

**PRC SOFTWARE**

**PRIMAVERA RISK ANALYSIS  
(PERTMASTER) TRAINING**





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# Overview Section 1: Intro to Risk

## Why Risk Management?

### Projects fail due to:

- Late Delivery
- Over Budget
- Failure to Meet Scope
- Risk Ignored
- Resource Requirements

### Business Consequences for failed projects:

- Profit Loss
- Reputation Damage
- Liquidated Damages
- Litigation

### Benefits of risk management:

- Increase Project Maturity
  - Improved Schedule
  - Accurate Estimates
  - Improved Information Flow
  - Analyze Cost and Schedule
- Tighten Margins
  - Increase Project Profit
  - Control Schedule Slippage
  - Pinpoint Contingency Dollars
  - Avoid Surprises

## Uncertainty vs. Risk Events

Risk and uncertainty are factors in managing projects. Risk involves the possibility of future events the probabilities of which can be calculated. If there is incomplete information and the expected value of occurrences cannot be determined, those elements are uncertainties.

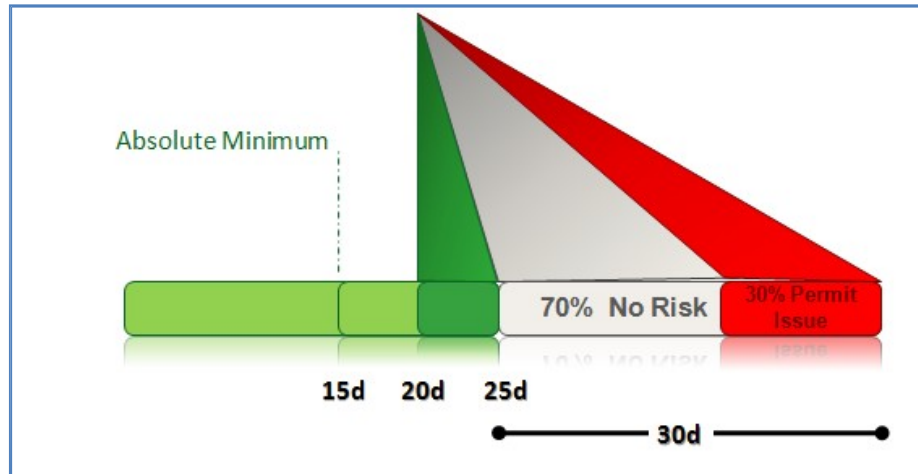
### Duration uncertainty

- Variability on how long a planned activity will take
- Planned activity has a 100% chance of occurrence
- Example: Building Demolition is planned for 20 days but has a range of 15 to 25 days.



## External Risk

- Event in question has an impact on a planned activity
- Risk events have a probability of occurrence less than 100%
- Example: Building Demolition has a 30% chance to be delayed 30 days due to permits.



## 3 Point Estimate

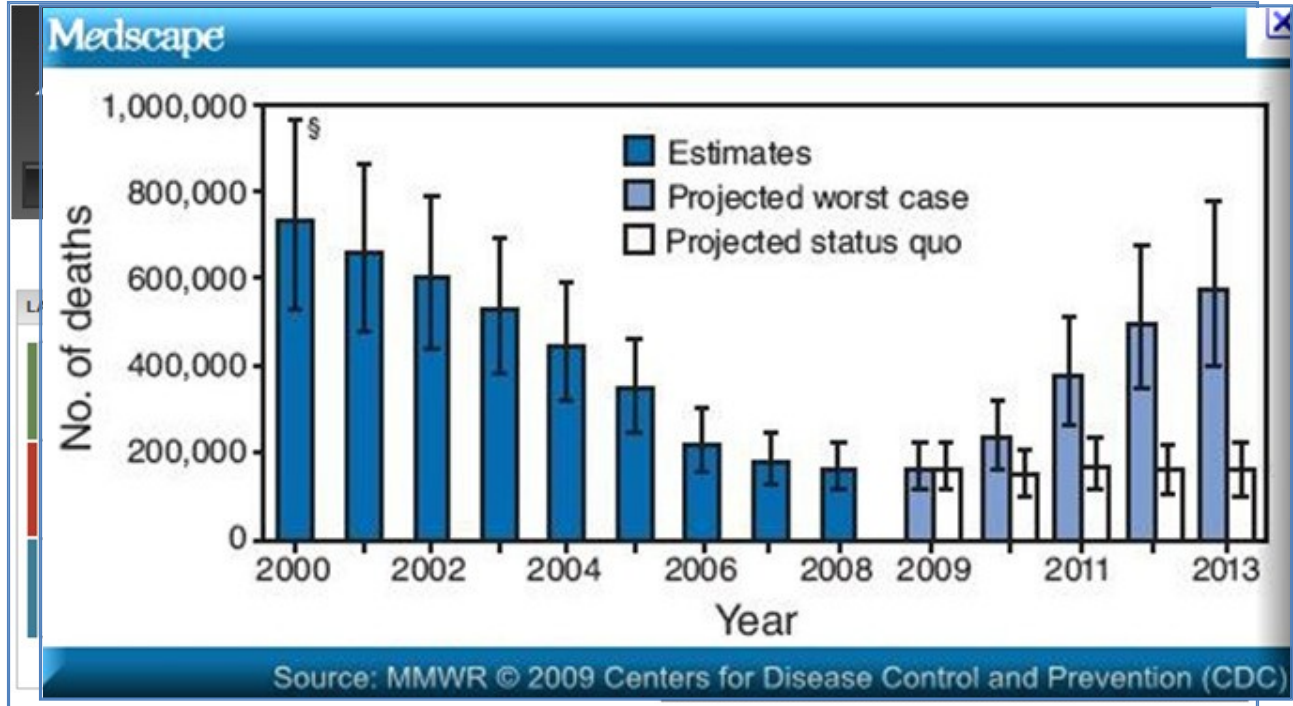
- Often used for entering uncertainty.
- Create a minimum, most likely, and maximum range for cost or duration.
- The Monte Carlo simulation will calculate data from the 3 point estimate to develop confidence or probability levels.

When modeling risk it is useful to separate uncertainty from risk events. Early in project planning no external risk events may be identified therefore ranges of uncertainty may be larger. As the project moves toward execution risk events will be identified yet uncertainty will decrease.

## Monte Carlo

Monte Carlo methods are a class of computational algorithms that rely on repeated random sampling to compute their results. The calculations provide a simulation of reality.

Monte Carlo will be used to simulate project schedules or estimates. Monte Carlo Simulations are used in many industries to simulate countless scenarios.

