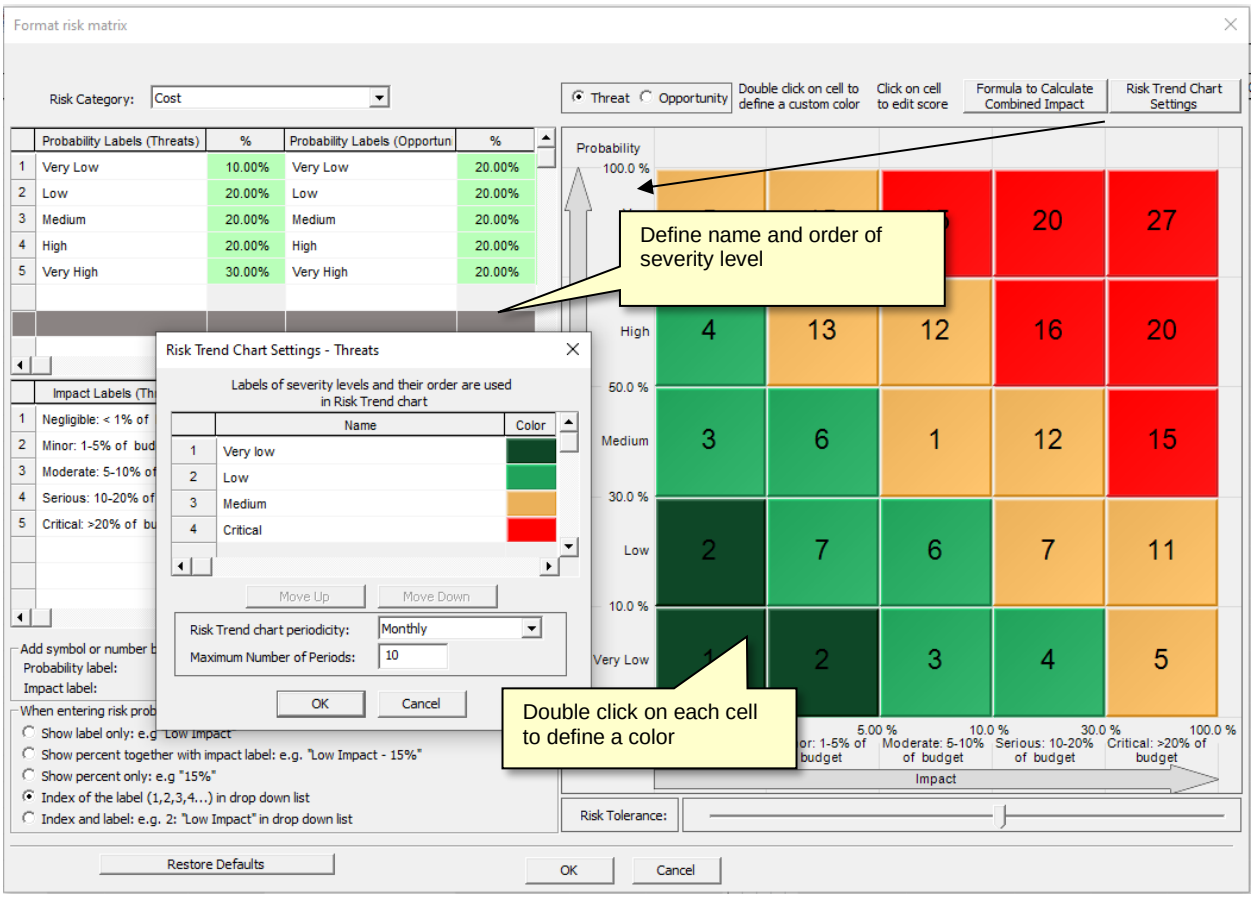
Negligible	1%
Minor	4%
Moderate	5%
Serious	10%
Critical	80%



The example below shows how this would appear in the Format Risk Matrix dialog box.

Risk Severity Levels

Each color on risk matrix represents a particular risk severity level. By default, there are only three ranges: "**Low**" – green, "**Medium**" – yellow and "**Critical**" red. Each severity level can be associated with certain risk mitigation and response actions. For example, risks that appear on green cells are low risk and can be accepted.



You may change color of each cell by double-clicking on the cell. You may also define a name of each range, and order how different ranges are shown in the Risk Trend Chart, as well as the periodicity of the risk trend chart.

Steps to Format Risk Matrix

To format the Risk Matrix:

1. Click the **Risks** tab. In the **Settings** group, click **Format Risk**.
2. Select a risk category from dropdown list. “Default” category is used if you did not explicitly define labels for specific risk category.
3. Modify the **Intervals** for **Impact** and **Probability** for the selected risk category.
4. Modify the **Impact** and **Probability** labels as required for the selected risk category.
5. Drag the **Risk Tolerance** slider to the left to set a low risk tolerance or to the right to set a high-risk tolerance.
6. Toggle between **Threat** and **Opportunity** to view how the risk matrix will look like for threats and opportunities.
7. Define how risk outcomes in Risk Information dialog box or Risk Register will be shown:
   - As label only (e.g., “Low Impact”)
   - As percent together with label (e.g., “Low Impact – 15%”)

- As percent only (e.g., 15%)
- As index of the label (1,2,3,4…) in dropdown list
- As index and the label: e.g. 2: Low Impact in dropdown list

8. Add symbol or number before probability or impact label. For example, instead of "Very Low" label you may use "A: Very Low".
9. The define properties of the severity level by clicking on "**Risk Trend Chart Settings**"
10. **Formula to Calculate Combined Impact** allows you define algorithm for impact calculation.

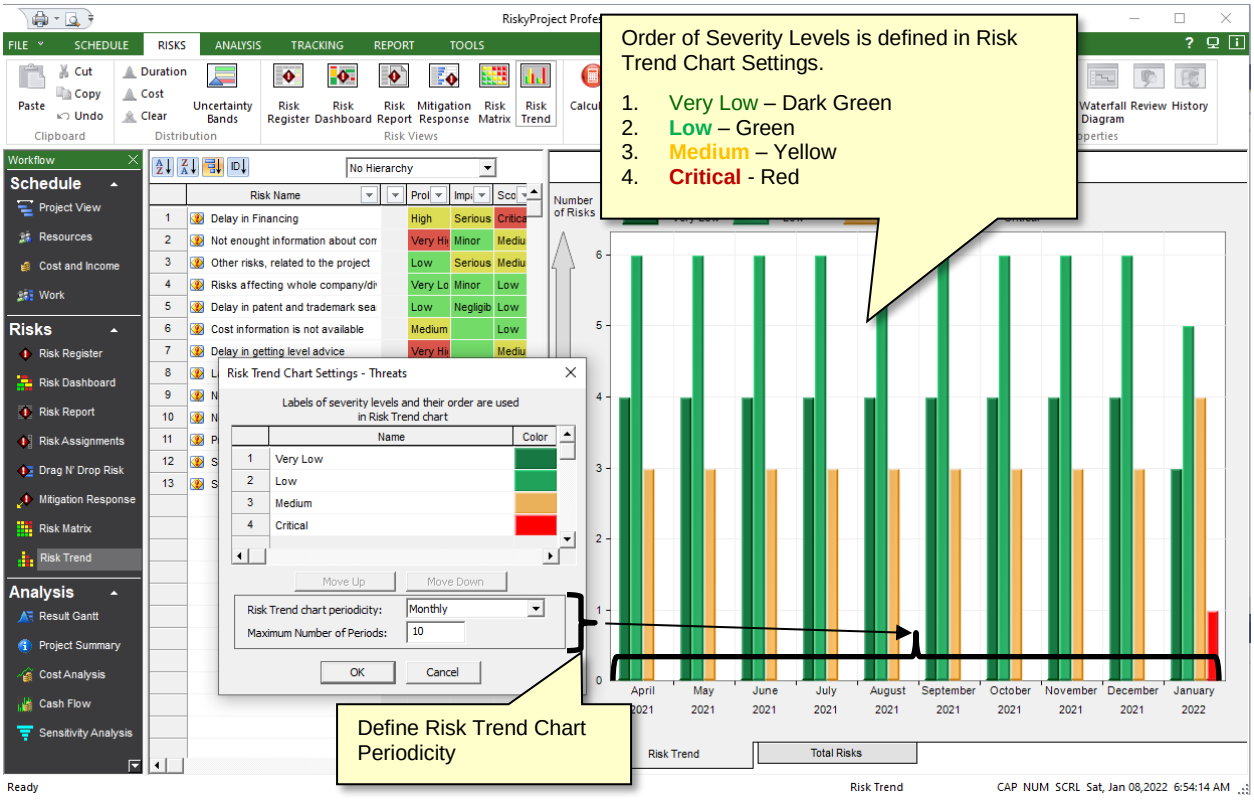
Your settings will be saved to the system registry for all new projects on your computer. These new defaults will not affect any previous projects. You can also restore the pre-defined set of categories and outcome types by clicking on the **Restore Defaults** button.

Risk Trend Chart Settings

Using Risk Trend Chart settings dialog box, you can define:

1. Order of bar on Risk trend chart associated with particular risk **severity level**. For example, for each time period **Low** risks (Green color) will first, **Medium** risk (Yellow color) will be second and **High** risks (Red color) will be third. You can use Move Up and Move down buttons to define the order.
2. Name of each range.
3. Risk trend chart periodicity (Monthly, Quarterly, Yearly, etc.)
4. Maximum number periods in in Risk Trend Chart. For example, Risk trend will show 10 month back starting from the current month.

Risk Trend chart settings can be invoked from Format Risk Matrix dialog or by right click on Risk Trend Chart.



Algorithm for Impact Calculation

You may define algorithm for impact calculation using **Formula to Calculate Combined Impact** button. There are two algorithms:

- Combined impact = maximum impact of all categories; for example, Cost Impact is 30%, Schedule Impact is 40%, and Safety Impact is 10%. Total impact is 40%
- Combined impact = sum of impacts in each category and then normalize. For example, Total impact will be 70%. However, if total impact for at least one risk in risk register with exceed 100%, all impacts for all risk register will be proportionally reduced to ensure that on impact is greater than 100%.

To define algorithm for impact calculation:

8. Click the **Risks** tab and then click on Format Risk Matrix
9. Click on **Formula to Calculate Combined Impact**
10. Select **Calculation of combined risk impact for all categories:** maximum impact or normalized sum of impacts.

Saving and Loading the Risk Register

You can share a risk register between different projects. This feature is useful when you create a set of risks for your organization and want to share risks between different projects on different computers. Risk register can be saved on a corporate server. RiskyProject will lock risk register if you are using it to prevent another user from overwriting it.

To save the risk register

- Click the **Risks** tab. In the **Export/Import** group, click **Risk Register** and then **Save Risk Register**. The risk register will be saved as a separate file with extension *.alr.

To load the risk register,

- Click the Risks tab. In the Export/Import group, click Risk Register and Load Risk Register.

- When you save a risk register, risk assignments that are used for quantitative risk analysis are not saved. If you wish to share information about global risk assignment between different projects use risk templates.
- When you load a risk register to existing project all risks will be deleted.

Chapter 3: Managing Project Schedules

RiskyProject for Microsoft Project and Oracle Primavera

RiskyProject as a Standalone Application

You can launch RiskyProject directly from the Windows Program menu. When you open RiskyProject, the main Project view appears in which you can enter schedule and risk, perform the analysis, track project performance and report the results.

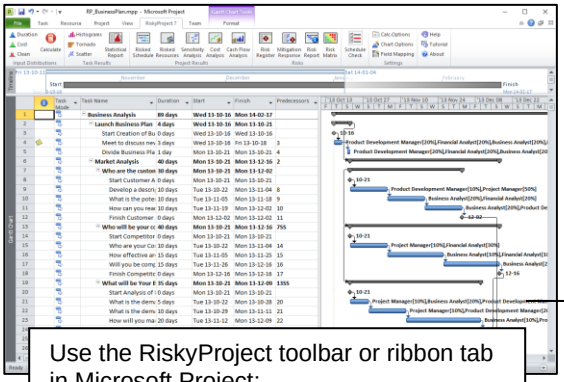
RiskyProject for Microsoft Project

RiskyProject seamlessly integrates with all versions of Microsoft Project from 2010 and later. When you install RiskyProject, it checks if Microsoft Project is installed on the computer. If Microsoft Project 2010 or later is, installed RiskyProject installs ribbon tab and Add-In to Microsoft Project.

Here is how the integration works:

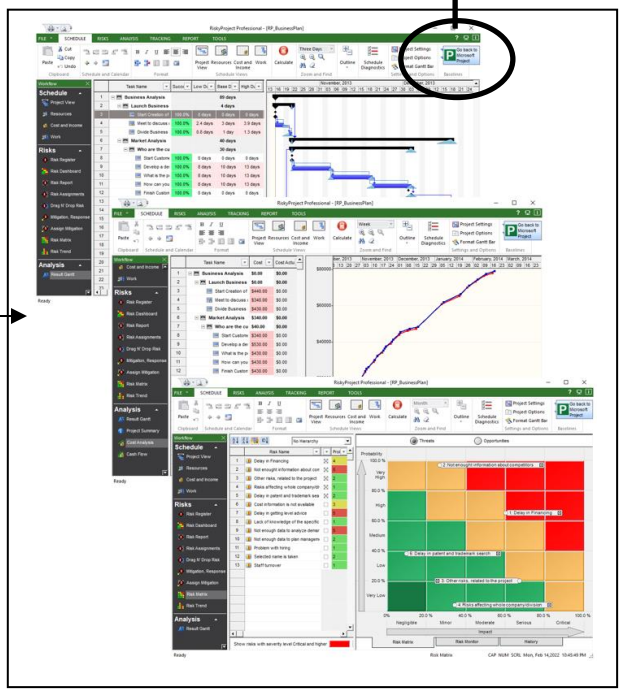
1. The first time you open Microsoft Project after installing RiskyProject for Project, check to see that the RiskyProject ribbon tab is visible. You can enable/disable ribbon tab by clicking on **Options** in the **File** menu. Project Options dialog will open where you can select **Customize Ribbon**. You can also check the installed RiskyProject add-in by selecting **Add-Ins**.
2. Create a schedule in Microsoft Project.
3. Define uncertainties, perform calculation, and analyze results:
   - Define statistical distributions for cost and duration for selected tasks inside Microsoft Project; all statistical distributions are saved in a RiskyProject file.
   - Add risk-related information in the RiskyProject views if necessary: risk events, probabilistic and conditional branching, probabilistic calendars, etc.
   - Perform Monte Carlo simulations
   - View results of analysis and reports in Microsoft Project
4. At any moment, you can go back to Microsoft Project and make changes to your schedule. All changes will be reflected in RiskyProject. However, if you make changes to the deterministic project schedule in RiskyProject, these changes may be overwritten by the Microsoft Project schedule.

Click the **Go Back to Microsoft Project** button in RiskyProject to view original schedule and resources



Use the RiskyProject toolbar or ribbon tab in Microsoft Project:

1. Define statistical distributions for selected task or group of tasks
2. Run Monte Carlo Simulations
3. View results of selected task or group of tasks
4. Open the selected risk view or report RiskyProject.



Microsoft Project

RiskyProject Add-In

- You must save the schedule in Microsoft Project to use the integration between Microsoft Project and RiskyProject.
- Always use the RiskyProject toolbar or ribbon tab in Microsoft Project and Go back to Microsoft Project button in RiskyProject to move back and forth between RiskyProject and Microsoft Project.
- Once you have added risks and uncertainties to your schedule in RiskyProject, they will be always associated with Microsoft Project schedule.
- Once you open a risk view from within Microsoft Project, your Microsoft Project file will be associated with the RiskyProject data file that contains risks and uncertainties for the schedule created in Microsoft Project.
- Links between the Microsoft Project schedule and the RiskyProject file (alm extension) are saved in the registry. If you move the RiskyProject file into a different directory, you will be prompted to browse to find the RiskyProject file associated with the Microsoft Project file.

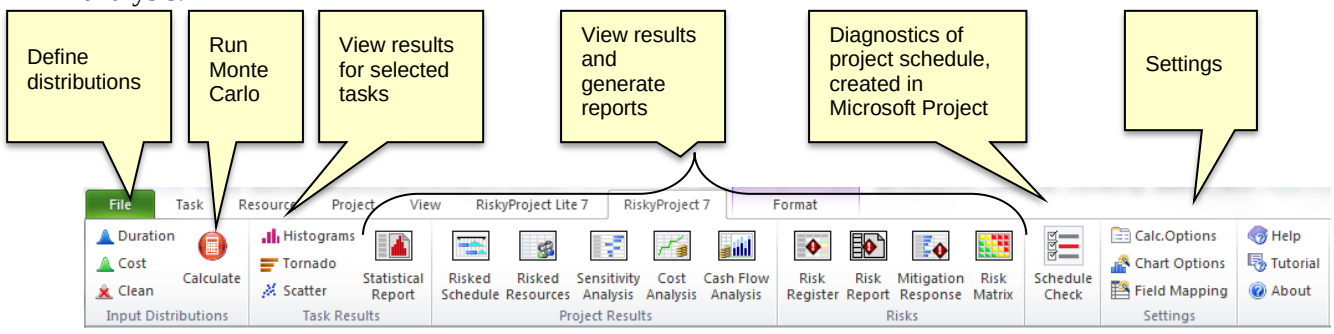
- If you move the Microsoft Project file, the link between Microsoft Project file and RiskyProject will also be broken. In this case, use the command **File > Import > Risks from Another Project** to find the RiskyProject file.
- If you make any changes in Microsoft Project and open RiskyProject using the toolbar or ribbon tab, RiskyProject will reflect the change; however, the risks and uncertainties will be adjusted proportionately. For example, your schedule in Microsoft Project has a task "Project

Inception" with a Base duration of 5 days and in RiskyProject you define Low duration as 2 days and High duration as 6 days. If you go back to Microsoft Project and change the Base duration to 10 days, when you return to RiskyProject, the Base duration will be 10 days (the same as in Microsoft Project); however, your Low and High durations will be adjusted proportionately (4 days and 12 days respectively. The same logic is used if you adjust the original fixed costs, work, income, lag, and start times.

- Low, most likely, and high duration and costs are stored in Microsoft Project: duration1, duration2, duration3… Statistical distributions are stored in text fields in Microsoft Project. You must map the duration, cost, and text fields in Microsoft Project to low, most likely, and high duration or cost in RiskyProject using **Field Mapping** settings.
- Some features of Microsoft Project are not supported in RiskyProject. For more information, see Frequently Asked Questions.
- You can make changes to the schedule in RiskyProject. However, RiskyProject does not write these changes, such as task duration or task name, back to the Microsoft Project schedule. Therefore, we recommend that you do not to make any changes to original schedule in RiskyProject. Use RiskyProject to add risks, uncertainties and other risk related information.
- If you want to transfer the original schedule updated in RiskyProject or results of probabilistic analysis to Microsoft Project, use **File > Launch > Microsoft Project**. Please note that RiskyProject is using Microsoft Project XML format. Some scheduling data may not be transferred due to limitations of the XML format.

Using Microsoft Project Add-In

Using the RiskyProject Add-In, you can quickly add Low and High estimates for Cost and Schedule directly to your Microsoft Project file, run the simulation, and view the results of the analysis.



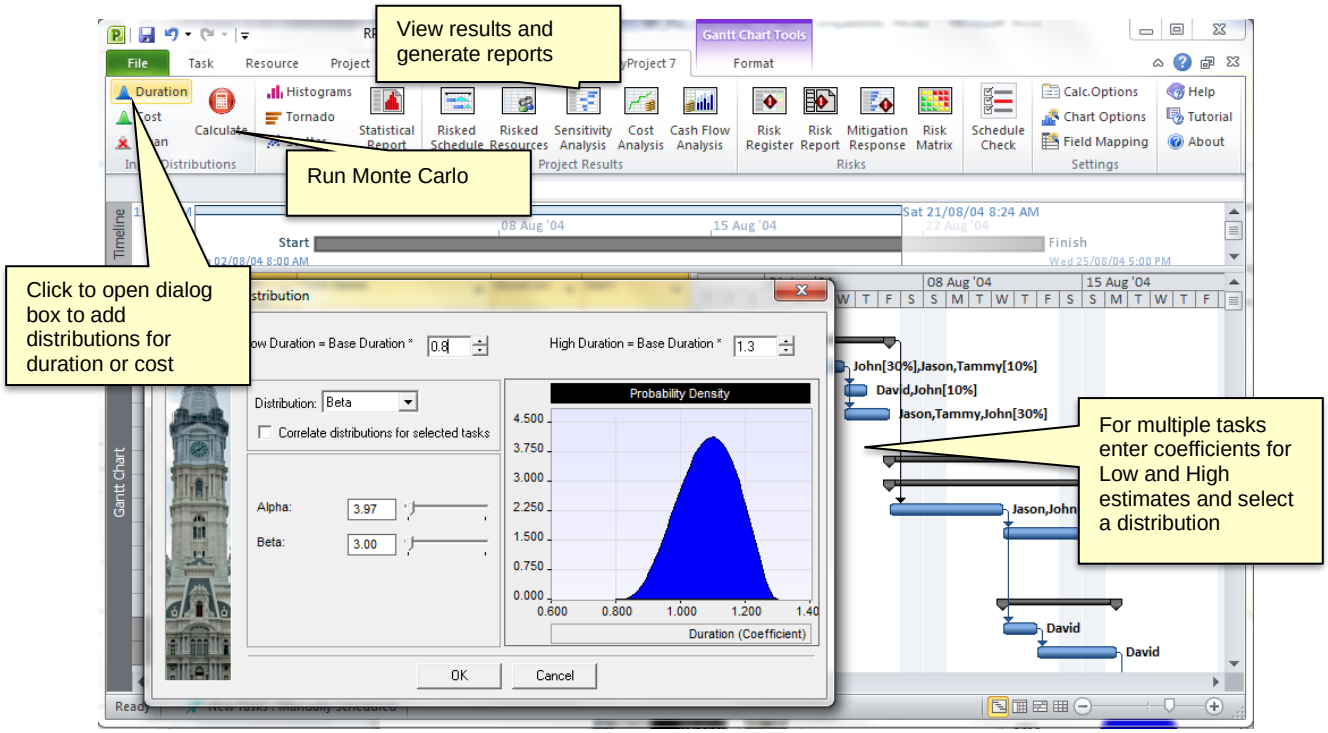
Setting up the Add-In options

You can set up your Monte Carlo calculation, chart, and field mapping options using the Add-In.

- Calculation options include the maximum number of iterations and convergence monitoring and more. To read more about calculation options, read Setting up calculation options.
- Field mappings allow you to modify the default fields where the distributions for duration and cost are saved. To read more about the mapping, read Mapping custom fields in Microsoft Project to low/most likely/high duration/cost/income/distribution fields in RiskyProject

Adding Low, Most Likely, and High Duration or Cost in Microsoft Project

1. Select one or more activities.
2. Click the **RiskyProject 7** tab. On the **Input Distributions** group, click **Duration** or **Cost**. The **Statistical Distribution** dialog box opens.
3. Enter in the Low and High estimates using coefficients or fixed values (single activity).
4. Select a distribution and modify any parameters required by the distribution. The "Most likely" estimate is available for Triangular and BetaPert.
5. Click **OK**.



To clean edits made to distributions:

1. Select the task or tasks in which you want to remove the distributions.
2. Click the **RiskyProject** tab.
3. On the **Input Distributions** group, click **Clean**.

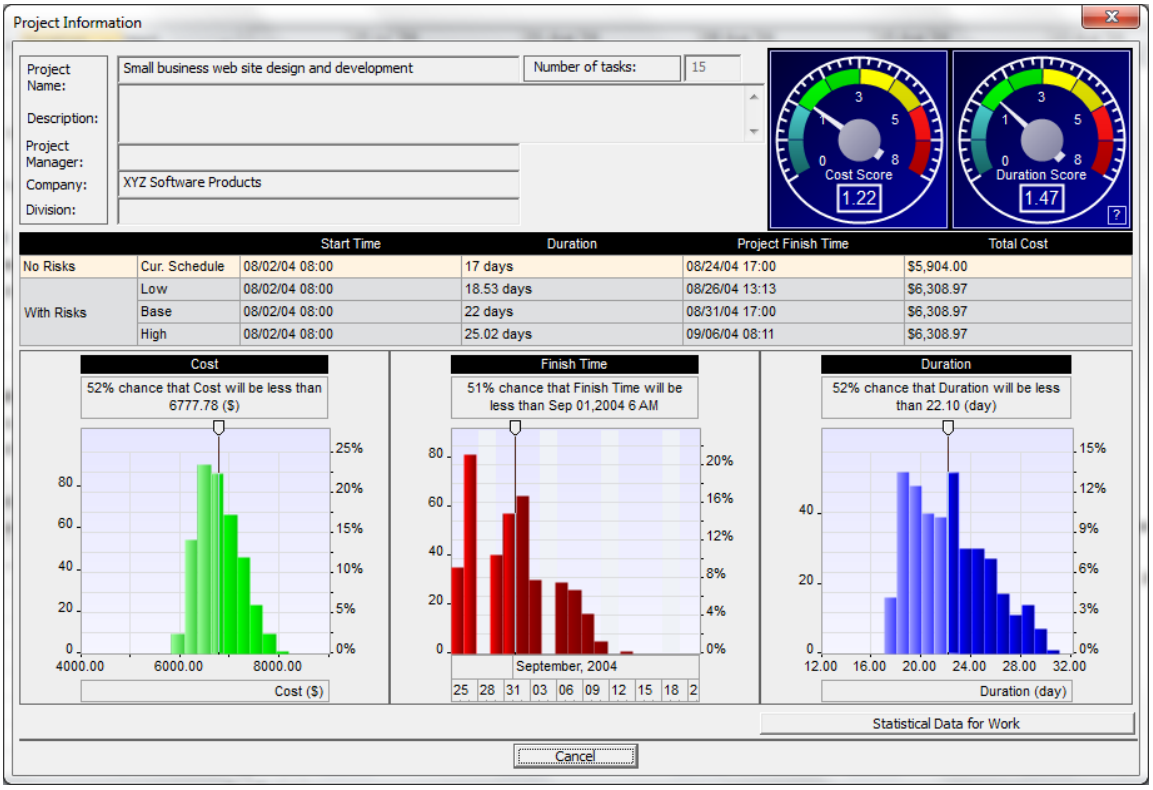
Run a Monte Carlo simulation using the Microsoft Project Add-In

Once you have defined the low, most likely, and high estimates and distributions to your activities, you can run a simulation.

To run a Monte Carlo simulation:

1. Click the **RiskyProject** tab.
2. On the **Input Distributions** group, click **Calculate**. A progress bar will open and indicating the number of iterations that have been completed.

3. When the simulations are completed the **Project Information** report opens, which contains a project summary of the results of the simulation.



View the results of the simulation for a task

You can quickly view either histograms or tornado charts for a task. Only one task can be selected.

To view a histogram or tornado chart for a single task:

1. Click the **RiskyProject** tab. On the **Task Results** group, click **Histograms** or **Tornado**. The Task Simulation Results report opens. To read more about these reports, see
2. Viewing Task Simulation Results.
3. Double- click on any of the reports to open a detailed view of the results.

Create a statistics report

You can automatically generate a report that includes a histogram, cumulative probability, and sensitivity analysis for one or multiple activities using the Statistics Report. To read more about the Statistics Report, see Statistics Report for Quantitative Analysis.

To create report:

1. Run a simulation.
2. On the **Task Results** group, click **Statistics Reports**. The **Statistics Report** view opens.
3. Select the activities that you want to include in the report.
4. From the **File** menu, click **Print** to open the **Print Options** dialog box.

Running Diagnostics of Microsoft Project Schedule

Diagnostics of Microsoft Project Schedule checks the schedule for logical errors as well as to uncover possible corruptions. Corrupted project schedules often cannot be imported to RiskyProject. To run project schedule diagnostics, click on **Check Schedule** button.

Diagnostics in Microsoft Project is a subset of schedule diagnostics in RiskyProject. It only indentifies a few most important errors and does not execute DCMA 14 point schedule inspection

About installing the RiskyProject/Microsoft Project integrated solution

During installation, RiskyProject checks if you have Microsoft Project 2010 or later installed. RiskyProject is not integrated with earlier versions of Microsoft Project using the toolbar. For early versions of Microsoft Project, you must use one of the formats generated by Microsoft Project (XML, or MPX).

Before you install the toolbar or ribbon, close all instances of Microsoft Project. RiskyProject adds the toolbar/macro or ribbon to the last installed version of Microsoft Project.

Information about RiskyProject's ribbon is saved in the system registry. RiskyProject will update these registry settings each time it is launched.

You may also install the integration after RiskyProject is open. Click the **Tools** tab**.** In the RiskyProject Configuration group, click **Install Integration with Microsoft Project** to install RiskyProject toolbar/macro or ribbon in Microsoft Project.

- You must be an administrator to perform the installation.
- Your system must have Microsoft .NET framework 2.0 or later installed in order to install RiskyProject for Project. If Microsoft .NET framework 2.0 is not installed, the RiskyProject installer will prompt you to download it from the Microsoft web site and install it on your system.

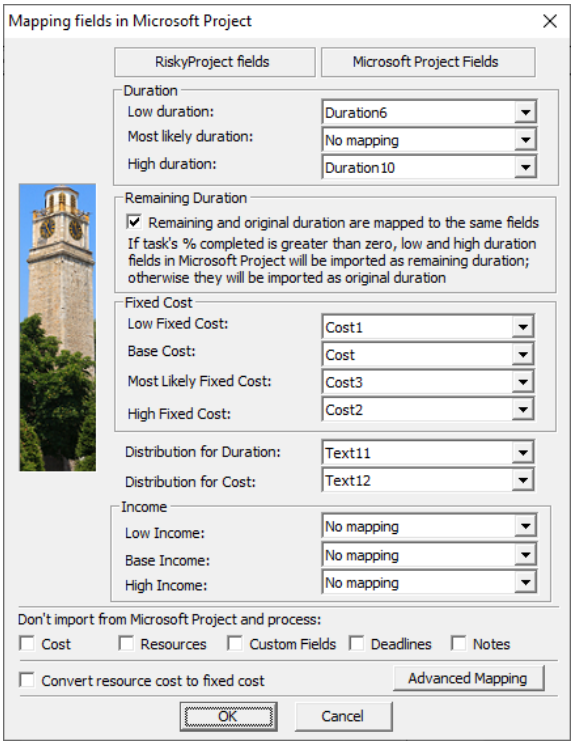
Mapping custom fields in Microsoft Project to low/most likely/high duration/cost/income/distribution fields in RiskyProject

You can use duration or cost fields in Microsoft Project or in any other software that uses Microsoft Project XML schema: duration1, duration2, duration3 … to define low and high duration in RiskyProject. You can also use duration1, duration2, duration3… fields in Microsoft Project to define low and high **remaining** duration for partially completed tasks.

You can use cost1, cost2, cost3, … fields in Microsoft Project to define low, base, and high cost and income. Text fields are used to save statistical distribution.

If you previously used Risk+, you may map these fields duration and cost fields the same way as it was done in Risk+. This way you will be able to migrate data related to uncertainties in Microsoft Project from Risk+ to RiskyProject.

To use these fields, you must map them to the corresponding fields in before you import the schedule into RiskyProject. This includes if you are using the RiskyProject toolbar or ribbon in Microsoft Project. The default settings are shown below:



To map Microsoft Project fields:

1. On the RiskyProject Microsoft Project add-in click **Field Mapping** or in RiskyProject, click **File** and then choose **Import > Map Microsoft Project Fields…**.
2. Select the Microsoft Project field associated with low/most likely/high duration, cost, and income in RiskyProject.
3. Select if you wish to map remaining duration fields as original duration fields. If remaining duration fields are mapped to the same fields as original duration fields and percent complete > 0, low and high duration fields in Microsoft Project are used for low and high remaining duration in RiskyProject. For example, both original duration and remaining duration are mapped to the same fields:

Microsoft Project XML	RiskyProject
Mapping: Duration1 -> Low Duration = Low Remaining Duration Duration3 -> High Duration = High Remaining Duration	
Scenario 1: % complete = 0%	
Duration1 = 3 days	Duration Low = 3 days, Low Remaining Duration = 0
Duration = 5 days	Duration = 5 days, Remaining Duration = 0
Duration2 = 7 days	Duration High = 3 days, High Remaining Duration = 0
Scenario 2: % complete = 50%	

Duration1 = 2 days	Duration Low = 5 days, Low Remaining Duration = 2
Duration = 5 days	Duration = 5 days, Remaining Duration = 2.5 days
Duration2 = 4 days	Duration High = 5 days, High Remaining Duration = 4

For remaining duration, you cannot define Most Likely value, only base value will be used for analysis.

4. If you do not want to import from Microsoft Project cost data, resources, cost fields, deadlines, and notes, select appropriate check boxes. It accelerates calculation.
5. If you have cost resources, you may wish to convert cost associated with these resources to the fixed cost during import. You can apply statistical distributions to the fixed cost but cannot do it with cost resources. If you select check box **Convert cost from cost resources** to fixed cost, in RiskyProject cost resource will remain the same as in Microsoft Project, but cost defined in resource assignments will be equal zero.
6. Click **OK**.

Once you define mappings, it will stay in the system registry for all projects transferred from Microsoft Project to RiskyProject.

- These mappings can be used for other scheduling applications that use Microsoft Project's XML format, including Oracle's Primavera. Please note: base fixed cost in Primavera may be saved as Cost1 in XML file. RiskyProject also supports XER file import for Oracle's Primavera.
- If remaining duration fields are mapped to the same as original duration fields and you **changed % complete in Microsoft Project, you must redefine statistical distribution for duration** or update values in duration fields for Microsoft Project.

Advanced Mapping Options

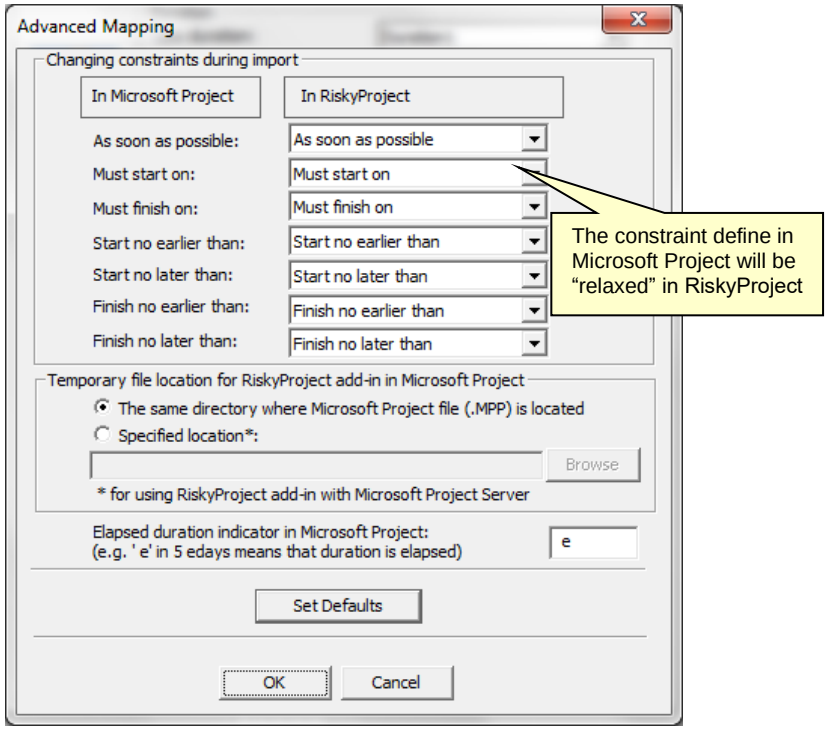
Using advanced mapping options, you may "relax" some constraints in your Microsoft Project schedule while it is imported into RiskyProject. You can also define the location of the temporary file used to import results to RiskyProject.

You must define a temporary file location if the original project schedule has been read directly into Microsoft Project from Microsoft Project Server.

To define advanced settings:

1. Open the **Mapping Fields in Microsoft Project** and click **Advanced Mapping**. The Advance Mapping dialog box opens.
2. Select the constraints in the original project schedule you want to modify during import.
3. If your Microsoft Project schedule has elapsed duration, define the prefix for elapsed duration. In the English version, the prefix is 'e' (with space), e.g. '5 edays'. However, in other languages, this prefix may be different.
4. Select the temporary file location for the RiskyProject Add-in in Microsoft Project.

5. Click OK.



Format of distribution definition text field for RiskyProject/Microsoft Project

If you define distribution in Microsoft Project, it will be saved in one of the text fields. Actual text field is defined in the process of mapping (see "Mapping custom fields in Microsoft Project to low/high duration/cost/income/distribution fields in RiskyProject"). Default fields are Text11 for duration and Text12 for cost distributions. The information will look like:

1^240^480^720^1209886208^0^5^2^12.88^3

Symbol '^' is a separator

The table below outlines all parameters for the distribution string

Parameter	Description	Comments
1	Unique Task ID	If Unique Task ID is zero, the same distribution is defined for the group of tasks
2	Low Duration or Cost	Duration is in hours
3	Base Duration or Cost	Duration is in hours
4	High Duration or Cost	Duration is in hours
5	Seed	Seed ranges from 0 to 2,147,483,648
6	Meaning of Low and High duration and cost	Used for normal and lognormal distribution only: 0: use standard deviation parameter instead of low and high values 1: low and high values are P1/P99

		2: low and high values are P5/P95 3: low and high values are P10/P90 For other distributions this parameter is ignored
7	Distribution Type ID	Uniform, Normal, Lognormal, etc. (See next table)
8	Number of distribution parameters	Must greater or equal zero, for example for uniform distribution number of parameters equals zero. For custom distributions, number of parameters equals number of point multiplied by 2.
9 ….	Distribution Parameters	Set of values which depends on the particular distribution (see next table)

Distribution types and parameters are shown in the next table

Distribution Type ID	**Distribution**	**Parameters**	**Comments**
0	Undefined		No distribution (on uncertainties)
1	Uniform		
2	Triangular	Most likely parameter	
3	Normal	Standard deviation parameter	
4	Lognormal	Mean and standard deviation parameter	
5	Beta	Alpha and beta parameters	
6	BetaPert	Most likely parameter	This is a modification of traditional BetaPert distribution which behaves differently if most likely value close to low or high values.
7	Gamma	Alpha and beta parameters	
8	Exponential	Mean parameter	
9	Laplace	One parameter	
10	Cauchy	Shape parameter	
11	Gumbel	Two share parameters	
12	Rayleigh	Standard Deviation parameter	
13	Discrete	Set of intervals with probabilities	Pair of parameters defining current internal. Number of parameters equals number of intervals multiplied by two.
14	Custom	Set of points with probabilities	Pair of parameter defining points. Number of parameters equals number of point multiplied by two.

XER File Import Settings

Mapping user defined fields in XER files to RiskyProject fields

If you are importing an Oracle Primavera *.xer file, you can use user defined fields to import low, most likely, and high estimates for duration and cost by mapping these fields to corresponding fields in RiskyProject. To map user defined fields, you would need to choose an XER file to use as a mapping template.

To map user defined fields in XER:

1. In RiskyProject, click **File** and then choose **Import > XER File Import Settings…**.
2. Click **Browse** to select a XER file to be used as a template. RiskyProject reads user defined fields in the file.
3. Select the user defined field associated with low, most likely, and high duration and/or cost.
4. Select units for the duration fields
5. Click **OK**. Once you define mappings, the mappings are saved in the system registry. If you import a file that uses different fields for duration and/or cost, you must update the XER mappings.

