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
- 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.
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.

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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.
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:

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.

Use the Risk Register to:
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:

- Risk Register
  - Risk 1 with attributes:
    - General Information
    - Risk history
  - Risk 2 with attributes
  - Risk 3 with attributes
  - …………………

- Mitigation or response plans
  - Plan 1 with attributes
  - Plan 2 with attributes
  - ……

- Risk Register Settings
  - Risk Categories and Outcomes
  - Default Risk Properties
  - Risk Matrix settings
  - Risk ID generation rules
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 at 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*:

![Risk Information dialog](image)

Default list of risk outcomes can be customized in the **Format Risk Matrix** dialog box.

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:

<table>
<thead>
<tr>
<th>Label</th>
<th>Interval</th>
<th>Midpoint</th>
</tr>
</thead>
<tbody>
<tr>
<td>Negligible: &lt; 1 month delay</td>
<td>From 0% to 20%</td>
<td>10%</td>
</tr>
<tr>
<td>Minor: 1-3 month delay</td>
<td>From 20% to 40%</td>
<td>30%</td>
</tr>
<tr>
<td>Moderate: 3-6 months delay</td>
<td>From 40% to 60%</td>
<td>50%</td>
</tr>
<tr>
<td>Serious: 6-12 months delay</td>
<td>From 60% to 80%</td>
<td>70%</td>
</tr>
<tr>
<td>Critical: &gt; 1 year delay</td>
<td>From 80% to 100%</td>
<td>90%</td>
</tr>
</tbody>
</table>

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

![Relationship diagram](image)
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:

<table>
<thead>
<tr>
<th>Chance</th>
<th>Outcome Type</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>10%</td>
<td>Relative delay</td>
<td>Negligible: &lt; 1 month</td>
</tr>
<tr>
<td>2%</td>
<td>Relative delay</td>
<td>Low: &lt; 1-3 months</td>
</tr>
</tbody>
</table>

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 shows mutually exclusive alternatives. You can view this diagram by clicking the About Risk Alternatives button in the Probabilities and Outcomes tab of the Risk Information dialog box.

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):

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Chance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safety – 70%</td>
<td>Safety – 30%</td>
</tr>
<tr>
<td>Schedule – 50%</td>
<td>Schedule – 30%</td>
</tr>
<tr>
<td>Cost – 50%</td>
<td>Cost – 30%</td>
</tr>
</tbody>
</table>

Calculated

Integrated probability and impact for all parameters

Impact - 70%  Probability – 30%
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 for all categories:

1. **Original**: when risk chance and outcome are defined. This information is saved in Risk History. If you want to change original probabilities, impacts and scores, you would need to make modifications in Risk History using the History tab on the Risk Information dialog box.

2. **Pre-mitigation or Current**: reflects most recent changes to chance and outcomes. If you simply enter chance and outcome, your original probability, impact and score will be represented as Pre-mitigation or Current value.

3. **Post-Mitigation**: Pre-mitigation probability, impact and score, with changes to do mitigation plans.

You can view all sets of probabilities, impacts, and scores in the Risk Register.

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.
Risk Attributes

About Risks

Each risk in RiskyProject can have a number of attributes. Some of the most common attributes are predefined and are found in the Properties tab of the Risk Information dialog box; however, you are not required to complete all of them. You should define the information required as part of your risk management plan.

General Information includes:

- **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.

- General Information about risks is a set of attributes that does not affect the calculation of probabilities, impacts, risk cost or mitigation efforts for qualitative risk analysis.
- 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”.
- You define the default risk mitigation strategy and default time between risk sunrise and sunset in the Default Risk Properties dialog box (Risk tab of the ribbon, Settings pane).
Defining General Information about risks

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 general information about the risks in the Properties tab.

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.
RiskyProject Getting Started Guide

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.

About Cost of Risk Calculations

Risk cost calculates the total cost of a risk that takes into account the risk mitigation plans linked to the risk. The Risk cost calculation is performed in the Properties tab of the Risk Information dialog box.

Risk cost calculation

1. Enter Potential Loss: the loss in monetary terms if the risk occurs.
   
   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. Probability Before Mitigation comes from the Probabilities and Outcome tab of Risk Information dialog box. See Risk Probabilities and Impacts for more information.

3. Expected Loss takes into account that the risk may not occur. It is an indicator that helps you to compare the costs of different risks. Expected loss can be calculated manually or automatically depending of 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:

\[ \text{Expected loss} = (\text{Project Cost with Risks} - \text{Project Cost Original}) \times \text{Correlation Coefficient} \]

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 Enterprise, the automatic calculation cannot be performed at the enterprise level or on summary projects, as they do not include project activities.