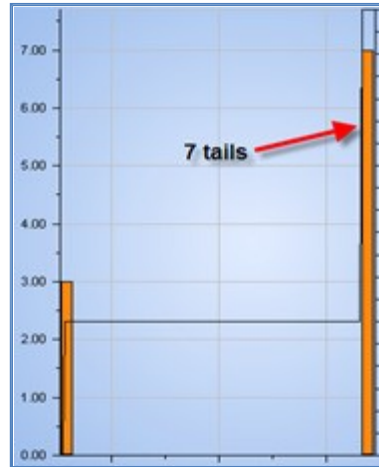
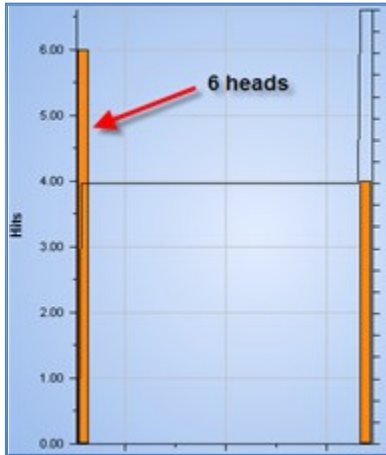


During a Monte Carlo simulation, values are sampled at random from the input probability distributions. Each set of samples is called iteration, and the resulting outcome from that sample is recorded. Monte Carlo simulation does this hundreds or thousands of times, and the result is a probability distribution of possible outcomes. In this way, Monte Carlo simulation provides a much more comprehensive view of what may happen. It tells you not only what could happen, but how likely it is to happen.

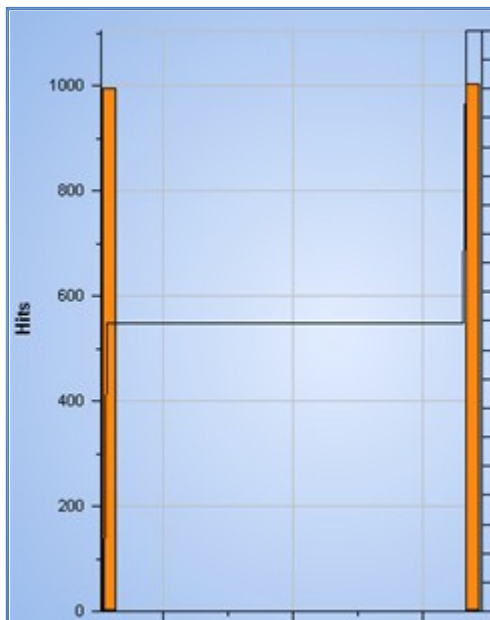
The technique is used by professionals in such fields as finance, project management, energy, manufacturing, engineering, research and development, insurance, oil & gas, transportation, and the environment.

#### Example of Monte Carlo:

- Variability input: when a coin is flipped it can hit heads or tails. The probability of heads is 50% and tails is 50%.
- Flip a coin 5 times and what is the result?
- Flip a coin 1000 times and what is the result?
- When running a simulation the results will eventually converge.
- When analysis is stopped before convergence the results may be invalid. The trend may not have developed yet.
- 5 flips may reveal sporadic results.



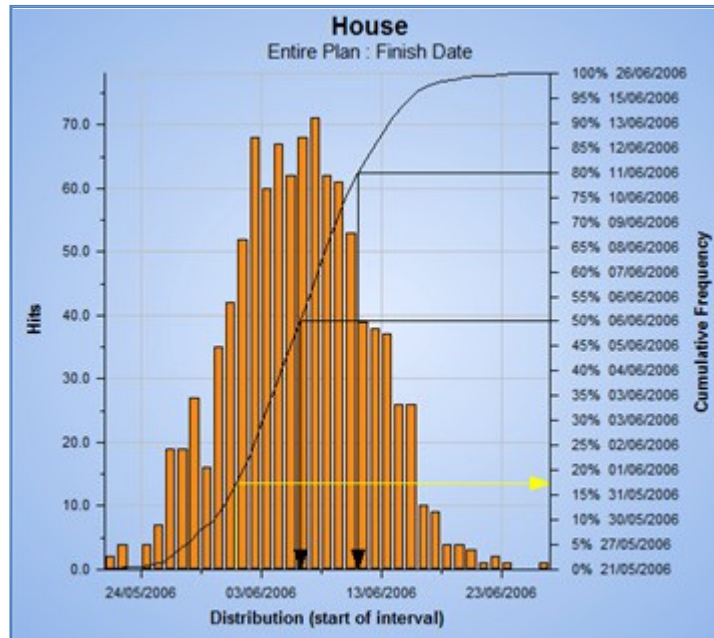
- 1000 flips should reveal approximately 50% heads on the coin flips.



## Histogram (Distribution Graph)

The histogram is a summary graph showing a count of the data points falling in various ranges. The effect is a rough approximation of the frequency distribution of the data.

The histogram shows the probability level of a finish date or cost. In a risk analysis, this would be seen as “where we are at.”



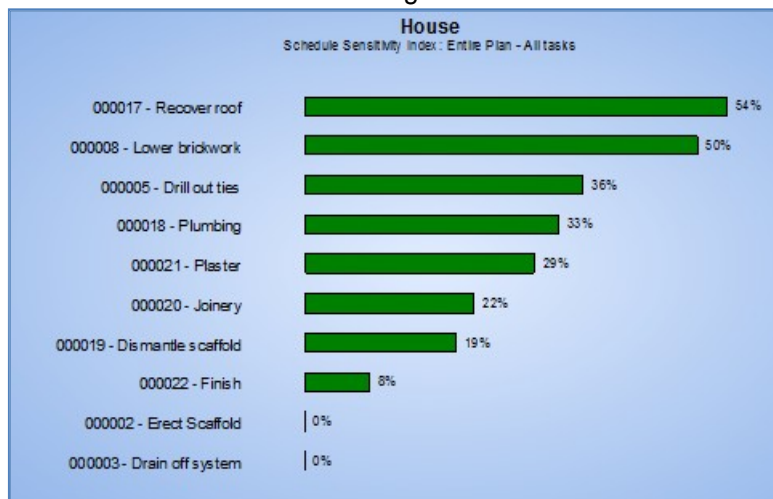
## Tornado Graph

A tornado graph is a special type of bar chart, where the data categories are listed vertically instead of the standard horizontal presentation. The largest bar appears at the top, the second largest appears second, and so on. The Tornado Graph is used to display and Rank sensitivity values.

Risk tornado charts highlight “risk hotspots.”

External risks & problem activities can be separated for improved decision making.

These charts are the answer to the histogram. The tornado chart tells us “how do we fix it?”





- Duration Sensitivity: Correlation of duration of activity and the duration of the project.
- Cost Sensitivity: Correlation of cost of the activity and the cost of the project.
- Criticality: The percentage of iteration the activity is on the critical path.
- Cruciality: Product of the duration sensitivity by the criticality.

## Risk Register

The Risk Register is a list of key risks that need to be monitored and managed. The Risk Register analyzes risks and drives action to:

- Reduce the likelihood of the risk occurring.
- Increase the visibility of the risk.
- Increase the ability to handle the risk, should it occur.
- Reduce the impact of the risk, should it occur.