You must use number (not text) user defined fields in Oracle Primavera to enter low, most likely duration and cost.

XER File Encoding

XER files do not include any information about what is being used to encode the files. If the file you are importing does not use standard encoding (for example, it uses Russian instead of English), then the characters may not display correctly when you import the file. You need to define encoding before you import XER file.

To define encoding:

1. In RiskyProject, click **File** and then choose **Import > XER File Import Settings ….**
2. Select XER file encoding: ANSI, UTF-8, or UTF-16LE
3. Click **OK**. Encoding will be saved in the system registry.

Setting up your projects

Setting up your project defaults

Project defaults are global project settings. There are two types of defaults:

- **Project Options** – These options are applicable to a particular project and are saved in the project file. You define project options on the **Schedule** tab, Settings group, Options.
- **Global Options** - These project defaults are applied to all new projects and are saved in the system registry. Global options include default risk properties, default risk outcomes, and default values of project options. You save global options clicking on **Set as default** in the tabs that support defaults in the Options, Risk Outcome, and Risk Properties dialog boxes.

The Options dialog box includes seven tabs. Use the:

- **View** tab to setup general project parameters and the appearance of the RiskyProject desktop
- **Duration** tab to define the calculation of task durations
- **Calendar** tab is responsible for the calculation of the project schedule
- **Units** tab defines how time units are displayed or input
- **Calculation** tab to set up default calculation parameters
- **Cost** tab is responsible for default cost parameters and calculation
- **Risk** tab defines default risks for the Global and Local risks.

Setting up viewing defaults

Use the **View** tab to set up general project parameters and modify the appearance of the RiskyProject workspace.

1. Click the **Schedule** tab. In the **Settings** group, click **Options**.
2. Click the **View** tab.
3. Enter the default project information (i.e., **Project Manager**) in the text boxes. You can view them in the Project Results view and Main Project Settings dialog box next time you create new project. The Project Manager box is also used as a default value for risk properties: recorder, owner, and contact.
4. Select the project view that will appear whenever RiskyProject is opened from the Default View list. "***LAST VIEW***" will automatically load the most recently open RiskyProject session.
5. Select or clear the **Show or hide startup view** check boxes to enable or disable the workflow bar, legends, and splash screens.
6. Use **Restore Default Column Layout** and **Set Default Column Layout** to restore and save column sequences and widths for all views.

All viewing defaults are global, so they are applied to all new projects created on this computer.

Setting up duration defaults

Use the **Duration** tab to define the calculation of task durations.

1. Click the **Schedule** tab. In the **Settings** group, click **Options**.
2. Click the **Duration** tab.
3. Select the time units that you will use to enter Duration and Work. Duration and Work can be entered in minutes, hours, days, weeks, and months.
4. Define default value for effort driven flag for new tasks.
5. Select how low and high durations will be calculated:
   - Absolute values can be added (subtracted) to the Base Duration.
   - High and low durations are calculated by multiplying the Base duration with a coefficient. You must enter the coefficients.
   - Internally all calculations in RiskyProject are in hours. The units you select are only for data entry and display.
   - By default, Low, Base, and High durations are the same. This is important as RiskyProject recommends that you use Risks to calculate task durations rather than a range of uncertainty.
   - Low and High can represent a different uncertainty range depending upon the distribution that you apply. For **uniform** and **triangular** distributions, **Low** and **High** represent the minimum and maximum duration. For **normal** and **lognormal** distributions, the range can be P1/P99, P5/P95, or P10/P90, which you define in the **Distribution** tab of the **Task Information** dialog for each particular task.

Setting up calendar defaults

In the Calendar tab, you set up the default calculations for project schedules. Actual project calendars are set up in the Working Time dialog box. The specific calendars and type (Deterministic or Probabilistic) are set up in the Main Project Settings.

1. Click the **Schedule** tab. In the **Settings** group, click **Options**.
2. Click the **Calendar** tab.
3. Enter in the daily, weekly, and monthly translation values in the fields provided.
4. Select the date format in the **Output Date Format** box.
5. Enter a default start date for tasks in the **New Task** box. New tasks can be started on current date or default start date. Default start date is defined in **Schedule** tab > **Project Settings** > **Project Start Time**. If new task supposes to start on current date and different date is defined in Project Start Time of Main Project Settings dialog, new task will be constrained **Start not early than**.
6. Use the **Show Deadlines** and **Show Resources** on the Gantt chart check boxes to modify what you want to view on the Gantt chart.

Input date format is always MM/DD/YY. For example, if task start time or finish time is December 31, 2010, you should enter it as 12/31/10

Setting up project units

You define how time units are entered and displayed in the **Units** tab.

1. Click the **Schedule** tab. In the **Settings** group, click **Options**.
2. Click the **Units** tab.
3. Select the labels that you want to use for each time unit. These labels will be used for entering rates or for results. However, they are not used for entering duration. Duration units are defined in the **Duration** tab
4. Select the **Add space before label** check box to add a space between the data and label. For example: **5 days** vs. **5days**
5. Click the Set as Default button to set these as the default project settings

Setting up calculation options

Setting up calculation defaults

You define default calculation parameters in the **Calculation** tab.

1. Click the **Schedule** tab. In the **Settings** group, click **Options**.
2. Click the **Units** tab.
3. Select the default calculation option from the **Default Calculation for Projects**.
4. Enter the maximum number of simulations that will be run in the **Maximum number of simulations** box.
5. Enter the convergence parameters in the boxes provided. Simulations can be stopped when the convergence criteria are met.
6. Select the meaning of low and high results. For example, if you check P10 and P90 it will mean that low start time result of the simulations is actually in the 10^{th} percentile of the distribution. You can choose a specific percentile for Low and High results. For example, P30 will be associated with low results and P70 will be associated with High results.
7. Select **Critical Path Calculation** to view critical path and analyze critical path metrics, such as Late Start and Late Finish, Free Slack, Total Slack, and Criticality Index. Enabling Critical Path Calculation will slow down Monte Carlo simulations.
8. Define minimum sensitivity coefficient for sensitivity view. If a sensitivity coefficient is less than the defined value, it will appear as zero in the sensitivity view. For example, minimum sensitivity coefficient is 0.16. A sensitivity coefficient for a particular task's duration and project duration equals 0.1. Sensitivity coefficient for this task will be set to zero and this task will not be ranked in the sensitivity view.

Defining the maximum number of simulations

Based on our experience with real project schedules, the results converge normally between 400 and 700 simulations. However, in projects where there are risks with a very small change of occurrence, the number of simulations should be increased. For example, if there is risk with chance of occurrence of 0.1%, the number of simulations should be at least 1200. The maximum number of simulations is 30000.

- The number of tasks and number of simulations define small projects. RiskyProject automatically adjusts the definition of a small project based on your computer's performance.
- If Monte Carlo simulations are not performed automatically, you can perform them at any time by clicking the **Calculate** button on the ribbon.

Setting up cost defaults

You define fixed cost defaults in the **Cost** tab. When you create tasks, RiskyProject uses these parameters for tasks (fixed costs) and resources (variable costs).

1. Click the **Schedule** tab. In the **Settings** group, click **Options**.
2. Click the **Cost** tab.
3. Enter in the scalar factors used to calculate default low and high fixed costs
4. Enter in the default rate for variable costs in the **Variable Cost** box. This is used when new work or material resources are created
5. If you want RiskyProject to calculate actual cost and income based on percent for work done (tracking information), click the **Actual costs are always calculated by RiskyProject** check box. Otherwise, you can manually enter actual data in Cost and Income view.
6. Select the **Currency symbol** and **format** for any field with currency.
7. Enter default **type of cost and income accrual**. Cost and income accrual can be at the start of the task, or at the end of the task and prorated.
8. Enter **Default Discount** rate for NPV calculation. This discount rate is used in Cash Flow view.

- If you define a distribution for cost using low, base, and high values and assign a risk for cost to the same task, this may cause a double count of the same risk factors.
- You can use any currency symbols, except for numbers, commas, and periods.
- You must define the particular unit for the default rate e.g. "hr" in the **Units** tab of the **Options** dialog box. By default, this unit is hours.

Setting up risk defaults

You define defaults for **Global** and **Local** risks in the Risks tab. When you create a new risk, RiskyProject uses these parameters as the default values.

1. From the ribbon's **Schedule** tab, choose **Options**.
2. Click the **Risk** tab.
3. Enter the default settings for the chance of:
   - Default chance of risk occurrence
   - Default type of outcome

- Default outcome

The result of outcomes is used to calculate outcomes for Relative Delay and Cost or Income Increase, as well as all user defined risk outcomes for non-schedule risks.

4. Select the default distribution for the moment of risk. This distribution is used to define when risk would occur during the course of project. It is defined by distribution type (uniform or triangular), and three parameters defining start, most likely, and finish time of risk occurrence expressed as a percent of total task duration starting from the beginning of the task. For example:

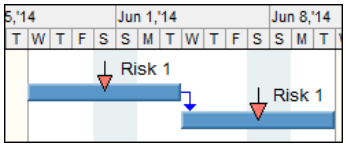
   - Distribution: Triangular
   - Start: 50%
   - Most likely:80%
   - End: 100%

   In the above case, the default for new task with duration 10 days risk would occur after 5th day, but most likely would occur on 8th day.

5. Select the risk chance option. The chance can be defined per task (by default) or per duration unit. For example, 30% chance that task can be restarted per day. If task duration is 2 days, chance of risk occurrence per task will be 60%. This option works for all projects. You cannot have different risks with chance applied to the duration unit or chance applied to the complete task for the same project at the same time.

5. Enable or disable automatic generation of Risk ID and define rules for automatic generation of risk ID. For more information about risk ID generation, read Risk ID settings.

6. Define correlation of risk assignment . One risk can be assigned to different tasks or resources:



   Alternatively, the risk can be assigned globally (to all tasks or resources). These risk events may occur at the same time (risk assignments are correlated) on in different times (risk assignments are not correlated). If check box **Risk assignments to different tasks are correlated** is checked, all local and global assignments of the same risk will be correlated by default. You can always change correlation of local risk assignment:

   - Go to the **Risk Assignment** view or **Task Information/Resource Information** dialog boxes.
   - Double-click on risk assignment ID
   - Go to correlation tab

   For more information click on **What is it?** button

7. Enable or disable statistical distribution for risk outcomes. For more information about statistical distribution of risk outcomes, read **Uncertainties in Risk Outcomes** or click on **What is it?** button.

8. Update Risk Status when risk probability/impact are changed. If you change risk probability and impact, new record will be added to **Risk Status View** for the specific risk.

Setting up Calendars

About Calendars in RiskyProject

There are four types of calendars in RiskyProject: base calendars, project calendars, resource calendars, and task calendars. They are used to determine resource availability, resource scheduling, and task scheduling. Project calendars and task calendars are used to schedule tasks, and if resources are assigned to tasks, resource calendars are used as well.

You can modify these calendars to define the working days and hours for the whole project, for groups of resources, for individual resources, and for tasks. These calendars are distinct from the Calendar view, which shows the project schedule in a calendar format.

Base calendars

A base calendar is used as a template that the project calendar, resource calendars, or task calendars are based on. It defines the standard working and nonworking times for the project. It specifies the work hours for each workday, the workdays for each week, and any exceptions, such as holidays. You can select a base calendar to use as the project calendar or as the basis for a resource calendar. You can also apply a base calendar to specific tasks.

RiskyProject has five default base calendars:

- **Standard:** The Standard base calendar reflects a traditional work schedule: Monday through Friday, 8:00 A.M. to 5:00 P.M., with an hour off for break.
- **24 Hours:** The 24 Hours base calendar reflects a schedule with no nonworking time. The 24 Hours calendar can be used to schedule resources and tasks for different shifts around the clock, or to schedule equipment resources continuously.
- **Night Shift:** The Night Shift base calendar reflects a graveyard shift schedule of Monday night through Saturday morning, 11:00 P.M. to 8:00 A.M., with an hour off for break.
- **Morning Off:** The Morning Off base calendar reflects a schedule Monday through Friday, 1:00 P.M. to 5:00 P.M., without breaks.
- **Afternoon Off:** The Afternoon Off base calendar reflects a schedule Monday through Friday, 8:00 A.M. to 12:00 P.M., without breaks.

You can also create your own base calendar, which is useful if you have alternative schedules for multiple resources. For example, you might have resources working part-time, 12-hour shifts, or on weekends.

Creating or modifying a base calendar

Base calendars can be created or modified in the **Working Time** dialog (ribbon's **Schedule** tab, schedule and calendar pane):

1. Click the **Schedule** tab. In the **Schedule and Calendars** group, click **Working Time**.
2. Click the **New** button to create a new base calendar, the **Delete** button to remove base calendar, or the **Rename** button to rename base calendar
3. Use the Working Time calendar options to modify the selected base calendar. Choose **Working Time** from **Schedule** tab.

Project calendars

The project calendar defines the working and nonworking days and times for tasks. This calendar usually represents your organization's traditional working hours. RiskyProject uses this calendar

to schedule tasks that do not have resources assigned. By default, the Standard base calendar is used as the project calendar, but you can reflect alternative schedules by using other base calendars.

The working days and hours in the project calendar reflect the working days and hours for your whole project. You can specify special days off, such as company holidays.

Project calendar can be deterministic and probabilistic. Probabilistic calendars are useful for modeling uncertain scheduling conditions such as weather. Both deterministic and probabilistic project calendars can be selected from the list of available calendars in the Project Settings dialog (Schedule tab).

Resource calendars

Resource calendars make sure that work resources (people and equipment) are scheduled only when they are available for work. They affect a specific resource or category of resources. By default, the working time settings in the resource calendar match the project calendar. However, you can customize the resource calendar to show individual schedule information, such as vacations, leaves of absence, or equipment maintenance time.

When you create a resource, the default resource calendar will be created. You can view this resource calendar in the **Working Time** dialog box. By choosing **Working Time** from the **Schedule** tab, you can edit resource calendars to indicate nonworking time. You can also create or assign different base calendars for individual resources to indicate specific working hours. For example, you can assign a resource to a calendar that you created for carpenters who may be working during a time that is different from other workers. You can edit Base calendars for each resource in the **Working Time** dialog box.

When RiskyProject schedules the project, it uses the resource calendar to schedule the tasks that have resources assigned. For example, if a resource has a week of vacation specified on his or her resource calendar, RiskyProject will not schedule the task for that week.

If you have resources that work alternative schedules, such as part-time or the night shift, we recommend that you set up and apply a separate base calendar for each shift. You should use resource calendars to accommodate exceptions to an individual resource's working times.

Task calendars

Task calendars make it possible to schedule tasks during nonworking time, as defined by the project calendar or resource calendar. For example, you can set up a task calendar if you have a task that needs to be worked on overnight or through the weekend.

You create a task calendar in the **Working Time** dialog box as a new base calendar. You can then apply the base calendar to a task by using the Advanced tab in the Task Information dialog box.

If you have applied a task calendar to a task that already has assigned resources, by default, the task is scheduled for the working times of resource calendars. If you want to schedule the task by using only the task calendar, select the **Ignore Resource Calendars** check box on the Advanced tab in the Task Information dialog box.

Defining working time

RiskyProject allows you to define multiple calendars. All calculations are done internally in hours and minutes.

1. Click the **Schedule** tab. In the **Schedule and Calendars** group, click **Working Time**.
2. Select a calendar from the **Calendar** list. There are five calendars provided:
   - **Standard**
   - **Morning Off**
   - **Afternoon Off**
   - **24 hours**
   - **Night Shift**
3. If you need to modify the selected calendar, click on a day in the calendar. The working and nonworking time is displayed in the schedule on the right. You can define working for specific weekday. To do it just click on weekday and modify working times for the weekday. You may also specify working time for the specific day. To do it just click on specific day and modify working times.
4. Click on an hourly period to set it as working or nonworking time. **White** is working, **pink** is nonworking.
5. Once you have completed the calendar, click **OK** to save the changes.

Creating a new calendar

You can create a new calendar and save it under a new name.

1. Click the **Schedule** tab. In the **Schedule and Calendars** group, click **Working Time**.
2. Click the **New** button. The **New Calendar** dialog box opens.
3. Provide a name for the calendar and description.
4. Select the base calendar from the **Based on** drop-down list.
5. Click **OK**.
6. Modify the new calendar as needed.
7. Click **OK** to save the new calendar.

Renaming a calendar

You can rename calendars that you have created.

1. Click the **Schedule** tab. In the **Schedule and Calendars** group, click **Working Time**.
2. Select the calendar that you want to rename from the **Calendar** drop-down list.
3. Click the **Rename** button. The **Rename Calendar** dialog box opens.
4. Type in a new calendar name.
5. Type in a note for this calendar (optional)
6. Click **OK**.

When you use any calendar other than the **Standard,** ensure that you properly translate the duration through the project. To define **hours per day**, **hours per week**, and **days per month** go to **Tools > Options** and select **Calendar** tab.

Deleting a calendar

You can delete calendars that you have created.

1. Click the **Schedule** tab. In the **Schedule and Calendars** group, click **Working Time**.
2. Select the calendar that you want to delete from the **Calendar** drop-down list.
3. Click the **Delete** button.

- You cannot delete the **Standard**, **Morning Off**, **Afternoon Off** , and **24 hours, Night Shift** calendars. All other base calendars can be deleted as long as they are not used for resource, task, and project calendars.
- Resource calendar will be deleted automatically, when you delete the resource and this calendar is not used for other resources.

Probabilistic Calendars

You can create a probabilistic calendar. Probabilistic calendars will be used only for Monte Carlo simulations. The current project schedule will use the project calendar.

Probabilistic calendars are a set of base calendars with their respective probabilities.

Defining probabilistic calendars

1. Click the **Schedule** tab. In the **Schedule and Calendars** group, click **Working Time**.
2. Define base calendars that will be used for your probabilistic calendar. For example, if you would like to model that March will be 50% non-working, you need to create a base calendar entitled “March non-working”.
3. Click the **Schedule** tab. In the Settings group, click **Project Settings**.
4. Enter probabilities for each base calendar. For the example above, enter 50% probability for the standard calendar and 50% probability for “March non-working”. The sum of all probabilities must be exactly 100%.

Calculations with probabilistic calendars are performed according to the following rules:

- If a resource calendar is used, base calendar for resources would use a probabilistic calendar. For example, you have a resource **Crew** that has a non-working exception for February 18 on the standard calendar. This exception will be applied to the standard calendar 50% of the time and to the “March non-working” another 50% of the time.
- If the task calendar is defined, the probabilistic calendar will be ignored and the task calendar will be used.

- If there is no task calendar or resource calendar defined, the probabilistic calendar will be used.

Weather Calendars

Weather calendar is a type of probabilistic calendar, which defines the number of non-working days per month. In each day, you can define low, base, and high estimates for non-working dates. The particular number of non-working dates is calculated for each simulation. For example, let us say you define that in March there will be between 5 to 10 non-working days. On the first iteration on Monte Carlo simulations, it will be 7 non-working days, and on the second iteration, it will be 6 non-working days, etc.

Defining weather calendar

1. Click the **Schedule** tab. In the **Schedule and Calendars** group, click **Working Time**.
2. Select Calendar from the dropdown list, which will become the weather calendar.
3. Click on the check box **This is a weather calendar**.
4. Click on **Settings**. The **Weather Calendar Settings** dialog opens.
5. In the Settings dialog, define the number of non-working days each month.
6. Select statistical distribution for the number of working days per month. It can be either uniform or triangular.
7. Select the year during which non-working days will occur. It can be a specific year, for example, year 2018, or a general number of non-working days that will occur every year.
8. Update the seed, if required. Using the seed, you can correlate different weather calendars, for example, if they are to be assigned to different tasks or resources.
9. Click OK on the **Weather Calendar Settings** dialog.
10. Use the slider in the **Working Time** dialog to see how many non-working days are generated on the first 25 iterations of Monte Carlo simulations. This will help you confirm that you have correctly entered information about non-working days.

The number of non-working days defined in the Weather Calendar Settings dialog can overlap with regular non-working days, such as Saturdays and Sundays, in the Standard calendar.

Creating Projects

Creating a new project

The original view for a new document is defined in the **Options**, **View** tab. The default view can be the last view in the previous RiskyProject session.

1. Click **File** and then **New**. The new project file opens.
2. To save the project click the **Save** button and type in a project name.

In addition to project files created in RiskyProject, you can also open files that have been saved as a Microsoft Project XML and Oracle Primavera XER format. Microsoft Project XML is the industry standard for project management software and is supported by Microsoft Project, Oracle Primavera, and many other project management software applications.

Importing existing project schedules

You can import existing project schedules from Microsoft Project, Primavera and other project management tools using a variety of file formats.

Importing Microsoft Project files

You can import MS Project files using XML format.

1. Click **File** and then **Open**. The **Open File** dialog box opens.
2. Select the format that the project file is in from the **Files of type** drop-down list.
3. Select the MS Project file format that you just saved.
4. Click **OK**.

You can use the RiskyProject toolbar or ribbon in Microsoft Project to transfer your schedule from Microsoft Project to RiskyProject. When you use the RiskyProject toolbar or ribbon, your schedule in Microsoft Project will be associated with risks and uncertainties defined in RiskyProject. Please read "RiskyProject for Microsoft Project" for more information.

Importing data from other project management software

RiskyProject can import data from other project management software in Microsoft Project XML and Oracle Primavera XER file formats.

1. Click **File** and then **Open.**
2. Select the XML or XER project schedule.

Due to the specific features of each application and the probabilistic nature of RiskyProject data, in very rare cases there may be discrepancies between the original project schedule and the imported

schedule in RiskyProject.

Importing data from other project management software and retaining risk assignments

Sometimes you may want to import a project schedule from Microsoft Project or other software and retain existing risk assignments. It can be useful when you have imported a project schedule from Microsoft Project or other software, assigned risks in RiskyProject, and then updated the project schedule in Microsoft Project.

1. Click **File** and then **Import**.
2. Select the format type of your project data (XML or XER).
3. Select whether or not you want to import the risks already assigned to the project.

RiskyProject will associate assigned risks with new tasks based on unique task IDs. Unique IDs do not change when you insert or delete tasks. You can rename the task in Microsoft Project, but risks will be assigned to the proper task and resource based on this unique ID.

Importing risks and uncertainties from different RiskyProject file

You can import risks and uncertainties from a different RiskyProject file and assign them to tasks and resources in the current schedule.

1. Click **File** and then **Risks from Another Project**.
2. Select the RiskyProject file (alm extension) with risks and uncertainties.

If the schedule originated in Microsoft Project, the risks will be assigned to the correct task and resource using the unique ID. Unique IDs do not change when you insert or delete tasks. If you created the schedule in the RiskyProject the risk will be assigned based to the tasks or resources based on ID shown in the task or resource data sheets. Such ID changes when you insert or delete tasks.

Project Settings

The Project Settings are where you enter general project information, project deadlines, and set the project calendars. Project settings can be defined by clicking on **Main Project Settings** (**Schedule tab, Settings and Options** group).

General Project Information

General project information includes:

- Project Name
- Project Manager
- Project Description
- Company
- Group/Division

This information will be shown on the Project Summary view as well as on reports. The Project Manager name will be used as a default value for risk properties: recorder, contact, and owner. Default values for these parameters are defined in **Tools >Options** view tab.

Project Start Time

Project start time is entered or edited in the **Main Project Settings** dialog box. Project start time is always deterministic. You change project start date and all project schedules will shift.

Project Status Date

Project status date is entered or edited in the **Main Project Settings** dialog box. Status date is used to report project's progress on this day you set. In RiskyProject project status dates is used for project diagnostics, particularly for the DCMA 9A, DCMA 9B, DCMA 11, DCMA 13, and DCMA 14 tests.

Project Calendar

Project calendar is used for scheduling tasks if task or resource calendars are not defined. Default project calendar is Standard.

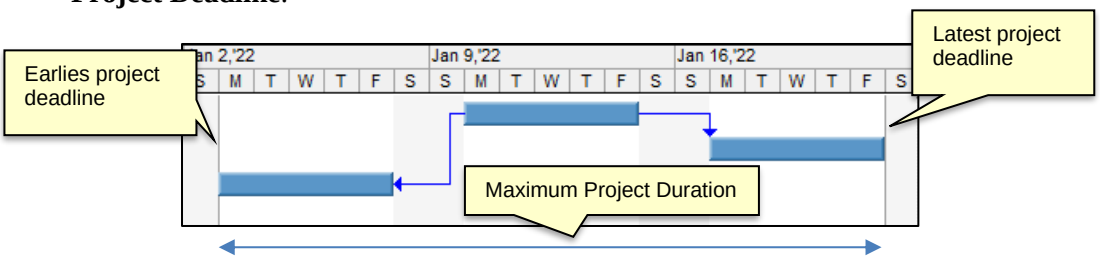
Project Deadlines

Project Deadlines are entered or edited in the **Main Project Settings** dialog box. Deadlines affect the results of the probabilistic calculations, but do not affect the results of deterministic current schedule calculation.

- **Earliest Project Deadline**: if any task is started or finished before this date, the task and the complete project will be marked as canceled for the particular iteration. Start and finish time of the project will be adjusted. If the finish time of the task date is before the earliest project deadline, the task will have zero duration and begin on the earliest project deadline.
- **Latest Project Deadline**: if any task is started or finished after this date, the task and the complete project will be marked as canceled for the particular iteration. The start and

finish time of the project will be adjusted. If the start date of the task is after latest project deadline, the task will have zero duration and begin on the latest project deadline.

- **Maximum project duration**:: actual project start time plus maximum project duration is the maximum project finish time. It affects the project schedule the same way as **Latest Project Deadline**.



When any task within a project reaches the project deadline, the project will be marked as canceled for the particular iteration. However, task duration, start and finish times can vary between the different iterations due to the risks and uncertainties; therefore, tasks can reach the deadline in a single iteration, but not in another. RiskyProject calculates the project success rate based on the number of iterations where the project is successfully completed.

Example:

- Maximum Project Duration is 5 years
- Actual start time is Oct 1,2003
- Projected Finish time is Oct 1, 2009
- Project will be canceled because Oct 1,2003 + 5 years < Oct 1,2009

Maximum project duration is working time (not calendar time). For example, one-month maximum project duration is 20 working days. It is done to make maximum project duration consistent to duration of any task.

Earliest Project Deadline and Latest Project Deadline are shown as red vertical lines on the Gantt chart. You cannot scroll Gantt charts beyond these dates.

If the project is outside of Earliest Project Deadline and Latest Project Deadline, the Monte Carlo simulations will not execute. For example,

- Actual Project Start Time: Oct 1,2008
- Projected Finish Time: Oct 1,2011
- Earliest Project Deadline: Jan 1,2008
- Latest Project Deadline: Jan 1,2011

In this example, the projected the probabilistic calculation will not proceed.

Entering main project information

1. Click the **Schedule** tab. In the **Settings** group, click **Main Project Settings**.
2. Define **Project Start Time.**
3. Define **Project Calendar.**

3. Define **Earliest Project Deadline**, **Latest Project Deadline**, and **Maximum** project duration.

Project Tasks

When you first start RiskyProject, the Project view opens. Start the scheduling process by adding tasks. Each task should have a name and a base duration. You can enter this information directly onto the datasheet or using the Task Information dialog box.

Opening the Task Information dialog box

The **Task information** dialog box can be used to enter task parameters (duration, start, finish times, assign resources to tasks, assign risks, etc.). You can open the task information dialog using one of the following ways:

- Double-click on Task ID
- Right-click on task ID and Select Task Information
- Select Task and Click on **Project** > **Task Information**

Entering task name and duration

When you create a task, the first step is to enter a name and a base duration.

1. Click on the **Task Name** field in the **Project** view.
2. Provide a name for the task.
3. Enter a base duration in the **Base Duration** field. You can enter elapsed duration. Elapsed task duration is calculated using a 24-month calendar. To define elapsed duration, enter 'e' before units, for example, "10 edays".

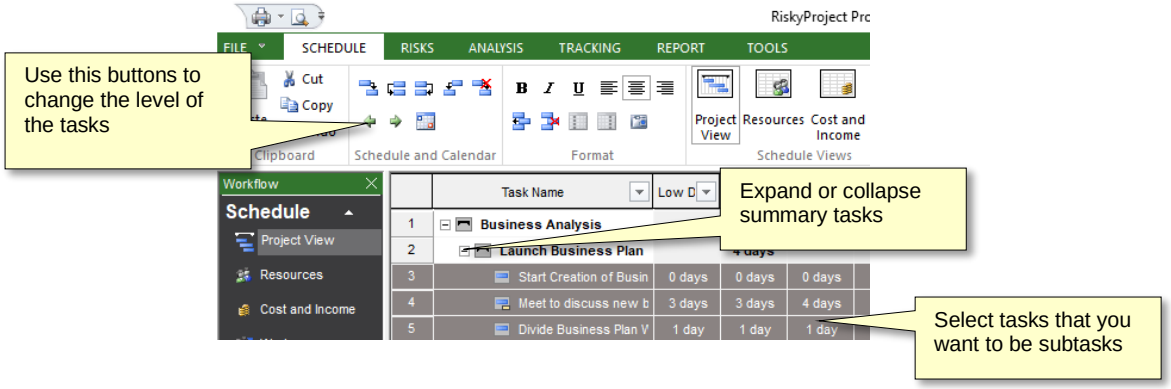
The default Start Time for tasks is defined in the Calendar tab of the Options dialog box. The start time can be either the current date or a project start date, defined in Project >Main Project Settings. You can always change start time using constraints (see Start, Finish Times and Constraints). You can also change other default parameters in the Options dialog box.

Define task durations using the **Base Duration** column. Once you have added all of the tasks, you can add uncertainties by assigning low and high durations. See **Define Distributions for Start Time, Cost, and Duration** for more information.

Defining summary tasks and subtasks

Summary tasks represent groups of tasks (subtasks) that can be logically grouped together under a larger task. In large projects with many tasks, this is a useful method of organizing your tasks.

1. Create a task directly above the tasks that you want to group under it. This will become the **Summary Task**.
2. Select the tasks that you want to be the subtasks of the summary task you created in step 1.
3. Click the **Indent** button located on the **Format** toolbar to indent the tasks. The indented tasks are automatically recognized as subtasks of the summary task. If you want to move at task out from under the summary task, select the task and click the Outdent buttons. After you click on an **Indent** or **Outdent** button, RiskyProject automatically recalculates the project.



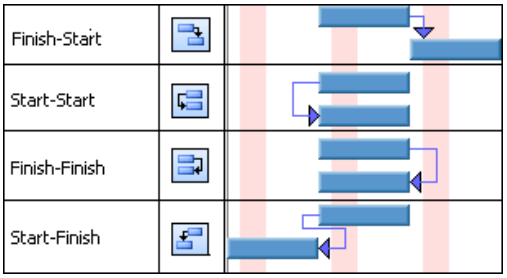
Outline Selected Level

You may view summary tasks associated with a particular level of the hierarchy using the Outline button (Schedule tab).

Task Links

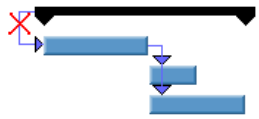
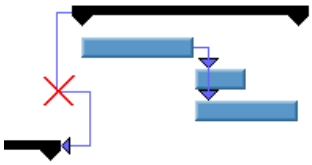
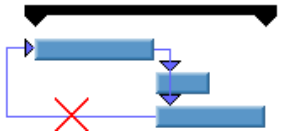
All projects require that the WBS tasks be performed in a certain order. These relationships are defined in RiskyProject using the four linking buttons located on the standard toolbar.

The four types of task dependencies are show in the following figure:



If you want a next task to be a predecessor of a previous task, for example task 5 to be a predecessor of task 3, you will have to use Predecessors tab in Task Information dialog box. You can also use the Predecessors tab if you want to define lags time greater than zero.

Remember the following rules:

1. You cannot link summary task to one of its subtasks	
2. The predecessors of a summary task must have a finish-start or start-start dependency.	
3. You cannot create circular relationships.	

The connecting line between successors and predecessors will be red if there is a scheduling conflict:

Predecessors and Lags

You define information about predecessors and lags in the **Predecessor** tab of **Task Information** dialog box.

You can use the **Standard** toolbar button to link tasks; however, this method of creating task dependencies has limitations:

- You cannot link a task (from example Task #5) to a previous task (for example Task #3).
- You cannot input lag, which is time delay between predecessor and successor. RiskyProject allows you to setup probabilistic lag with statistical distribution defined by low, base, high number.

Sometimes it is convenient to use predecessor tab instead of link toolbar buttons when task has multiple predecessor or if there is a big difference in task Ids between current task and predecessor. For example, it is not convenient to link task number 5 to task number 74 using toolbar buttons.

You can use Predecessor column within Project view to define or modify predecessors. Text: "1, 2+2 days" would mean than current task has two predecessors (Task 1 and Task 2 with lag 2 days).

Adding a predecessor to a task

1. Select the task to which you want to add a predecessor.
2. Open the **Task Information** dialog box.
3. Click the **Predecessor** tab.

4. On the first row of the grid, click in the **Task Name** cell. A drop-down list appears containing a list of all available tasks or type
5. Select the predecessor from the drop-down list. By default, the predecessor type is **Finish-Start (FS).**
6. If required, enter a **lag** time. Use the **Lag low** and **Lag high** cells to enter a range of time. Lag can be positive or negative
7. If you are entering a base, high and low lag, you can change the default distribution using the drop-down list in the distribution cell.
   - If the low and high lags are different, the default distribution is triangular.
   - If low, base, and high lag are the same the distribution is undefined.
8. If required, edit the **Seed** number. **Seed** is the starting parameter used for the random number generation that is used to calculate lag. If you have two predecessors, and they have strong positive correlations between their lags, you can make their seeds the same. For example, a low lag for one predecessor will coincide with a low lag for another predecessor.
9. Click **OK**.

- You cannot make a task be a predecessor to itself
- You cannot create a schedule that it will lead to a circular relationship between tasks
- You cannot link a summary task to one of its subtasks
- You cannot link two tasks twice.
- You can have two predecessors (SS and FF) to the same task.

Constraints

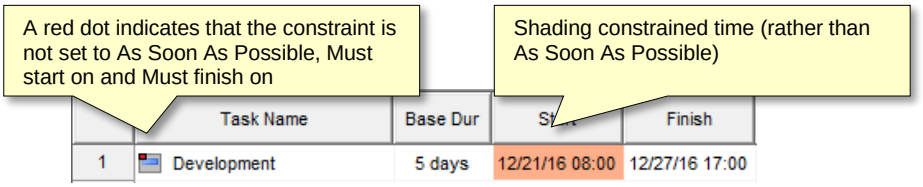
Constraints are limitations that you set on tasks. For example, you can specify that a task must start on a particular date or finish no later than a particular date. In RiskyProject, you can assign one of seven constraints to a task:

- As soon as possible (default)
- Start no earlier than
- Must start on
- Must finish on
- Start no later than
- Finish no earlier than
- Finish no later than

Summary tasks have only “As soon as possible” and “Start no earlier than”.

Use the **General** tab of **Task Information** dialog box to add or modify constraints. If you set a constraint to Start no Earlier Then, an additional edit box opens in which you set the date for this constraint.

If you assign a constraint other than **As Soon As Possible**, the background color for low, base, and high Start Times or low, base and high Finish Times changes to orange to indicate that the constraint is other than **As Soon As Possible**.



Use constraints to ensure that the task starts or finishes on the specific dates. Use caution when you link tasks with a constrained start or finish time with predecessors because of the potential for scheduling conflicts. In this situation, to avoid scheduling conflicts, set the constraint to **As Soon As Possible.**

Constraints affect both probabilistic and deterministic calculations. If you change the Low or High Start times, the constraint is set to Must Start On, similar to when you change the Base Start time.

- When a task has a constraint other than As Soon as Possible, it may not shift due to the nature of Monte Carlo calculations, even if predecessors have risks and uncertainties. Therefore, use caution when planning to perform probabilistic calculations with constraints.
- When you enter the actual start date of the task as part of tracking input, task would become constrained for the probabilistic calculation only. Start time will not change regardless of risks and uncertainties for predecessors.

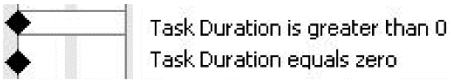
Adding constraints

Before you add a constraint, you should define the task name and duration.

1. Double- click the task to which you want to add a constraint.
2. Click the **General** tab.
3. From the **Constraints** drop-down list, select a constraint that you want to add to the task.

Milestones

You can flag a task as a milestone. If you turn on a milestone, the task bar within a Gantt chart is displayed as:



Any task with zero duration is automatically displayed as a milestone in the Gantt chart; however, any task can be marked as a milestone. The milestone flag is for display only and does not affect the project calculations.

If a task has no duration entered, it is automatically displayed as a milestone, and you do not have to complete the following steps. If you want to flag a task that has duration, complete the following steps.

Creating a milestone

1. Select the task that you want to flag as a milestone.

2. Open the **Task Information** dialog box.
3. Click the **Advanced** tab.
4. Select the **This task is a milestone** check box.
5. Click **OK**.

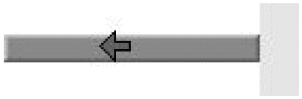
Task Deadlines

You define task deadlines in the **Deadline** Tab of **Task Information** dialog box.

The Actual task deadline is defined by two factors: the maximum task duration and the task deadline. The Actual task deadline is a minimum of two numbers: task start time + maximum task duration and task deadline.

Three different actions can occur when a task deadline hits its deadline:

- **No Actions**: A red deadline arrow is displayed on the Gantt chart for all views, but it will not affect the calculation.



- **End task**: The task duration is reduced, but the task is not canceled.
- **Cancel task**: The task duration is reduced, and the task is canceled.

- Deadlines do not affect the results of the deterministic calculation (for the current schedule); however, a red deadline arrow is shown on all views that include a Gantt chart. You can turn display of the deadline arrows on and off in RiskyProject Options (Calendar tab).
- If the actual deadline occurs on a non-working time, it is moved to the nearest previous working time.
- When a task reaches the deadline when it is assigned the **Cancel Task** option, the task is canceled. However, task duration, start and finish times are different on different iterations due to the risks and uncertainties. Therefore, the task can reach the deadline in one iteration and not another. RiskyProject calculates task success rate based number of iterations where the task has been successfully completed. Deadlines are one of the examples of Event Chains where events on one task (e.g., restart or delay) may cause another event (cancellation because deadline has been reached).
- Example: Task deadline is October 17, 2009. At the finish of the Monte Carlo simulations, the finish time of the task was less than October 17, 2009, 100 times and greater than October 17, 2009 150 times. A “Cancel task” result was set for the task deadline. Task success rate will be 40%.

Adding a deadline to a task

1. Select the task to which you want to add a deadline.
2. Open the **Task Information** dialog box. Click the **Deadline** tab.
3. Enter in the Maximum duration in the **Maximum task duration** boxes.
4. Select the time unit from the drop-down list.

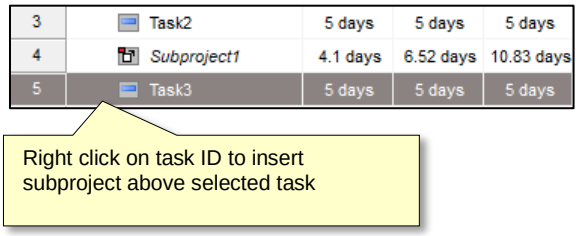
5. Click on the **Task Deadline** box. A calendar opens.
6. Select a date from the calendar.
7. Select an action that will occur if the task reaches the deadline from the **Action for Probabilistic Calculation** option box.
8. Click **OK**.