4. **Total Expected Loss** (for RiskyProject Enterprise only):

\[ \text{Total Expected loss} = \text{Expected Loss on Current Level of Project Hierarchy} + \text{Expected Loss of Sub Projects} \]

Total expected loss is calculated at the enterprise or on for summary project level. For example, a summary project has two sub projects with expected loss $8,000 and $7,000, which can be calculated manually or automatically. The summary project itself has expected losses of $5,000 from risk managed at that level. Total expected loss will be $20,000.

5. **Cost of Mitigation** is taken from Waterfall 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.

6. 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.

7. Residual risk may still occur 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.

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

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

9. **Expected loss after mitigation** 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 information

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%

10. **Total Risk 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

11. **Saving from Mitigation** 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.

**Assigning Risk Response Plans**

Response plans defined in the **Mitigation and Response** view can be assigned to risks. Only one response plan can be assigned to a particular risk.

**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 **Properties** tab
4. Select **Response Plan** from defined in Mitigation and Response View from dropdown list.
5. You may define a new response plan by clicking on **New Response** button.
6. You may update a response plan description by clicking on the **Response Description** button.
Assigning Mitigation Plans

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 taken from the History tab on the Risk Information dialog.
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.

- 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**).

- 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.

**Viewing the Risk Matrix and Risk Trend Chart**

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. Select a risk category from the **Risks affected** dropdown list, if you do not select. Lists of all risks associated with the selected risk category are shown in the table. Select **All Parameters** 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, simply clear the check box. By default, risks with zero impact cannot be selected. Use the “Hide a risk if Score is < “ box to show/hide risks below the entered threshold.

To format the Risk Matrix, right-click on the **matrix** and choose **Options**. For more information about formatting the Risk Matrix, read, “Formatting the Risk Matrix”.
RiskyProject Getting Started Guide

Select risk category to view the risks

Select risk to display it on the Risk Matrix

This risk is selected

Threats and opportunities are viewed separately

Number of risks for each cell

How probabilities and impacts of risks are changing over time

Risk trend shows how risks are changing over time. Total Risks shows risk trend in the table format.
Chapter 3: Managing Project Schedules
RiskyProject for Microsoft Project as a Standalone Application

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.
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 Error! Reference source not found.
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 Error! Reference source not found.

Adding Low 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.
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 7 tab.
3. On the Input Distributions group, click Clean.

Run a Monte Carlo simulation using the Microsoft Project Add-In
Once you have added low and high estimates and distributions to your activities, you can run a simulation.

To run a Monte Carlo simulation:
1. Click the RiskyProject 7 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 7** tab. On the **Task Results** group, click **Histograms** or **Tornado**. The Task Simulation Results report opens. To read more about these reports, see [Viewing Task Simulation Results](#).
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 [Error! Reference source not found.](#).

**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.
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 or MPX format, as well as 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.

- MPX format is a legacy Microsoft Project format supported by some applications. MPX format may not contain certain scheduling information fields.
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 a 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 shown 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 the 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.

**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:

- Task Duration is greater than 0
- Task Duration equals zero

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**.
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.
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:

<table>
<thead>
<tr>
<th>Task Name</th>
<th>Cost Low</th>
<th>Cost</th>
<th>Cost HI</th>
<th>Annual</th>
<th>Fee Cost</th>
<th>Total Cost</th>
<th>Income A...</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Web design</td>
<td>$0.00</td>
<td>$0.00</td>
<td>$0.00</td>
<td>Start</td>
<td>$1004.8</td>
<td>$1604.8</td>
<td>$0.00</td>
</tr>
<tr>
<td>2 Art works</td>
<td>$0.00</td>
<td>$0.00</td>
<td>$0.00</td>
<td>Start</td>
<td>$864.00</td>
<td>$1464.00</td>
<td>$0.00</td>
</tr>
<tr>
<td>3 Selection of art work</td>
<td>$200.00</td>
<td>$200.00</td>
<td>$200.00</td>
<td>Start</td>
<td>$800.00</td>
<td>$1000.00</td>
<td>$0.00</td>
</tr>
<tr>
<td>4 Purchase of art work</td>
<td>$400.00</td>
<td>$400.00</td>
<td>$400.00</td>
<td>Start</td>
<td>$64.00</td>
<td>$64.00</td>
<td>$0.00</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Resource name</th>
<th>Chart</th>
<th>Type</th>
<th>Initials</th>
<th>Rate</th>
<th>Max Units</th>
<th>Base Calcul...</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Graphic Artist</td>
<td></td>
<td>Work</td>
<td>G</td>
<td>50.00/hr</td>
<td>100.00%</td>
<td>Standard</td>
</tr>
<tr>
<td>2 Purchaser</td>
<td></td>
<td>Work</td>
<td>P</td>
<td>40.00/hr</td>
<td>100.00%</td>
<td>Standard</td>
</tr>
<tr>
<td>3 Project Manager</td>
<td></td>
<td>Work</td>
<td>P</td>
<td>80.00/hr</td>
<td>100.00%</td>
<td>Standard</td>
</tr>
</tbody>
</table>

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 art work…” (Task 3) = $200.00

Base fixed cost for “Purchase of art work” (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 art work (Task 3) 16 hours * $50/hr = $800.00
Resource cost for Purchase of art work (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).