Risk		Pre-Mitigation					
ID	Type	Title	Probability	Schedule	Cost	Performance	Score
1	Threat	Poor understanding and detail in specification	L	H	M	VL	12
2	Threat	Guidance System failure	VL	VH	VH	VH	8
3	Threat	Contract Delay	H	M	L	H	28
4	Threat	Key resource unavailable	H	L	L	VH	56
5	Threat	Delivery overrun	M	H	N	N	20
6	Threat	Fabrication contractor goes bust	N	M	M	M	0
7	Threat	Rework required for assembly and integration	M	M	M	L	10
8	Threat	Testing fails	L	L	L	N	3
9	Threat	Design changes	H	M	M	N	14
10	Opportunity	Reuse previous design work	H	M	H	N	28

Use the Risk Register to:

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



- Examine Exposure.

## Quantitative Analysis

If a risk occurs it may have a quantifiable schedule and/or cost impact on the project. Risks and mitigation can be integrated into the plan for analysis. Schedule, probability, and cost in the risk register will become part of the analysis and reports.

## Seven Step Process

Running a Pertmaster analysis can be broken into 7 steps. Although each analysis may be slightly different, the main 7 steps will remain unchanged. Below is a quick overview of the process. In depth help can be obtained in Pertmaster's help file

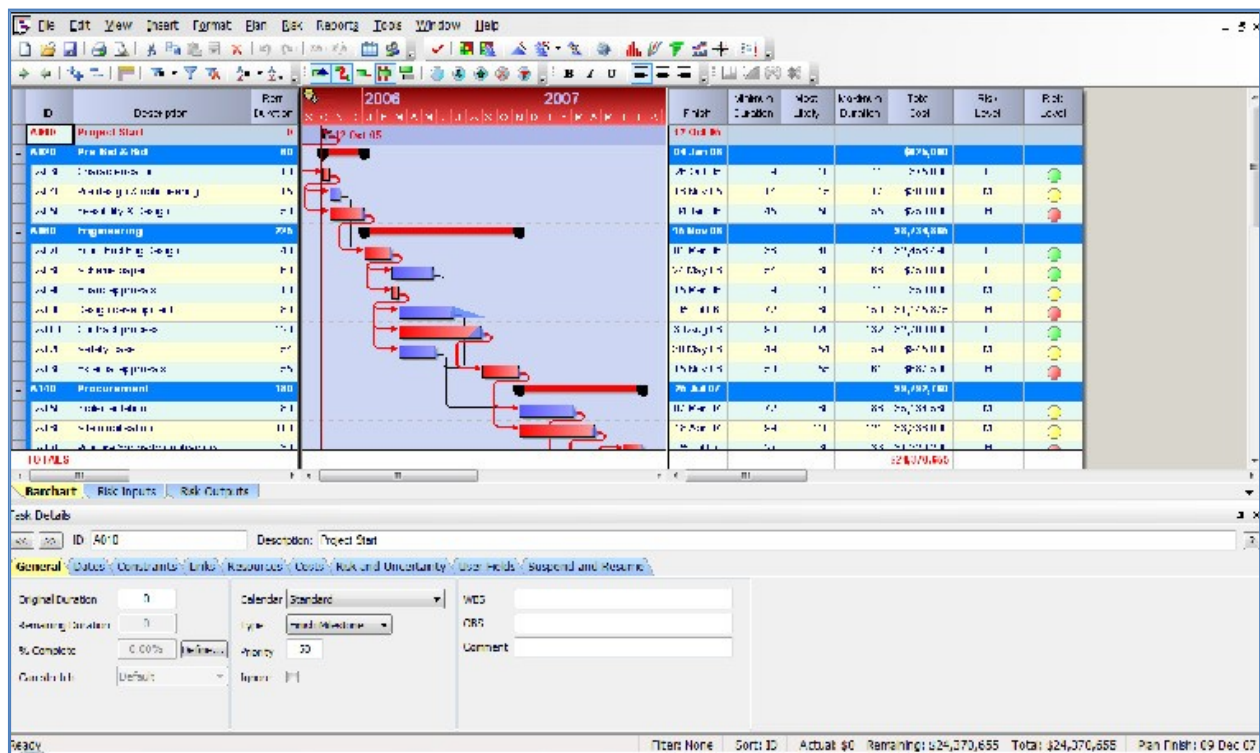
1. **File Import:** Pertmaster will allow a schedule to be imported from Primavera or Microsoft Project. The files are not directly edited but the values are imported into Pertmaster's scheduling engine for manipulation and analysis.
2. **Import Validation:** After loading a file into Pertmaster it is vital to check for errors in the import. Each scheduling engine is slightly different and errors can be caused by the nuances of the scheduling tool or poor planning techniques.
3. **Schedule Check:** Pertmaster will create a web-based report for all scheduling pitfalls in the schedules. Many schedules will need to be cleaned before loading any risk. If bad schedule data is loaded into the system, then the analysis will not be useful. Performing a network check with a Monte Carlo simulation will highlight the health of the network.
4. **Uncertainty Loading:** Pertmaster provides many methods of loading 3 point estimates on activities. A 3 point estimate is a best, most likely, and a worst case scenario used for schedule simulation.
5. **Risk Register:** The risk register will allow for the modeling of discrete risk events into the simulation. The use of the risk register can provide more accurate results statistically and aid in creating mitigation plans.
6. **Running the Analysis:** After the schedule is verified clean and the risk is loaded then a risk analysis is run. Pertmaster uses Monte Carlo techniques to simulate the schedule in order to create trends for reporting.
7. **Reporting:** Pertmaster contains a wealth of reports however the confidence histogram, risk tornado, and distribution analyzer are the 3 key reports to any analysis. The histogram shows the probability of finish to a time or budget. The tornado shows the key risk drivers. The distribution analyzer allows for the viewing of s curves on one chart for comparison and is a great tool for what-if scenario modeling.



# Overview Section 2: Interface & Menus

## Pertmaster User Interface

The Oracle | Primavera Risk (Pertmaster) user interface is designed to feel like many of the popular commercial scheduling tools on the market. The origins of the Pertmaster tool were as a scheduling tool. This section will highlight key features for navigation, shortcuts, and usability.



### Menu Ribbon

The Primavera Risk Menu Ribbon is similar to most computer applications. It is worth noting that looking at the menu items that almost all menu items are related to plan setup, options, or scheduling. There is only one menu item for risk. After a schedule import has been validated most users will not need to use options outside of the risk and report menus. The Pertmaster tool has an intimidating amount of buttons and menus. Sticking to the risk and reports menu will accomplish 90% of the functions a new or most advanced users will need.

### Shortcut Icons

The Oracle | Primavera Risk (Pertmaster) shortcut icons are located directly below the menu ribbon at the top of the user interface. Almost all menu items in the product will have a corresponding icon. Right-clicking in any blank area by the menu ribbon or toolbar icons will



Launch a list of predesigned toolbars that can be shown or hidden. By default most of the toolbars will be viewable. The large number of toolbars and icons can intimidate new users or cause confusion even with experienced users. After right-clicking on the blank area by the menu or icons, users can uncheck and hide any toolbars which they will probably not be using. This is not critical but may save some navigation time.