Subprojects

You can insert a subproject to the project as a single task with uncertainties. It can be useful when you have a large integrated project, which include subprojects with risks and uncertainties. You can calculate each subproject separately and insert these subprojects with results of Monte Carlo simulations to the master project. Statistical distribution of project cost and duration will become custom input distribution for the task that represents subproject. This approach can significantly simplify schedule and accelerate Monte Carlo simulations on very large programs.

To insert subproject to the master schedule:

1. Open the subproject, run the simulation, and save. The subproject simulation results are saved to the file.
2. Open the file that will be the master schedule.
3. Select the row in the schedule where you want to insert the subproject.
4. Right click on task ID and from the shortcut menu choose Insert Subproject**…**



5. In the **Open** dialog box, navigate to the project you want to insert and click **Open**. The subproject will be inserted as a single task to the schedule.

- Custom statistical distributions for task fixed cost and duration will be defined if subproject has results of Monte Carlo simulation. You can verify them in Distribution tab of task information dialog. Low, base, and high fixed cost and duration of this subproject task will be also defined based on results of simulations.
- Start time of new task will be set based on start time of the subproject. The constraint will be set to "Must Start On". You may remove this constraint and define predecessors and successors of this subproject.

- You can insert any number of subprojects. The subproject may contain nested subprojects.
- You can assign risk events to the subproject task. However ensure that these risks are not assigned in the subproject schedule. Otherwise this will cause a double count of the same risks.

- Subprojects start and finish must be linked to tasks in master project schedule. If internal tasks of a subproject are linked to master schedule tasks, you may need to split one subproject into on or more smaller subprojects.

Refreshing Subprojects

If you run a new simulation on a subproject, it can be updated in the master schedule. You can update manually, or it can be updated automatically when you open the master schedule. You can define the refresh mode in Advanced tab of the **Task Information** dialog box. Manual mode is the default setting.

- **Manual refresh: c**lick the **Refresh** button Low, Base, High fixed cost and duration, as well as statistical distributions of fixed cost and duration of the subproject task will be updated.
- **Automatic refresh:** select this to automatically update when you open the master project. Automatic mode will increase the time it takes to open master projects.

If your subprojects contain other subprojects, only subprojects at the next lower level will be refreshed. To refresh nested subprojects, open each individually and refresh them.

For more information about refreshing subproject please see **Advanced Task Management**.

Advanced Task Management

Use the Advanced tab on the Task Information dialog box to enter, review, or change supplemental task information. You can:

Specify the task type: A characterization of a task based on which aspect of the task is fixed and which aspects are variable. There are three task types: Fixed Units, Fixed Work, and Fixed Duration. The default task type in the Project is Fixed Units. See Task Types below.

Specify the task calendar: The base calendar that you can apply to individual tasks to control their scheduling, usually independent of the project calendar or any assigned resources' calendars. By default, all tasks use the project calendar. You can select to ignore the resource calendar. Use the Working Time dialog box to modify calendars.

Mark the task as effort-driven: In effort driven scheduling the duration of a task shortens or lengthens as resources are added or removed from a task, while the amount of effort necessary to complete a task remains unchanged.

Change link to subproject, refresh link and define refresh mode: You can change a path to the subproject, which will also allow you to replace the linked subproject. You can also define the refresh mode: **manual** or **automatic** See **Subprojects** for more information.

Task Types

The three task types used in Project are:

- Fixed units: Fixed unit is a fixed value and any changes to the amount of work or the task's duration do not affect the task's units. It is a default task type.
- Fixed work: Fixed-work task is a task in which the amount of work is a fixed value and any changes to the task's duration or the number of assigned units [or resources] do not affect the task's work.

- Fixed duration: Fixed duration task is a task in which the duration is a fixed value and any changes to the work or the assigned units are not affected.

Each of the task types affects scheduling when you edit one of the three elements as follows.

Task type	Change Units	Change Duration	Change Work
Fixed units task	Duration is recalculated.	Work is recalculated.	Duration is recalculated.
Fixed work task	Duration is recalculated.	Units are recalculated.	Duration is recalculated.
Fixed duration task	Work is recalculated.	Work is recalculated.	Units are recalculated.

Formatting Gantt Bars

You can adjust the shape and color of Gantt for specific tasks or for specific types of tasks: standard tasks, summary tasks, critical tasks, milestones, etc.

Formatting Gantt Bars for All Tasks

- Click the Schedule tab. In the **Settings and Options** group, click Format Gantt Bar.

Formatting Gantt Bars for Selected Tasks

1. Select task or a group of tasks
2. Right-click on Task ID and choose **Format Bar…**

Managing Resources and Work

Resources are the people and equipment that are assigned or the material that is used to complete a task.

Adding resources

1. Click the **Schedule** tab. In the **Schedule Views** group, click **Resources**.
2. Click on a row.
3. Provide a **Name** (mandatory), **Initials** (optional), and **Rate** (mandatory).
   - You can group resources to define reams using the indent and outdent buttons.
   - Initials and notes are for information only and do not affect the calculations.
   - Rates affect the cost the task to which the resource is assigned. Rates for work resources can be per year, month, week, day, hour and minute. Rates for material resources are per unit (e.g., 10 tons).
4. Select the resource type: **Material, Cost** or **Work**.
   - Material label indicates type of material resources (e.g., tons)
5. Maximum units are used to calculate Overallocation of work resources. It is not used for the material or cost resources.

- Use the **Resource Information** dialog box to assign resources risks.
- You can add risks to a resource using the **Risk tab** of Resource Information dialog box. If you have only a few risks assigned to a few resources, this is the preferred method to define resource risks. If you have many resources, we recommend that you add the risks in the Risk Register of Risk workflow tab and then assign them to the resources from one of the risk views.
- Default rate for resource type Work is defined in **Tools > Options** Cost tab.

Assigning resources to tasks

1. On the **Schedule** tab, in the **Schedule Views** group, click **Project View**.
2. Select the task to which you want to assign the resource.
3. Click in the **Resource** field associated with the task.
4. Select a resource from the drop-down list. If you type in a new resource name, it will be added to the list of resources in the resource view. When you add a new resource in this manner, it will be assigned at 100% effort for work resource.
5. Enter **Cost** for cost resources

- Multiple resources can be assigned to a particular task.
- Tasks do not have to have resources assigned to them.

Assigning a calendar to a resource

1. By default, RiskyProject assigns the Standard calendar to resources.
2. On the **Resource** view, double-click on a resource ID.
3. Select a resource calendar from the **Base Calendar** drop-down list.
4. Click the **Working Time** button (**Schedule** tab) to modify the resource calendar.

Defining work

You can enter tasks as work rather than duration. The Work view shows the total work of all resources assigned to a task.

1. On the **Schedule** tab, in the **Schedule Views** group, click **Work**.
2. Select the **Task type**: **fixed units**, **fixed duration**, or **fixed work**. The same information can be defined using **Advanced** tab of Task Information dialog box
3. Check the **Effort driven** flag if the task is effort driven (default value). Effort driven task can be defined in the **Advanced** tab of Task Information dialog box.
4. Enter low, base, and high work for the selected task. Units for work are defined in the **Tools** > **Options** > **Duration** tab. Duration and units for the task will be calculated based on task type.

- For probabilistic calculations, work is always correlated with duration. Seed and distribution of the duration are used for work as well. Therefore, seed and distribution for work are not entered.
- You may view work assigned to the particular resource in the Resources tab of Task Information dialog box.

Cost Rate Tables

Cost rate tables allow you to define rates and cost per use that change over time. For example, on January 1, 2011, cost was $10/hr. On February 1,2011, cost became $12/hr. For rate you may enter a value or a percentage of increase or decrease from the previous rate. For instance, if a resource's cost per use is reduced by 20% type -20%.

To define cost tables:

1. On the **Schedule** tab, in the **Schedule Views** group, click **Resources**.
2. Double-click on Resource ID. Resource information dialog opens
3. Go to **Costs** tab
4. Enter effective date, rate and cost per use for this effective date

Managing Costs

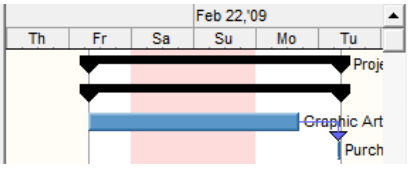
Cost, Income, and Profit Calculations in RiskyProject

You can define cost and income associated for tasks with risks and uncertainties. You can use income to perform an analysis of the full life cycle of a project. Profit is calculated as the difference between income and cost. This will affect the way that RiskyProject presents data in the Cost and Cash Flow views. If the project has income, all cost and cash flow, data is now shown as Profit where costs are a negative value. In these cases, it is possible that a project will have negative profit.

The example below illustrates how fixed, and variable (resource) costs are calculated with respect to tasks and subtasks:

	Task Name	Cost Low	Cost	Cost Hi...	Accrual	Res.Cost	Tot.Cost	Income A...
1	**Web design**	**$0.00**	**$0.00**	**$0.00**	**Start**	**$1004.8**	**$1604.8**	**$0.00**
2	**Art works**	**$0.00**	**$0.00**	**$0.00**	**Start**	**$864.00**	**$1464.0**	**$0.00**
3	Selection of art	$200.00	$200.00	$200.00	Start	$800.00	$1000.00	$0.00
4	Purchase of ar	$400.00	$400.00	$400.00	Start	$64.00	$464.00	$0.00

	Task Name	Base Dur
1	**Web design**	**2.2 days**
2	**Art works**	**2.2 days**
3	Selection of art	2 days
4	Purchase of ar	0.2 days



The project schedule includes the summary task “Web Site Design”, the summary task “Art Works”, and subtasks “Selection of artwork” (2 days duration) and “Purchase of art work” (0.2 days duration). “Selection of artwork…” has base fixed cost $200 and is assigned to the Graphic Artist with rate $50.00/hour. “Purchase of artwork” has a base fixed cost of $400 and is performed by Purchaser with a rate of $40.00/hour. The work is supervised by project manager with rate $80.00/hour, but only 10% his time is assigned to this project. It is assumed that a day has eight (8) working hours.

	Resource name	Chart	Type	Initials	Rate	Max.Units	Base Cale...
1	Graphic Artist	☐	Work	G	50.00/hr	100.00%	Standard
2	Purchaser	☐	Work	P	40.00/hr	100.00%	Standard
3	Project Manager	☐	Work	P	80.00/hr	100.00%	Standard

The Fixed cost for the summary task is calculated as the sum cost of all subtasks, which do not have subtasks under them. Resource costs for summary tasks are calculated as cost of all resources assigned to summary task plus resource cost of all subtasks.

A. Calculation of base fixed cost for summary task “Web Site Design”:

Base fixed cost for “Selection of artwork…” (Task 3) = $200.00

Base fixed cost for “Purchase of artwork” (Task 4) = $400.00

Total = $600.00

B. Calculation of variable (resource) cost for summary task "Web Site Design":

Resource cost for project manager = 17.6 hours * $80/hr / 10 = $140.80

Resource cost for Selection of artwork (Task 3) 16 hours * $50/hr = $800.00

Resource cost for Purchase of artwork (Task 4) = 1.6 hours * 40/hr = $64.00

Total = $1004.80

Income is calculated similarly to cost calculation. Income cannot be assigned to the resources.

Variable and Fixed Costs and Income

There are two types of costs in RiskyProject:

- **Fixed costs**, which are associated with tasks; and,
- **Variable costs**, which are associated with resources.

Costs associated with resources are calculated based on rate, units assigned, and work of the particular resource.

Income is always fixed. You define it in the same manner as fixed costs. Both fixed cost and income can be accrued at the beginning of the task, at end of the task or be prorated.

You define and verify costs and income in the **Cost and Income** tab (Schedule tab if the workflow bar) and report results within **Profit Report** view (Report tab).

Cost Per Use

Per-use costs are one-time fees for the use of a resource, such as equipment. Per-use costs never depend on the amount of work done. Instead, they are one-time costs that are incurred every time that the resource is used. Although a per-use cost for a work resource depends on the number of assignment units used, a per-use cost for a material resource is applied only one time. For example, if a bricklayer has a per-use cost of $100 (instead of an hourly rate) and it takes three brick layers to complete a task, the cost is $300. However, a per-use delivery cost of $100 for a material resource like cement is applied only once per delivery, whether 10 tons of cement are delivered or 100 tons.

Adding fixed costs and income to tasks

The Cost and Income view also shows the calculated results for fixed costs and resource costs.

1. On the **Schedule** tab, click the **Cost and Income** view.

1. Select the task in which you want to include fixed cost or income.
2. Enter base fixed cost in the **Cost** field. You can enter in Low and High estimated costs.
3. Select an accrual method in the **Accrual** column. Accrual methods indicate how cost or income is accrued in the task. Default accrual method if defaulted in **Tools > Options,** cost tab separately for cost and income. Accrual methods available are:
    - Start
    - Finish
    - Prorated
4. Enter Income in the same manner as above.

- You may assign fixed cost and income to the summary tasks the same way as they are assigned to the subtasks
- You may define uncertainties in fixed cost and income using low, base and high values of cost and income, as well as seed and statistical distribution.
- Uncertainty in variable cost is originated in task work since variable cost = resource work * number of units * rate.

Chapter 4: Quantitative Risk Analysis

Assigning Risks to Tasks and Resources

Risk Assignments

Risks must be assigned to calculate their impact. If a risk is not assigned to any tasks or resources it will remain in the risk register, but probability, impact, and score will not be shown.

RiskyProject has two types of risks assignments:

- **Global Risk Assignments** – Global risk assignments are those risk assignments that have a chance of affecting the project as a whole and are not limited to specific tasks or resources. For example, political or weather risks would be assigned as global.
- **Local Assignments** – Local risk assignments are those risks that have a chance of affecting only specific tasks or resources. A local risk assignment can affect more than one task or resource. For example, risks affecting the delivery of specific equipment for a certain phase of a project would be assigned local.

You can edit or view risk assignments in the following dialog boxes and views:

View	dialog box/Tab	Local or Global	Assigned to tasks or resources
Drag'N'Drop Risk View		Local risks	Both task and resources
Risk Assignment View		Risks can be re-assigned to different tasks or resources or become global	Both task and resources
Risk Register	Risk information dialog (double-click on Risk ID), Assignment tab	Both local and global risk	Both task and resources
Any view with task information (Project View, Result Gantt, etc.)	Task information dialog (double-click on Task ID), Risk tab	Local risks	Task
Resource View	Resource information dialog (double-click on Resource ID), Risk tab	Local risks	Resources

Converting your project from Qualitative to Quantitative Risk Analysis

If you have risks in the Risk Register, but no schedule, you can perform a qualitative risk analysis of your project. If you add even one task to the project, all your risks will convert to global risks, and will therefore be assigned to all tasks.

In quantitative risk analysis risk categories are separated into two groups:

- **Schedule related risk categories**: "Schedule and Scope" which is related to category "Duration" in qualitative analysis and "Cost and Income" which is related to category "Cost" in qualitative analysis.
- **Non-schedule categories** (Safety, Quality, Technology, etc.)

In qualitative risk analysis the "Duration" category has only one outcome type "Relative delay"; however, in quantitative analysis, the corresponding category "Schedule and Scope" has many outcome types (fixed delay, relative delay, etc.). Similarly, in qualitative analysis the"Cost" category has only one outcome type, "Relative cost increase"; whereas the "Cost and Income" category in quantitative analysis has many outcome types (fixed cost increase, relative cost increase, etc.).

If you add a schedule (i.e. activites or tasks) to your project, the following occurs:

- Risks with the outcome type "Relative Delay" will convert to a global risk with the same outcome type.
- Risks with the outcome type "Relative Cost Increase" will convert to a global risk with the same outcome type".

At this point, you may need to reassign these risks to particular tasks or resources and modify the outcome types. For example, a risk which had a Relative Cost Increase may need to be modeled as a Fixed Cost Increase.

- The Probabilities and impacts of schedule related risks in quantitative analysis are calculated differently than in qualitative analysis.
- Schedule related risk impacts are calculated as a correlation between the duration or cost impact for each risk and project duration or cost.
- As a result, probabilities and impacts of schedule risk for quantitative and qualitative analysis will be different.

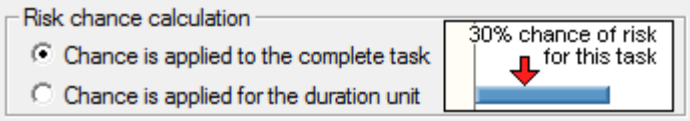
For more information about calculation of probabilities and impacts of risks for quantitative analysis read, "**How are risk probabilities, impacts, and scores calculated**?" in the Frequently Asked Questions.

- The risk register has an additional column for quantitative risk analysis: risk assignment. To view pre- and post-mitigation probabilities and impacts for quantitative risk analysis, you must calculate your project.
- When you have a project with a schedule, the Risk Assignment view is enabled. The Risk Assignment icon will be disabled in the workflow bar for qualitative analysis (no schedule).
- When you remove a schedule but do not remove risks, you will be performing qualitative risk analysis.

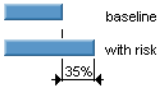
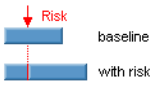
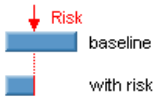
Risk Attributes for Quantitative Risk Analysis

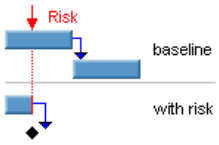
Each risk has the following information related to quantitative analysis.

- Risks can be assigned to Tasks or Resources
- Risks are defined by the **chance of occurrence** (from 0% to 100%). The chance can be defined per task (by default) or per duration unit. For example, if there is a 30% chance that task can be restarted per day. If task duration is 2 days, the chance of the risk occurring per task is 60%. This chance calculation option is defined for **all tasks and resources** for the project in the **Risk** tab of the **Options** dialog box:



- Each risk has a different **outcome type**. Outcome types can be schedule and cost related and non-schedule related, which you can customize using the Risk Outcome dialog box. Standard schedule-related risk outcomes are shown in the table.

Outcome Type	Description	
No Impact	This is for information only and has no impact on project schedule	
Relative Delay Fixed Delay	Durations will be expanded in the period, defined in the **Result** field regardless of, when the risk occurs. If the **Result** is negative, the task duration will be reduced. If task duration is elapsed, the delay will also be represented in elapsed units (edays, ehour, etc.)	
Relative Cost Increase Fixed Cost Increase	Task related fixed costs are increased by the amount, defined in the field **Result** regardless of when the risk occurs. If the **Result** is negative, costs are reduced. These risks do not affect cost per use.	
Relative Income Increase Fixed Income Increase	Works in a similar manner to fixed cost increase and relative cost increase but applied to the income.	
Restart Task	Tasks are restarted from the moment the risk occurs. As a result, the task duration is increased.	
End Task	Tasks are successfully completed when the risk occurs. As a result, the task duration is reduced.	
Cancel Task	Tasks are canceled when the risk occurs. As a result, the task duration is reduced, and the task is marked as canceled.	

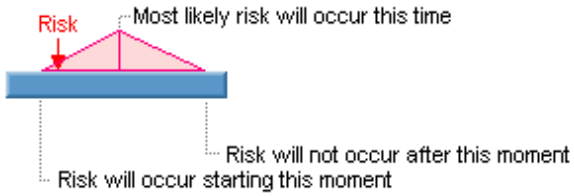
Cancel Task + all successors	Tasks and all its successors are canceled when the risk occurs. As a result, the task duration is reduced, and the task and all its successors are marked as canceled.	
Rate Increase	This risk can only be used on resources. If this risk occurs, the rate will be increase or reduce. For example, if the rate is $20/hour and risk outcome is 50%, the rate will be $30/hour if the risk occurs. This outcome affects project cost.	
Execute Response Plan	Result field for this risk contains a dropdown list with mitigation plans. They come from Risk Mitigation or Response view. If task has multiple local and global risks, which require execution of the particular mitigation or response plan, this plan will be executed only once.	

- The **Outcome** is related to the outcomes "**Fixed cost increase**", "**Relative cost increase**", "**Fixed delay**", "**Relative delay**", and "**Rate Increase**". It defines how much the duration or cost will be increased or reduced.
- RiskyProject calculates the **Risk Impact** for duration and cost using sensitivity analysis and displays this in the Risk Register, Risk Assignment views and Risk Tabs for Tasks and Resources. Colors are used to indicate the level of correlation between the risk and project duration and cost.
- Red indicates a strong correlation
- Yellow a medium correlation
- Green a weak or no correlation

Colors for threats are the opposite. Particular colors for the risk impact value depend on the risk tolerance defined in Format Risk Matrix dialog box.

The **Moment of risk** is defined by:

- Start time of Risk occurrence;
- Most likely Time of risk occurrence;
- Finish Time of Risk occurrence
- Uniform or triangular distributions



Start, Most Likely, and Finish times are entered as a percentage of total task duration starting from the beginning of the task.

For example:

- Distribution: Triangular
- Start: 50%
- Most likely: 80%

- End: 100%

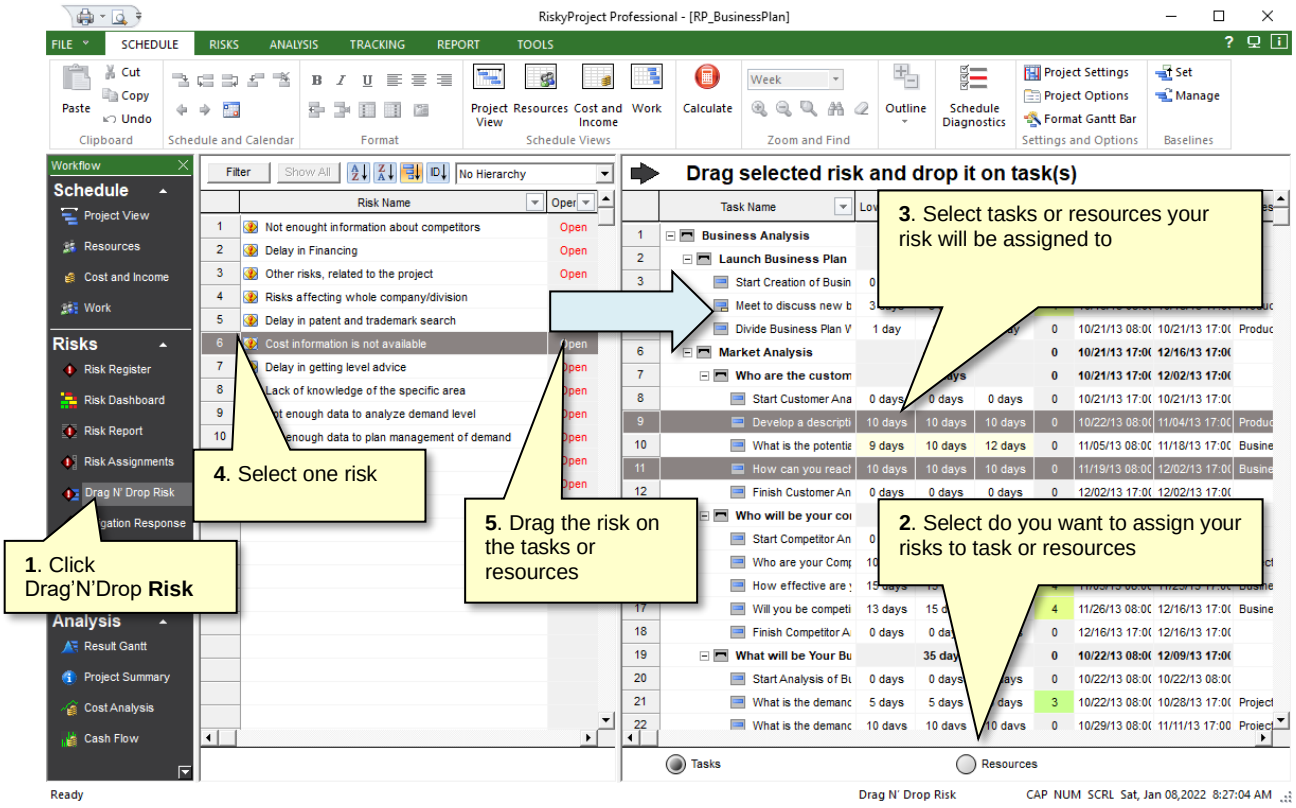
This description means that by default for A new task with duration 10 days risk would occur after 5th day, but most likely would occur on 8th day.

Assigning local and global risks

Once you have added your risks you can start assigning your local risks to tasks and resources. You cannot assign the same local risk to both a task and a resource. RiskyProject offers a number of ways to assign risks to task and resources.

Method 1: Assigning risks using the Drag'N'Drop Risk view

This is the preferred method for assigning risks to complex projects as it allows you to quickly assign risks to multiple tasks or resources.



1. On the **Risks** tab, click the **Drag'N'Drop Risk** view.
2. You must indicate whether you are assigning the risk to Tasks or Resources using the options below the list of tasks or resources. Select **Task** or **Resources** and the right pane will list change based on your selection. By default, the view is set to Tasks.
3. Select tasks or resources your risk will be assigned to.
4. Select one risk.
5. Drag risk onto the tasks or resources.

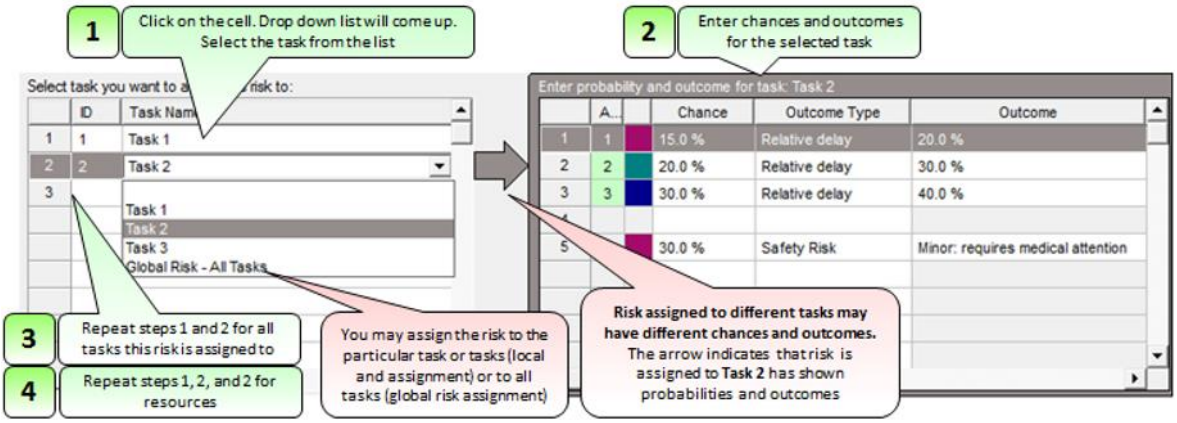
6. The **Assign risk to task or resource** dialog box opens. It shows a list of the task or resources that the risk will be assigned to and allows you to define risk chance, outcome type, outcome, and moment of risk
7. Select whether you want to add or update a risk for the specific task or resource or if you do not want to make any changes to risk assigned to the specific task
8. Enter the risk chance, outcome type, outcome and moment of risk. These parameters will be the same for all selected tasks.
9. Click **OK**. The risk assignment to the selected tasks or resources is updated.

Method 2: Assigning global and local risks using Risk Register

This method is useful when you edit risk assignment, for example for mitigation planning. You will be able to view all risk assignments in one place. With the risk register, you can assign both local and global risks.

1. Open the **Risk Register**.
2. Double- click on the risk to which you want to add properties.
3. Click the **Assign to tasks or resources** tab.
4. Depending upon whether you are assigning local or global risk to a task or resource click on the first empty row in either the Tasks or Resources tables.
5. Select the task or resource from the drop-down list. You may select “All Tasks” or “All Resources” for global risk assignments. If you select a specific task or resource, it will have a local risk assignment.
6. Click the row ID cell the item you just select to enable the **Selected assignment** table to the right. This is where you define the risk assignment.
7. Click in the **Chance** cell to start entering the **Chance**, **Outcome**, and **Result** of the risk.
8. Select the **Moment of risk** distribution from the drop-down list. If it is triangular, you must define the **Start**, **Most Likely**, and **Finish** parameters.
9. Click in an additional row to enter a mutually exclusive risk alternative. A risk alternative is a different outcome from the same event.

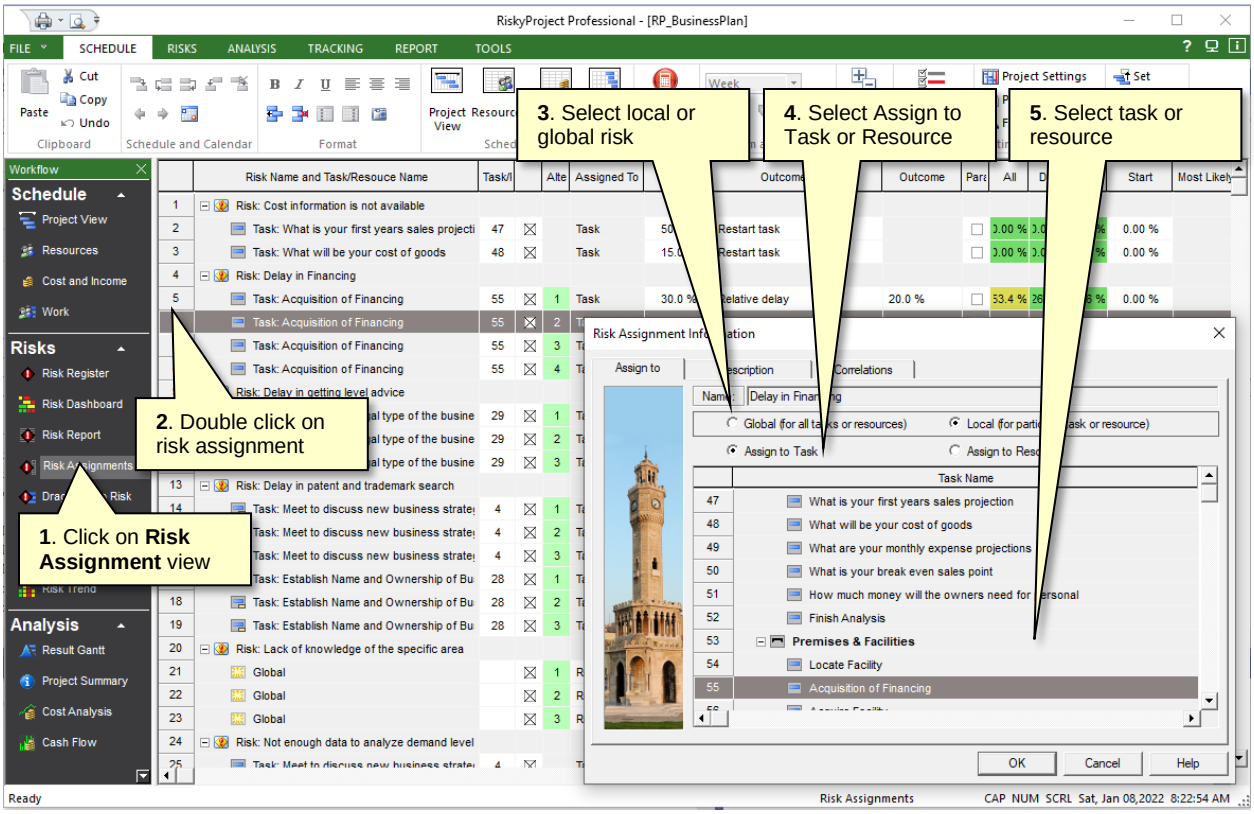
This shows how you assign risks to tasks in the Risk Register:



- Use the Pie Chart for mutually exclusive risk alternatives to as a guide for how they affect the overall chance that the risk will occur.
- If you do not enter chance, outcome, results, or moment of risk assignment will not be saved even you selected task or resources.

Method 3: Re-Assigning risks using the Risk Assignment view

This is the recommended method to re-assign risks to different task and resources or make them global.



To reassign risks:

1. On the Risks tab, click the **Risk Assignment** view.
2. Double-click on a risk assignment; the **Risk Assignment Information** dialog opens
3. Select either global risk (for all tasks or resources) or local risk (for particular tasks or resources)
4. For Local risks, select Task or Resource
5. For Local risks, select tasks or resources from the list box.

- If a risk has multiple alternatives, you may need to re-assign all alternatives

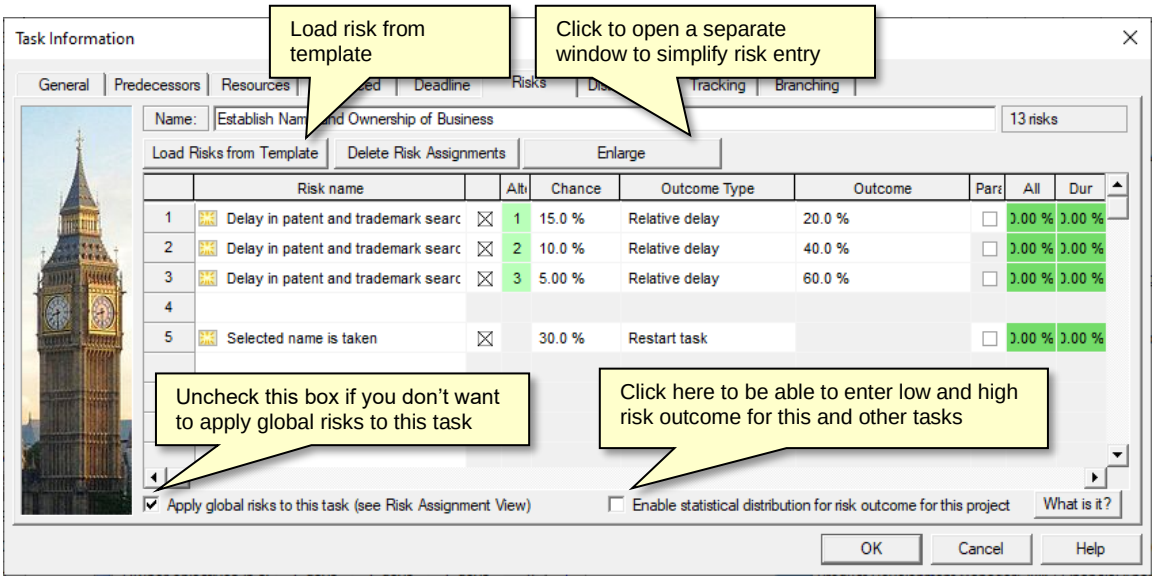
- You can disable Global risks for specific tasks. To disable a global risk for a specific tasks, open the Task Information dialog box, Risks tab and clear **Apply global risks to this task** checkbox.

Method 4: Assigning Local Risks Using the Task Information dialog box and Resource Information dialog box

You can define task risks in the **Risk** Tab of **Task Information** dialog box. All risks entered here are "local risks". It is a preferred method if you want to assign few different risks to few separate tasks and resources.

1. Open the **Task Information** or the **Resources Information** dialog box.
2. Click the **Risks** tab.
3. Double-click on **Risk Name** field and type in the name of the risk.
4. In addition to the above steps, you can:
   - Click the **Enlarge** button to expand the view and make it easier to assign risks.
   - Click the **Load Risks from Template** button to load all risks from a risk template. In this way, you can create a master list of risks in the template, load it here and enable or disable risks as required.
   - Clear the **Apply global risks to this task** check box (it is selected by default) if you do not want to include this task in global risk calculations.
   - Check **Enable statistical distribution for risk outcome** to be able to enter low and high risk outcome for this and other tasks. For more information about probabilistic risk outcome types, read "*Uncertainties in Risk Outcomes*". You can also Enable/Disable statistical distribution for risk outcome in **Schedule** > **Project Options** > **Risk** tab.

- You cannot add risks to summary tasks.
- Ensure that you have clearly defined your risks and uncertainties. For example, if you have already accounted for risk using a range (Base, High, and Low) of durations; do not add this as a risk as it is accounted for twice in the calculations.

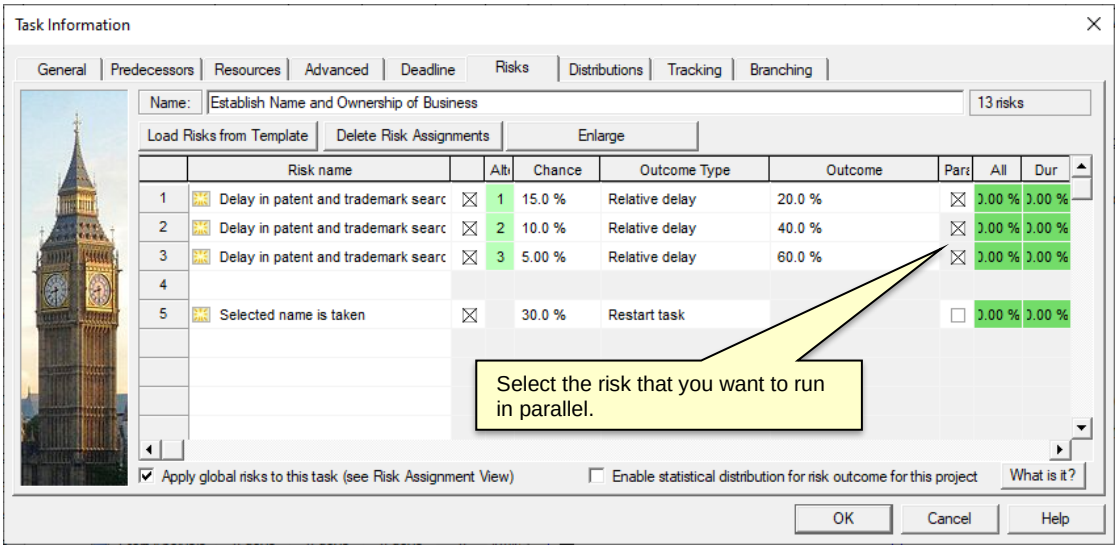


You can copy and paste risks between tasks. Right-click and choose Copy Risks to copy a risk. In the target task's risk list, right-click and choose Paste Risk to add the risk to the task.

Parallel Risks

Parallel risks represent a way of modeling risks in cases where multiple risks occur simultaneously. If risks are parallel, RiskyProject will only account for maximum impact of the most critical risk during each iteration of a simulation. This is useful if one or more less critical risks occur in conjunction with a critical risk recovery from all potential risks that can occur over the same period. In such cases, only the impact of the most critical risk will be accounted for in the simulation.

For example, a risk 'Not enough information…' causes a delay of 5 days, and a risk 'Staff turnover' causes a delay of 1 day. If these risks occur together and they are not parallel, the cumulative impact will be 6 days maximum. If they are parallel, cumulative impact will be 5 days.