**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 Profit** view.
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.
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:

<table>
<thead>
<tr>
<th>View</th>
<th>dialog box/Tab</th>
<th>Local or Global</th>
<th>Assigned to tasks or resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drag’N’Drop Risk View</td>
<td></td>
<td>Local risks</td>
<td>Both task and resources</td>
</tr>
<tr>
<td>Risk Assignment View</td>
<td></td>
<td>Risks can be re-assigned to different tasks or resources or become global</td>
<td>Both task and resources</td>
</tr>
<tr>
<td>Risk Register</td>
<td>Risk information dialog (double-click on Risk ID), Assignment tab</td>
<td>Both local and global risk</td>
<td>Both task and resources</td>
</tr>
<tr>
<td>Any view with task information (Project View, Result Gantt, etc.)</td>
<td>Task information dialog (double-click on Task ID), Risk tab</td>
<td>Local risks</td>
<td>Task</td>
</tr>
<tr>
<td>Resource View</td>
<td>Resource information dialog (double-click on Resource ID), Risk tab</td>
<td>Local risks</td>
<td>Resources</td>
</tr>
</tbody>
</table>
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. activities 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 **Options** tab of the **Risk** tab:

• 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.

<table>
<thead>
<tr>
<th>Outcome Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Impact</td>
<td>This is for information only and has no impact on project schedule</td>
</tr>
<tr>
<td>Relative Delay</td>
<td>Relative Delay is for information only and has no impact on project schedule</td>
</tr>
<tr>
<td>Fixed Delay</td>
<td>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 increased. If task duration is elapsed, the delay will also be represented in elapsed units (edays, ehour, etc.)</td>
</tr>
<tr>
<td>Relative Cost</td>
<td>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 unit.</td>
</tr>
<tr>
<td>Increase</td>
<td>Works in a similar manner to fixed cost increase and relative cost increase, but applied to the income.</td>
</tr>
<tr>
<td>Fixed Cost Increase</td>
<td></td>
</tr>
<tr>
<td>Relative Income</td>
<td>Tasks are restarted from the moment the risk occurs. As a result, the task duration is increased.</td>
</tr>
<tr>
<td>Increase</td>
<td>Tasks are successfully completed when the risk occurs. As a result, the task duration is reduced.</td>
</tr>
<tr>
<td>Fixed Income Increase</td>
<td></td>
</tr>
<tr>
<td>Cancel Task</td>
<td>Tasks are canceled when the risk occurs. As a result, the task duration is reduced and the</td>
</tr>
</tbody>
</table>
task is marked as canceled.

<table>
<thead>
<tr>
<th>Cancel Task + all successors</th>
<th>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.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rate Increase</td>
<td>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.</td>
</tr>
<tr>
<td>Execute Response Plan</td>
<td>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.</td>
</tr>
</tbody>
</table>

- 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.

**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. Click the How to Assign Risk button to view this directly in the application.

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**Risk Assignments on the Gantt Chart**

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

1. On the Project view, double-click on the task ID.
2. Click the General tab.
3. Select a Base, Low, and High dates for Start Time.
4. Select 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 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 Options.
3. Enter income data for Inc. Low, Income, and Inc. High.
4. Click OK to save the estimates.

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.

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.
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.

**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.
- 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.

- 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.

**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.
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.
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 three cost diagrams:

<table>
<thead>
<tr>
<th>Cost diagram</th>
<th>Description</th>
<th>Color</th>
<th>When it is shown</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current schedule (budgeted)</td>
<td>Cost diagram with current project schedule (no risks)</td>
<td>Red</td>
<td>Always when cost or profit for any task is defined</td>
</tr>
<tr>
<td>Result cost</td>
<td>Cost diagram with risk and uncertainties (calculation results)</td>
<td>Blue</td>
<td>Shown after calculation if uncertainties are defined</td>
</tr>
<tr>
<td>Actual cost</td>
<td>Cost diagram represents actual cost</td>
<td>Green</td>
<td>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)</td>
</tr>
</tbody>
</table>

You may use the slider to determine:

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

![Diagram showing cost analysis](image-url)