## Gantt Chart & Timescale

The Pertmaster Gantt chart is interactive. It will have a familiar feel to users of Microsoft Project and is even closer to Primavera P6. A separate module will detail the Gantt chart functionality; however in this training module we will list some of the key features. Hovering over the activity bars will change the pointer to either a double arrow to nudge the activity date, a single arrow to change the duration via dragging, or either an F (finish link) or an S (start link) symbol, which allows users to create a link by dragging the connection between the finish (F) or start (S) of one activity to another activity.

The Gantt chart size and timeline can be adjusted by left or right-clicking on the red timeline at the top of the Gantt chart. A left-click while holding the button allows users to pinch and pull, or zoom in and out. Right-clicking the red timescale will give users the option to format the timescale periods, etc.

## Data Columns

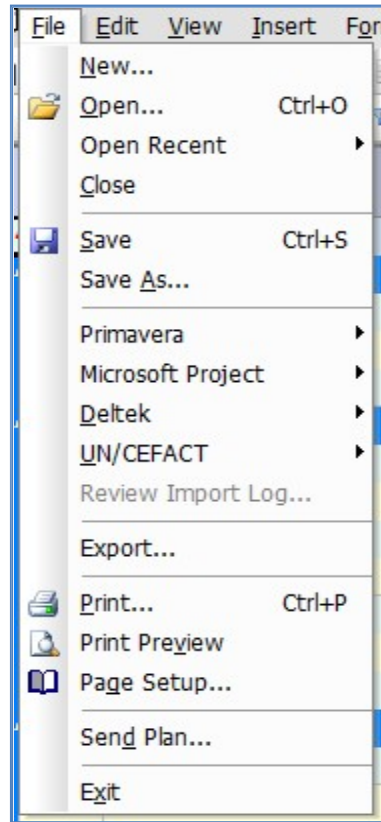
Data can manually be typed into the Pertmaster columns much like using Microsoft Excel. One of the most convenient features of Primavera Risk is the ability to copy and paste data directly to and from the columns. Data can be copied to Microsoft Excel, manipulated, and copied back. Cost estimates can be directly pasted into a blank template. Moving data back and forth to Excel can have pitfalls as it is easy to make errors, however with careful use, large amounts of time can be saved. Certain fields will have list functionality and users will only be able to paste items that are in the drop-down box such as calendar name, constraint type, etc.

## Task Details Navigation Pane

Microsoft Project and Primavera users will be familiar with using a navigation pane for data entry. At the bottom of the screen a tabbed area exists to organize all columns into sections. Data can be entered directly into the navigation pane instead of in the data columns. A thumbtack icon toward the top right corner of the navigation pane allows users to minimize the section. The navigation window can be completely hidden by removing the CHECK BY TASK DETAILS located under VIEW in the menu bar.

## Oracle | Primavera Risk: Pertmaster File Menu

The Oracle | Primavera Risk (Pertmaster) file menu contains all of the options to create a new Pertmaster Plan file, save existing files, create printouts, or start the import process from any supported scheduling tool.



### File Menu Item: New

This section allows users to create a blank new project in Oracle | Primavera Risk (Pertmaster). The user is able to select from any existing template. The product provides two default templates, NEW PLAN and SIMPLE COST ESTIMATE. Pertmaster is a full function scheduling and estimating tool. There is no database back-end; therefore it is designed as a standalone product for a single user at one time. The NEW menu option will allow users to create a project file directly in the Primavera Risk tool without having to import it from another scheduling tool such as Primavera P6, Microsoft Project, or Deltek Open Plan. Upon selecting a template, the user will have a blank project file to begin working.

### File Menu Item: Open, Open Recent, Close

This section allows users to open a project file from any supported file type, such as Primavera P6 .xer, Pertmaster .plan, and Microsoft Project .mpp files. The open menu will allow users to quickly open a file instead of finding the product specific open screen.

The OPEN RECENT menu is in-line with the Microsoft Office Suite of products and the functionality is standard. The close menu option is worth detailing as it closes only the open project and not the Oracle | Primavera Risk (Pertmaster) product. If a user has 5 open projects, then it will only close the active project.



## File Menu Item: Save, Save As

The SAVE ITEM will allow users to save the progress on an open file. Obviously the functionality does not need to be detailed, however it is very important to note that Oracle | Primavera Risk (Pertmaster) does not have a database back-end. Changes are not saved automatically. It is recommended to save frequently as data can be lost if the product or your computer crashes.

The SAVE AS ITEM will allow users to change the name of a file; however it does not change the project information which is located under the PLAN INFORMATION item under the PLAN menu. When users are creating multiple scenarios for analysis, it is recommended that each scenario be saved as a different file name and the plan information be updated.

## File Menu Item: Primavera, Microsoft Project, Deltek, UN/CEFACT

The product specific menu items allow users to directly import schedule files from the listed products. Microsoft Project .mpp, Primavera P6 .xer, Primavera P3 dir.p3, and various other backup files can be directly imported into Pertmaster. Primavera P6, Microsoft Project Server, and Deltek Open Plan Databases can also be mapped directly to the Primavera Risk product in order to create the ability to import and export data quickly and easily.

Pertmaster plans can also be saved as other file types. Under the Primavera and Microsoft menu items, options exist to export a Pertmaster .plan file to Primavera .xer, Primavera P3, and Microsoft .mpp formats. Primavera P6 is not required to be installed on a machine to export a Pertmaster file as a .xer file. To convert files to Primavera P3 and Microsoft Project, the user must have those products installed on the same machine as Oracle | Primavera Risk.

## File Menu Item: Export, Print..., Print Preview, Page Setup, Send Plan..., Exit

The EXPORT Menu has additional export options on a single screen such as different version of Primavera .xer files (P5, P6, and P7). This option will automatically create a backup file for import into another product. The original Pertmaster .plan file will not be edited in the process.

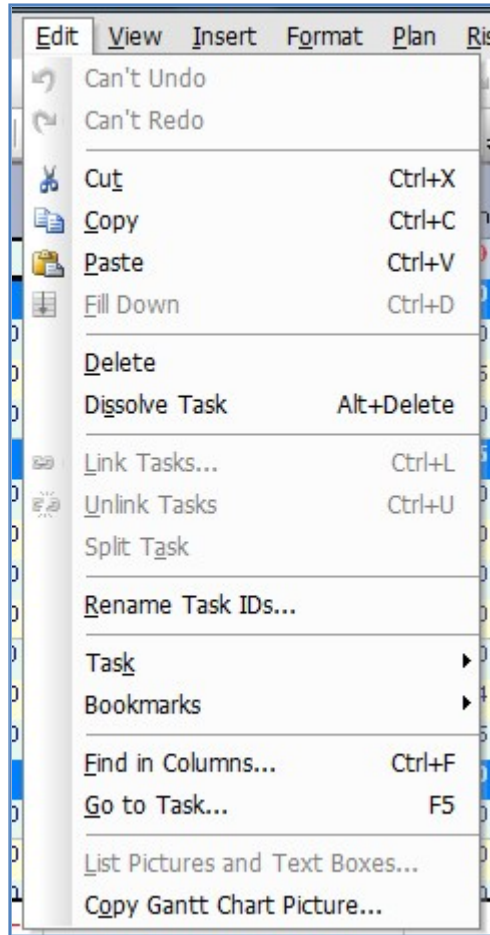
The print options are in line with the Microsoft Office Suite of products and do not need detailing. The SEND PLAN option will launch an e-mail with the current Pertmaster .plan file as an attachment.