To set a risk to run in parallel:

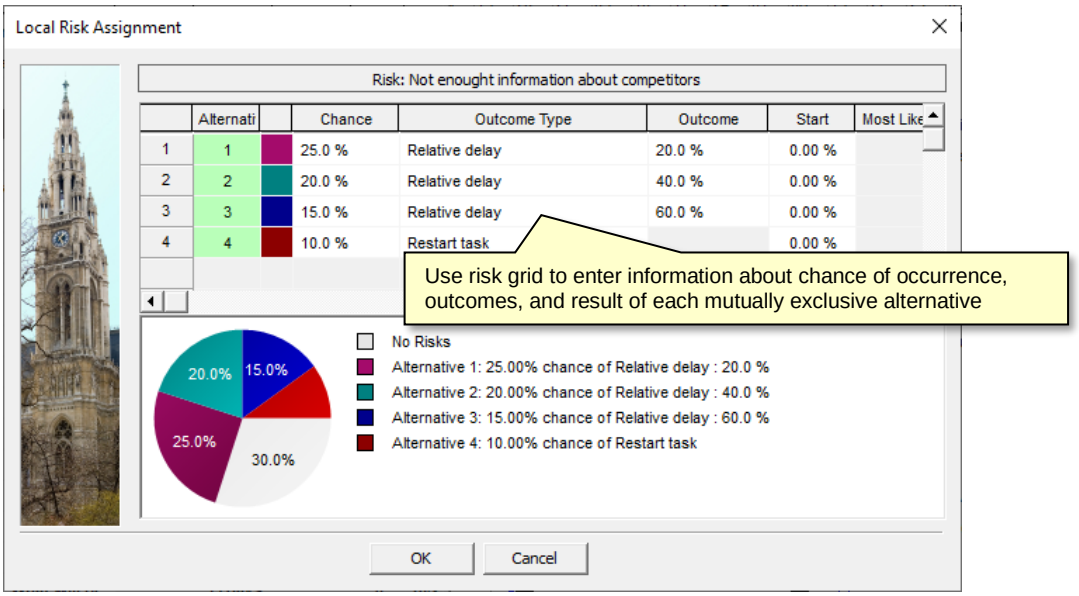
2. Double- click on the task id for the task in which you want to set a parallel risk.
3. Click the **Risks** tab.
4. Locate the risk you want to run in parallel.
5. In the "**Parallel Risk**" column for the risk, click the check box. The risk will now run in parallel to the other risks assigned to the project.
6. Repeat for all other risks that you want to run in parallel.

Parallel risks are calculated for increasing cost and duration. They do not affect risk outcomes of cancel/end tasks or non-schedule risks.

Risk Assignments on the Gantt Chart

Risks and issues can be shown on the Gantt chart as arrows:

Colors represent the calculated the impact of the risk on all project parameters combined. The size of the arrow represents probability. You may click on each risk arrow within a Gantt chart to be shown with information about risks:



- Only local risks are shown as arrows.
- You cannot add or remove mutually exclusive alternatives using this dialog, but you can input chance of occurrence, outcomes, result, and moment of risk.

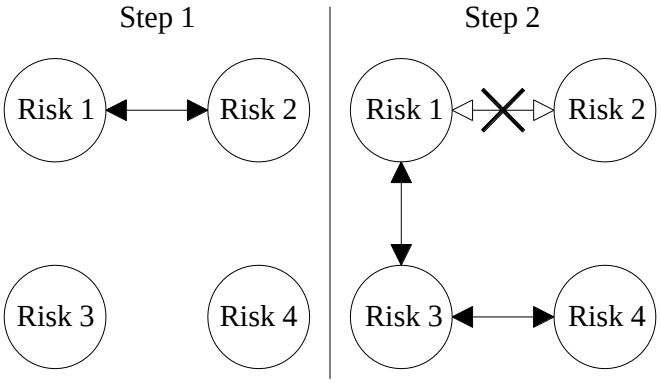
Showing or hiding risks on the Gantt chart

Click the button on the Analysis tab toolbar to toggle the risk arrows on or off. You may also Right-click on Result Gantt chart and select Show Risks.

Risk Correlations

Different risks can be correlated to each other. For example, bad weather conditions (risk 1) can mean that the delivery of the goods can be delayed (risk 2). For each risk, you can specify correlated risks or view risks, which can occur with a particular risk. For example, the risk **Technical Difficulties with HTML editor** occurs together with the risk **Major problem with web site**.

If you define a correlation between risk 1 and risk 2, and then define a correlation between risk 1, risk 3 and risk 4, the correlation between risk 1 and risk 2 defined in the previous step will be removed. Therefore, if you want to setup correlations between many different risks, you must perform this in one-step.



- Risk correlations can be specified once for different mutually exclusive alternatives of the same risk. The Moment of risk will not be correlated: even though risks are correlated, they may occur at a different moments during the task duration.

How correlated risks are calculated

RiskyProject uses the same seed for correlated risks. If seeds for two risks are the same, then sampling will follow the same pattern and risks will be correlated with each other.

If risks are correlated with each other, it does not mean that they will always occur together as the risks may have different chances of occurrence. If Risk 1 has a chance of occurrence of 10% and Risk 2 has a chance of occurrence of 20% and both risks are correlated, Risk 1 will always occur when Risk 2 occurs, but Risk 2 may occur when Risk 1 does not occur.

Correlating risks

Risk correlations can only be defined in the risk tabs on Task Information and Risk Information dialog boxes.

1. Right-click on the risk.
2. Click the **Correlations** tab.
3. Select a risk from the list of all available risks.

4. Select the task or resource to which this risk is assigned. This is required when risks with the same name are assigned to different resources or tasks.
5. Click **OK** to save this information.

Correlation of risk assignments

The risk events may occur at the same time (risk assignments are correlated) on in different times (risk assignments are not correlated). The default rule, or how different risk assignments are correlated, is defined in project options. To change this rule:

1. Click the **Schedule** tab. In the **Settings and Options**, click **Options**. The Options dialog box opens.
2. Click the **Risk** tab.
3. If check box **Risk assignments to different tasks are correlated** is checked, all local and global assignments of the same risk will be correlated by default.

Risk Templates

Risk templates allow you to quickly add risks to your project and assign chances of occurrence and outcomes. Risk templates are different from the Risk Register: they contain information about risk assignment. Risk templates are useful when you want to:

- Move risk assignments between different projects
- Perform a risk assignment as you did in a previous project
- Manage different sets of risk assignments for different types of projects

Creating a risk template

Create a set of global risks assignments:

1. Click the **Risks** tab. In the **Export/Import** group, click **Risk Assignment** and then **Save Risk Template**. Only global risk assignments will be saved to the template.
2. Provide a name and description.
3. Click **OK**. RiskyProject automatically saves the files. If the template already exists, a warning will open.

- You may have both Global and Local risk assignment. They are shown in Risk Assignment view. But when you create a template only Global risk assignments will be saved in the template.

Loading a risk template

1. Click the **Risks** tab. In the **Export/Import** group, click **Risk Assignment** and then **Open Risk Template.** The **Open Risk Template** dialog box opens.
2. Click on a list to select it.
3. Click **OK**. The template risks will replace any global risks that exist in the project.

Selecting a default risk template

When you select a template as the default, the template will be loaded each time you create a new project.

1. Click the **Risks** tab. In the **Export/Import** group, click **Risk Assignment** and then **Open Risk Template.**
2. Select the check box to the left of a template to set it as the default template.

- Templates are saved into the Templates directory. Templates directory is a subdirectory of RiskyProject directory. Templates directory is generated during installation. You Templates directory does not exist, templates are saved to the RiskyProject directory. The file extension for the template is *.aln. Template names are displayed in the status bar.

Using risk templates for local risk assignments

1. Open the **Risk** tab located in the **Task Information** dialog box or the **Resource Information** dialog box.
2. Click **Load Risks from Template** button. The Load Risks from Template dialog box opens.
3. Select the template from the list and click **OK**. The risks template will overwrite all existing local risks for the particular task or resource.

- Templates may contain risks assigned to both task and resources. If you load a risk template from Task Information dialog box, resource risks will not be loaded. If you load risk template from Resource Information dialog box, task risks will not be loaded.

Managing Uncertainties

If you have accurate historical statistical data that is analogous to a particular element in your project, we recommend that you use this data to model uncertainty in your project as opposed to risk events. Be aware of double-counting risk and uncertainty as most of the uncertainty in a project is due to the probability of risk events occurring.

To define uncertainties:

1. Define a 3-point estimate for any of task parameters: fixed cost, income, duration, and start time. 3-point estimates for work will be calculated automatically based on uncertainty in duration. You may also define 3-point estimates for the lag.
2. You can define a **Most Likely** duration or fixed cost. By default, Most Likely duration or fixed cost equals Base duration and Fixed Cost. However, you can define separate Most Likely values. This can be used if you believe that the Base values from original project schedule is not realistic, but you want to maintain the original Base values. Most Likely values are used only with Triangular and BetaPert distributions.
3. After you define 3-point estimates, a statistical distribution will be assigned. You may change the default statistical distribution for the duration, cost, income, and start time parameters in the gf **Distributions** tab of **Task Information** dialog box.

The meaning of low, base, and high data depends on the statistical distribution defined in the Distributions tab of the Task Information dialog box.

Adding 3-point estimates for task duration and start times using Task Information Dialog

1. On the **Project** view, double-click on the task ID.
2. Click the **General** tab.
3. Define a **Base**, **Low**, and **High** dates for **Duration** and/or **Start Time**.
4. Define a **Base**, **Low**, and **High** values for **Duration**. By default, when you enter a value for duration, the default values for Low and High are calculated based on the defaults set in the Duration Options.
5. Click **OK** to save the estimates.

Adding 3-point estimates for task duration using the Project View

1. On the **Project** view, select the task to which you want to add cost and income estimates
2. Enter cost data for **Duration Low**, **Duration Base**, and **Duration High**. By default, when you enter a value for Duration Base, the default values for Low and High are calculated based on the Duration defaults set in the Duration Tab of Project Options dialog.
3. You may define a **Most Likely Duration**. The Duration Most Likely column is hidden by default, so you will need to insert the to your datasheet. To insert column right click on column header, choose “Insert Column Before…” or “Insert Column After…”, and select **Duration Most likely**.

Adding 3-point estimates for task cost and income

1. On the **Cost and Income** view, select the task to which you want to add cost and income estimates
2. Enter cost data for **Cost Low**, **Cost**, and **Cost High**. By default, when you enter a value for Cost, the default values for Low and High are calculated based on the Cost defaults set in the Cost Tab of Project Options dialog.
3. You may define a **Most Likely Duration**. The Duration Most Likely column is hidden by default, so you will need to insert the to your datasheet. To insert column right click on column header, choose "Insert Column Before…" or "Insert Column After…", and select **Duration Most likely**.
4. Enter income data for **Inc. Low**, **Income**, and **Inc. High**.

Adding 3-point estimates for lags

1. On the **Project** view, double-click on the task ID.
2. Click the **Predecessor** tab.
3. Enter Low, Base, and High Lag. Default statistical distribution will be generated automatically. There are only two distributions for lag: Uniform Triangular.
4. Click **OK** to save the estimates.

Distributions for 3-point estimates for duration, cost, income, and start time

You define distributions for 3-point estimates in duration, start time, income and cost in the **Distributions** tab of **Task Information** dialog box. Distribution for work is the same as distribution for duration. Distributions do not affect the deterministic calculation of current schedule. You cannot define distributions for summary tasks.

The Distributions tab allows you to assign distributions and define the meaning of low and high values for normal and lognormal distributions. The actual values for low, base (most likely), and high duration, cost, and start time are defined when you enter task parameters in data sheets. Low and high duration and start time can be entered in **General** tab of **Task Information** dialog box of in data sheets. Seeds, which are associated with the distributions, are defined in data sheets.

RiskyProject offers the following distributions:

	Distribution	Parameters	How to use
1	Beta	Alpha and beta parameters	Used for wide range of conditions. If Alpha and Beta are 1, Beta distribution will uniform. If Alpha and Beta are the same, the distribution will be symmetrical.
2	BetaPert	Mean parameter	Used as "smoother" substitute to Triangular distribution
3	Cauchy	Shape parameter	Used if low duration, cost, or start time represents "best case scenario" value. High value represents a cut off: how long duration, cost, and start time can expand.

4	Custom	Set of points with probabilities	Used to define generic shape of distribution by entering point as a percentage of task duration, start time or cost, and associated relative probability.
5	Discrete	Set of intervals with probabilities	Used to define distributions consisting of multiple segments with associated relative probabilities. Each segment is defined by uniform distribution. Interval is entered as a percent of task duration.
6	Exponential	Mean parameter	Similar to Cauchy distribution
7	Gamma	Alpha and beta parameters	Similar to Cauchy distribution
8	Gumbel	Two share parameters	Skewed distribution. Useful if there is lower chance that task will take longer time than a shorter time.
9	Laplace	One parameters	Similar to Cauchy distribution
10	Lognormal	Mean and standard deviation parameter or P1/P99, P5/P95, P10/P90	Similar to Gumbel distribution
11	Normal	Mean parameter or P1/P99, P5/P95, P10/P90	Symmetrical distribution. Low and high values of duration, cost, and start time serve as cut offs.
12	Rayleigh	Standard Deviation parameter	Similar to Gumbel distribution
13	Triangular	Most Likely parameter	Most likely parameter overwrites base value of duration, cost, or start time.
14	Uniform		Equal probability that duration, cost, or start time will be between low and high values.

Defining task distributions

1. Select the task in which you want to define distributions.
2. Open the **Task Information** dialog box.
3. Click the **Distributions** tab.
4. Select the **Cost**, **Duration** or **Start Time** tab.
5. Select the distribution from the **Distribution** list. If you select **Undefined,** the base value will be used for all iterations.
6. Define the distribution parameters. The Probability Density chart is automatically updated. You can adjust distribution parameters using the sliders.
7. If you use a custom or discrete distribution, a grid opens. The grid will allow you to define points (or intervals for discrete distributions) and associated with each point (interval)
8. If you select **Normal** or **Lognormal**, you must select the **Low** and **High** probability range (P1 and P99, P5 and P95 or P10 and P90). These are "cut-off" parameters; meaning that duration, cost, or start time cannot go beyond these values.

- The Probability Density chart's colors are consistent with those found in the Project Summary and Monte Carlo Simulation results: Duration is blue, Cost is green, and Start Time is yellow.

- Double- click on the probability density chart to enlarge it.
- To copy the chart to the clipboard or as a file, right-click and choose a copy command from the shortcut menu.

In most real life examples, the type of distribution (triangular, normal, and lognormal, etc.) may not significantly affect the results of calculation. Results of project scheduling cannot be accurate with high precision due to the large systemic errors of estimation in project management. It is recommended that you assign different statistical distribution if you have reliable historical data about similar tasks.

Using Empirical Data to Generate a Statistical Distribution

You can use empirical data to define a custom statistical distribution. The data must be saved in a comma separate file and contain numbers only. The minimum number of values should be 20. At least one value should be different from all others. If there is a text field, it will be interpreted as a zero value. Values can be entered on multiple lines. But it could be one row, or one column. Here is the example of a file:

67.78, 88.32, 32.33, 47.54, 57.32, 45.23, 58.23, 67.00, 56.20, 32.87, 32.22, 30.00, 32.33

32.99, 18.32, 56.22, 32.21, 32.98, 23.23, 73.43

58.23, 67.00, 56.20, 32.87, 32.22, 30.00, 32.33, 22.45, 48.34

Fitting a distribution

1. Open Project View
2. Double click on Task ID; Task Information dialog opens
3. Go to **Distributions** task
4. Selection Cost, Income, Duration or Start Time
5. Click the **Get Empirical Data** button.
6. Select the comma separated file that contains the data
7. Existing durations for low, base, and high values will be replaced with the custom distribution generated using the empirical data.

Assigning Low, Most Likely, and High Estimates for Duration and Cost for Group of Tasks

You may assign statistical distribution for duration and cost for a selected group of tasks:

1. Open the **Project** View**.** Select a group of tasks.
2. Right-click on a Task ID.
3. Select **Set Low/ /High Duration** or **Low/ High Fixed Cost.**
4. Enter fixed values or use coefficients to calculate **Low, Most Likely, and High duration** or cost based on **Base duration or Cost.**

5. Select a distribution from the drop-down list.
6. Click **OK** to apply changes.

You may clear the statistical distribution for a particular group of tasks. To do so, go to the same dialog and select "Set low, most likely and high duration equal base duration" for duration or "Set low, most likely and high cost equal base cost" for cost.

Uncertainty Bands

If you are able to identify or characterize activities based on a known levels of uncertainty, you can create uncertainty bands to model these and quickly apply them to all activities that meet the criteria. You can define a set of coefficients to calculate low and high duration or fixed cost. For example:

Band 1 (Low):

Duration Low = Duration Base * 0.95

Duration Most Likely = Duration Base * 1.0

Duration High = Duration Base * 1.1

Band 4 (Critical):

Duration High = Duration Base * 0.8

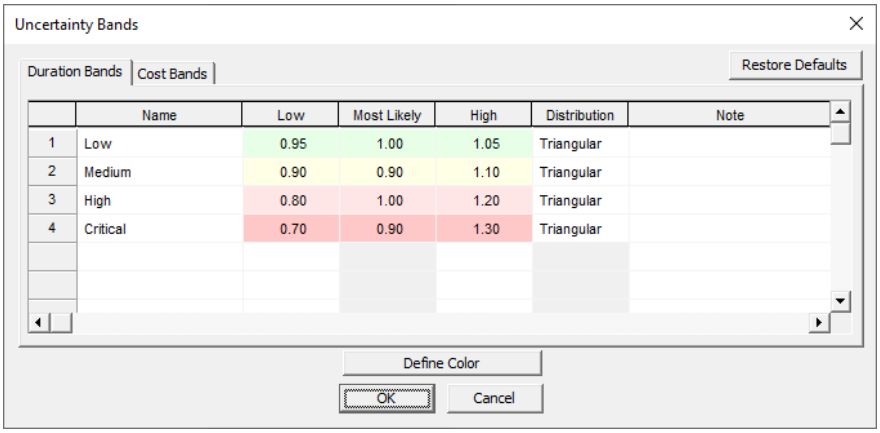
Duration Most Likely = Duration Base * 1.05

Duration High = Duration Base * 1.3

Each band is associated with certain color. This color will be a background color for low/base/high duration or fixed cost, which belong to particular band. You can assign bands to the group of selected tasks.

To define uncertainty bands:

1. Click the **Risk** tab.
2. Click **Uncertainty Bands**. **Uncertainty Bands** dialog box opens.
3. Each row represents a band. Define the Name, Low, Most Likely and High coefficients, color and note for each band. Use the Delete button to remove bands if required.
4. Select the **Statistical Distribution** for the Band. Uncertainty Bands only support only Triangular or BetaPert distributions.
5. Toggle between **Duration Bands** and **Cost Bands** to define bands for duration uncertainties or fixed cost uncertainties.
6. Click **OK**.



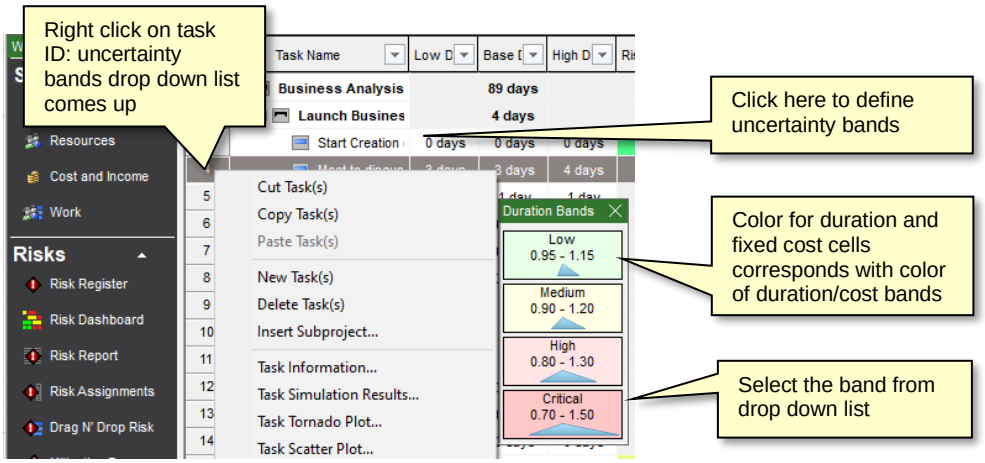
- Each time you make changes to uncertainty bands they are saved in the system registry as default sets of bands for all new projects.
- It is recommended not to repeat coefficients for different bands

To assign an uncertainty band to activities:

1. Select a group of tasks in any view where tasks are shown

   or

   Click on **Find** button, select tasks based on certain criteria (see **Finding Text or Data**).
2. Right-click on a task ID. The uncertainty bands drop down list appears next to the shortcut menu. Uncertainty Bands for fixed costs and income are available in the Cost and Income, Cost Analysis, Cash Flow, Work and Profit Report views.
3. Select a band from uncertainty bands: the background color the activity estimates will be changed to match the selected the band color.

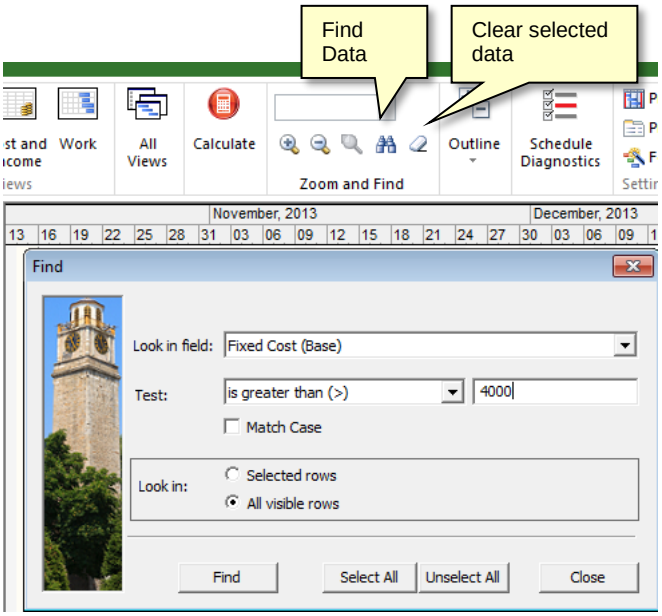


Finding Text or Data

A popular method to quickly assign low and high estimate for duration and cost using coefficients is to assign them to groups that are identified by specific values in text or data fields. This is often referred to as grouping or banding.

To find specific text or data values in your project fields.

1. Click the **Schedule** tab. On the **Zoom and Find** group, click the Find button. The Find dialog box opens.
2. From the **Look in field:** dropdown list, select the column that you want to search. This list contains only those columns available in currently open view.
3. From the **Test:** dropdown list select the logic definition that you want to use for your search. Type in the value that you want search for in the text box to the right. Selected activities are highlighted. Activities will remain selected until you clear the selections.
4. To clear your selections, click the **Unselect** button.
   For example, if you want to find/select all Tasks with that include "Design" in the task name, select Task Name in the Look in field: dropdown list. From the Test: dropdown list, select contains and type in "Design" in the text box and click Find.



To select all activities:

1. Click the **Schedule** tab. On the **Zoom and Find** group, click the Find button. The **Find** dialog box opens.
2. Click **Select All**. All activities are selected.

Assigning Low and High Estimates for Duration and Cost to Found Tasks

Once you have selected the activities that you want to modify, you can then mass edit the low and high estimates for duration and cost to the selected activities.

To set low and high duration or cost to found activities:

1. Using the **Find** feature, search for those activities to which you want to set the low and high duration or cost.
2. In an open view, click on the Task ID of one of the found activities (highlighted in black) to select it. The highlighting will change to a lighter shade of gray to indicate that you have made a selection.
3. Right-click and from the shortcut menu, choose either Set Low/High Duration or Set Low/High Fixed Cost.
4. In the dialog box, click the **Apply to Found tasks** option.
5. Enter the rest of the required values or coefficients for Low and High estimates and select a statistical distribution.
6. Click **OK**.

Chapter 5: Analyzing Project Results

Calculations

RiskyProject has two types of calculations:

- **Deterministic calculation of current schedule -** The default calculation is automatically performed when you modify a project schedule. As this calculation occurs automatically, you do not need to press the Calculation button. This calculation uses the Base input parameters (duration, start time, lag) without calculating the effect of risk or uncertainty.
- **Probabilistic (Monte Carlo simulations) -** Use this to calculate the project schedule and costs with uncertainties and risks.
- Automatic Monte Carlo simulations for small tasks are enabled by default.

Enabling or disabling automatic Monte Carlo simulations for small projects

1. Click the **Schedule** tab. In the **Settings and Options**, click **Options**. The Options dialog box opens.
2. Click the **Calculations** tab.
3. From the **Default Calculation for Small Projects** option box, select one of the two options:
   - Current Schedule Calculation only
   - Probabilistic Calculation (Monte Carlo simulation)
4. Click **OK**. RiskyProject automatically determines which project is small based on your computer's performance and the size of the project.

Running probabilistic calculations

Click the **Calculate** button. You may cancel the probabilistic calculation at any time; however, if the number of simulations performed is less than 20, no probabilistic results will be calculated.

- By default RiskyProject performs convergence monitoring. Simulations can be stopped when they convergence equals mean and standard deviation values defined in Schedule tab > Options > Calculation.
- Minimum number of simulations is 200.
- If you cancel a calculation after more than 20 simulations and generate results, use these results with caution as the number of simulations which have been run may be too small to provide an accurate portrayal of the project's risks and uncertainties.
- If you try to perform Monte Carlo simulations without risks and uncertainties, simulations will not proceed in the same manner as when you define risk and uncertainties. Remember that uncertainties include a probabilistic calendar.

Defining the number of simulations

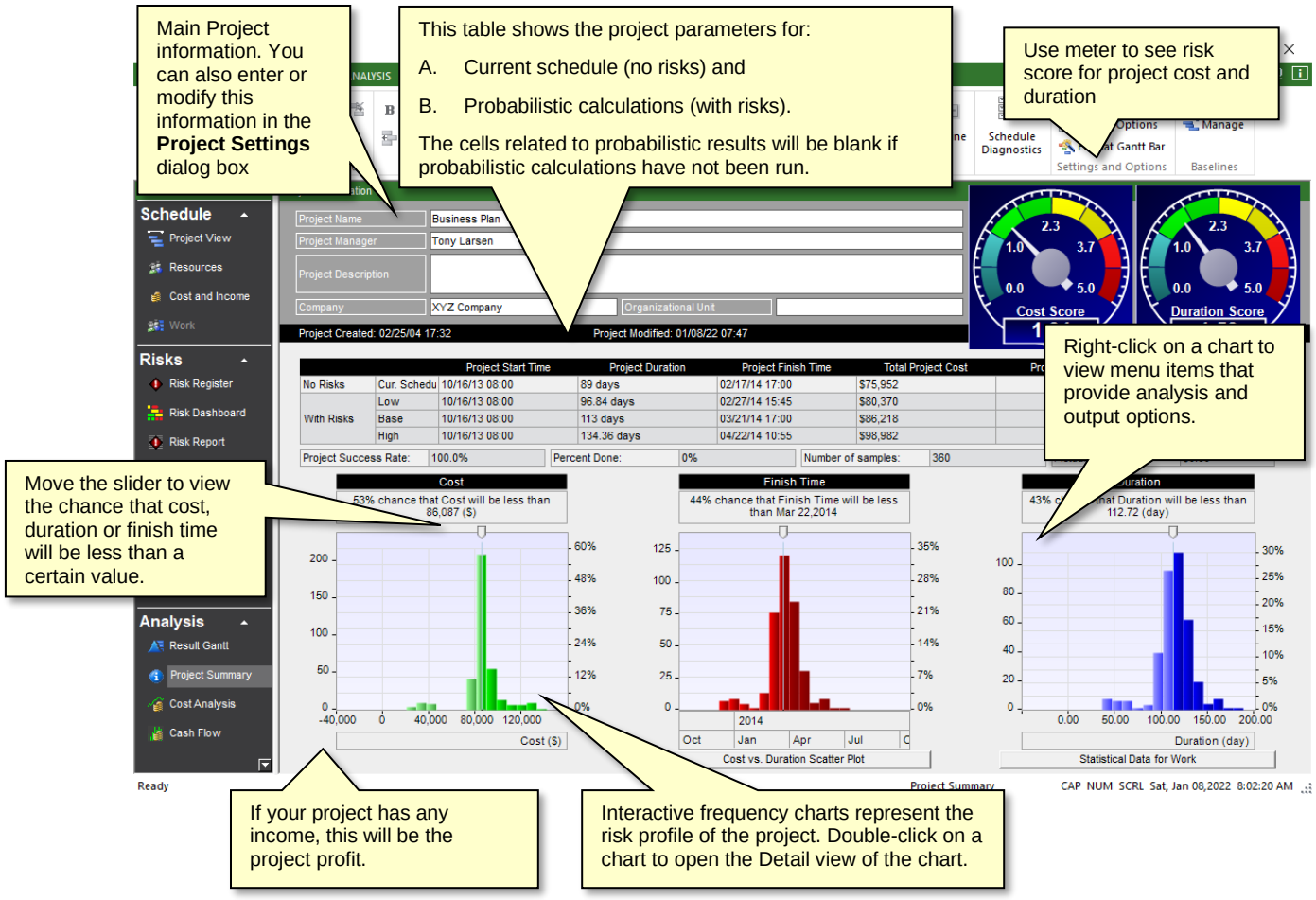
You can define the total number of simulations run during each probabilistic calculation.

1. Click the **Schedule** tab. In the **Settings and Options** group, click **Options.**
2. Click the **Calculations** tab.
3. Type in the number of simulations in the **Maximum number of simulations** box. The number of simulations that have actually been run could be less if the simulations converge.

Analyzing Results

Project Summary

The Project Summary view shows the main information about your project: total cost or income (if income is defined), finish time, duration, and success rate for both deterministic and probabilistic calculations.



The Project Summary is divided into four sections:

- Main project information – the main project information includes the project name, manager, etc.
- Main project parameters with and without risks – this table is located in the center of the project summary and shows the project start time, duration, finish time, cost, income, and profit for the current schedule (no risks) and the low, base, and high calculated results.
- Main project parameter frequency/cumulative probability charts – interactive charts that show the distribution of the results.

- Meters: provide project risk scores for cost and duration. You can adjust the scale and calculation formula for project meters by clicking on the question mark (?) on the left bottom corner of the duration meter. You can also define a formula for project risk score.

Risk Score Meter Settings

To define risk score meter scale and calculation formula click on the question mark at the lower right corner of the Duration Score meter.

Project duration score is calculated using the following formula:

$$\text{Score} = \frac{\text{Risk Duration}}{\text{Original Duration}}$$

Where:

Risk Duration – could be mean project duration as a result of analysis, mean project duration plus a standard deviation of duration, or a certain percentile of the entire project duration.

Original Duration - Original (baseline) project duration with no risks and uncertainties

- If the project does not have duration risks, the **Duration** score will be equal 1.
- If the Duration risk score is > 1, the project has threats related to duration.
- If the Duration risk score is < 1, the project has opportunities related to duration.

Project cost score is calculated similarly

To define risk score meter settings:

1. Select risk parameter from dropdown list
2. Define maximum threat score
3. Click **OK**

Viewing the project summary frequency charts

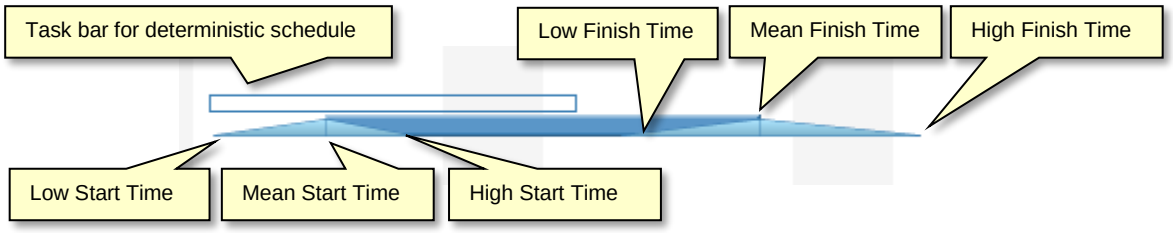
The frequency charts are interactive and show the risk profile for each project parameter: Cost, Finish Time, and Duration.

1. Drag the slider across a chart to view the chance that the project parameter will equal a certain value.
2. Double- click on a chart to enlarge it. The enlarged chart provides several different features including:
   - Cumulative probability chart
   - Full access to all statistical data for the selected parameter
3. Click on the **Statistical Data for Work** button to view the distribution for work. Work data is correlated to project duration distributions.
4. Right-click on the chart to view a full menu of analysis and copying options.

- The low and high results of probabilistic calculations (cost, duration, and finish times) are associated with P1/P99, P5/P95, P10/P90, or any custom percentiles. These are defined in the Options (Calculation tab).
- You may customize frequency charts either using Format > Format Frequency Chart or by right-clicking on a frequency chart and selecting Options.

Results Gantt Chart

RiskyProject displays the start and finish ranges of each task in the Result Gantt view. The calculated project and baseline schedules are shown in the same Gantt chart. You can use the task bar for current schedule to compare deterministic and probabilistic schedules.



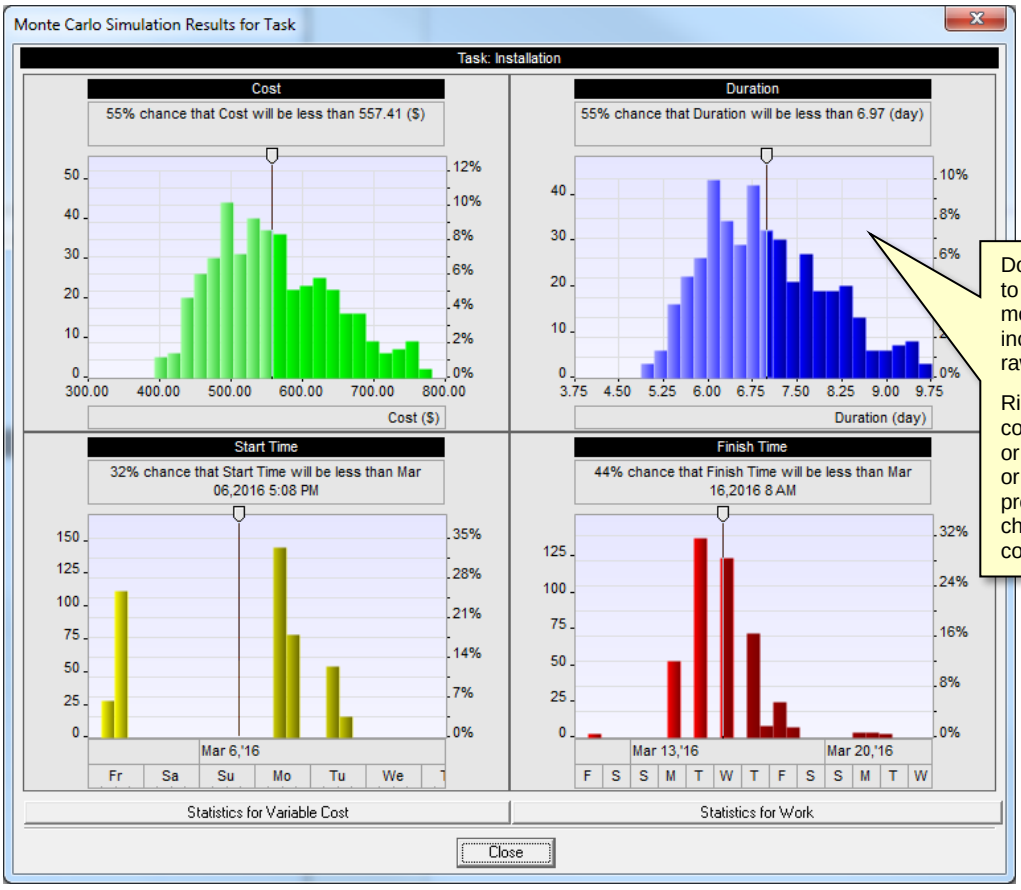
You can display Result Gantt associated only with low (optimistic) and high (pessimistic) results.

Showing or Hiding Low/High Results

1. Right-click on the chart and a shortcut menu opens.
2. From the shortcut menu, choose one of the following viewing options:
   - Show Low/High Results
   - Show Low Results
   - Show High Results
   - Show Current Schedule.

Task Simulation Results

RiskyProject allows you to quickly view the cost (profit, if income in any task is defined), duration, start time and finish times uncertainties associated with each task.



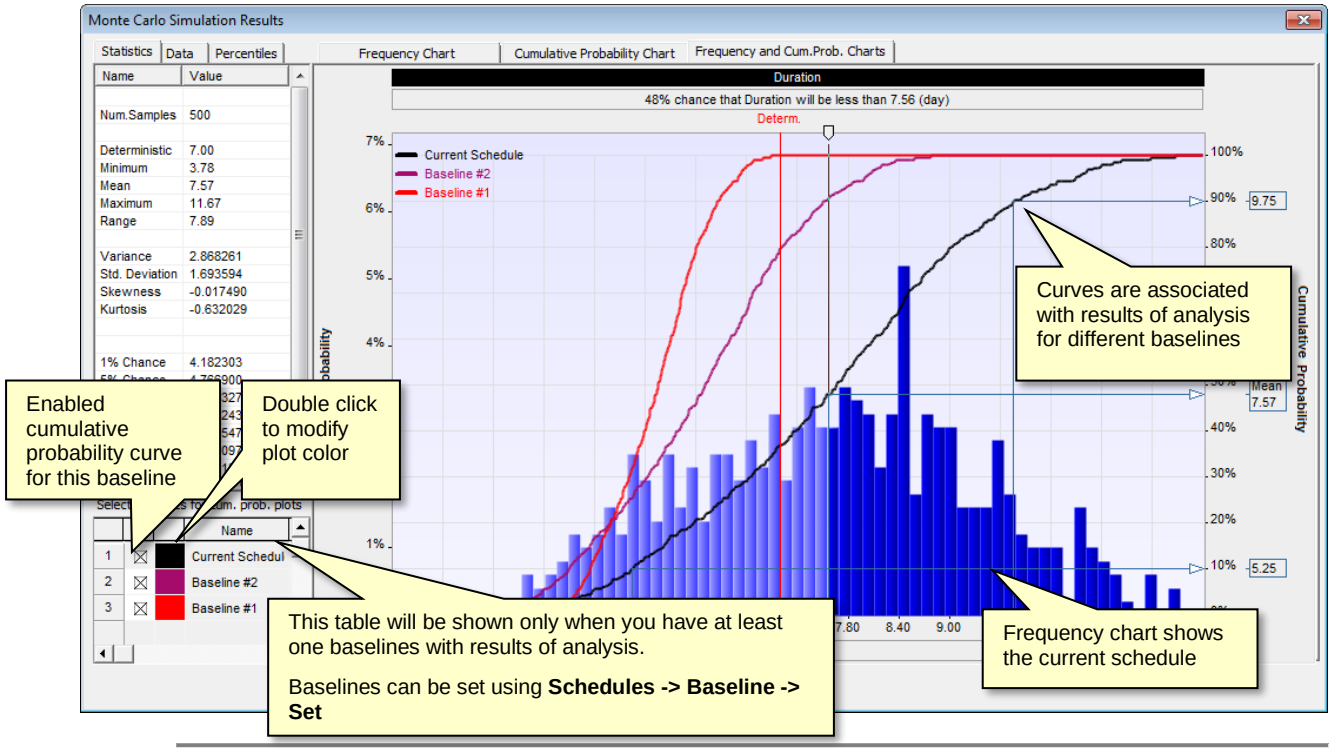
After you have completed a probabilistic calculation, you can see the probability that the particular task will start and finish on particular dates and will have a duration and a cost less than a certain value. The six charts available are for:

- Cost (Profit
- Duration
- Start Time
- Finish Time
- Variable cost
- Work

Viewing Task Simulation Results

1. Right-click on a task **ID** in any view. A shortcut menu opens.
2. Choose **Task Simulation Results** from the shortcut menu. The **Monte Carlo Simulation Results** dialog box opens.
3. Drag the slider across the charts to view the chance of a certain result.
4. Double-click on a chart to open up a detailed view of the chart.
   - Click the tabs on the top of the charts to toggle between **Frequency, Cumulative Probability** views, and their combination.
   - Click the **Statistics**, **Data**, or **Percentiles** to view more detailed views of the result data.

- If you created at least one baseline with results of analysis, you will see a detailed chart with multiple cumulative probability plots. A list of baselines is shown in the left bottom corner of the dialog box. You can enable and disable plots, as well as change colors for the plots. By using multiple cumulative probability plots, you can compare uncertainties in different project scenarios for particular task or for whole project.



- Right-click on a chart to copy the chart, statistics or data to the clipboard or view cumulative probability, frequency charts, or their combination.
- You may customize this chart either using Risks tab > Format Chart or by right clicking on the chart and selecting Options.

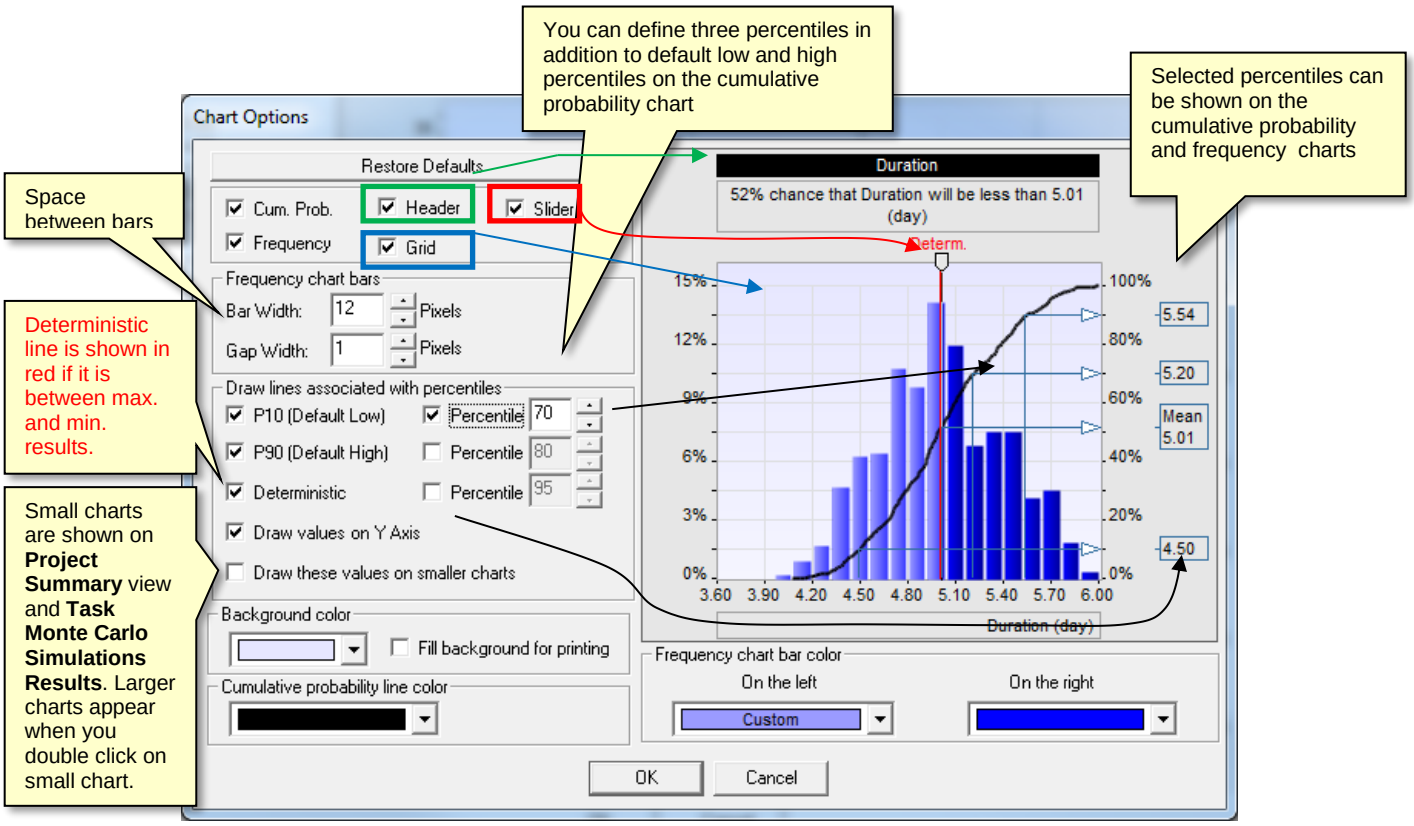
- You may use this feature to view task simulation results at each phase of the project. For example, if you have a milestone associated with a certain phase of the project, you can determine the chance that this phase of the project will be completed on time and budget.

Simulation Chart Options

You can use the chart options to define how the charts will appear.

To define chart options:

1. Select chart you want to format
2. Right-click on a chart. A shortcut menu opens.
3. Choose **Options**. The **Chart Options dialog box** opens.
4. Define the default viewing options.



Viewing statistics results of work

1. On the **Task Information** dialog box, click the **Resources** tab.
2. Right-click on a resource ID and select **Simulation Results**.
3. Drag the slider across a chart to view the chance that the work will equal a certain value.
4. View statistical parameters, percentiles, and raw statistical data for work on the left pane
5. Switch between frequency chart, cumulative probability chart, and combined chart on the right pane of the dialog
6. Right-click on the chart to view a full menu of analysis and copying options.

- The low and high results of probabilistic calculations (cost, duration, and finish times) are associated with P1/P99, P5/P95, P10/P90, or any custom percentiles. These are defined in the Options (Calculation tab).
- You may customize this chart either using Risks tab > Format Chart or by right clicking of the chart and selecting Options.

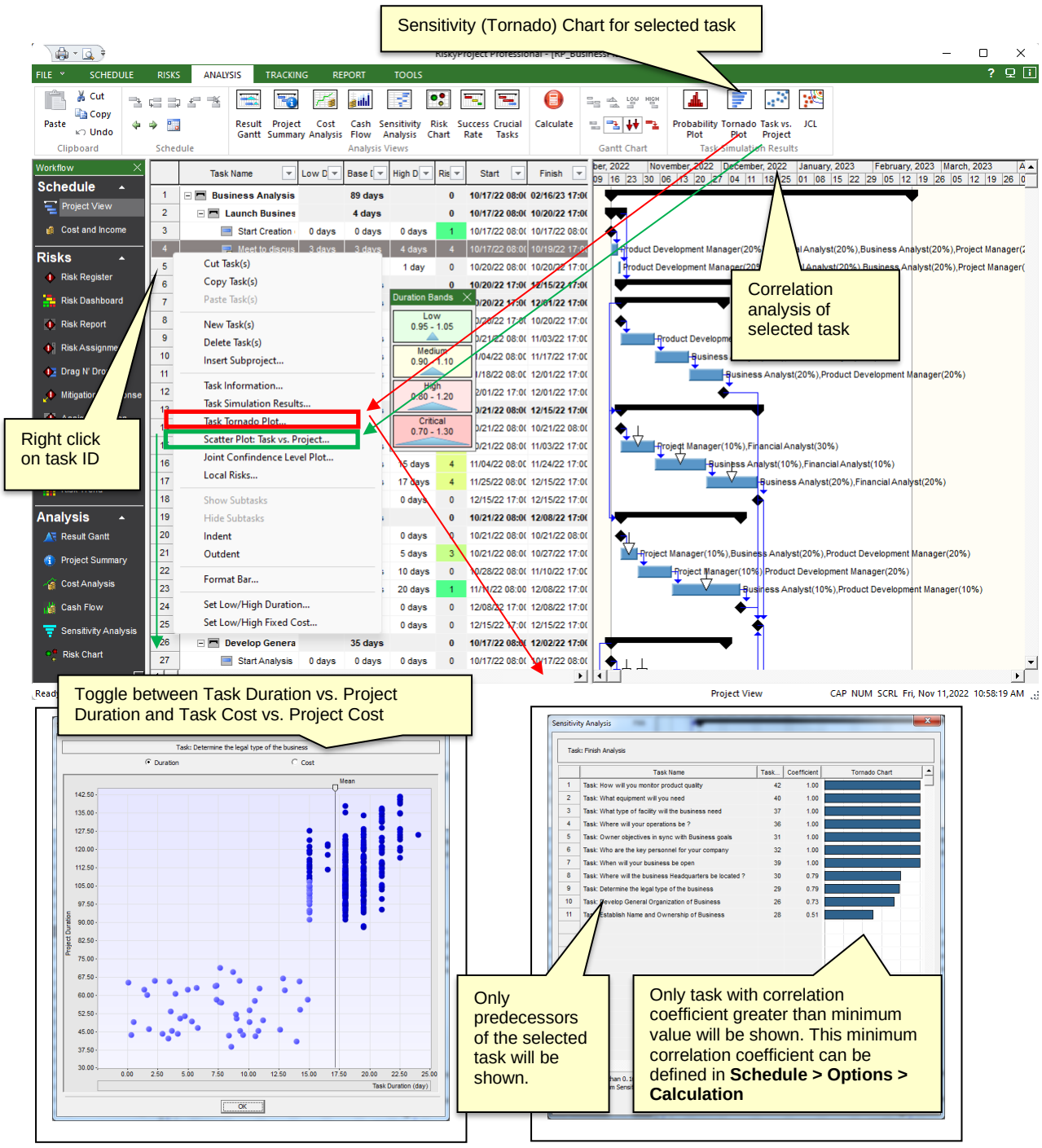
View sensitivity analysis for each task

Sensitivity analysis is available for each activity. Two types of charts are available:

1. **Tornado Plot**: the chart will show how finish time of task predecessors will affect finish time of the selected tasks.
2. **Scatter Plot**: the chart will show correlation between task duration or cost and project duration or cost.

To view the sensitivity analysis for a single activity:

1. Run a Monte Carlo simulation.
2. Click on the task from which to generate a sensitivity analysis.
3. Click the **Analysis** tab. On the **Task Simulation Results** group, click **Tornado Plot** or **Scatter Plot**. A tornado chart or scatter plot opens. You can also right-click on a task ID and then click **Task Sensitivity Analysis** or **Task Scatter Plot**.


Sensitivity (Tornado) Chart for selected task
Right click on task ID
Correlation analysis of selected task
Toggle between Task Duration vs. Project Duration and Task Cost vs. Project Cost
Only predecessors of the selected task will be shown.
Only task with correlation coefficient greater than minimum value will be shown. This minimum correlation coefficient can be defined in **Schedule > Options > Calculation**

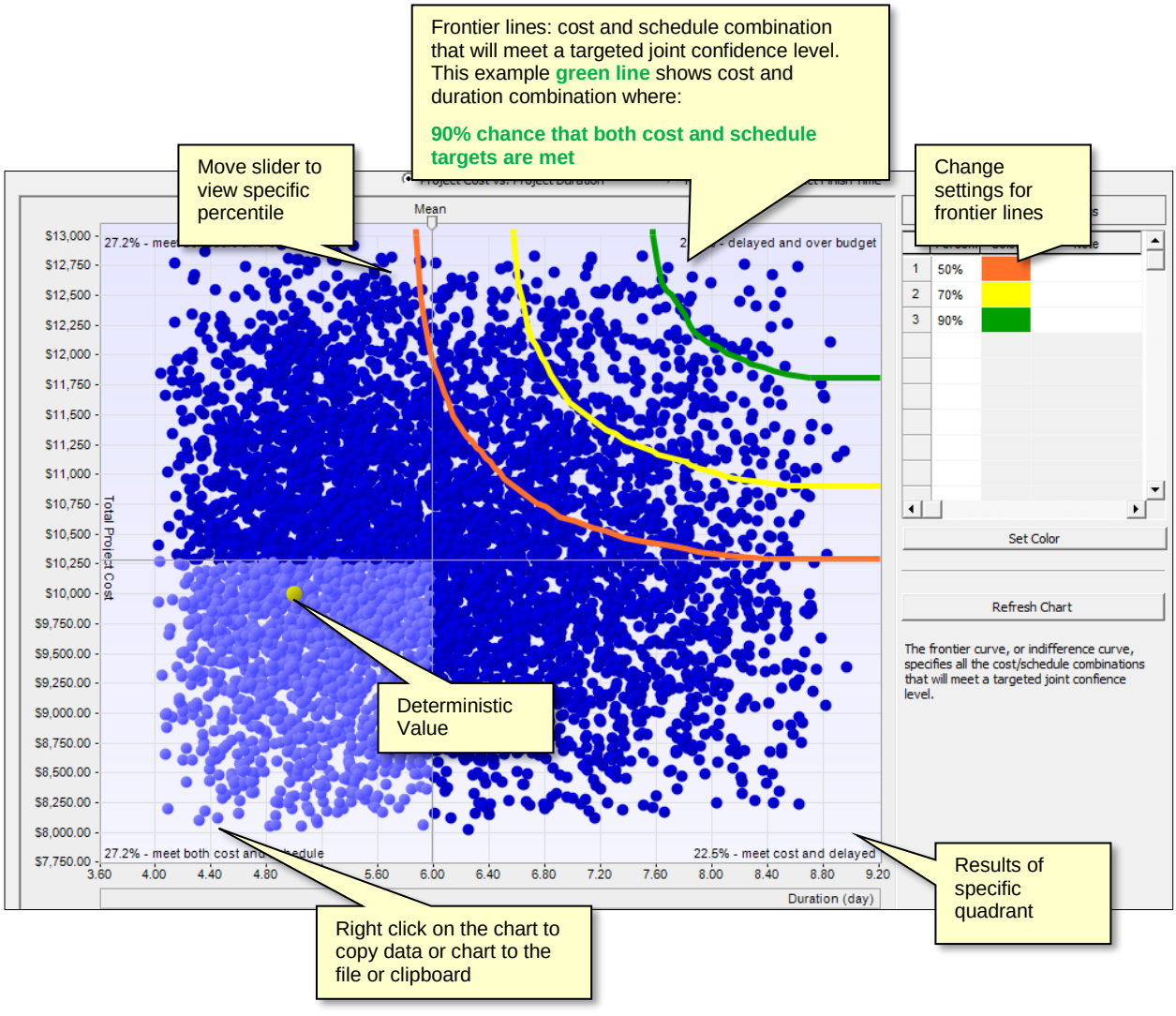
Joint Confidence Level Plot

Joint Confidence Level Plot is also known as a Bull's Eye, Football, or Cost vs. Duration chart. Joint Confidence Level Plot can be shown either of individual task or for complete project. It shows a comparison of the Total Project or Task Cost vs. Total Project or Task Duration or Finish Time for each iteration of the simulation.

The plot includes four quadrants:

1. **Left-Top**: % of simulations in which project or task meets schedule but is over budget
2. **Left-Bottom**: % of simulations in which project or task meets both budget and schedule
3. **Right-Top**: % of simulations in which project or task are over budget and schedule
4. **Right-Bottom**: % of simulations in which project or task meets budge but is over schedule

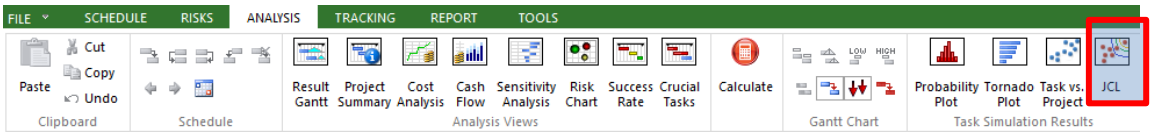
The plot also present frontier lines or lines where Cost and Duration (Finish Time) combination meets certain predefined targets. You can define many frontier lines with different targets.



To view the Joint Confidence Level Plot:

1. Make sure that your schedule has both uncertainties in duration and cost

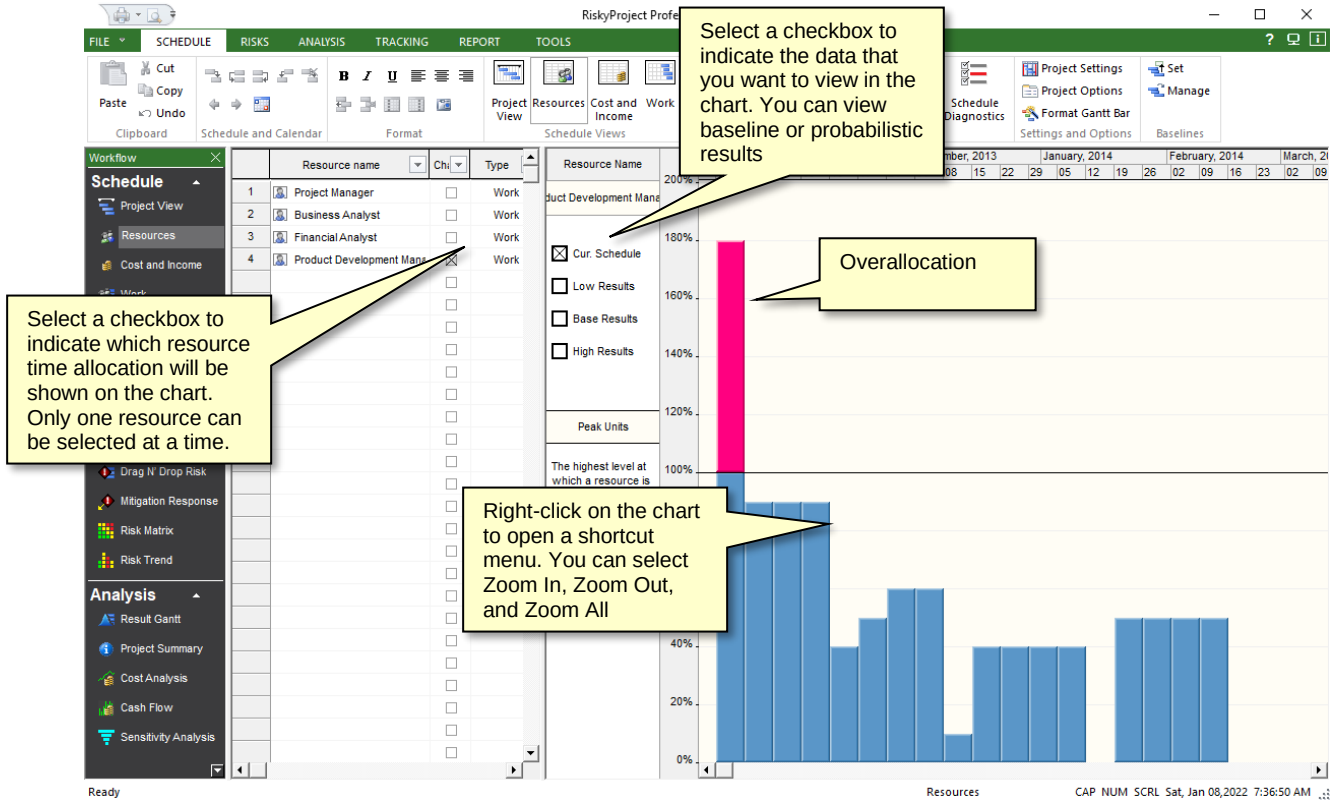
2. Run a Monte Carlo simulation.
3. To view the plot:
    - *For Project*: Click the **Analysis** tab. On the **Project Summary** view, click **Cost vs. Duration Scatter Plot**, or Click on **JCL** button in Task Simulation Results group of ribbon's **Analysis** tab.
    - *For Task*: Right click Task ID and select **Joint Confidence Level** from drop down menu, or Click on JCL button in Task Simulation Results group of ribbon's **Analysis** tab.



4. Select type of the plot you want to view:
    - Project/Task Cost vs. Project/Task Duration, or
    - Project/Task Cost vs. Project/Task Finish Time
5. Define frontier line settings: chance that both cost and schedule are met and color of each frontier line. You can also add a description of each line. To hide one or many frontier lines right click on frontier line ID and select Delete. After you updated frontier line settings click **Refresh Chart**.

Resource Allocation

The Resource chart shows the time allocation for a selected resource.



For the resource chart to open, two conditions must be met:

- You must select the **Chart** check box for a resource in the resource sheet.
- The selected resource must be assigned to a task.

You can select four different types of resource charts:

- **Peak units:** The highest level at which a resource is scheduled for all assigned tasks during a given period.
- **Work:** The total number of hours a resource is scheduled for all assigned tasks during a given period.
- **Overallocation:** A resource is over allocated when it has more work assigned than can be done in the resource's available time. Overallocation is number of hours a resource is scheduled for all assigned tasks over resource's available time. Overallocation can be shown only for work (not material and cost) resources.
- **Percent allocation:** The percentage of a resource's capacity taken up by all of its assigned tasks during a given period. Percent allocation is only available for work (not material and cost) resources.

Selecting the resource chart type

1. Select the **Chart** check box associated with the resource.
2. Right-click on the **Resource** chart and choose one of chart types from the shortcut menu.

Overallocation for work resources is calculated based on Maximum Units, defined for the resource in the Resource view. For example, if maximum units are 150%, overallocation can be work above 150%.

Viewing results for resource assignments

You may view the statistical distribution of work associated with each resource. Statistical distributions are only shown for resources that are designated work rather than material and cost.

1. Double-click a task **ID** to open **the Task Information** dialog box
2. Click the **Resources** tab.
3. Right-click on a resource assignment ID.
4. Choose **Simulation Results…** to view the work associated with selected resource assignment.

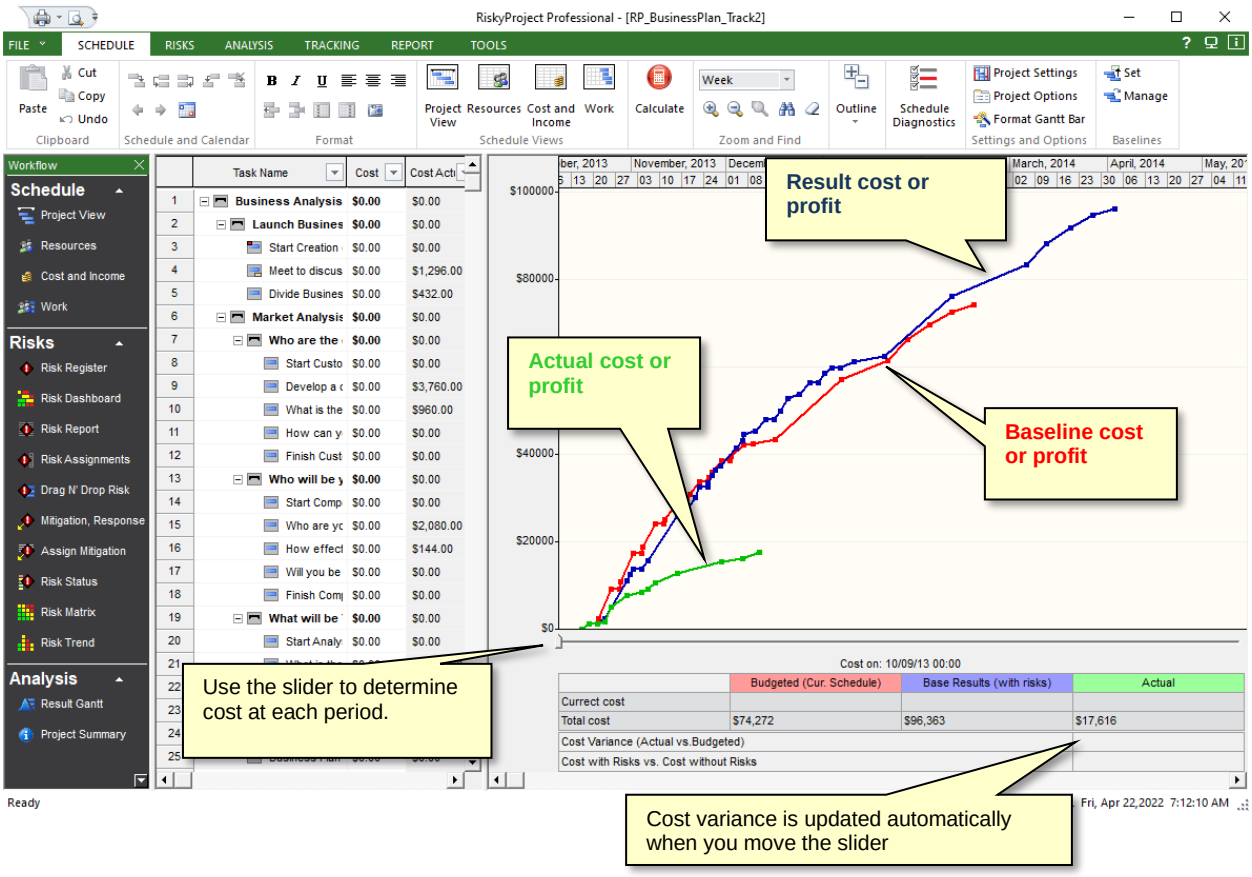
Analyzing Cost and Profit

Use the **Cost Analysis** view to analyze cost and profit on each stage of the project. The Cost Analysis view has up to five cost diagrams:

Cost diagram	Description	Color	When it is shown
Current schedule (budgeted) cost or profit	Cost diagram with current project schedule (no risks)	**Red**	Always when cost or profit for any task is defined
Result cost (Low)	Cost diagram with risk and uncertainties (calculation results, low estimate)	**Blue – dashed line**	Shown after calculation if uncertainties are defined and **Low Result Cost Chart** is selected from shortcut menu (right click on the chart)
Result cost (Base)	Cost diagram with risk and uncertainties (calculation results, base estimate)	**Blue**	Shown after calculation if uncertainties are defined and **Base Result Cost Chart** is selected from shortcut menu (right click on the chart)
Result cost (High)	Cost diagram with risk and uncertainties (calculation results, high estimate)	**Blue dashed line**	Shown after calculation if uncertainties are defined and **High Result Cost Chart** is selected from shortcut menu (right click on the chart)
Actual cost	Cost diagram represents actual cost	**Green**	Shown after calculation if uncertainties are defined and actual cost is available (either entered directly or percent done for at least one task is defined)

You may use the slider to determine:

- Cost Variance (actual vs. budgeted cost)
- Cost with Risks and uncertainties vs. Current schedule (budgeted) cost.

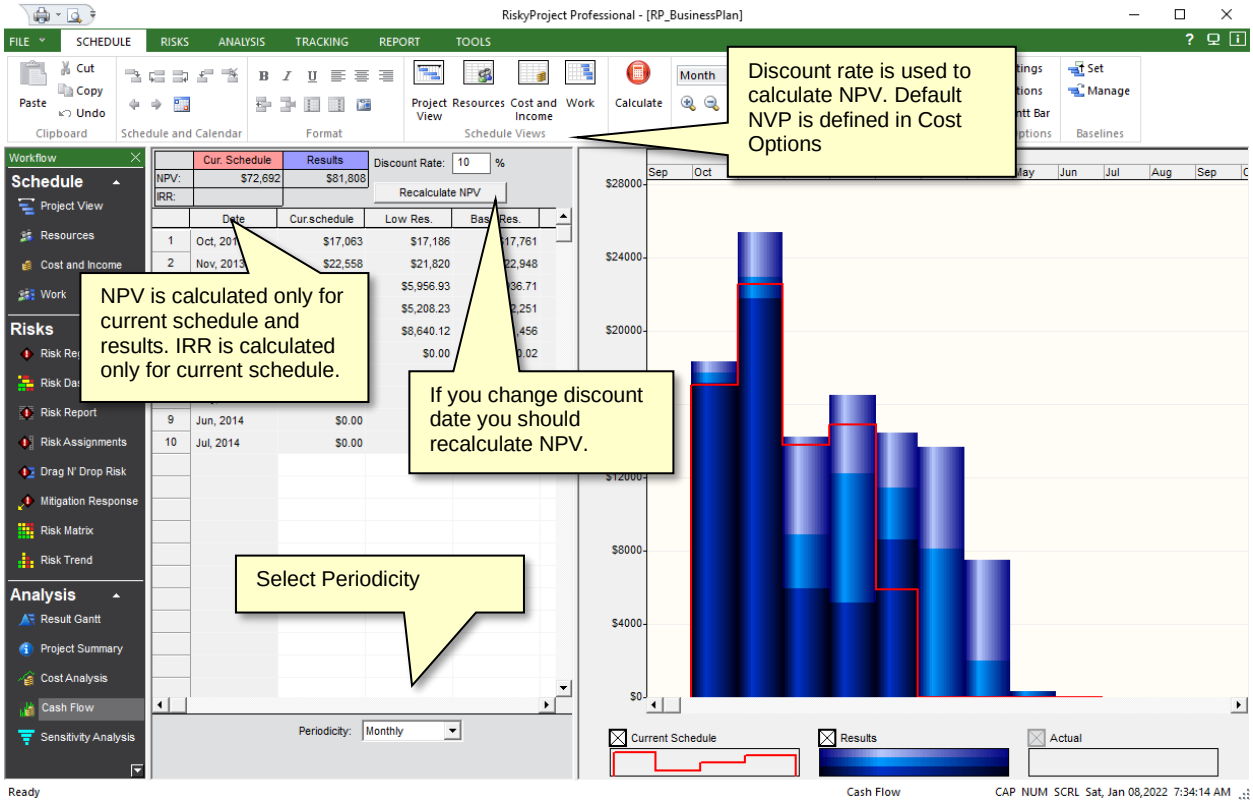


- If income is defined for at least one task, the cost analysis diagram will show the project profit calculated based on the formula: **Profit = Income – Cost.**
- If Cost exceeds Income in any given period, Profit will be negative.
- If income is not defined, Cost will be always positive.

Use the shortcut menu to manipulate with chart. In particular, instead of presenting a line chart of current schedule, result, and actual cost, you can create an area chart by choosing Fill Chart from the shortcut menu.

Cash Flow results

The Cash Flow view shows a comparison between Current Schedule, Calculated (with risks and uncertainties), and Actual project cost and income.



- If you enter income for at least one task, the cash flow diagram will show the project profit calculated based on the formula: Profit = Income – Cost.
- If Cost exceeds Income in any given period, Profit will be negative.
- If you do not enter any income, Cost will be always positive.
- If n is the number of months, the formula for NPV is:

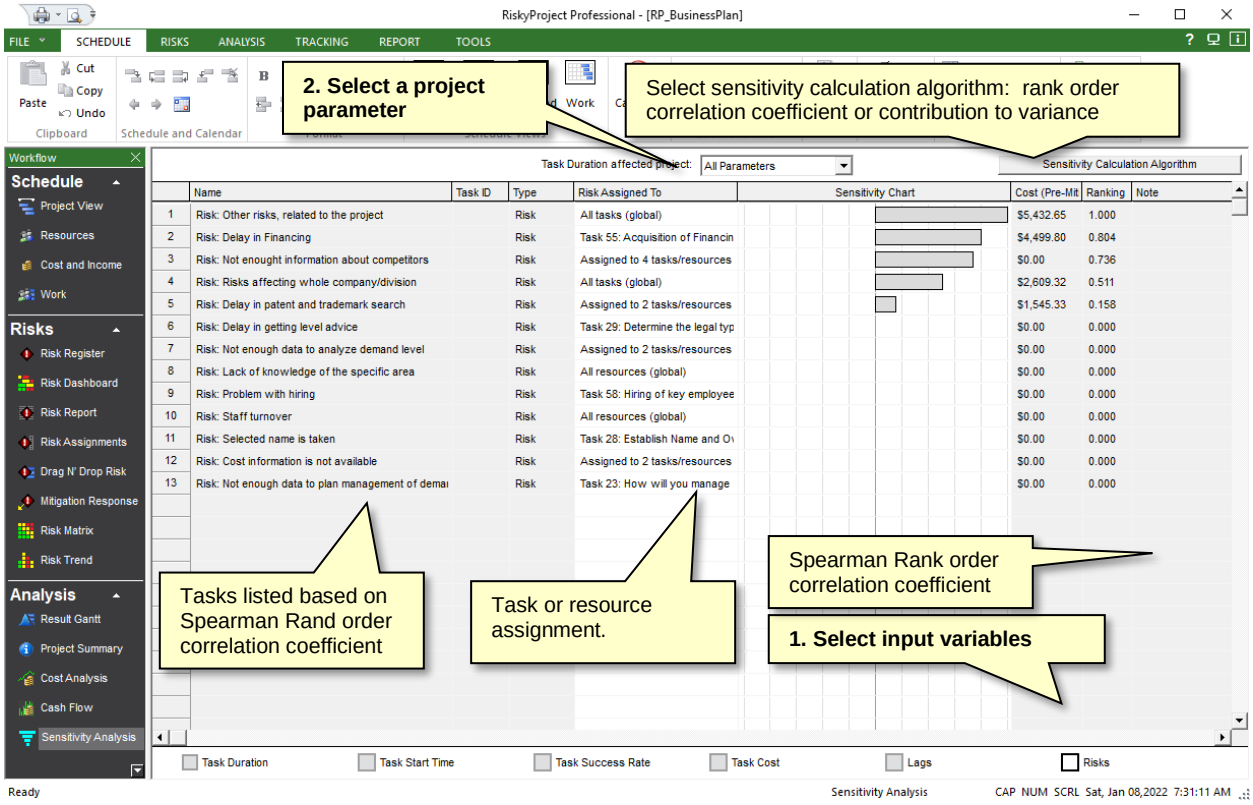
$$NPV = \sum_{j=1}^{n} \frac{values_j}{(1+rate)^j}$$

Sensitivity Analysis

Sensitivity analysis shows which variables have the potential to have the greatest effect on the main project parameters. RiskyProject performs calculations for the sensitivity analysis as part of all probabilistic calculations. The results of sensitivity analysis are shown as a sensitivity chart in the **Sensitivity View**.

Sensitvity Analysis view is accessed using the Worflow bar. The sensitvity Analysis icon will be disabled in the workflow bar for qualitative analysis (without schedule).

The Sensitivity view shows how sensitive or how much potential each project input parameter has on the main project parameters. Sensitivity measures how much a change in an input variable will affect the selected project parameter. For example, if a risk occurs, how much this will affect the project duration. This is measured as the Spearman Rank correlation coefficient. The higher the coefficient, the higher potential this input parameter has to affect the selected output parameter.



RiskyProject uses six input parameters to calculate sensitivity:

- Task duration
- Task Start Time
- Task Success Rate
- Task Cost
- Lags
- Risks

You can select these inputs using thee check boxes at the bottom of the chart.

RiskyProject has the following output parameters:

- project duration
- cost
- finish time
- success rate
- non-schedule risk categories

You can also select "All Parameters". You can only measure the effects of risks on "All Parameters" and all non-schedule risk categories. If you select "All Parameters", the sensitivity chart shows the ranking across all risk categories, using the risk weighting entered for each risk category.

Examples:

- Input parameter **Task Duration** and output parameter project **Duration** are selected. If task A is shown at the top of the sensitivity chart, this indicates that the project duration is very sensitive to the uncertainties in the task A's duration.
- Input parameter **Risks** and output parameter **All Parameters** are selected. If risk A is shown at the top of the sensitivity chart, this indicates that the all-risk categories (project scope, duration, cost, all-non-schedule categories) are very sensitive to the uncertainties caused by risk A.
- Input parameter Task Duration and output parameter project Cost are selected. If task A is shown at the top of the chart, this indicates that the project cost very sensitive to the uncertainties in the task A's duration. It occurs if task A has significant variable cost.

- RiskyProject identifies risks based on their unique name. For example, if the risk Budgetary Problems is assigned to different tasks, it will be considered as one risk for the purpose of sensitivity analysis. RiskyProject will calculate the overall effect of this risk on the main project parameters. If you select only risks that are input variables, you will see critical risks or risks that have the greatest effect on the project schedule. In the example above, an assessment of Critical Risks begins with difficulties obtaining comprehensive information.
- If an input parameter (task or risk) is not seen in the list, it means that it does not have a significant effect on project parameters.
- The correlation coefficient for a risk is not the risk impact, it is the measure of relative importance of the risk. Correlation coefficients are used to calculate risk impact. To read more about this, see "How are risk probabilities, impacts, and scores calculated?" in the Frequently Asked Questions section.
- In Schedule tab -> Options you can define the minimum sensitivity coefficient for the Sensitivity view. If a sensitivity coefficient is less than the defined value, it will be shown as zero in the Sensitivity view. For example, minimum sensitivity coefficient is 0.16. A sensitivity coefficient for a particular task's duration and project duration equals 0.1. Sensitivity coefficient for this task will be set to zero and this task will not be ranked in the sensitivity view.
- If the number of tasks is greater than 4000, the sensitivity chart includes only summary tasks and does not include sensitivity to lags between tasks.

Viewing the Tornado Chart

1. Select a project parameter from the drop-down list at the top of the chart. The name of the list changes according to the parameter selected. If you select **All Parameters,** you will only be able to see risk sensitivities.
2. Select an input parameter check box located at the bottom of the chart. You can select more than one output parameter. The resulting correlation coefficient is the calculated as the sensitivity of all the selected inputs on the output parameter.

Calculation Algorithm for Sensitivity Analysis

There are two algorithms for sensitivity calculation: rank order correlation coefficient and contribution to variance:

- Spearman's rank correlation coefficient is a non-parametric measure of statistical dependence between two variables. Perfect positive correlation coefficient equals +1.
- Contribution to Variance is calculated by squaring the rank correlation coefficients and normalizing them to 100%.

To select the sensitivity calculation method:

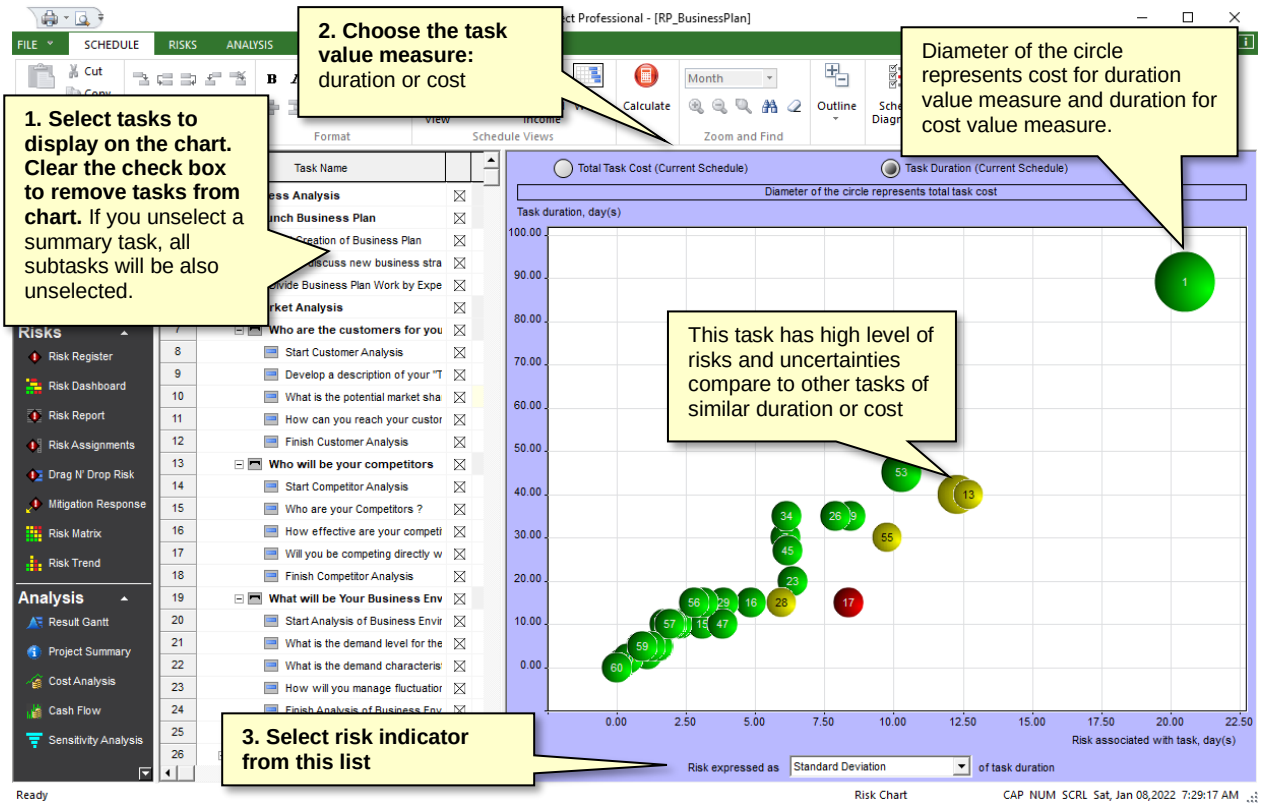
1. Click the **Analysis** tab on the **Workflow** bar and then click **Sensitivity Analysis**.
2. Click **Sensitivity Calculation Algorithm.** The Sensitivity Calculation dialog box opens.
3. Select the calculation method.