Unlike the CLOSE ITEM above, the EXIT ITEM will close the Oracle | Primavera Risk (Pertmaster) product and all open files. Users will be prompted and given the opportunity to save files before the product actually closes. Upon closing the product certain cached data such as S Curve reports will be cleared from system memory.



## Oracle | Primavera Risk: Pertmaster Edit Menu

The Oracle | Primavera Risk (Pertmaster) EDIT menu contains options to undo and redo changes, manipulate column data, change activity links, create summary structure, bookmark activities, and search for activities





#### Edit Menu Item: Undo, Redo

This option allows users to undo or redo the last change made to the project schedule. Oracle Primavera Risk (Pertmaster) allows for an unlimited number of steps backward or forward. Additional memory can be allocated to the undo buffer via the SYSTEMS OPTIONS section under the TOOLS menu. Editing the undo buffer is probably not necessary due to the large default setting. A single step can reverse complex changes such as multiple cells that were pasted from excel simultaneously.

#### Edit Menu Item: Cut, Copy, Paste, Fill Down

The CUT, COPY, PASTE and FILL DOWN options are in-line with the Microsoft Office Suite of products and the functionality is standard. The cells in Pertmaster are similar to those in Excel. Multiple cells, lines, or columns can be highlighted and manipulated at one time.

#### Edit Menu Item: Delete, Dissolve Task

Deleting an activity in Primavera Risk will remove the activity, all links, and resource assignments. All records of the activity are removed. Dissolving an activity will remove the activity and resource assignments; however the logic connected to the activity will be relinked to keep the same chain of predecessors and successors. For example if Activity A is linked finish-start to Activity B and Activity B is linked finish-start with Activity C, then Activity B can be dissolved and Activity A will be directly linked to Activity C with a finish-start link.

#### Edit Menu Item: Link Tasks, Unlink Tasks, Split Task

In Pertmaster there are multiple ways to link tasks. Two or more activities can be linked by highlighting the activities and selecting the LINK TASKS option. Finish to Start, Start to Start, Finish to Finish, and Ladder logic can be selected. If more than 2 activities are selected, then the entire chain will be linked from top to bottom based on the sort order. Unlink Tasks will work in the opposite way. Links will be removed to and from selected activities to other selected activities. Links from a selected task to a task that has not been highlighted will not be removed.

Splitting an activity in Oracle Primavera Risk is not the same as creating suspend and resume data or creating an activity break. Splitting an activity will turn a single activity into 2 activities that are linked finish-start. The activities will take the original name of the activity and the tasks are labeled with a pt 1 and pt 2. Once the activity is split, the two parts function like any other activity. Users can manipulate both activities as they would any other activity. By default the task duration is split exactly in half and the resource units are also split the same.



## Edit Menu Item: Rename Task IDs

Activity IDs can be changed across the entire project or in groups via the RENAME TASK ID option. This option allows users to pick a name for the task and a number that will be added to the previous activity name. For example, if the initial risk name was ENG.10 for my engineering activities and the increment value was 10, the activities would be renamed from top to bottom on the screen (ENG.10, ENG.20, ENG.30, etc.).

## Edit Menu Item: Task > Edit Task Details, Promote & Demote Tasks, Expand & Contract Level

The Task section can be expanded and includes three sections. The first section is EDIT TASK DETAILS. This button serves no real purpose. The next section is for promoting and demoting tasks. Primavera Risk (Pertmaster) functions very similarly to Microsoft Project to create a summary or breakdown structure. In Primavera P6 the work breakdown structure, or WBS, is created in a separate section and acts more like a hierarchical folder system in Microsoft Windows. Activities are put in the WBS elements like a container. In Pertmaster the WBS is created by promoting and demoting tasks. If two tasks are on the same level of the WBS hierarchy, the second task can become a child of the first by demoting it. It can once again be put on the same level by promoting it.

## Edit Menu Item: Bookmarks > Toggle, Clear, and Filter Bookmarks

The Primavera Risk Gantt chart view has a column on the far left side that appears to be used only for selecting rows and expanding & collapsing the work breakdown structure. Bookmarking an activity will create a blue dot which will allow users to quickly find and skip to a desired activity. Certain functions such as the schedule check will bookmark flaws so that users may quickly skip to flagged activities or filter to only show those activities. Users can also clear all bookmarked activities by clicking the Clear All section.

## Edit Menu Item: Find in Columns, Go to Task

Pertmaster has very similar functionality to Microsoft Office products for finding items in a cell. Users can click FIND in the COLUMNS option or they can also hit the CTRL-F hot key. This will search for any activity that is visible in the columns. Hidden columns or filtered activities will not be searched.

The GO TO TASK option is one of the quickest ways to locate an activity. Upon clicking GO TO TASK a pop-up search box launches. Users are able to type in a search, apply a filter, sort activities, etc. If the user knows any part of the risk description, then it is very easy to find a task regardless of the number of activities. The search will find any part of the text string. For example if the user types "al Comp," then the Mechanical Complete milestone would be one of the items listed.

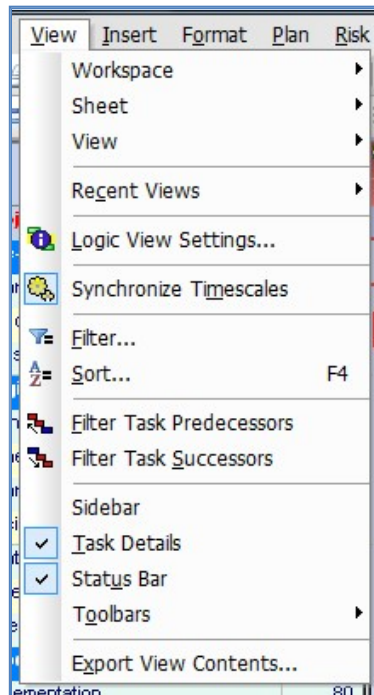


### Edit Menu Item: List Pictures and Text Boxes..., Copy Gantt chart Picture...

Users are able to add pictures and text boxes to the Primavera Risk Gantt chart. The list function will create a log of all pictures and text boxes that have been added to the Gantt chart. Items can be edited or deleted from the list view. The COPY GANTT CHART PICTURE allows one or multiple screens of the Gantt chart to be copied to the clipboard and pasted into Microsoft Office products or other similar tools.

## Oracle | Primavera Risk: Pertmaster View Menu

The Oracle | Primavera Risk (Pertmaster) VIEW MENU contains options to customize the working areas, show & hide toolbars, and filter & sort activities



### View Menu Item: Workspace, Sheet, View, Recent Views

The WORKPLACE, SHEET, and VIEW MENU options are all very similar on their sub-menus. Pertmaster allows users to create, load, or save custom layouts. The menu options are fairly easy to navigate. The Primavera Risk definition of workspace, sheet, and view are the keys to navigating this section.





In Pertmaster a view can be added to a viewable area on the screen. For example, a user can add a resource graph and PERT chart view and see those along with the Gantt chart simultaneously. A view is an area added to an existing sheet. Primavera Risk has tabbed sheets similar to Microsoft Excel. Custom tabs can be saved that will keep the arrangement of cells. Each tab is a separate work area and sorting & filtering will only affect the active sheet. A workspace is considered a compilation of all sheets in an open project. If a user creates multiple custom sheets that will be reused they can save all of the sheets in a custom workspace. Views are a part of a sheet and the configuration of multiple sheets makes a workspace.

### View Menu Item: Logic View Settings

The Primavera Risk LOGIC VIEW allows users to trace the logic on the Gantt chart view by simply clicking an activity. The logic view settings can be adjusted to show a user defined number of predecessors or successors when a task is selected. Users have 2 options to trace the logic. The logic can be traced on a single view by selecting the CAN TRACK LOGIC WITHIN ITSELF option. When an activity is clicked the active view will automatically filter based on the LOGIC TRACE options. The second option is to have 2 separate functioning Gantt chart views open. Users can then set one of the Gantt views as click-able and the other view displays the filtered data.

### View Menu Item: Synchronize Timescales

When a sheet has more than one view there is a timescale above each chart or graph. Multiple timescales for items such as Gantt charts and resource views can be synchronized by clicking the SYNCHRONIZE TIMESCALE BUTTON. This will put the timescales in perfect alignment and as one timescale is changed another will automatically reflect the changes. This option can be useful for many functions such as the logic views and resource graphs. A user could view or print a Gantt chart with the same time scale as a resource to view not only activity durations but where resources are over- allocated.

### View Menu Item: Filter, Sort (F4)

The FILTER and SORT OPTIONS in Pertmaster will seem very familiar for users of Microsoft Excel. Both the filter and sort functions will be usable on visible or hidden column data. When clicking FILTER users are able to load existing saved filters or create and save a new filter. Complex filters can be created which allow the user to sort based on data in multiple columns. A check box exists that allows parent activities or WBS items to be shown or hidden. The SORT option is also very similar to Excel. Users can sort based on multiple columns based on the order created in the sort view. A check box exists that allows the user to KEEP SUMMARY TASK STRUCTURE. If this option is checked, then activities will be sorted under their WBS element. If the item is unchecked, then all items will be sorted outside of their hierarchy.



#### View Menu Item: Filter Task Predecessors, Filter Task Successors

The FILTER TASK PREDECESSORS & SUCCESSORS OPTIONS will show a chain of activities that is logically before or after an activity. For example, if FILTER TASK PREDECESSORS is selected, then the chain of predecessors to the selected activity will be shown and the successors will be hidden or filtered from the active view.

#### View Menu Item: Sidebar, Task Details, Status Bar, Toolbars

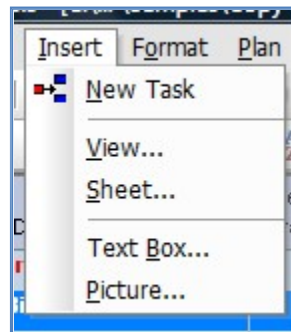
The options above are menus or sections that can be hidden. The SIDEBAR has quick links that attempt to simplify the Primavera Risk tool by guiding the user through a sequential risk process. The TASK DETAILS are the navigation pane which is shown at the bottom of the screen. The NAVIGATION PANE allows users to find any data without adding a heading to the column view. The STATUS BAR is below the TASK DETAILS navigation pane and shows a few pieces of data such as TOTAL COST, FILTER & SORT APPLIED, and PLAN FINISH DATE.

#### View Menu Item: Export View Contents

The EXPORT VIEW CONTENTS OPTION exports all column data from the current view into a .csv file which can be opened in Microsoft Excel.

## Oracle | Primavera Risk: Pertmaster Insert Menu

The Oracle | Primavera Risk (Pertmaster) INSERT MENU contains options to add or insert tasks, views, sheets, text boxes and pictures.



#### Insert Menu Item: New Task

This option allows users to insert a new task into the column and Gantt chart view. The new activity will be added to a row above the activity which is currently selected in the column view. If an empty row is selected the activity is added to the unused row. The new task will be loaded with attributes pre- defined via the DEFAULT TASK TAB in the PLAN OPTIONS MENU (PLAN|PLANOPTIONS).



### Insert Menu Item: View, Sheet

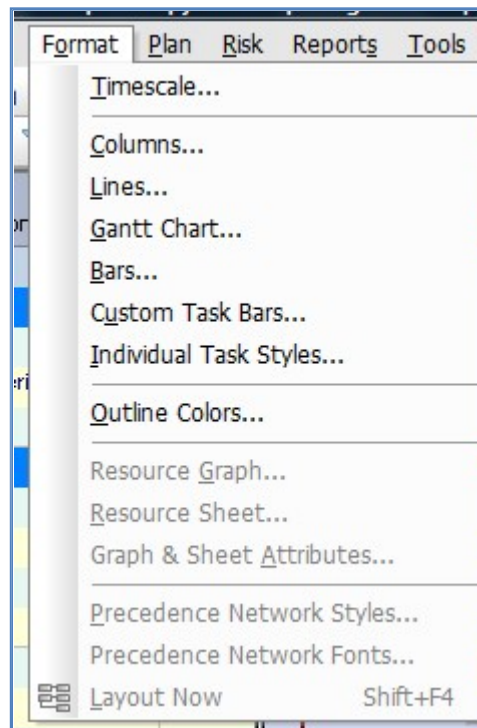
Different views and sheets can be created via VIEW MENU. After saving a view or sheet, users can add these saved settings to any project via these menu options. Views and sheets can be saved to the shared folder or to the user's personal folder.

### Insert Menu Item: Text Box, Picture

The text box and picture menu items will allow a user to add these items directly to the Gantt chart for viewing or printing. The TEXT BOX selection will add a blank text box to the Gantt chart which can be moved or edited. The picture selection will allow the user to browse their computer, external storage device, or server for a JPEG or bitmap formatted picture to add overlay on the Gantt chart. The pictures and text boxes will show up when printing.

## Oracle | Primavera Risk: Pertmaster Format Menu

The Oracle | Primavera Risk (Pertmaster) format menu contains options to edit the look and feel of the Gantt chart and other visual items, such as resource graphs and sheets.