Risk Chart

The Risk chart shows risks associated with tasks versus task duration or cost. The risk is expressed as:

- task standard deviation of task duration or cost
- maximum or minimum values
- ranges: the difference between maximum and minimum values
- percentiles

In well-balanced project schedules, different tasks usually have similar level of risks. However, if risk associated with a task is higher than for tasks with similar duration or cost, these risks should be carefully analyzed and possibly mitigated. Alternatively, if the task does not have significant risks and uncertainties compared with other similar tasks, it may represent an opportunity to increase the risks and increase benefits.

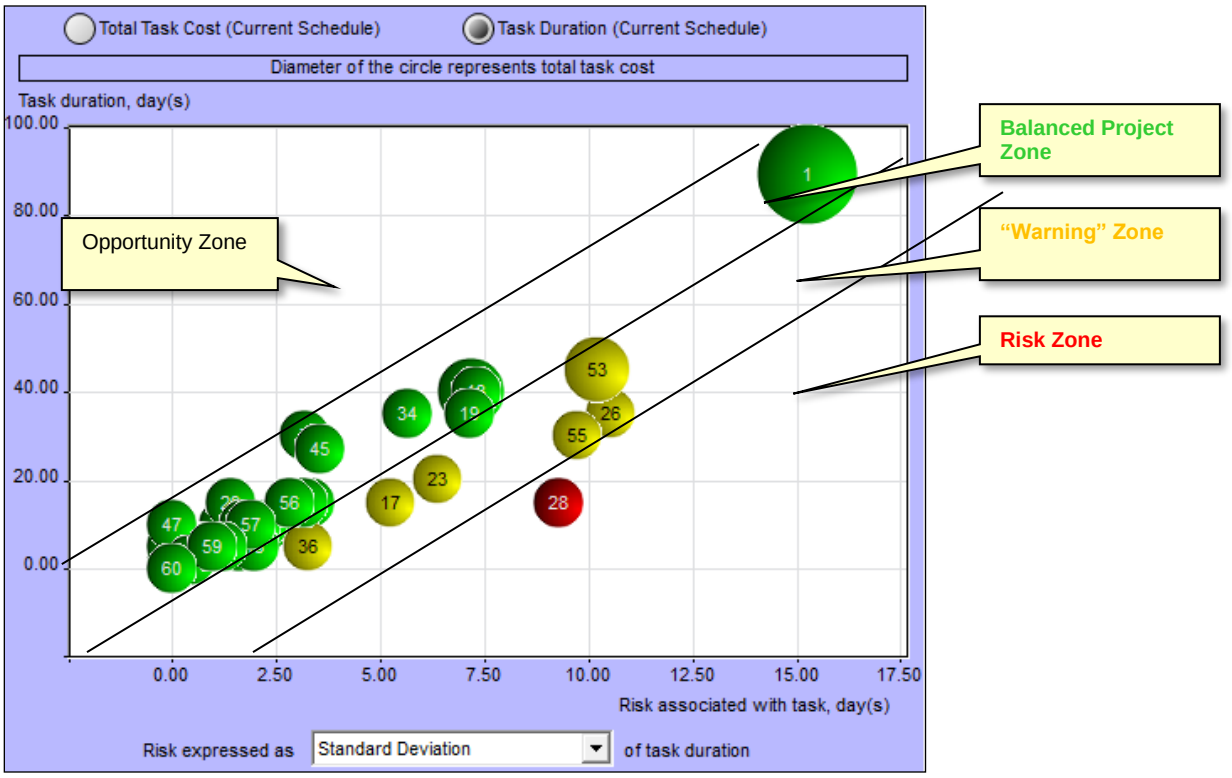


Analyzing the Risk Chart

1. Select the tasks that you want to display on the chart from the list on the left.
2. Select the project parameter option (**Total Task Cost** or **Task Duration**) option at the top of the chart.
3. Select a risk indicator from the Risk expressed as drop-down list. These are standard statistical measures such as standard deviation or percentiles.

The example below illustrates how the Risk Chart can be analyzed using “risk zones”. If you visualize these zones on your risk chart, you can clearly see which tasks are outliers and merit further examination.

Note: These zones are shown here purely for demonstration purposes and do not appear in the actual Risk Chart.



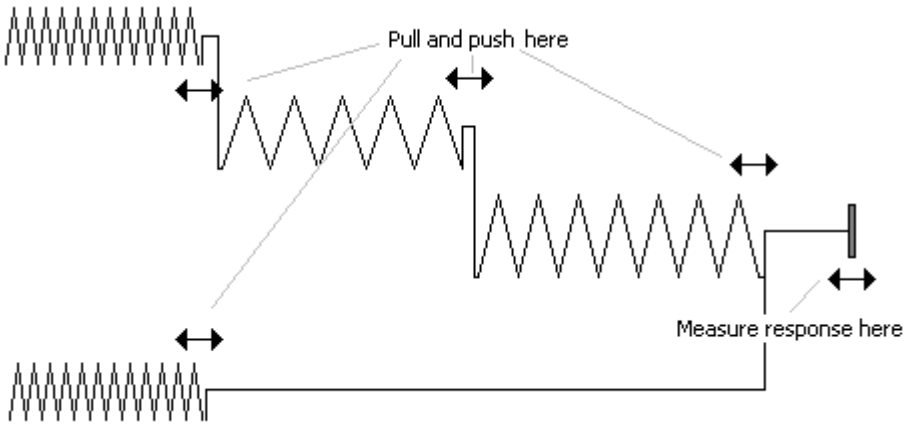
Crucial Tasks Chart

In addition to sensitivity charts, the results of sensitivity analysis can be shown on the **Crucial tasks** Gantt chart.

Each task can belong to one of three categories:

1	**Red bar**	Tasks that have the most effect on the project duration– **crucial tasks**. There is a strong correlation between the task and project duration.
2	**Yellow bar**	Tasks which have some effect on project duration, i.e., there is a correlation between task and project duration
3	**Green bar**	Small or no correlation between the task and project duration

To explain crucial tasks, we use the "spring analogy". Let us assume that each task is a spring in a big system of springs. When we start moving springs back and forth, we find that some of them significantly affect the movement of the full spring system, while others do not. The amount of movement depends on how springs are connected to each other (links between tasks) and how flexible they are (the type of risks and uncertainties they have assigned).



Crucial tasks may not lie on the critical path; however, in many cases, crucial tasks will lie close to the critical path because they are defined by the project schedule structure and risk and uncertainties associated with each task. Critical path calculations take into account only the project schedule structure.

Viewing the Crucial Task chart

By default, the Crucial Tasks View is not shown on the Analysis Workflow bar. The Crucial Tasks view provides another analysis view to investigate the root causes of project uncertainty.

1. If the **Crucial Tasks View** does not appear on the **Workflow** bar, click the **All Views** button.
2. Click on the **Crucial Tasks** icon to open the view. Crucial tasks are color-coded, red indicating tasks that are most crucial.
3. Double- click on a crucial task in the Gantt chart to view distribution charts and statistics for the selected task.
4. Double- click on a risk (arrow) to view the **Risk Properties** of a risk assigned to a crucial task.

Success Rate Chart

The success rate or chance the task will be successfully completed is shown on the **Success Rate Gantt** chart.

RiskyProject represents the success rate of each task using different colors, which represent a range of success rates.

A task can be canceled in one of three cases:

- if the outcome **Cancel task** or **Cancel task + all successors** occurs, this cancels the tasks plus all successors that have occurred;
- if a task reaches a deadline, and action associated with deadline is set to **cancel task**; and,
- if a project has reached a deadline and the task, finish time is beyond the deadline.

Viewing task success rates

The Success Rate view provides another analysis view to investigate the root causes of project uncertainties:

1. If the **Success Rate** view does not appear on the **Workflow** bar, click the **All Views** button.
2. Click on the **Success Rate** icon to open the view. The calculated success rates of tasks are color-coded.
   - Double- click on a task with a low success rate in the Gantt chart to view distribution charts and statistics for the selected task.
   - Double- click on a risk (arrow) to view the **Risk Properties** of a risk assigned to a crucial task.

Chapter 6: Project Control

Tracking Performance

Tracking is an important step in the project risk management workflow. You add tracking information in the **Tracking** tab of the **Task Information** dialog box. Tracking information is shown on the **Tracking Gantt** and **Result Gantt** views.

Tracking information is not included in the current schedule (deterministic) calculation. The progress of summary tasks is a function of its subtasks; therefore, you cannot add tracking data to summary tasks. RiskyProject will calculate tracking data for summary task and complete project automatically.

Calculating and reassessing tasks using tracking data

RiskyProject uses tracking information for probabilistic calculations. The purpose of the calculation is to reassess the task duration, start, and finish dates based on the actual progress. As the deterministic current project schedule remains unchanged, you can compare your original estimates with the forecasted schedule.

If a task has tracking information, new forecasted task duration and finish times are calculated. The results of this calculation are instantly plotted on the tracking chart as a green rectangle. The task's start time is actual start time entered in the tracking data.

The actual start time, forecasted task duration, and finish time are used for probabilistic calculations. If the percentage complete is greater than 0%, uncertainties in remaining duration are calculated using one of two methods:

1. If you enter percent completed, but did not enter remaining duration, original low and high duration will be used to calculate remaining duration. RiskyProject project will calculate deterministic projected duration based on percent completed and status date. Then on each iteration, RiskyProject will calculate duration based on original statistical distribution. Duration for task in progress on each iteration will be extrapolated based on projected deterministic duration.

   Example

   Originally, a task had duration **of 10 days (low duration 8 days, high duration 12 days: +- 20%). After two days, only 10%** task is completed. Deterministic projected duration will be 20 days. As a result of the analysis, the updated duration will now be between 16 and 24 days (+- 20% of projected duration).

2. If you enter the statistical distribution for the remaining duration and percent completed, remaining duration will be taken from the statistical distribution and added to the duration of the completed portion of the task. Original statistical distribution for duration will be ignored.

   Example

   Originally, a task had duration of 10 days (low duration 8 days, high duration 12 days: +- 20%). After two days, only 10% task is completed. Duration of the completed portion of the task is 2 days. Remaining duration is defined using triangular statistical distribution (min 1 days, most likely 2 days, and max 3 days). As a result of the analysis, the updated duration will now be between 3 and 5 days.

If the task has risks assigned to it (global or local), the chance of the risk is recalculated based on the current time, when the risk occurred, and the task completion percentage.

- If the percentage completed equals zero, all risks are used with their original chances of occurrence.
- If the percent completed equals 100, the chance of occurrence for all risks is internally set to zero. Although the original chance of risk occurrence is not changed, it is important to note that the actual outcome of risks changes.

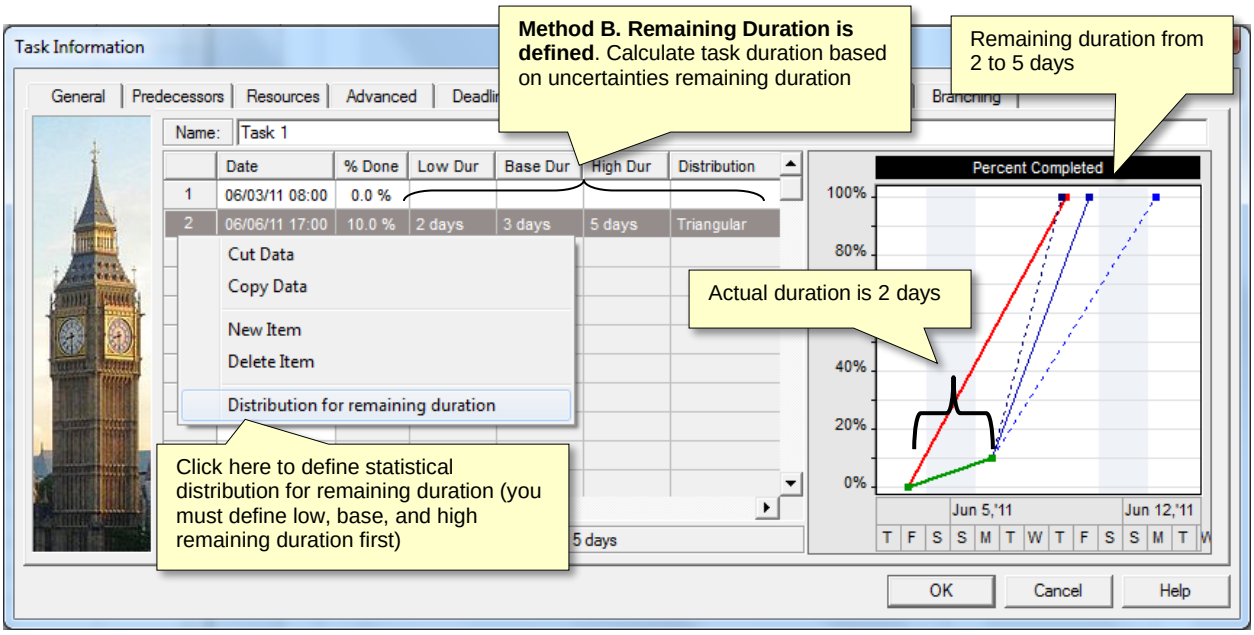
Tracking Results

The probabilistic calculations always encapsulate the tracking information if it has been entered for a task. RiskyProject presents results of the tracking calculations in several different ways depending upon the view you are using to examine it.

View	How Tracking information is presented
Project View	No tracking information on the baseline schedule
Results Gantt	Tracking data is represented as green, yellow, and red bars. These bars represent percent completed. It can be turned on and off when you right-click on Gantt chart and select “Show Tracking Bars”.
Success Rate	Gantt chart is drawn based on current (deterministic) schedule
Crucial Task s	Gantt chart is drawn based on current (deterministic) schedule
Tracking Gantt	The Tracking Gantt behaves in the same manner as the Results Gantt, in addition, the percentage completed will be shown on the right of the bar

Entering tracking data

1. Select the task to which you want to enter the tracking data.
2. Open the **Task Information** dialog box.
3. Click the **Tracking** tab. By default, the first row should contain the actual start time with zero percent done.
4. Click the row below the previous entry.
5. Enter the status date or select it from the calendar.
6. Enter the percentage of the task completed by the specified date. All dates and percentages must be consistent. For example, you cannot have a record with 60% completed before a record with 40% completed. In addition, you cannot have historical data with the date Jan 5, 2004, before the record with Dec 14, 2003.
7. Optionally enter remaining duration parameters: low, base, and high duration, and statistical distribution for remaining duration. If you do not enter this information remaining, duration on each iteration will be calculated using extrapolation of original duration.
8. Define parameters of statistical distribution for remaining duration (see “Defining statistical distribution for remaining duration” for more information).
9. You can define Actual Work for each resource assigned to a task. It can be used to calculate tracking information. To enter Actual Work use **Resources** tab of Task **Information** dialog box.
10. Type in a comment to record actual details of work completed. You can now view the Tracking chart.



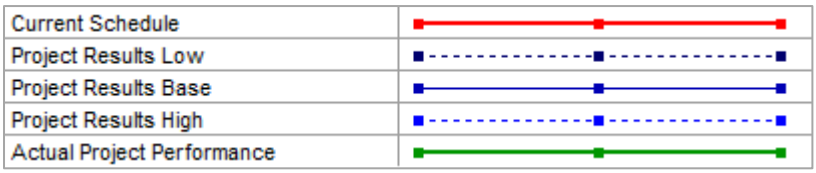
- To view any tracking information, including the percentage completed for summary tasks and the project, you must calculate the project.
- Remaining duration information is used only for probabilistic analysis.

Defining statistical distribution for remaining duration

1. Select the task to which you want to enter the tracking data.
2. Open the **Task Information** dialog box.
3. Click the **Tracking** tab. By default, the first row should contain the actual start time with zero percent done.
4. Enter low, base and high remaining duration for certain status date
5. Right-click on ID and select **Distribution for remaining duration**
6. Select the distribution from the **Distribution** list. If you select **Undefined,** remaining duration will not be used for probabilistic analysis (analysis will be done using percent completed only)
7. Define the distribution parameters. The Probability Density chart is automatically updated. You can adjust distribution parameters using the sliders.
8. If you use a custom or discrete distribution, a grid opens. The grid will allow you to define points (or intervals for discrete distributions) and associated with each point (interval)
9. If you select **Normal** or **Lognormal**, you must select the **Low** and **High** probability range (P1 and P99, P5 and P95 or P10 and P90). These are “cut-off” parameters; meaning that duration, cost, or start time cannot go beyond these values.

Viewing Tracking Data

Once you have entered in the tracking information, the tracking chart is automatically updated to show the Current Schedule, Low, Base, High, Actual and Forecast tracking data.



- **Current Schedule** is always visible and represents the start and finish times of the task as entered in the task sheet.
- **Results Low**, **Base**, and **High** are calculated as part of the probabilistic calculations. **Low** is associated with minimum, P1, P5, or P10 results depending on setting defined in **Options** (**Calculation** tab). **Base** is associated with the mean. **High** is associated with the maximum, P90, P95, or P99. If the low, base, and high results are the same, only one base line is drawn.
- **Actual** represents the actual progress of the task.
- **Forecast** is generated if you do not have the results of probabilistic calculations and you have entered a percentage for task completion but did not recalculate the project.

- To enlarge the chart, right-click and choose Details.
- To copy the chart to the clipboard or as a JPEG, TIFF, GIF, PNG, or BMP file, right-click and choose a copy command from the shortcut menu.

Viewing tracking data for a task

1. Select the task to which you want to enter tracking data.
2. Open the **Task Information** dialog box.
3. Click the **Tracking** tab. By default, the first row should contain the actual start time with zero percent done.
4. Right-click on the chart and select **Details**:
5. To copy the chart for use in presentations or reports, right-click and select one of the **Copy** commands.

Viewing the Tracking Chart

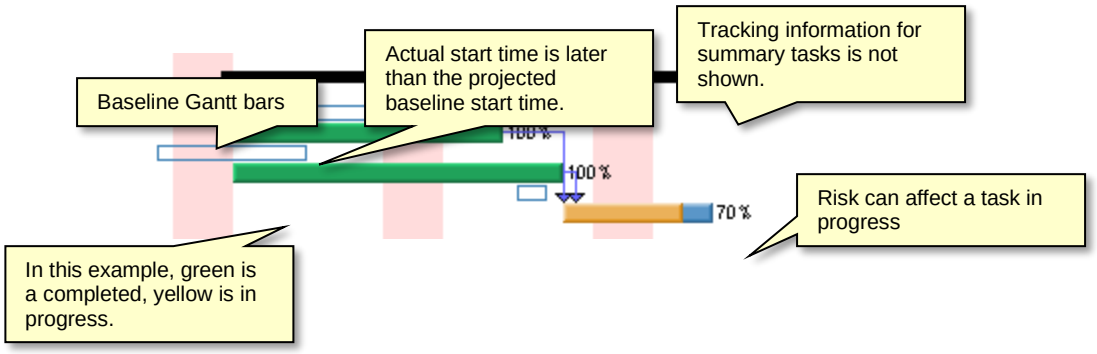
The Tracking chart view is the only way to see tracking results for the complete project

1. Click the **Tracking** tab. In the **Tracking Views** group, click **Tracking Chart**.
2. Select a checkbox beside the task name to see results for the specific task. If no check boxes are selected, the results for the entire project are shown.

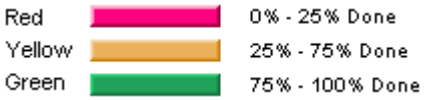
Tracking Gantt Chart

You can use the Tracking Gantt to view the impact that your tracking information has upon the project schedule. It behaves much like the Result Gantt except it shows the percent completed for each task.

Below is an example of tracking information as shown in the **Tracking** viewing:



RiskyProject uses the following system of colors to represent percent completed in Tracking and in Result Gantt.



The tracking bars can be turned on and off in the Gantt chart.

Showing the Baseline and Tracking bars

- Right-click on the chart and choose Show **Current Schedule** and/or **tracking Bars** from the shortcut menu.

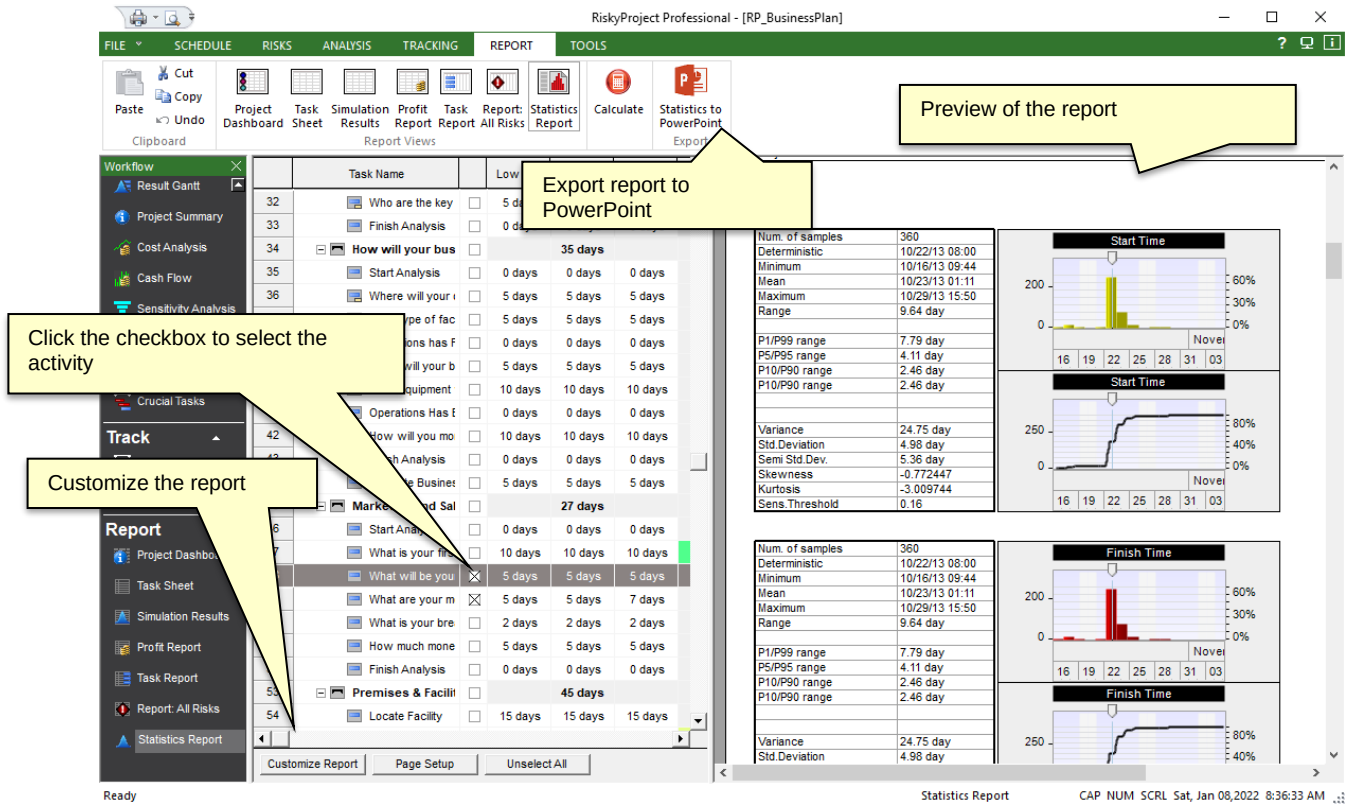
Chapter 7: Reporting Project Results

Statistics Report for Quantitative Analysis

Once you have completed the Monte Carlo simulation, you can quickly generate a statistics report for selected tasks in your project schedule. The statistics report can include histograms for Start Time, Finish Time, Duration, and Cost as well as a Sensitivity to Finish Timetable with a Tornado chart. Statistics reports can be exported to PowerPoint.

To create a statistics report:

1. Run a simulation on your project.
2. Click the **Reports** tab. In the **Report Views** group, click **Statistics Repor**t.
3. Select the activities that you want to report on by clicking the check boxes beside the activity names.



To export a statistics report to PowerPoint

1. Click the **Report** tab. Click **Statistics to PowerPoint**. Alternatively, you may click on Click **File** and then click **Export -> Microsoft PowerPoint**.
2. If Microsoft PowerPoint is installed on your computer, PowerPoint will be launched, and the report will be generated using settings defined in Customize Report dialog. Only frequency and cumulative probability charts and tornado (sensitivity) plots are exported to PowerPoint.

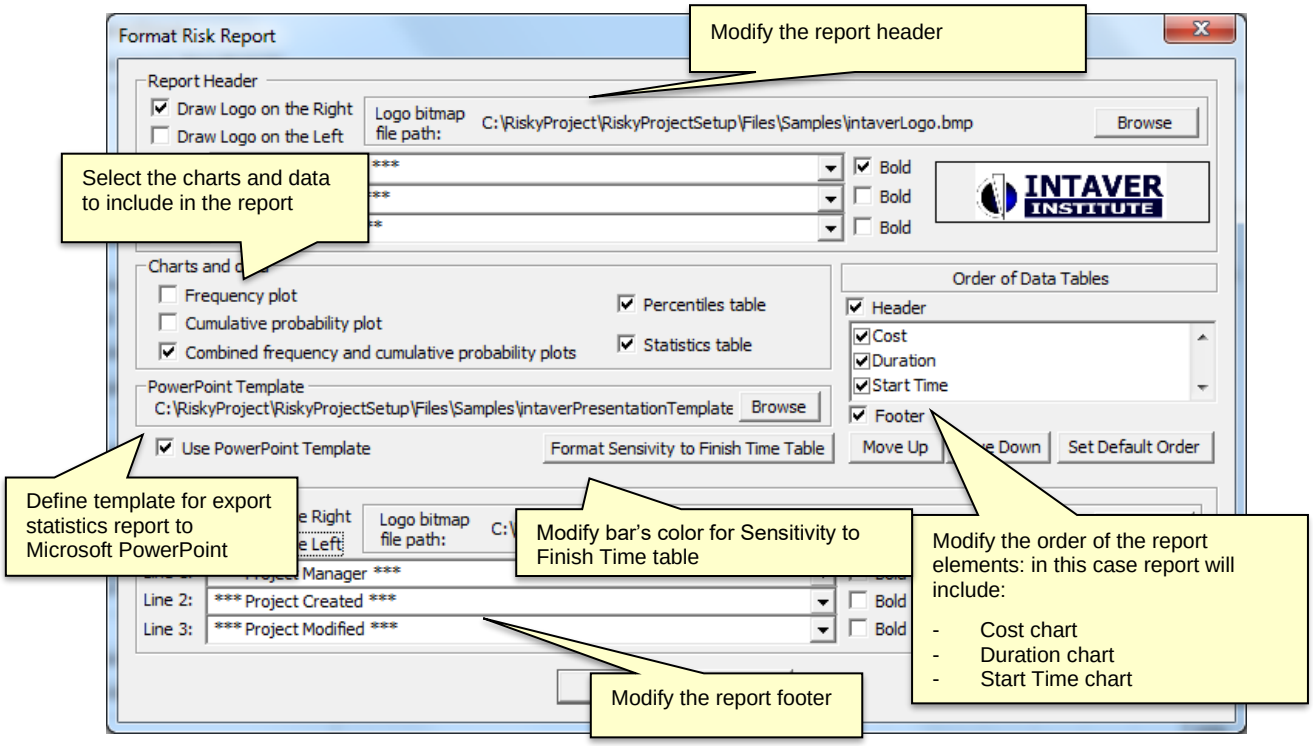
You may use your custom PowerPoint template. The template file can be defined in Customize Report dialog

Customizing the Statistics Report

You can modify the statistics report by adding or removing histograms, statistics, or the sensitivity chart as well as the general project information that is included.

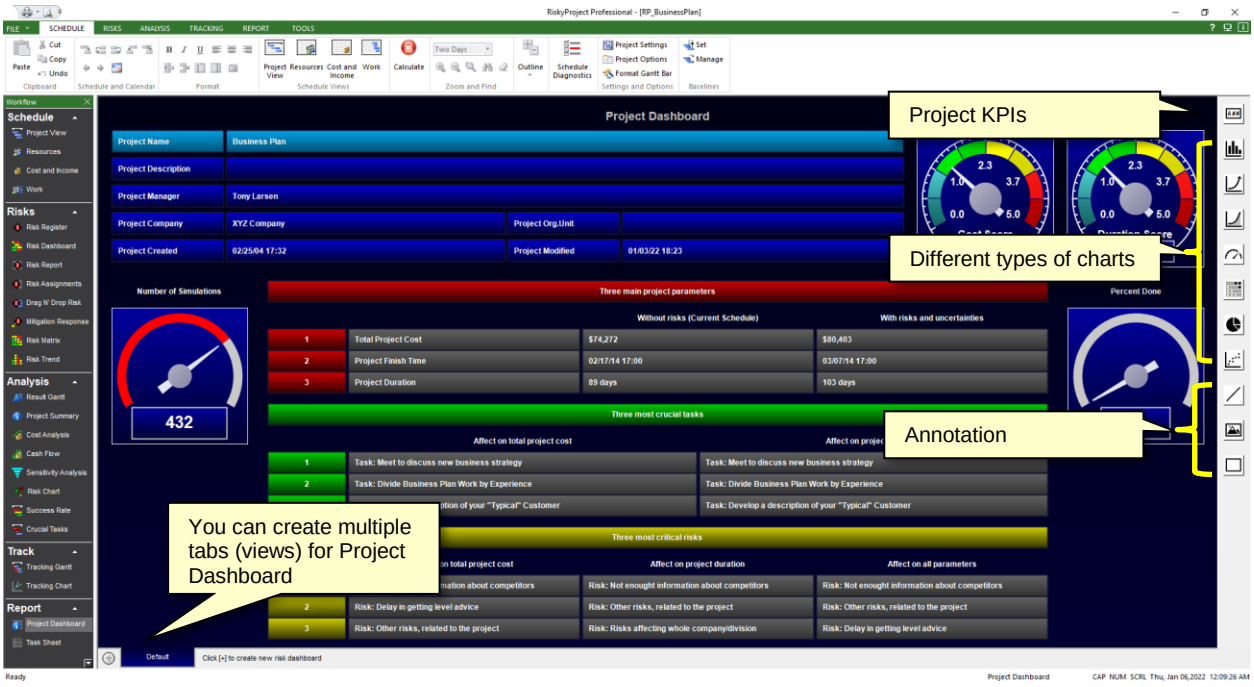
To customize the statistics report:

1. Click the **Reports** tab. In the **Report Views** group, click **Statistics** Report.
2. Click the **Customize Report** button. The Format Risk Report dialog box opens.
3. In the **Charts and Data** group, add or remove the charts and tables that you want to include in the report.
4. Modify the order in which the report elements are shown in the **Order of Data** tables
5. Define bar's color for **Sensitivity to Finish Time** table
6. Define **PowerPoint template** for export statistics report to Microsoft PowerPoint
7. Add or modify **Header** and **Footer** information.



The Project Dashboard

RiskyProject includes the **Project Dashboard.** This view shows the results of project risk analysis. Project Dashboard is similar to **Risk Dashboard** (see *Risk Dashboard*) and allows to define the same KPIs and charts. It is also fully customizable, though comes with a different default configuration.



By default, Project Dashboard includes:

1. Three main project parameters for the current schedule and with risks and uncertainties (mean values)
    - Total Project Cost
    - Project Finish Time
    - Project Duration
2. Three most crucial tasks
    - Effect on project cost
    - Effect on project duration
3. Three most critical risks
    - Effect on project cost
    - Effect on project duration

In addition, default project dashboard includes main project information, project score, number of simulations and percent of project completed meters.

Task Sheet, Results, and Profit Reports

Use the **Task Sheet view** to enter and view baseline, low, base, and high task durations without a Gantt chart. The **Results** view is similar to Task Sheet View but shows the results of the probabilistic analysis. You can use these views for the reporting and analysis of your results. **Profit Report** view shows input data and results associated with cost, income, and profit. Report: All tasks

Task Reports

Use the Task Report View to display information for all tasks. This information includes:

- General task information (task duration, start and finish time, and costs): see the General tab of the Task information dialog or Cost and Income view
- predecessors: see Predecessor the tab of Task Information dialog box
- Successors: successors are explicitly shown in Branching tab; successors are defined through defining of predecessors in Predecessor tab of Task Information dialog box
- Advanced task information: task calendars, task type (Fixed Units, Fixed Duration, Fixed Work), Milestones, and other information (see Advanced tab of task information dialog)
- Task notes: see the General tab of the Task information dialog
- Local risks assigned to tasks: see Assigning local risks to tasks
- Resources assigned to tasks: see the Resources tab in the Task Information dialog box
- Tracking information: see the Tracking tab in the Task information dialog box
- Statistical distributions: see the Distributions tab in the Task Information dialog box
- Branching information: see the Branching tab of the Task information dialog
- Branching notes: see the Branching tab of the Task information dialog - notes for each branch
- Moment of risk information: see Assigning local risks to tasks.

- You may enable/disable certain information using the Customize report button in upper left button of the Task Report View.
- You may export the report to comma separate file. This file can be opened in Microsoft Excel or other applications. To export report to comma separate file click on the Export Report button in the left upper corner of Task Report View.

Report: All Risks

Use the All Risks Report View shows information for all risks. This information includes:

- General risk information (risk or issue, opened or closed risk, etc.): see Risk Register
- Risk Properties
- Risk assignments: global and local risk assignment to tasks or resources
- Moment of risk information: the moment when a risk occurs during a course of the task

- You may enable/disable certain information using Customize report button in upper left button of the Risk Report View.
- You may export the report to comma separate file. This file can be opened in Microsoft Excel or other applications. To export report to comma separate file click on Export Report button in the left upper corner of Risk Report View.

Setting up reports

You can set up how you want to print from all views with the exception of the **Resources**.

1. Click **File** and then click **Page Setup**. The **Page Setup** dialog box opens.
2. Enter the page margins in the **Margins** group box.
3. If you want to include a footer, select the **Draw Footer** check box.
4. Select the checkboxes associated with the information you want to include in the header.
5. If you want to include a header, select the **Draw Header** checkbox.
6. Select the checkboxes associated with the information you want to include in the footer.
7. If you only want to include headers or footers on the first page, select the **Draw on first page only** check boxes.
8. Click either the **Landscape** or the **Portrait** page orientation option. If you want a page border, select the **Draw page border** checkbox.
9. Adjust the height of each item (row) in the **Height of one item** box.

Modify the number of columns to print from a view

1. Select the view from the **columns for view** drop-down list.
2. Select the number of columns to print from the **Print** box. RiskyProject will print the number of columns in the same order they appear left to right in the selected view.
3. Click **OK**.

Printing reports

- Click **File** and then **Print**.

Previewing reports

- Click **File** and then **Print Preview.**

Copying data to the Clipboard

You can copy project data to the clipboard, for use in other applications; see "**Copy column**" and "**Copy cut and paste selected rows**" in RiskyProject Data sheets. You can also copy data, associated with charts to the clipboard: These charts are:

- Simulation Results chart
- Probability Density chart
- Tracking chart
- Tracking chart within **Tracking Tab** of the **Task information** dialog box

Images and Pictures

You can copy or save images associated with all charts and all views with the exception of the Resource and Simulation Results charts. Images can be copied to the clipboard or saved as a JPEG, BMP, TIFF, PNG or GIF file.

Copying an image from a chart

- Right-click on the image and choose a copy command. You can also copy the content of a view (e.g., Project view) to the file or clipboard

Copying the content of a view

- Click the **Schedule** tab. In the **Format** group, click **Copy Picture** . The **Copy Picture** dialog box opens.

Exporting Projects

You can export project data to a variety of 3rd party applications. You may export data to Microsoft Project XML format, or MPX format. Most project management scheduling software supports Microsoft Project XML format. While Microsoft Project no longer saves data in the MPX format, it can still read this format.

Exporting data to XML or MPX formats

1. From the **File** menu, choose **Export> XML** or **Export> MPX** and enter the file name. The Export Data dialog box opens.
2. You can export either the current project schedule or the results of the analysis. You must select the type of the schedule you want to export.

MPX files do not support all RiskyProject data including risks. Therefore, when you export data to MPX file and import it back, you can lose information.

Exporting Data to Excel

You can export data from data tables directly to Excel. A new instance of Excel will be launched every time you export the data. To export data to Excel:

1. Navigate to the table you want to export
2. From the **File** menu, choose **Export> Microsoft Excel.** The **Export Data** dialog box opens.
3. Choose if you want to export all table or only selected rows. Also, choose formatting of the header and data: fonts, background color, and border.
4. Click **OK**.

Exporting Results of Analysis to Microsoft Excel

You can export statistical data for a group of selected tasks to the comma-separated (CSV) file for use in Microsoft Excel. For the selected tasks, the csv file contains the following simulation results: duration, cost, start and finish time, and work for all iterations.

1. Open any view that contains task information, such as Project View, and select tasks you want to export
2. From the **File** menu, choose **Export> Statistics…**
3. Enter the file name for comma separated (CSV) file and click **OK**. You can now open this file Microsoft Excel.

Launching Microsoft Project

You can launch Microsoft Project directly from RiskyProject. In these cases, a temporary XML file will be created and passed as an input to the Microsoft Project. RiskyProject will try to get a location of Microsoft Project from the system registry. If RiskyProject cannot find the Microsoft Project, you can browse to find it.

Chapter 8: Advanced Project Risk Management

Critical Path

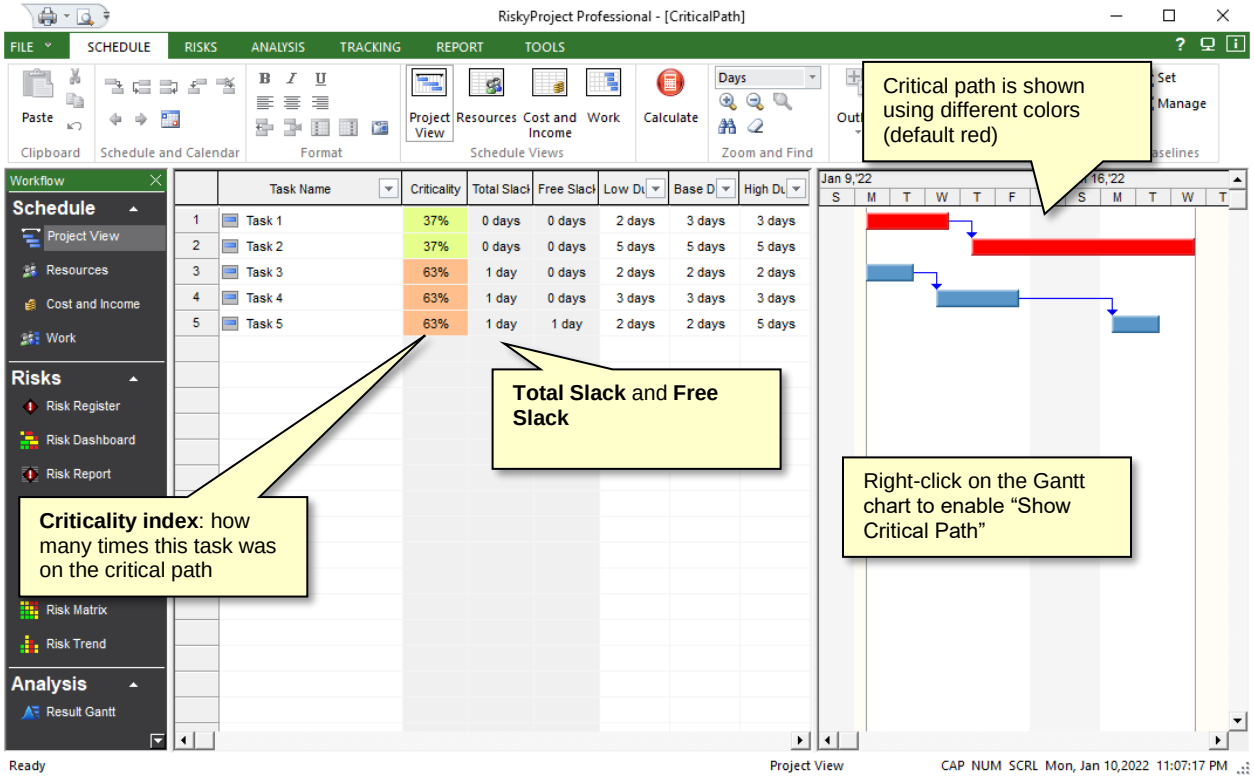
By default, critical path calculation is disabled to improve calculation performance. If you enable critical path calculation, you can view critical tasks on the Gantt chart, as well as critical path metrics.

To enable critical path calculation:

1. Click the **Schedule** tab.
2. Click on **Project Options.**
3. In the **Calculation** tab, select **Calculate Critical Path.**
4. Click **OK.**

To view critical path and critical path metrics:

1. Open the Project view or **Result Gantt** view.
2. Right-click on **Gantt** chart and click on **Show Critical Path**
3. Right-click on the column header for the list of tasks and insert column with critical path metrics: Late Start, Late Finish, Total Slack, Free Slack, or Criticality index. You can also select Critical Path – cur. schedule, which is an indicator that this task is on the critical path.



- You can change color for the critical path in **Schedule -> Format Gantt Chart**, under **Settings and Options**.
- Critical path may slow down Monte Carlo simulation. You may disable Critical Path calculation if don't need to analyze critical path

Critical Path Metrics

The following metrics will be calculated if you enable critical path:

1. **Total Slack**: amount of time that a task can be delayed without delaying any successor tasks. If the task has no successors, free slack is the amount of time that a task can be delayed without delaying the entire project's finish date.
2. **Free Slack**: amount of time that a task can be delayed without delaying any successor tasks. If the task has no successors, free slack is the amount of time that a task can be delayed without delaying the entire project's finish date.
3. **Late Start**: the latest date that a task can start without delaying the finish of the project. This date is based on the task's start date, as well as on the late start and late finish dates of predecessor and successor tasks, and other constraints.
4. **Late Finish**: the latest date that a task can finish without delaying the finish of the project. This date is based on the task's late start date, as well as on the late start and late finish dates of predecessor and successor tasks, and other constraints.
5. **Criticality Index**: how many times this task was on the critical path. Criticality index is calculated as a result of Monte Carlo simulation. For example, if total number of simulation was 1000 and particular task was 640 times on the critical path, criticality index for this task would be 64%. Criticality index is important because task be not on a critical path for deterministic analysis but may have risks with high probability and/or impacts assigned to them. In such cases, it will have high criticality index.

Schedule Diagnostics

Schedule diagnostics is a detailed analysis of project schedule. Using Schedule diagnostic tool, you can:

1. Find issues with your project schedule, which would affect results of risk analysis as well as affect integrity and quality of the schedule. RiskyProject allows you to perform 21 tests and identify tasks, which such issues.
2. Perform a DCMA 14 point Schedule Assessment. DCMA 14-point Schedule Assessment is a project management guideline established on 14 metrics that provide the possibility to make a qualitative and quantitative evaluation of the schedule. It was developed by the US. Defense Contract Management Agency (DCMA) for the purposes of the defense industry but is used in other industries as well. DCMA 14 point Schedule Assessment description can be found at: https://www.dcma.mil/Portals/31/Documents/Policy/DCMA-PAM-200-1.pdf?ver=2016-12-28-125801-627.
3. Review schedule metrics, such as number of tasks, links, summary tasks, resources, etc.

To perform schedule diagnostics:

1. Click the **Schedule** tab.
2. Click **Schedule Diagnostics** to run the diagnostics. When completed, the diagnostics results will open in the Schedule Diagnostics pane.

Configuring Schedule Diagnostics

RiskyProject can perform up to 21 tests on a project schedule. By default, all of them are enabled. You can enable or disable tests, define their severity, as well as define other parameters associated with tests.

To configure schedule diagnostics:

1. Click the **Schedule** tab.
2. Select **Schedule Diagnostics**.
3. Click on **Configure**.
4. Enable or disable tests you want to run.
5. Select color indicating relative severity level of each test.
6. Select number of days for 2 tests: “Task duration is greater than …” and “Task has float greater than …”
7. Click **OK.**

DCMA 14-point Schedule Assessment

DCMA 14 point Schedule Assessment is performed automatically when you click on **Schedule Diagnostics**. For some tests, additional settings are required:

1. For DCMA-6, DCMA-7, DCMA-12, you may need to enable critical path calculation: in **Schedule** -> **Project Options**, go to **Calculation** tab and select **Calculate Critical Path**.
2. For DCMA-9, you may need to define project status date. **Schedule** -> **Project Settings**.

3. For DCMA-13, right-click on row ID and click on Milestone for DCMA 13-CPLI and then select milestone which is required for this test.

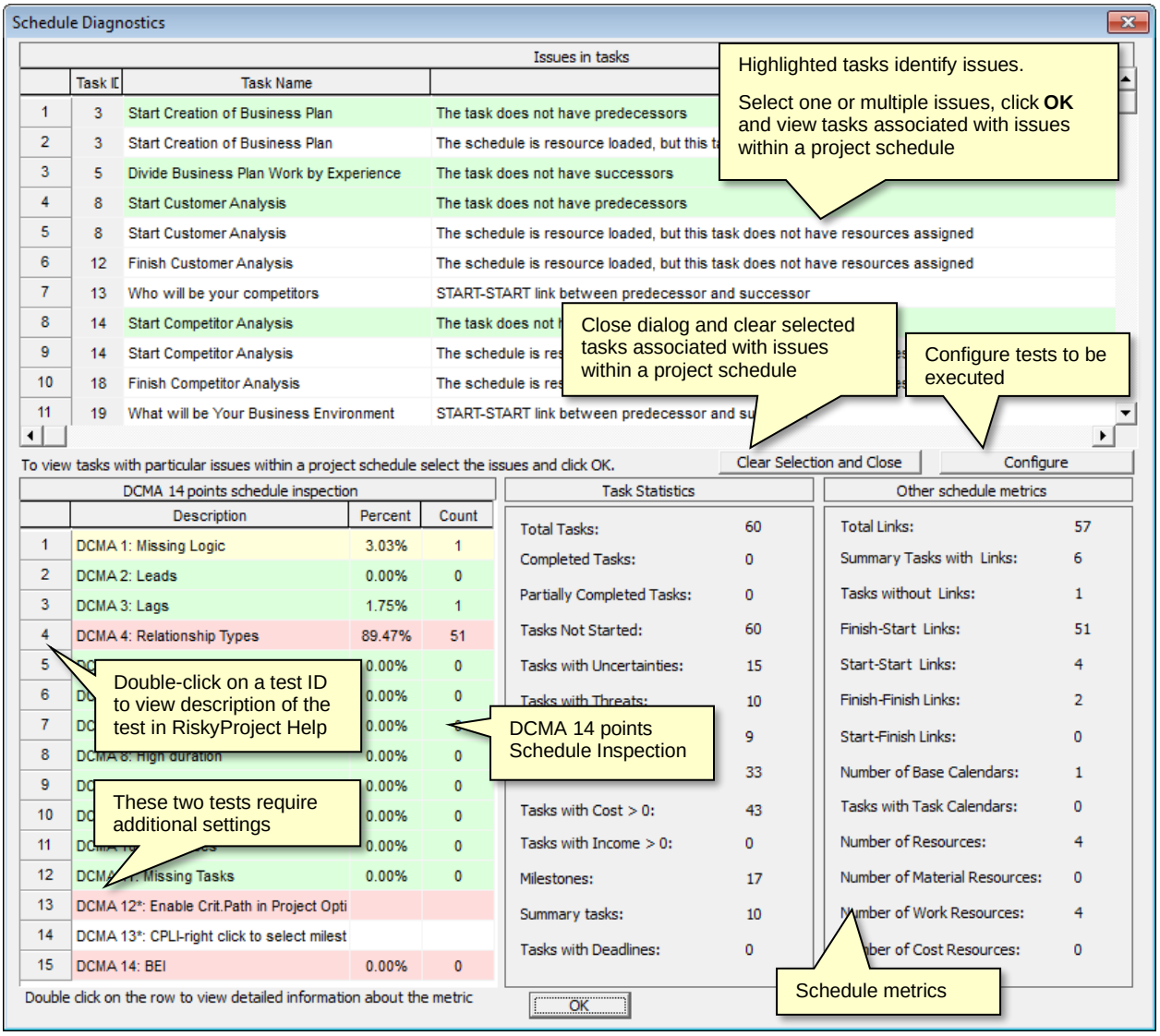
- You can double-click on each DCMA test and view detailed information about particular metric as part of RiskyProject Help System. To view Help you must be connected to Internet.
- You can copy test results to clipboard: right-click on row ID and click on **Copy**
- You can see issues associated with DCMA tests within list of issues (top listbox) by clicking on the particular DCMA test

Viewing Tasks with Issues within a Project Schedule

You may view tasks associated with particular issue or particular DCMA test:

1. Open any view that has project schedule, such as **Project View** or **Gantt Result** view.
2. Click the **Schedule** tab.
3. Select **Schedule Diagnostics**. Diagnostic of the schedule is performed.
4. Click on DCMA test and see issues associated with this test in top list box.
5. Select any other issues from the top list box.
6. Click **OK.**
7. Task with selected issues will be highlighted.

You can clear highlighted tasks by clicking on **Clear Selection and Close** with Diagnostics dialog box or by clicking on **Schedule** -> **Zoom and Find** -> **Clear** (eraser icon)


Schedule Diagnostics
Issues in tasks
Task ID
Task Name
1 3 Start Creation of Business Plan The task does not have predecessors
2 3 Start Creation of Business Plan The schedule is resource loaded, but this t
3 5 Divide Business Plan Work by Experience The task does not have successors
4 8 Start Customer Analysis The task does not have predecessors
5 8 Start Customer Analysis The schedule is resource loaded, but this task does not have resources assigned
6 12 Finish Customer Analysis The schedule is resource loaded, but this task does not have resources assigned
7 13 Who will be your competitors START-START link between predecessor and successor
8 14 Start Competitor Analysis The task does not
9 14 Start Competitor Analysis The schedule is re
10 18 Finish Competitor Analysis The schedule is re
11 19 What will be Your Business Environment START-START link between predecessor and su
Highlighted tasks identify issues.
Select one or multiple issues, click OK and view tasks associated with issues within a project schedule
Close dialog and clear selected tasks associated with issues within a project schedule
Configure tests to be executed
To view tasks with particular issues within a project schedule select the issues and click OK.
Clear Selection and Close
Configure
DCMA 14 points schedule inspection
Description Percent Count
1 DCMA 1: Missing Logic 3.03% 1
2 DCMA 2: Leads 0.00% 0
3 DCMA 3: Lags 1.75% 1
4 DCMA 4: Relationship Types 89.47% 51
5 0.00% 0
6 0.00% 0
7 0.00%
8 DCMA 8: High duration 0.00% 0
9 0.00% 0
10 0.00% 0
11 0.00% 0
12 Missing Tasks 0.00% 0
13 DCMA 12*: Enable Crit.Path in Project Opti
14 DCMA 13*: CPLI-right click to select milest
15 DCMA 14: BEI 0.00% 0
Double-click on a test ID to view description of the test in RiskyProject Help
These two tests require additional settings
Double click on the row to view detailed information about the metric
Task Statistics
Total Tasks: 60
Completed Tasks: 0
Partially Completed Tasks: 0
Tasks Not Started: 60
Tasks with Uncertainties: 15
Tasks with Threats: 10
9
33
Tasks with Cost > 0: 43
Tasks with Income > 0: 0
Milestones: 17
Summary tasks: 10
Tasks with Deadlines: 0
DCMA 14 points Schedule Inspection
Other schedule metrics
Total Links: 57
Summary Tasks with Links: 6
Tasks without Links: 1
Finish-Start Links: 51
Start-Start Links: 4
Finish-Finish Links: 2
Start-Finish Links: 0
Number of Base Calendars: 1
Tasks with Task Calendars: 0
Number of Resources: 4
Number of Material Resources: 0
Number of Work Resources: 4
Number of Cost Resources: 0
Schedule metrics
OK

Analyzing Risk Mitigation Efforts with Multiple Baselines

RiskyProject allows you to create multiple baselines of the same project. Multiple baselines can be used during the planning stage, to determine the effects your risk mitigation efforts or response plans will have on the project's overall cost, finish time, and success rates. You can save up to 10 baseline versions of a project.

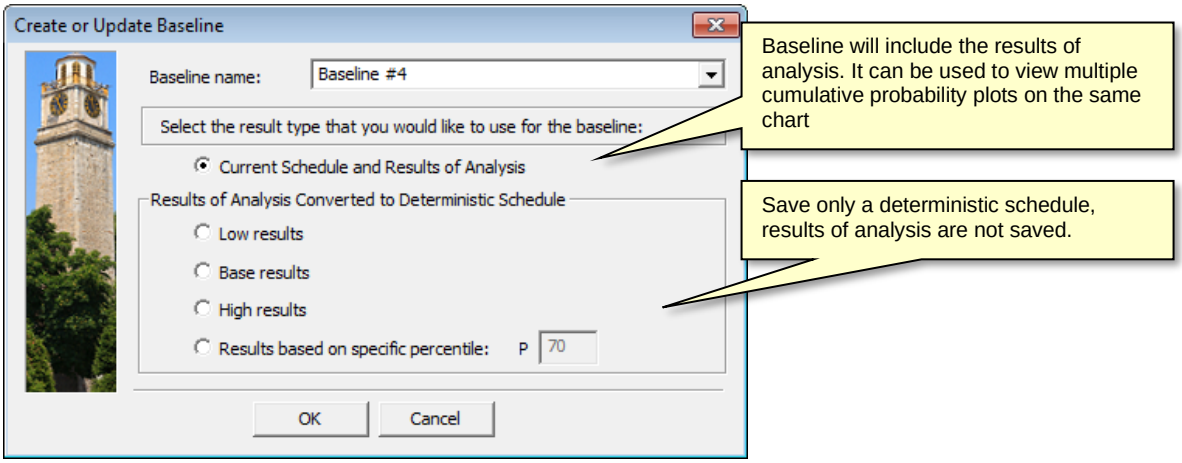
For example, once you have created your project and run a risk analysis on it, you can create a baseline. When you create the baseline, you can select a level of certainty (percentile) that you have decided to use for management purposes. You can then model the effects of mitigation efforts or risk response plans. This modeling may include adding additional activities with resources and costs as well as the closing or minimizing of risks. You can then create a baseline of the "mitigated" project plan and compare it with the unmitigated baseline. In this way, you can decide you risk response plan as defined in PMBOK: avoid, transfer, mitigate, or accept.

Results of analysis for project and tasks can be presented as cumulative probability plots. If you have multiple baselines with results of analysis you can compare uncertainties using multiple cumulative probability plots on the same charts.

Creating a baseline

Once you have run a simulation on your project, you can save the results as a baseline.

1. Click the **Schedule** tab. In the **Baselines** group, click **Set**.
2. Enter a name for the baseline. By default, it is assigned "Baseline #_"
3. Select the type of results (**Low**, **Base**, **High**, **specific percentile**, or **Current Schedule and Results of Analysis**) that you want to use for your baseline.
4. Click **OK.**
5. If you are using probabilistic results for the baseline, you are prompted to disable all risks and uncertainties from the schedule. Choosing **Yes** will in effect create a deterministic baseline out of the results you selected. Choosing **No** will mean that all risks and uncertainties will remain. If you calculate this baseline again, this may cause a double count of the risks and uncertainties.



Setting the current baseline

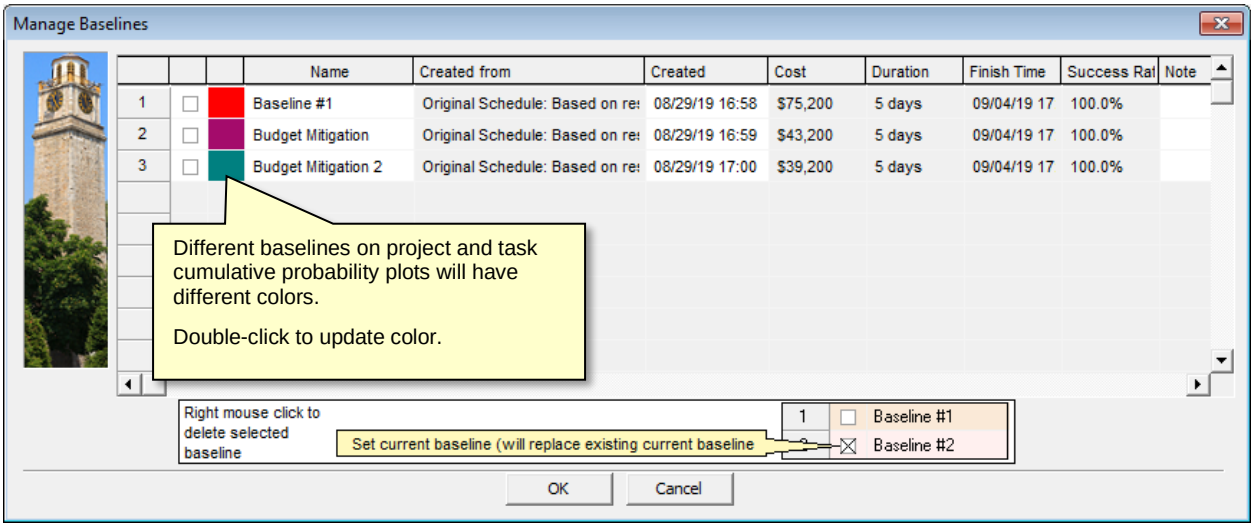
The current baseline is the project data that appears in RiskyProject. You can change current baselines as part of you planning efforts.

1. Click the **Schedule** tab. In the **Baselines** group, click **Manage**.
2. Select the check box beside a baseline to set it as the Current Baseline.
3. Enter a name for the baseline. By default, it is assigned “Baseline #_”

Right-click on a baseline to copy baseline data to the clipboard or delete it.

Viewing multiple baselines

Click the **Schedule** tab. In the **Baselines** group, click **Manage**. The Manage Baselines dialog box opens.



In this example, we can see the differences between two baselines due to mitigation efforts. Particularly cost associated with baseline “Budget Mitigation” is lower than cost of “Baseline #1”.

Using this dialog box, you may set a previously saved baseline as current schedule. The baseline will replace currently active schedule.

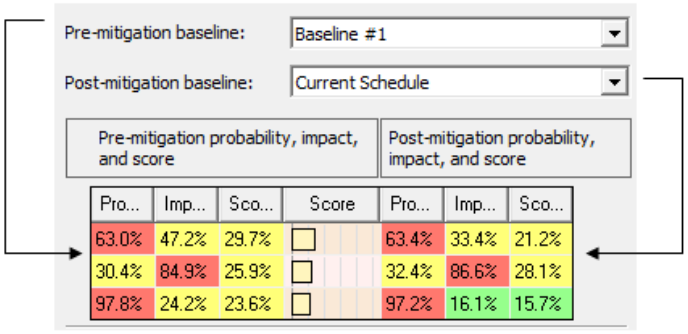
Converting a baseline to a current schedule

1. Click the **Schedule** tab. In the **Baselines** group, click **Manage**. The Manage Baselines dialog box opens.
2. Select a baseline you want to make current using a check box on the left from baseline name.
3. Click **OK**.

Comparing pre and post-mitigation baselines

1. Open the **Risk Register** view (Risk tab of the workflow bar)
2. Click the **Configure Pre and Post Mitigation** button.

3. Select your baseline Pre and Post Mitigation baselines.



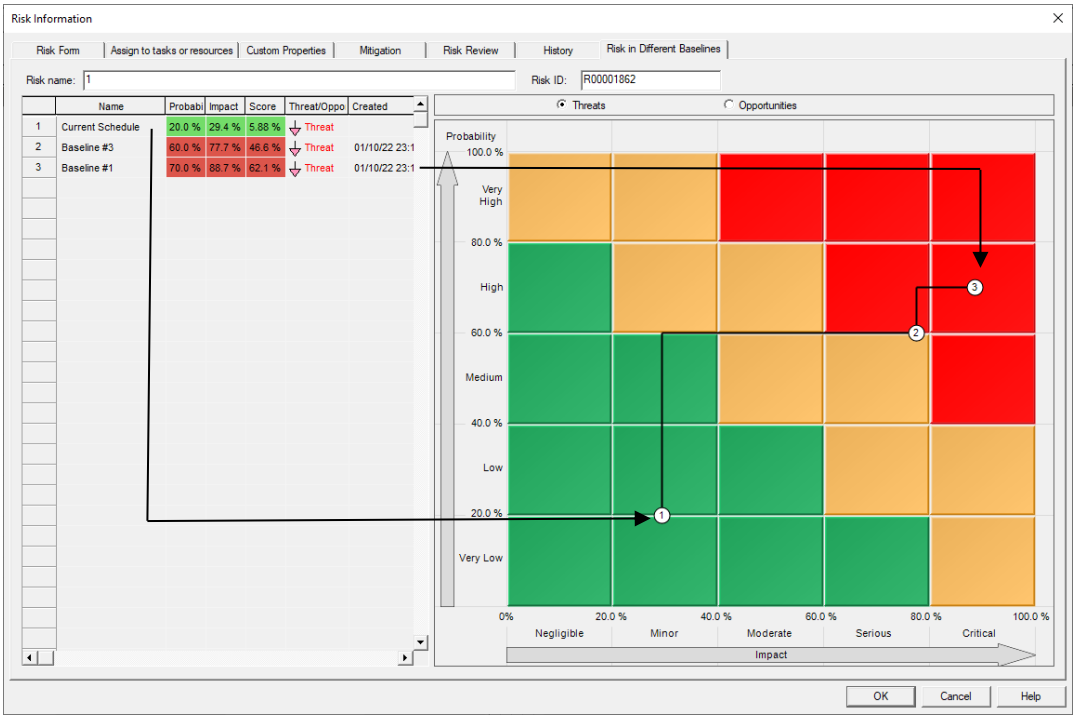
Probabilities, impacts, and scores for multiple baselines

You can view risk mitigation efforts for any individual risk using the risk matrix. To view risk mitigation for an individual risk, you must have multiple baselines with various mitigation efforts for this risk. Mitigation efforts for the risk can be:

- Reducing the chance of occurrence or outcome of the risk
- Changing the outcome
- Changing the mutually exclusive alternatives associated with the risk
- Changing the project schedule, e.g., executing a number of additional activities on the specific baseline
- All the above

Viewing a risk for different baselines

1. Open the **Risk Register** view.
2. Double- click on Risk ID. The **Risk Information** dialog box opens.
3. Click the **Risk in Different Baselines** tab.


Risk Information
Risk Form
Assign to tasks or resources
Custom Properties
Mitigation
Risk Review
History
Risk in Different Baselines
Risk name: 1
Risk ID: R00001862
Name
Probabi
Impact
Score
Threat/Oppo
Created
1 Current Schedule 20.0 % 29.4 % 5.88 % Threat
2 Baseline #3 60.0 % 77.7 % 46.6 % Threat 01/10/22 23:1
3 Baseline #1 70.0 % 88.7 % 62.1 % Threat 01/10/22 23:1
Threats
Opportunities
Probability
100.0 %
Very High
80.0 %
High
60.0 %
Medium
40.0 %
Low
20.0 %
Very Low
0%
20.0 %
40.0 %
60.0 %
80.0 %
100.0 %
Negligible
Minor
Moderate
Serious
Critical
Impact
OK
Cancel
Help

Probabilistic and Conditional Branching

Probabilistic and conditional branching can be used in project planning to model projects in which there are two or more possible activities that may succeed an activity, but a decision regarding which activity will be taken has not yet been made.

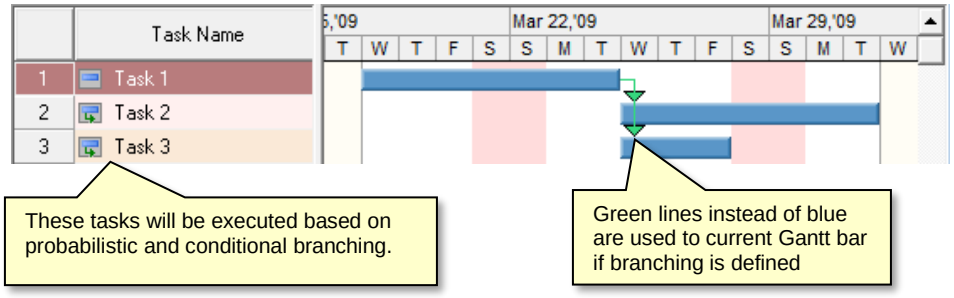
Probabilistic Branching

Probabilistic branching allows you to calculate expected values (EV) for the project given that you have not yet been able to determine which branch will be executed. This type of branching is useful to calculate the expected value for the project cost given the current uncertainty in the project plan. Probabilistic branching is defined by the probability (chance) that a certain branch will be executed or not executed.

Conditional Branching

Conditional branching is useful when you need to determine expected values of the project under certain conditions. For example, what would be the cost of the project if certain activities will not proceed? What will happen if their predecessors take longer than 100 days to complete? Conditions can be related to:

- Task duration
- Task Cost
- Task Start Time
- Task Finish Time

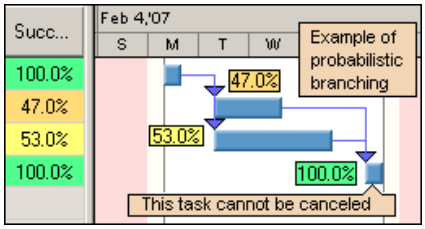


Creating Probabilistic and Conditional Branching

1. Open the **Task Information** dialog box for the task in which you want to create the branch.
2. Click the **Branching** tab.
3. For each successor define the **Condition** and **Value** that will cause the successor to be cancelled. The type of value you can select is dependent upon the condition you select.
4. Select the **Action** that will occur when a successor is cancelled or executed.
5. Select the **This task and all successors are always executed even if cancelled by predecessors** check box if you want to force this task and all successors to be run in the simulation even if its predecessors are canceled.

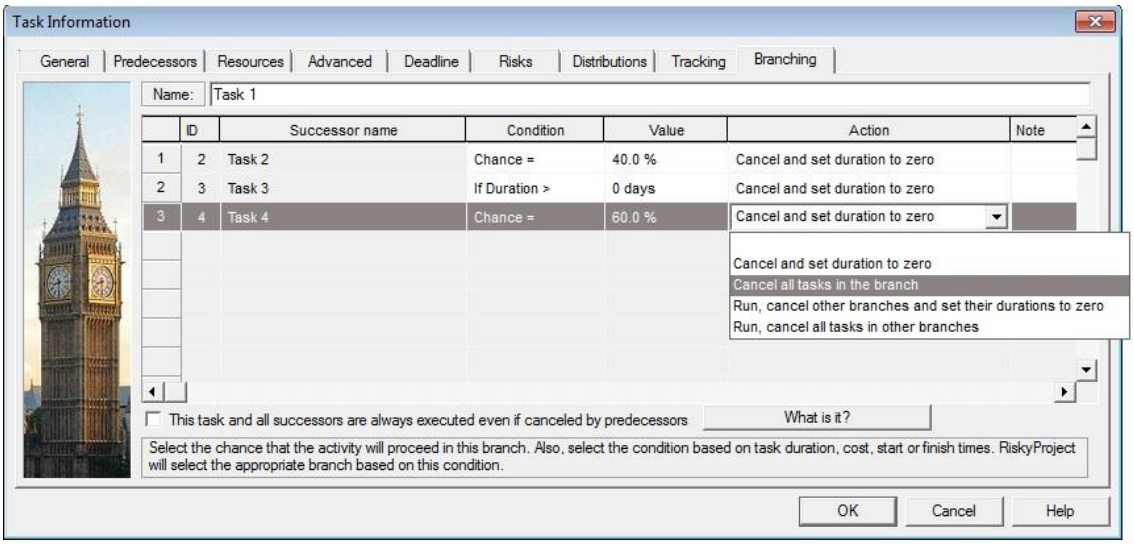
   A task can have multiple predecessors. These predecessors may belong to different branches and can be canceled due to the results of the branching. Select the check box if you want to

force this task and all successors to be run in the simulation even if its predecessors are canceled.



6. Click **OK**.

Example of Conditional and Probabilistic Branching



In this case, Task 1 has three successors:

1. Task 2 will be canceled in 40% of the time. Task 2's success rate will be around 60%. This is example of probabilistic branching
2. Task 3 will be canceled if duration of Task 1 is greater than 5 days. Task 2's success rate depends on the statistical distribution for duration of Task 1. This is example of conditional branching.
3. Task 4 and all its successors will be canceled in 60% of cases. Task 4 success rate will be around 40%. This is example of probabilistic branching.

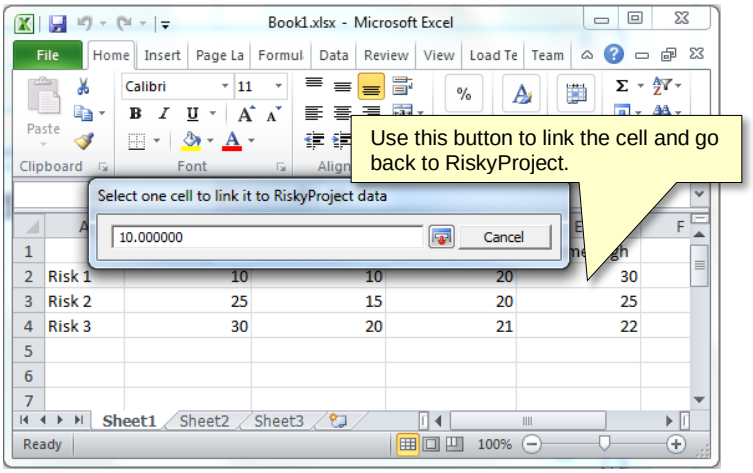
Importing Data from Microsoft Excel

Importing Chances and Outcomes of the Risk from Microsoft Excel

You can import risk chances and outcomes from Microsoft Excel files. You can use this, to link the chances and outcomes of a particular risk to cells in an Excel spreadsheet. If you link chance and outcomes to an Excel spreadsheet and then make changes to that spreadsheet, RiskyProject will automatically update these values when you open the linked RiskyProject file and click the Refresh Data (Tools tab) button.

To setup integration between RiskyProject and Excel:

1. **Setup a connection to an Excel spreadsheet**. To set up a connection to an Excel spreadsheet, on the Tools tab, click the **Connect/Disconnect** button. You can visualize the Excel spreadsheet with the **Visualize Excel** button.
2. **Open any view in which you can perform risk assignment.** For example, the **Risk** tab of Task Information dialog box.
3. **Right-click on an outcome or chance field**. Select **Link to Excel Cell** from the shortcut menu.
4. **The Excel spreadsheet will open**. Select a cell within the spreadsheet. In the dialog box, click the button to link the selected cell to an outcome or chance field.



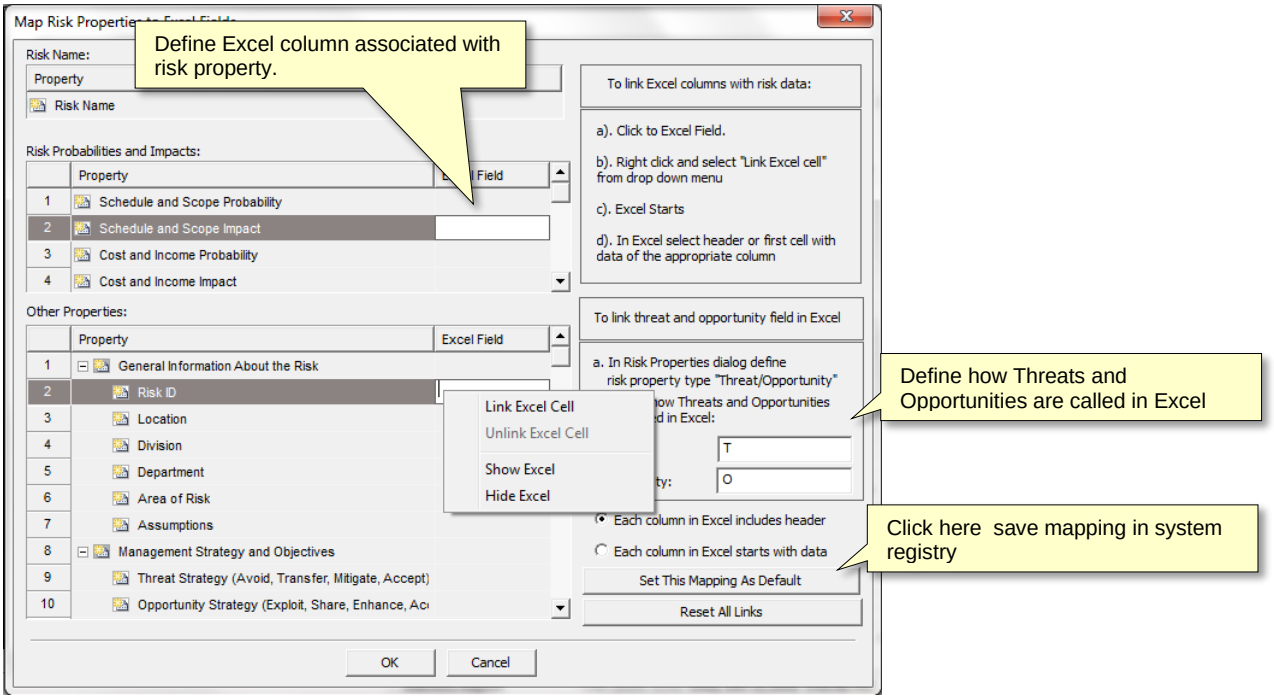
Probability and impact of risk is defined as a percent, e.g. for 25% in Excel use 25 not 0.25.

Importing Risk Register from Microsoft Excel

You can import the complete risk register from Microsoft Excel. To do so, you need to map Excel fields to RiskyProject fields.

To import risk register from Microsoft Excel:

1. Make sure that your **Risk Register** has all risk properties defined to present all data in Excel. Use the **Default Risk Properties** dialog to create any custom properties.
2. Ensure your **Risk Register** contains all columns to present these properties. Very often Excel spreadsheets contain risk probabilities and impacts for specific categories. In this case, you need to define the column: for example, Impact: Cost, or Probability: Quality.
3. Click on **File > Import > Import Risks from Excel**
4. Select the import type of risk data that will be imported:
    - **Risk Register Excel File:** where each row is a risk
    - **Risk Mitigation Excel File**: where each row is mitigation plan assigned to particular risk; such file must have mitigation name and associated risk as a separate columns; RiskyProject will associated each mitigation plan with a particular risk based on Risk Name or Risk Unique ID; you must import Risk Register Excel file first before importing Risk Mitigation Excel File.
    - **Risk Status Excel File**: historical data about risk probabilities and impacts for individual categories and combined for call categories. Similarly to Risk Mitigation Excel File RiskyProject will associated each risk status record with a particular risk based on Risk Name or Risk Unique ID; you must import Risk Register Excel file first before importing Risk Status Excel File.
5. Browse and select Excel File; click OK
6. **Map Risk Properties to Excel Fields** dialog opens.
7. If you have done mapping for this file before, verify that mapping is correct for the selected Excel file and click OK. If you did have not done this mapping before, you need to enter the mapping information.
8. To enter mapping information:
    - click on the Excel Field for a particular risk property
    - right-click and select “Link Excel cell” from dropdown menu; Excel will be launched
    - in Excel, select the header or first cell with the data of the appropriate column
    - repeat this process for all risk properties



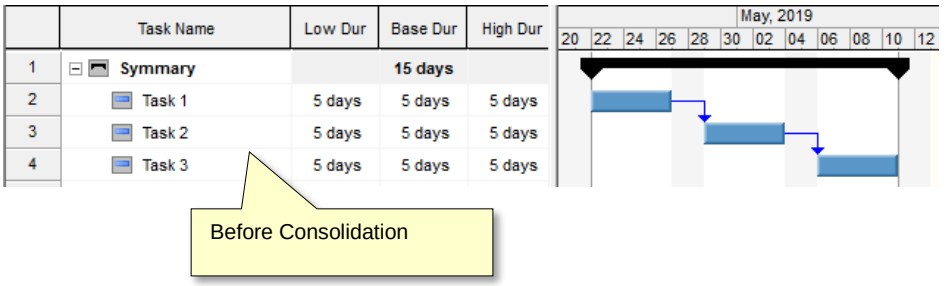
- If you define probability and impact of risk as a percent in the project schedule for 25% use 25 not 0.25.
- If, in Excel, there is a column from Threat/Opportunity, define how Threats and Opportunities are named in Excel; for example, Excel may label a threat as "T" and an opportunity as "O". Use the Threat and Opportunity data type for risk properties in RiskyProject to map such properties in Excel.
- If you are entering mitigation plans, which are defined as list of strings on an Excel spreadsheet, use the Mitigation Actions risk property. For example, an Excel spreadsheet has a column entitled Mitigation Action Plans. It could be a number of lines for one risk in each cell of the Excel spreadsheet, for example Action 1, Action 2, … If you map a risk property with data type "Mitigation Actions risk property" to this column, all individual actions will be imported as separate mitigation plans.

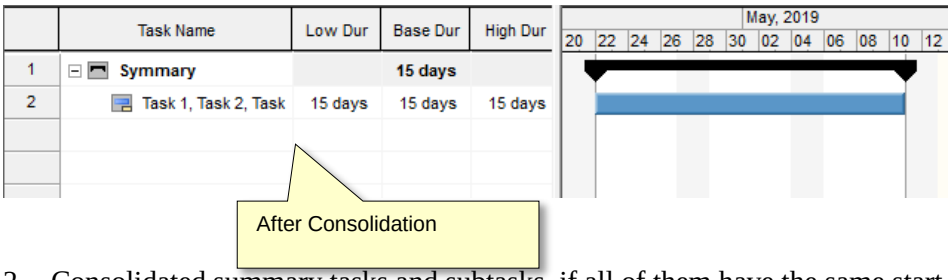
Schedule Consolidation

Some project schedules can include very significant number of activities and resources. To increase the performance of Monte Carlo simulations, very large schedules can be consolidated or condensed. When consolidation is performed, the number of activities will be reduced. RiskyProject will apply risks, resources and costs to consolidated activities accordingly. Tasks with actuals (tracking information), deadlines, and with different calendars cannot be consolidated. As a result, consolidated schedule will be equivalent to the original schedule: the same duration, start and finish times, cost, work, etc. RiskyProject will include notes to the consolidated activities with information about original activities. Consolidated task name will include names of original activities.