## Format Menu Item: Timescale

This option allows Pertmaster users to change the timescale ribbon above the Gantt chart as well as certain items on the Gantt chart, such as how the data date appears. FORMAT TIMESCALE is useful for viewing activities on screen. If a user has a 10 year project plan and the timescale is set to days, then the user will probably not be able to see the logic and durations on the Gantt chart. This menu can also be loaded by right-clicking on the time time scale above the Gantt chart and clicking the FORMAT TIMESCALE option.

## Format Menu Item: Columns

The COLUMNS MENU item allows user to add and remove columns within the Primavera Risk Gantt chart view. Users can add columns to the right and left side of the Gantt chart and create calculated value fields as well. Double-clicking on the column headers in the main window will also launch the pop- up to manipulate the columns. Many Pertmaster users choose to add columns instead of working from the navigation pane at the bottom of the screen because data can be quickly copied and pasted to (and from) Microsoft Excel.

## Format Menu Item: Lines, Gantt chart, Bars, Custom Task Bars, and Individual Task Styles

The menu items above have been grouped together as they all impact the viewable area in Pertmaster; however they are not necessary to run a risk analysis. The layout and view can be changed much like in Primavera P6 or Microsoft Project, however because many users spend much more time in the scheduling tool than the risk tool, and these options may not be considered critical for usability.

- The LINES OPTION allows users to setup horizontal lines to separate the spreadsheet data. This function is similar to creating borders in Microsoft Excel. Users can choose to view a horizontal line after every activity or after a certain number of activities.
- The GANTT CHART menu item launches a pop-up with multiple tabs to control the visual aspect of task styles, baseline activity bars, link, and risk data. Most of the options in this section are fairly intuitive and will not require a great deal of explanation. The number of tabs and options is very high as the look of the tool can be highly customized.
- The BARS OPTION controls the color, fonts, special characters, backgrounds, and other items on the Gantt chart. This option can be useful for analysts who would like to change the view for printing or interactive risk and planning sessions.
- The CUSTOM TASK BAR allows users to add bars and overlays to the Gantt chart based on any date column whether it is standard or user-defined. Users may overlay actual date or probability start and finish date bars.
- The INDIVIDUAL TASK STYLES POPUP has multiple tabs and allows users to globally change areas of the Gantt chart at once. If a user wanted to change all of the bars pink for Valentine's Day or green for Earth Day, then this is where they would go.



#### Format Menu Item: Outline Colors...

The OUTLINE COLORS menu option allows users to change the shading color and font color for the outline levels, or work breakdown structure, in Primavera Risk. All items at level 10 or higher in the WBS will be coded to use the same outline format.

#### Format Menu Item: Resource Graph, Resource Sheet, Graph & Sheet Attributes

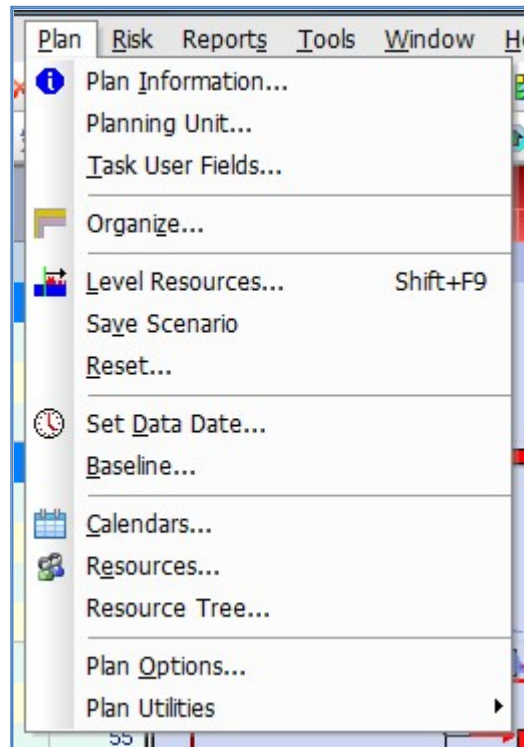
The above options will be grayed out in the menu unless the resource graph or resource sheet view is loaded in an active worksheet. The resource graph and resource sheet do not have quite as many customization options as the Gantt chart, however it allows users to change colors and edit the information shown, such as remaining units, budgeted units, Over-demand etc

#### Format Menu Item: Precedence Network Styles, Precedence Network Fonts, Layout Now (Shift+F4)

The above options will be grayed out in the menu unless the PERT network view is loaded in Pertmaster. Users have similar options to edit the PERT chart as they would in the Ganttchart.

## Oracle | Primavera Risk: Pertmaster Plan Menu

The Oracle | Primavera Risk (Pertmaster) plan menu has some of the more important functionality for a typical user. The plan information, planning units, user defined fields, resources, calendars, plan options, and ability to organize by activity codes are all located in this section. Many of these items will have detailed training sections in other modules.



### Plan Menu Item: Plan Information

This option is one of the more important options for document control and the way data will be presented on the risk charts. A detailed module will outline this section due to the high level of importance for scenario modeling. Editing the plan notes, plan title for reports, project data date, and the project start date can all be done in this section. An overview of the project statistics such as actual cost, remaining cost, number of milestones, and count of each activity type can be found under a tab in this section as well.



## Plan Menu Item: Planning Unit

The planning unit in Primavera Risk can be set to 15 minutes, 1 hour, and 1 day intervals. When importing a file from Primavera P6 or Microsoft Project, users will choose the planning unit at that time. This option allows the flexibility for users to plan in whole days for common schedules. They are also able to use a smaller planning unit for schedules such as outage and turnaround plans.

## Plan Menu Item: Task User Fields

The TASK USER FIELDS option has a detailed training module; however this is the screen that users will access to setup user-defined field or activity codes in Primavera Risk. If users setup user-defined fields, or UDFs, in Primavera P3, Primavera P6, or Microsoft Project, they will be able to see and edit the user- defined fields or code values in this pop-up.

## Plan Menu Item: Organize

The ORGANIZE MENU item is very popular for Primavera P3 and Primavera P6 users. A risk analyst or project planner can create a hierarchy or breakdown structure for the project plan based on activity codes and user-defined fields. The Pertmaster user can switch back to the work breakdown structure sort at any point, however it is common to create a breakdown view based on codes, such as area, discipline, project phase, etc.

## Plan Menu Item: Level Resources... (Shift+F9)

Primavera Risk does allow for resource leveling like most planning and scheduling tools on the market. This option allows users to toggle on and off resource leveling, set resource leveling priorities, and determine which resources are being leveled. Pertmaster also has options to turn resource leveling on during simulations in the risk analysis options. This is a very time intensive mode of analysis; however it will work as expected and provide a full resource level for every risk simulation.