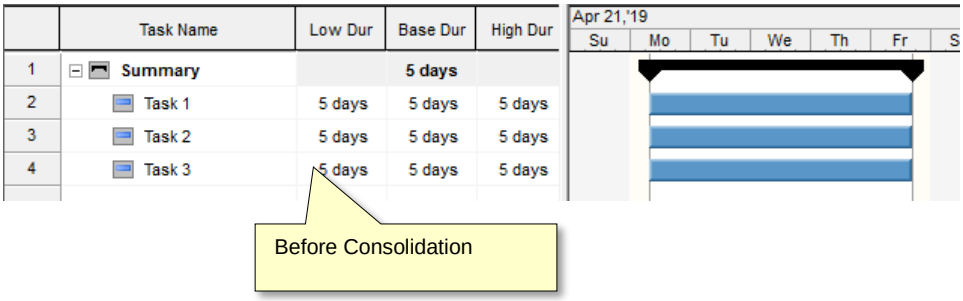
There are two ways to consolidate schedule:

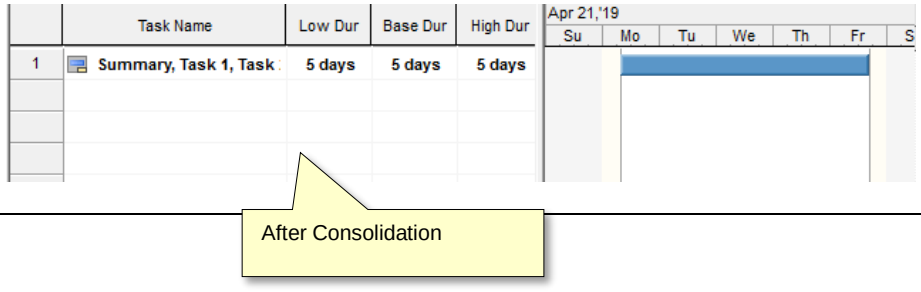
1. Consolidate sequential activities, if they belong to the same summary task. Consolidated activities must have only one successor and predecessor and do not have constraints.





2. Consolidated summary tasks and subtasks, if all of them have the same start and finish times.





To perform consolidation:

Click on **Tools** -> **Schedule Consolidation**. You will be presented with number of tasks before and after consolidation.

- In XER import RiskyProject will offer consolidation if number of activities greater than 20,000.
- It is recommended to have original schedule before consolitation. If you perform consolidation but want to restore original schedule, click on Ctrl + Z.

Additional Information

Frequently Asked Questions

What is the difference between qualitative and quantitative risk analysis in RiskyProject?

If you do not have a schedule for your project, RiskyProject will only perform qualitative risk analysis. However, if you add a schedule by either adding activities or importing a schedule, RiskyProject automatically switches to quantitative analysis. You may switch between qualitative and quantitative analysis by adding or removing a project schedule.

How do I assign risks to tasks?

You can assign risks to task using four methods in RiskyProject.

1. **Risk Drag & Drop View**: this is the preferred method for project risk assignment. You simply select one or many risks on the left page and drop them on the task.
2. **Risk Register**: if you are using the Risk Register, you can assign a risk and mutually exclusive risk alternatives to tasks by double-clicking on the risk in the risk register and assigning tasks to the risk in the **Assign to tasks or resources** tab.
3. **Risk Assignment View:** double-click on a risk ID in Risk Assignment view and use the **Risk Assignment Information** dialog to re-assign risks to task or resources or make them global.
4. **Risk Tabs on Task Information and Resource Information dialog boxes**: you can create and assign local risks to a task using this method. This is the preferred method if you want to assign a few different risks to separate tasks or resources.

How should I use the risk register?

You should use the risk register as the central place to define your project's risk breakdown structure. Once you have added the risks, from the risk register you can:

1. Add risk properties (date created, recorder, owner, etc.)
2. Assign risks to tasks and resources
3. Sort and filter risks
4. View risk status, including results of mitigation efforts. Risks can be opened and closed, risk and issues, or threats and opportunities.

When should I correlate risks and how do I do it?

Risk correlations are useful when the two risks are likely to occur together. For example, the risk "bad weather" is correlated with the risk "late delivery of materials". You can create risk correlations in the Correlations tab of the Risk Assignment Information dialog box in the Risk Assignment view, as well as risk tabs for tasks and resources.

RiskyProject uses only strong correlation between risks. If Risk 1 has chance of occurrence is 10% and Risk 2 chance of occurrence is 20% and both risks are correlated, Risk 1 will always occur when Risk 2 occurs, but Risk 2 may occur when Risk 1 does not occur.

How are risk probabilities, impacts, and scores calculated for quantitative analysis?

Risk probabilities, impacts, and scores are calculated the following way:

1. RiskyProject tracks the impact of each risk on each project parameter at each iteration of the Monte Carlo simulation. It is performed using absolute units. For example, in the first iteration Risk A caused a delay of 2 days.

2. RiskyProject also calculates duration, cost, success rate, finish time, and work on each iteration.
3. RiskyProject calculates the Spearman Rank Order correlation coefficient between duration impact for each risk and project duration. This coefficient is presented in the Sensitivity view.
4. Correlation coefficients are not yet a risk impact. They only show how the risk affects the project. If a correlation coefficient is low, and the risk is not correlated with duration, it means than some other factors affect duration other than this risk. To become an impact, the correlation coefficient must be normalized. For example, you have a schedule, which has only one risk with an outcome of an increase in duration of 2 days. The correlation coefficient will be 100% because the schedule does not have any other uncertainties. Now change the risk outcome to 100 days. The correlation coefficient again will be 100%. Risk impact takes into account absolute value of duration increase, cost increase, etc. If the duration increases 2 times when compared with the original project schedule, the normalization coefficient is 1. Otherwise, the normalization coefficient will be greater or less than 1. Impact equals correlation coefficient multiplied with the normalization coefficient.
5. Risk probability is calculated based on the chance of risk for each assignment. If a risk has only one assignment, calculated probability equals input chance. If the risk has multiple assignments which are not mutually exclusive alternatives, the probability is calculated by combining risk results of each iteration as shown in the example:

Risk Assignment	Iteration 1	Iteration 2	Iteration 3	Iteration 4	Iteration 5
Assignment to Task 1	occurred			occurred	
Assignment to Task 2		occurred		occurred	occurred

   Combined probability will equal 80%
6. Risk score equals probability multiplied by impact.
7. For risks affecting All Parameters (combination of duration, cost, safety, quality, etc.) calculated impact is calculated using impact for each risk category, multiplied on relative importance of risks for this category. For schedule related risk categories risk impact on finish time and success rate will not be used to calculate risk impact. For schedule related risk categories, the risk impact on finish time and success rate will not be used to calculate risk impact. This relative importance can be seen on the Categories and Outcomes dialog (Risk tab).

How can I update a project schedule from Microsoft Project and keep my assigned risks?

You may use the RiskyProject toolbar or ribbon in Microsoft Project to transfer a schedule from Microsoft Project to RiskyProject. When you use the RiskyProject toolbar or ribbon, your schedule in Microsoft Project will be associated with risks and uncertainties defined in RiskyProject. Please read “RiskyProject for Microsoft Project” for more information.

When you import (click **Import** on the **File** menu) an updated schedule from Microsoft Project, RiskyProject gives you the option of completely overwriting the existing schedule or updating the

existing schedule with new data in Microsoft Project, while retaining global and local risk assignments. This is useful if you originally exported the schedule and assigned risks to the project. RiskyProject keeps unique task IDs from Microsoft Project.

How do I rank schedule related and non-schedule risks together?

RiskyProject calculates the relative impact of both schedule-related and non-schedule risks in such a manner as to provide a valid comparison of both types of risks in regard to potential impact on the project. The basis of this comparison is the relative weight (importance) that you assign to each risk category. You can view the impact (threat or opportunity) of each risk in the Risk Matrix view and Risk Register view. In the Risk Tabs of Task Information dialog box and Resource Information dialog box you will find an impact of the risk on all parameters under "All" (Calculated impact on all project parameters) column.

How do I plan a risk response?

Risk response planning is done in the Mitigation or Response view in the Risk workflow. Risk responses are the duration and cost effects of activities that will occur if a risk occurs. These activities can be modeled in a similar manner as a risk with an outcome and result. Risk Mitigation and Response view can be useful, if you have many risks causing the same response.

You assign the risk response to a risk as a risk outcome "Execute Response Plan" and the response plan as the result.

For example, you have two risks "Problem with supplier" and "Problem with the component" that will initiate the same response "Replace Component". If you define "Replace Component" and assign it to both risks using the risk outcome "Execute Response Plan", the response plan will be executed only once even if both risks occur together.

How can I compare mitigation efforts using different baselines?

There are two methods to view the results of your mitigation planning against the original schedule. To compare the results, first create a baseline using the results from the original schedule. Model the planned mitigation efforts in your current schedule taking into account any additional activities and costs that the mitigation efforts will entail (these may also introduce additional risks)

In the risk register, use the Configure Pre and Post Mitigation button to select the original baseline as the pre-mitigation and the current schedule as the post-mitigation. The risk register will display the risk impact and score of each risk for the pre and post mitigation schedules.

In the Manage Baselines dialog box, you can compare major project parameters of the two schedules: Duration, Finish Time, Cost, and Success Rate.

How many iterations are required in a simulation?

The number of iterations required depends upon the risks you have assigned to the project. Normally, the minimum number of iterations is 200 and can be adequate on small, non-strategic projects. However, if you have risks that have a very low chance of occurring, but have a potentially large impact, the results will not account for this risk unless you run sufficient simulations. For example, your project has a 0.5% chance of being cancelled due to political instability. You must run at least 200 iterations, just to ensure just to ensure that the simulation runs a single occurrence of this risk. To adequately model these types of risks, we recommend a minimum of 600 simulations.

When should I use a risk event instead of a statistical distribution?

RiskyProject supports both methods of risk analysis. Statistical distribution or uncertainty modeling is recommended in projects where there is strong and analogous historical data that is supported by expert opinion.

If this data does not exist, risk event modeling will normally result in a more accurate assessment of your project risk and uncertainty. In addition, risk events make it much easier to identify critical risks through sensitivity analysis as most if not all uncertainty in a project is caused by risk events. Without risk event modeling, you will need to do a root cause analysis to identify which risks are causing the uncertainty in your project.

What are mutually exclusive alternatives for risks and how does RiskyProject calculate them?

Mutually exclusive alternatives are used to calculate alternate outcomes for the same risk event that cannot occur at the same time. An alternative risk is similar to using a Boolean “OR” statement. Only one risk alternative can occur at the same time. For example, if you have a fire risk, the fire could be minor or major each with different outcomes. They are the same risk, but unlike other risk events, these alternatives cannot occur at the same time.

In this example, the risk Fire has two alternatives:

Chance	Outcome	Result
10%	Fixed delay	2 days
2%	Relative delay	45%

When the simulations are run, there is a 12% chance that the risk Fire will occur. 10% of the time the outcome of the minor fire will be calculated, while 2% of the time the outcome of a major fire is calculated, but they are never calculated during the same simulation.

What are risk templates and how do they differ from the risk register?

A risk template is a flat list of risks that have been assigned a chance, outcome, result, and distribution. The risk templates can be imported into risk views where you can quickly assign them as global, task, or resource risks. In this way, risk templates provide a quick way of loading risks into your project.

A risk register is a risk management tool that allows you to create, assign, and track risks with greater detail than any of the other risk views. The register allows you to add risk properties, assign ownership, convert risks to issues, and view pre and post mitigation risk scores.

You may share a risk register between different computers in your organization by saving it to the corporate server. Using RiskyProject, you may establish simple an easy-to-use corporate risk management system:

1. Create a risk register and save it on the corporate server (*.alr).
2. Load the risk register file into a new project.
3. RiskyProject will ensure that different users do not overwrite the corporate copy of the risk register through the built-in locking mechanism.

How do I use the probabilistic cash flow as part of my product lifecycle management?

Probabilistic cash flow view is used to show the original, actual, and simulation results of cash allocation during monthly, bi-monthly, quarterly and yearly periods. In RiskyProject, you can apply risks and uncertainties to cost and income. As a result, the probabilistic cash flow view can

have both a negative (cost) and positive (income) cash flow. This is a useful analysis for project lifecycle management, where you are trying to determine both the cost associated with product development and the income associated with sales of the product.

When should I use probabilistic calendars?

Probabilistic calendars are useful for modeling uncertain scheduling conditions such as weather. If you know from experience that during the project there is a 30% chance that you will be operating under poor weather conditions that will restrict working time, you can create a calendar that reflects this. Using the probabilistic calendars, you can then run this calendar 30% of the time to realistically model weather risks.

How do I customize risk outcomes?

You can add or customize non-schedule risk categories and outcomes (cost and schedule outcomes are hard coded and cannot be edited). RiskyProject provides several default risk categories and outcomes (Legal, Safety, Quality, etc.). Click the Risks tab, and in the Settings group click Risk Categories and then the **Outcomes** tab. You may use the Risk to add or modify non-schedule risk categories and outcomes. You may also enable or disable certain outcomes, so they are not shown in the dropdown list when you do risk assignments.

We recommend that you modify the default risk outcomes so that they can be used across your organization. These outcomes are saved in the system registry and can be used for all projects.

I imported a schedule from Microsoft Project to RiskyProject. Are there any potential differences?

In most cases, if you import your project schedule from Project, the projects in both applications will be identical. However, there are specific cases that may cause slight differences:

1. RiskyProject currently does not support split tasks. However, RiskyProject will import work calculated using split tasks. RiskyProject does not have task usage or resource usage views. The note for the task will be generated, then the task imported to RiskyProject as a split task.
2. RiskyProject calculates task duration differently than Microsoft Project in cases where resources that have different calendars are attached to the same task. However, even in these cases, start and finish times of the tasks will be identical.
3. RiskyProject does not support overtime rates.
4. RiskyProject does not import resource groups. Each resource is imported individually.
5. RiskyProject does not support the earned value method “Percent work completed”. Instead, it uses “Percent completed”.

How can I define opportunities versus threats?

When you create a risk assignment, define a negative outcome result that translates to an opportunity. For example, fixed delay –2 days indicates that if the event occurs, the task will require 2 fewer days to complete and is an opportunity.

How can I import low, base, and high duration from Microsoft Project?

Use the following fields in Microsoft Project to represent Low, Base, and High durations:

1. Duration1 for Low Duration
2. Duration2 for Base Duration
3. Duration3 for High Duration

Please remember that Duration1 < Duration2 < Duration3

Why is the high result for duration or cost for the current schedule different from the high results?

Low and high estimates for inputs, which you define for each task, are different from low and high results because their actual meanings are different.

1. You define the definition for low and high estimates for duration, cost, income input in the **Distributions** tab of **Task Information** dialog box. This can be interpreted differently depending upon what distributions you select. By default, low distribution inputs are P10 and high is P90.
2. You define the definition of low and high results for duration, cost, and income in the **Calculation** tab of the **Options** dialog box as a percentile of statistical distribution obtained as a result of your analysis. By default, low distribution results are P10 and high are P90.

Glossary

Actual Cost	Cost that is accrued during a course of task or project. RiskyProject calculates actual cost automatically based on tracking data. Alternatively, you can enter this cost manually if you uncheck a flag in **Options** (cost tab).
Actual Start Date:	The start date of a task based on tracking data. Actual start dates can be input using the **Tracking** tab in **Task Information** dialog box. The Result Giant chart takes into account the actual start date. In addition, the Gantt chart shows actual start dates.
Assignment (for Resources)	Resources are assigned to particular tasks. Each assignment is defined by a resource name and the number of units allocated for the task. Assignments are defined in the **Task Information** dialog box.
Assignment (for Risks)	See Risk Assignment
Assignment Units	The percentage of a work resource's time assigned to a task.
Base Calendar	A calendar that can be used as a project and task calendar that specifies default working and nonworking time for a set of resources. Differs from a resource calendar, which specifies working and nonworking time for an individual resource.
Baseline Project Schedule (Baseline)	The baseline project schedule is a snapshot of the project schedule. Baselines are saved without taking into account risks, uncertainties, and tracking information. RiskyProject uses an unlimited number of project baselines. Current baseline project schedules are shown in the Project view. The current baseline name is shown in the status bar. You may create baseline, restore baseline, or delete baseline. Baselines are very useful for analysis of mitigation efforts.
Budgeted cost	Cost associated with current project schedule.
Calendar	Calendar is a set of working and non-working times and days. Calendars are defined in **Working Time** dialog box. RiskyProject uses project, task, and resource calendars. Any number of calendars can be created.
Chance of Risk Occurrence	Chance that the selected risk, assigned to the task or resource or particular risk alternative, would occur. In this document, the chance of risk occurrence usually refers to the input chance for a risk assignment. Risk probability refers to the calculated probabilities for this risk, which can be different.
Closed Risk or Issue	Risks or issues that previously affected the project, but were analyzed, addressed, mitigated, and no longer affect the project. You may switch between opened and closed risks in the Risk Information dialog of **Risk Register**.

Constraint	A restriction that is set on the start or finish date of a task. If you enter a new task by specifying parameters (task name, duration, etc.) rather than start and finish dates, RiskyProject does set a constraint and the task will start and finish as soon as possible. If you specify a start date, a constraint is set to Start No Later Than. If you specify a finish date, a constraint is set to Must Finish On. You can change or remove constraints in the **General** tab of the **Task Information** dialog box. Constraints for start or finish dates are indicated using an orange background in all views.
Convergence	In the process of Monte Carlo simulations, RiskyProject monitors mean and standard deviation of project duration. RiskyProject then calculates relative difference between standard deviations of project duration in two consecutive simulations. If convergence monitoring is turned on, the simulation will stop, when this relative difference is less than the predefined value within a predefined number of simulations. The same is done for mean. Convergence parameters are set in the **Options** dialog box, **Calculation** tab. Convergence allows you to minimize the number of simulations and reduce calculation time, if a sufficient amount of information is collected.
Cost Per Use	Per-use costs are one-time fees for the use of a resource, such as equipment. Per-use costs never depend on the amount of work done. Instead, they are one-time costs that are incurred every time that the resource is used. Although a per-use cost for a work resource depends on the number of assignment units used, a per-use cost for a material resource is applied only one time. Cost per use is defined in **Resource View**.
Criticality Index	How many times this task was on the critical path. Criticality index is calculated as a result of a Monte Carlo simulation. For example, if total number of simulation was 1000 and particular task was 640 times on the critical path, criticality index for this task will be 64%.
Crucial Task	A task that has the most potential to affect project duration. Crucial tasks are shown as red in the **Crucial Task View**. RiskyProject calculates the Spearman Rank Order correlation coefficient and it as an indicator of how task duration affects project duration.
Cumulative Probability Plot	This chart plots cumulative probability versus the value of a variable. A cumulative probability chart allows you to analyze the risk associated with a variable. All cumulative probability charts in RiskyProject are interactive. By moving the slider, you can determine what is the chance that the project will be completed within a given period; or what is the chance that the cost of the project will be within budget? Cumulative probability charts can be combined with frequency charts using the same variable.

Current Schedule	The deterministic project schedule that is currently active and used for probabilistic calculations. In most cases, it is the original project schedule you created or imported from other project management software. You may also set a baseline, which you previously created. See "Baseline Project Schedule (Baseline)" for more information.
Duration	The total span of working time required to complete task or the whole project. Task duration can be input in months, weeks, days, hours, and minutes, as it is specified in **Options** dialog box (Duration tab). Normally, duration is calculated in hours. Duration is calculated using your current calendar.
Earliest Project Deadline	See Project Deadline
Effort Driven Scheduling	The duration of a task shortens or lengthens as resources are added or removed from a task, while the amount of effort necessary to complete a task remains unchanged
Event Chain Methodology	A method of defining and analyzing uncertainties in time related business and technological processes. According to this methodology, most uncertainties are driven by stochastic events or risks. Single events can precipitate other events and create event chains. RiskyProject implements this methodology for project management problems.
Finish date	The date the task is scheduled to be completed. The start date is calculated based on successors, predecessors, constraints, and task durations using the current calendar.
Fixed Duration Task	A task in which the duration is fixed. Any changes to the work or the assigned units [that is, resources] will not affect the task's duration. This is calculated as follows: Duration x Units = Work.
Frequency Chart	This chart plots the number of samples or probability versus the value of the variable. Frequency charts allow you to analyze the risk associated with a variable. All frequency charts in RiskyProject are interactive. By moving the slider, you can check the chance that the project will be completed within a given period, or what is the chance that the cost of the project will be within budget. Frequency charts can be combined with cumulative probability chart for the same variable.
Free Slack	Amount of time that a task can be delayed without delaying any successor tasks. If the task has no successors, free slack is the amount of time that a task can be delayed without delaying the entire project's finish date.
Frontier Lines	The Joint Confidence Level plot presents frontier lines or lines where Cost and Duration (Finish Time) combination meets certain predefined targets. You can define many frontier lines with different targets.

Gantt Bar	A graphical element of the Gantt chart that represents start, finish times, and duration of the task.
Global Risk Assignment	A stochastic event, which affects all tasks or resources in the project. Global risks are presented in the **Risk Assignment** View. You may also use **Risk Register** to assign global risks.
Income	Net processed from sales or net profit (without cost). RiskyProject analyzes cost and income separately, because they may have different risk and uncertainties. Specifically, RiskyProject has the risks Fixed Income Increase and Relative Income Increase. You can assign a special statistical distribution for Income.
Income Actual	Income that is accrued during the course of a task or project. RiskyProject calculates actual cost automatically based on tracking data. Alternatively, you can enter this income manually if you uncheck a flag in Options (cost tab).
IRR (Internal Rate of Return)	The rate of return that would make the present value of future cash flow (income) equal current market price of investment (cost). RiskyProject calculates IRR in Cash flow view.
Issue	Event that has already occurred. Issues could be viewed in Risk Register. Risks can be converted to issues using the Risk Information dialog from Risk Register. When risks become an issue, the chance of risk occurrence would become 100% for all risk assignments. You have to manually set the chance of risk occurrence to 100% for all mutually exclusive alternatives.
Joint Confidence Level Plot	Scatter Plot also known as Cost vs. Duration or a Bull's Eye plot shows a comparison of the Total Project Cost vs. Total Project Duration or Finish Time for each iteration of the simulation and is part of the Project Summary. Joint Confidence Level Plot may include frontier lines, which show Cost and Duration (Finish Time) combination that meet certain predefined targets.
Kurtosis	Kurtosis is one of statistical parameters used by RiskyProject. Kurtosis is a measure of the flatness or peaked nature of a distribution relative to a normal distribution. RiskyProject presents kurtosis as part of results of Monte Carlo simulations for project and for the tasks. $Kurt = \left\{ \frac{1}{n} \sum_{i=1}^{n} \left[\frac{x_i - \mu}{\sigma} \right]^4 \right\}$ where μ is mean, σ is standard deviation and n is number of samples (number of Monte Carlo simulations).
Lag	The delay between the finish of the predecessor and the start of the successor task. Lags can be probabilistic. They are defined by statistical distribution.

Late Start and Late Finish	The latest date that a task can start (for late start) or finish (for late finish) without delaying the finish of the project. This date is based on the task's start or finish dates, as well as on the late start and late finish dates of predecessor and successor tasks, and other constraints.
Latest Project Deadline	See Project Deadline
Legend	The Legend appears by default at the bottom of each view. It contains practical information for each view. By default, legends are turned off. They can be toggled on and off from the **View** menu or the **Options** dialog box (**View** tab). In addition, legends can be turned off by clicking the X in the title bar of legend.
Lognormal Distribution	A distribution where the logarithm of the variable follows the normal distribution. The lognormal distribution is often used to model data, which is positively skewed.
Material Label	Material resource property: name of material units (e.g., ton).
Maximum Project Duration	See Project Deadline
Material Resources	The supplies or other consumable items used to complete tasks in a project. RiskyProject treats both work and material resources differently during calculation.
Maximum Units	Parameters associated with work resources. These are used in analysis of resource allocation: a resource will be over-allocated if the maximum units are exceeded.
Maximum Value	The maximum result of a Monte Carlo simulation. It can be the maximum value of duration, cost, and start and finish times for all simulations. RiskyProject presents minimum and maximum values as part of results for Monte Carlo simulations for projects and tasks.
Mean	Mean is one of the statistical parameters. Mean is calculated as the sum of variable values on each simulation divided by the number of simulations.
Milestone	A reference point indicating a major event in the project. Milestones are used to monitor the project progress. Milestones in RiskyProject may or may not have zero duration. If the task has zero duration, it is automatically displayed as a milestone.
Minimum Value	Minimum result of Monte Carlo simulations. It can be a minimum value of duration, cost, start, and finish times for all simulations. RiskyProject presents minimum and maximum values as part of the results of Monte Carlo simulations for the project and for tasks.

Monte Carlo	The mathematical method used on risk analysis. Monte Carlo simulations are used to approximate the distribution of potential results based on probabilistic inputs. Each simulation is generated by randomly pulling a sample value for each input variable from its defined probability distribution. These input sample values are then used to calculate the results (in RiskyProject, it is project schedule parameters: project duration, start and finish times, success date, and cost). This procedure is then repeated until the probability distributions are sufficiently well represented to achieve the desired level of accuracy. The probability distribution to be used for these inputs is dependent on the types of numbers you want to generate.
NPV (Net Present Value)	NPV is the present value of investment's future cash flow minus initial investment. RiskyProject calculates NPV and presents it in Cash flow view. You may change discount rate for NPV calculation.
Non-schedule Risk Outcomes	Risk outcomes, which do not affect project schedule directly. Examples are safety related risk outcomes (reduce safety, accident, etc.), quality related outcomes (reduce quality), etc. See risk outcomes for more information
Normal Distribution	A distribution that describes situations where values are distributed symmetrically around the mean. 68% of all values under the curve lie within the standard deviation of mean and 95% lie within two standard deviations.
Opened Risk or Issue	Risk or issue that is currently active and may affect your project schedule. You may switch between opened and closed risks in the Risk Information dialog of **Risk Register**.
Opportunity	Risk event, which positively affects the project. In RiskyProject, opportunity is determined based on the results of risk outcomes. If a result is negative, (for example fixed delay is -2 days) it is an opportunity. Otherwise, it is a threat.
Overallocation	An over-allocated resource has more work assigned than can be done in the resource's available time. Overallocation is the number of hours a resource is scheduled for all assigned tasks over the resource's available time. Overallocation is shown within the **Resource** view. Use the shortcut menu (right-mouse click) to switch between the different types of charts available in the **Resource** view.
P1/P99 (P5/P95, P10/P90) range	The difference between P1 and P99 percentiles (P5 and P95, P10 and P90). RiskyProject presents such ranges as part of results for Monte Carlo simulations for project and for tasks.
Peak Units	The highest level at which a resource is scheduled for all assigned tasks during a given period. Peak units are shown in the **Resource** view. Use the shortcut menu (right-mouse click) to switch between the different types of charts available in the **Resource** view.

Percent Allocation	The percentage of a resource's capacity for all assigned tasks during a given period. Percent allocation is shown within resources view. Use the shortcut menu (right-mouse click) to switch between the different types of charts available in the **Resource** view.
Percentile	A measure used in statistics indicating the value below which a given percentage of observations in a group of observations fall. A value in the 95^{th} percentile is a value equal to or better than 95 percent of other values. RiskyProject presents percentiles as part of results of Monte Carlo simulations for project and for the tasks. Notation P95 indicate 95^{th} percentile.
Predecessor	A task that must start of finish before another task starts of finishes.
Project Calendar	The base calendar used by the project. Project calendar is used for scheduling tasks if tasks or resource calendars are not defined.
Project Deadline	Calculated using the earliest project deadline, the latest project deadline, and the maximum project duration. These parameters are entered in the **Main Project Settings** dialog box (see Project menu). The project is cancelled when the deadline is reached. The deadline can also affect the project success rate as any tasks that exceed the project deadline are canceled.
Projected Duration	The task duration, which is recalculated, based on current schedule task duration and tracking data.
Range	The difference between maximum and minimum values. RiskyProject presents range as part of results for Monte Carlo simulations for projects and tasks.
Resource Calendar	A calendar that specifies working and non-working time for a specific resource. A resource calendar differs from a project calendar, which specifies working and non-working time for more than one resource.
Resource Information dialog box	This dialog box contains **General** and **Risks** information about particular resources. The Resource Information can be viewed by double clicking on any not editable field associated with the resource in the resource view, for example on resource ID. The Resource Information dialog box can also be opened using shortcut menu in resource view.
Resources	People, materials, and costs used to complete tasks.
Profit	Profit = Income – Cost. Profit is calculated only if income is defined for at least one task.
Risk	A stochastic event that can be applied to tasks or resources and affects project schedules. Risks are defined by name. When risks are assigned to tasks or resources, you need to define their chance of occurrence, outcome, and time of occurrence.

Risk Assignment	Risk can be assigned to all tasks or resources (global) or particular task or resource (local). When you perform risk assignment, you need to define chance of risk occurrence, risk outcome, result, and moment of risk. If risk is not assigned to any tasks and resources, it will remain in the Risk Register but will not be used for risk ranking and will not affect your project schedule.
Risk Category	Group of risk outcomes. RiskyProject calculates risk impacts and scores for each category. For example, one of the default risk categories is safety. It has a number of outcomes: reduce safety, injury accidents, etc. Risks within these outcomes will be ranked together.
Risk Chart	Chart, which represents task risk, expressed as standard deviation, range, P10. P90, etc. versus task cost or task duration.
Risk Impact	RiskyProject calculates risk impact for duration, cost, and combined for all parameters as a result of sensitivity analysis, normalizes it, and presents it within different views, including Risk Register, and Risk Matrix. Red for threat-type risk impact means there is a strong correlation between the risk and project duration/cost. Yellow means that there is a medium correlation between the risk and the project duration/cost. Green means there is a weak or no correlation between the risk and project duration/cost. Colors for opportunity type risk impacts are the opposite. If a risk has threats and opportunities, its color is not defined.
Risk Matrix	The view presenting risk probability versus risk impact within matrix. Risk matrix uses different colors (red, green, and yellow) to represent severity of the risk. In RiskyProject, risk matrix can be viewed separately for risks and opportunities.
Risk Outcome Type	A result if a risk occurs. In quantitative analysis risk outcome types can be schedule-related and non-schedule. Multiple risk outcome types can be combined in risk category. You can customize non-schedule risk outcome types, as well as enable/disable schedule risk outcome types using the **Categories and Outcomes** dialog. If a risk is assigned to a task, the outcome type can be Increase cost, Delay Restart End task, Cancel task Cancel task + all successors, Cancel Project, and others. If a risk is assigned to a resource, the outcome type can be Increase cost, Delay, Restart, End task, and others. If an outcome is set to No impact, the risk is ignored.
Risk Probability	Calculated chance that event would occur. Risk Probability is shown in Risk Matrix, Risk Register, and other views and dialog boxes, where risks information can be viewed. In this document, chance of risk occurrence usually refers to input chance for risk assignment. Risk probability refers to the calculated probabilities for this risk, which can be different.

Risk Properties	Attributes, associated with the risks. Examples of these risk properties include when risk is created or modified, name of record, name of contact, and other information. Default sets of risk properties are defined in **Default Risk Properties** dialog. Actual values of these risk properties are entered in the **Risk Information** dialog of **Risk Register**.
Risk Register	The set of all risks. Includes input parameters: opened or closed, risk or issue, and properties. Also, includes calculated parameters: threat or opportunity, pre- and post-mitigation probability, impact, and score. Risks from Risk Register should be assigned to tasks or resources. RiskyProject is shown in Risk Register view.
Risk Severity	Range of risk probabilities and impacts defined by different colors and presented on Risk Matrix or Risk Trend chart. For example, risk with high probability and impacts placed on red area on risk matrix are called High severity risks.
Risk Score	Calculated risk impact multiplied by risk probability. Risk score can be viewed in **Risk Register** view and **Risk Matrix** view. You may sort all risks based on risk score in **Risk Register**.
Seed (in Monte Carlo Simulations)	Seed is a number, which is used as a starting point for Monte Carlo simulations. RiskyProject automatically generates and saves the seed for all uncertain parameters: duration, start and finish times, work, cost, etc.
Schedule	The timing and sequence of tasks within a project. A schedule contains tasks with dependencies, as well as other project information.
Schedule Related Risk Outcome types	In quantitative risk analysis, Risk outcome types that directly affect project schedule. Examples are restart task, fixed delay, and fixed cost increase. Schedule related risk outcome types are hard coded, but you can enable or disable them. See Risk Outcome Types for more information
Semi Standard Deviation	Semi standard deviation is calculated the same way as standard deviation, except only samples below mean are used in the calculation. RiskyProject presents semi standard deviation as part of results of Monte Carlo simulations for project and for the tasks.
Skewness	Skewness is a measure of the degree of asymmetry of a distribution around its mean. If the distribution is skewed to the left, it will have a positive skewness. If it is skewed to the right, it will have a negative skewness. RiskyProject presents skewness as part of results of Monte Carlo simulations for project and for the tasks. $Skew = \frac{1}{n}\sum_{i=1}^{n}\left(\frac{x_i - \mu}{\sigma}\right)$ where μ is mean, σ is standard deviation and n is number of samples (number of Monte Carlo simulations).

Spearman Rank Order correlation coefficient	A nonparametric (distribution-free) rank statistic proposed by Spearman in 1904 as a measure of the strength of the associations between two variables. It is used in RiskyProject to estimate which task duration, risk, task start date, task cost, risk, etc. affects project duration, finish time, cost, and success rate are the most critical. Complete results of calculation in form of chart are shown in Sensitivity View. See Lehmann, E.L. and D'Abrera, H.J.M. *Nonparametrics: Statistical Methods Based on Ranks, rev. ed.* Englewood Cliffs, NJ: Prentice-Hall, pp.292, 300, and 323, 1998.
Standard deviation	The standard deviation is a measure of how widely dispersed the values are in a distribution. Equals the square root of the variance. RiskyProject presents standard deviation as part of results of Monte Carlo simulations for project and for the tasks. Standard deviation can also be shown for input distributions for cost, duration, and start time (see **Task Information** dialog box, Distributions Tab). $\sigma = \sqrt{\frac{1}{n-1}\sum_{i=1}^{n}(x_i - \mu)^2}$ where μ is mean and n is number of samples.
Start date	The date when task is scheduled to begin. The start date is calculated based on successors, predecessors, constraints, task durations using current calendar.
Statistical Distribution	An arrangement of values or variables showing their observed or theoretical frequency of occurrence.
Subtask	A subtask is a task that is part of a summary task. The subtask information such as cost, and duration is consolidated into the summary task. Summary task and subtasks can be outlined using the **Indent** and **Outdent** buttons located on the **Formatting** toolbar, as well as the **Indent** and **Outdent** menu items.
Success Rate	The chance that a task or project will be completed. A task success rate of 56% means that there is a 56% chance that this task will be completed and 44% percent chance that it will be canceled. A task can be canceled when either it reaches a task or project deadline, or if a risk with a **Cancel task**, **Cancel Task + all successors** or **Cancel Project** outcome type occurs. A project can be canceled either when it reaches the project deadline or if a task, risk with a **Cancel Project** outcome occurs. The task success rate is shown on the **Success Rate** view, but it can be requested within any view. The Project success rate is shown in the **Project Information** view.
Successor	A task that cannot start or finish until another task starts or finishes.
Summary Task	A task that encompasses and summarizes the duration and costs of all tasks in a group. Summary task and subtasks can be outlined using the **Indent** and **Outdent** buttons located on the **Formatting** toolbar, as well as the **Indent** and **Outdent** menu items.

Task Deadline	A target date for the completion of a task. Task deadlines are defined in the **Deadlines** tab of **Task Information** dialog box. You can assign different actions for when a deadline occurs: the deadline can be ignored in the scheduling process and the task can be canceled with or without affecting the success rate. Deadlines are displayed as a red arrow in Gantt charts. Deadline arrows can be turned off and on in the Project **Options** (**Calendar** tab).
Task Dependencies	The type of link between different tasks. There are four types of task dependencies: 3. Finish-To-Start: Task 2 (successor) cannot start until task 1 (predecessor) finishes 4. Start-To-Start: Task 2 (successor) cannot start until task 1 (predecessor) starts 5. Finish-To-Finish: Task 2 (successor) cannot finish until task 1 (predecessor) finishes 6. Start-To-Finish: Task 2 (successor) cannot finish until task 1 (predecessor) starts Task dependencies can be defined in the **Task Information** dialog box (predecessor tab). They can also be defined using the toolbar buttons.
Task Information dialog box	Information regarding a specific task is organized using a series of tabs (**General**, **Predecessors**, **Resources**, **Deadline**, **Risks**, **Distributions**, **Tracking**, and others). The dialog box can be opened by double-clicking on any non-editable field associated with a task in the task view. A task ID is an example of a non-editable field. You can also open the Task Information dialog box using the shortcut menu in the task view or choosing **Project> Task Information** from the menu.
Task	An activity or job that has a start date and time, an end date and time, duration, and other properties. A Project is comprised of tasks.
Task Calendar	The base calendar that you can apply to individual tasks to control their scheduling, usually independent of the project calendar or any assigned resources' calendars. By default, all tasks use the project calendar.
Threat	Risk events that negatively affect the project. In RiskyProject, a threat is determined based on the result of a risk outcome. If the result is positive (for example, fixed delay is 2 days) it is threat. Otherwise, it is an opportunity.
Time scale	The time period indicator that appears at the top of the various Gantt charts, the Resource charts, frequency and cumulative probability plots and tracking plot. Time scale always has two tiers. Information in timescales is automatically adjusted based on the resolution of the particular chart.

Total Slack	Amount of time that a task can be delayed without delaying any successor tasks. If the task has no successors, free slack is the amount of time that a task can be delayed without delaying the entire project's finish date.
Variance	The variance is a measure of how widely dispersed the values are in a distribution, and thus is an indication of the risk of the distribution. It is calculated as the average of the squared deviations about the mean. The variance gives disproportionate weight to outlying values that are far from the mean. The variance is the square of the standard deviation. RiskyProject presents range as part of results for Monte Carlo simulations for project and for tasks. $\sigma^2 = \frac{1}{n-1}\sum_{i=1}^{n}(x_i - \mu)^2$ where μ is mean, σ is standard deviation and n is number of samples (number of Monte Carlo simulations).
View	A graphic user interface component, which may combine charts and worksheets. RiskyProject has 12 views. You can navigate between views using the ribbon or the **Workflow** bar. The order of the views in the workflow bar reflects the recommended project risk management workflow.
Work	For tasks, the total labor required to complete a task. For assignments, the amount of work to which a resource is assigned. For resources, the total amount of work to which a resource is assigned for all tasks. Work is different from task duration.
Work in Resource Chart	Total number of hours a resource is scheduled for all assigned tasks during a given period. Work is shown within **Resource** view. Use the shortcut menu (right-mouse click) to switch between the different types of charts available in the **Resource** view.
Workflow bar	Located on the left of the RiskyProject workspace, the Workflow bar allows you to quickly select and open Views. The order of the views in the workflow bar reflects the recommended project risk management workflow. The Workflow bar can be turned on and off from within the **Options** dialog box (view tab) or the **View** menu. In addition, the Workflow bar can be turned off by clicking the X in the title bar (top of workflow bar).

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