For resource leveling, software algorithms choose how the activities will be leveled; therefore many users do not use this option on a detailed plan as it separates the human element from planning, over- allocation, and sequencing. On some plans the resource leveling capabilities may make sense. Although this relates more to planning and scheduling, it is important since a Monte Carlo analysis can be considered proactive scheduling when the concepts are applied to a schedule.

## Plan Menu Item: Save Scenario, Reset

Users can "nudge" activities in the Primavera Risk Gantt chart view by dragging them to their new desired start date or setting a nudge date in the COLUMN VIEW. Users can save a scenario based on the nudge dates or clear all nudge dates from the scenario using the RESET option. This allows users to see what making a change to the project plan will do without actually making the change to the live dates.



## Plan Menu Item: Set Data Date

The SET DATA DATE option is similar to the STATUS DATE option in Microsoft Project or the DATA DATE option in Primavera P6. The users are able to set the "time now" date or status date of the project plan. This option can also be accessed under the PLAN INFORMATION option detailed above. The data date from an imported Microsoft Project, Primavera P3, or Primavera P6 plan will be imported automatically. When importing a Primavera P6 file with sub-projects it is important that all project plans have the same data date.

## Plan Menu Item: Baseline

The BASELINE option allows users to set a baseline start and finish date for each activity as they are currently planned in the live schedule. Primavera Risk will allow analysts to overlay the baseline bars for comparison as the project is progressed and updated. Pertmaster only allows for one project baseline. Setting a second baseline will launch a warning that the original baseline will be overwritten. Baseline dates setup in other scheduling tools such as Microsoft Project and Primavera P6 will be imported automatically. The risk reports will allow users to report to a deterministic date based on Pertmaster CPM calculation or a baseline date that may be set due to contractual requirements, etc.

## Plan Menu Item: Calendars...

Project calendars can be setup directly in Primavera Risk. Most users will not need this functionality as all calendars from the Primavera P3, Primavera P6, and Microsoft Project schedule will be imported into the risk tool. A risk analyst can edit the calendars if desired.

Primavera Risk also incorporates the concept of a probabilistic calendar. In any scheduling tool, users can set non-working periods. A probabilistic calendar allows users to introduce uncertainty on the non-working period based on conditions such as weather, work stoppages, etc.

## Plan Menu Item: Resources/Resource Tree

Resources names, units, and rates will import directly from the original scheduling tool. Resources and sub-resources can also be setup in Primavera Risk. The resource tree allows users to see a hierarchical view of the resources in the project. Most analysts will not have to create their resources in Pertmaster as they will import from another tool. If the imported resources do not exist or need to be edited, they can be edited via these options.

## Plan Menu Item: Plan Options

The PLAN OPTIONS menu item is very important. It has options such as editing the date, duration, and currency formats. Most importantly, a tab for the SCHEDULING OPTIONS is located in this section. The scheduling options control critical items such as retained logic or progress override. Lag calendars and float calculations are also set in this section. The scheduling options will import from the original scheduling tool, however it is a best practice to make certain that the options were imported correctly. Items such as float calculations will impact risk charts, such as criticality tornadoes.



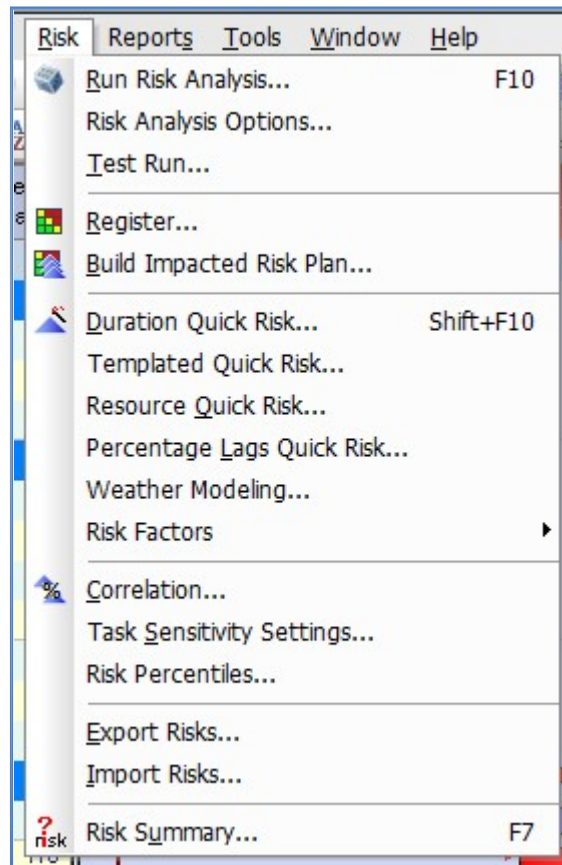


## Plan Menu Item: Plan Utilities

Pertmaster has some macros and spreadsheets that have been added to help users to do certain complex functions quickly and easily. Items such as loading the costs from excel will have their own training module to fully detail the process.

## Oracle | Primavera Risk: Pertmaster Risk Menu

The Oracle | Primavera Risk (Pertmaster) risk menu has almost all of the risk functionality and options for the entire Pertmaster product. Almost all other menus are related to planning, scheduling, and options. The Primavera Risk tool was a scheduling tool long before it was a Monte Carlo simulation product. If a user has a perfectly clean schedule, it may not be necessary to leave the risk menu until it is time to run reports and scenarios.



## Risk Menu Item: Run Risk Analysis (F10), Risk Analysis Options, Test Run...

In our risk analysis process overview, we consider the risk analysis options and running the risk analysis the 6th of 7 steps. Users will use the options often. Therefore, an entire section of the training course is dedicated to the risk analysis options. Each time an analysis is run, the risk analyst will use the RUN RISK ANALYSIS option via the menu or the toolbar icon.



## Risk Menu Item: Register, Build Impacted Risk Plan

In our risk analysis process overview, we consider the risk analysis options and running the risk analysis the 5th of 7 steps. The REGISTER OPTIONS launches a full qualitative and quantitative risk register. Qualitative risk relates to categorizing and tracking risk. Quantitative risk registers relate to turning risk events into probabilistic schedule elements and integrating them into a cost estimate or into schedule logic. Risk events for simulations can be thought of as activities that may or may not occur. When those risk events do occur, they will link to the schedule tasks, causing a delay.

## Risk Menu Item: Duration Quick Risk (Shift+F10)

All of the QUICK RISK items we consider uncertainty loading. This is the 4th step in our 7 step process. The uncertainty loading allows users to put various distributions or three-point estimates on activity durations. While risk events are basically activities that may or may not occur, the uncertainty is not driven by the probability of occurrence. Uncertainty or productivity is put on items that will occur but may have a slightly variable duration.

Much of the risk theory and Primavera Risk modules will be dedicated to the theory and thought behind separating risk events from uncertainty for a more accurate and traceable model. The DURATION QUICK RISK serves to put a blanket of uncertainty over all activities (or selected tasks) on a percentage basis. At a bid level a team may document that the estimates are plus or minus 15%. A duration quick risk could be applied to the entire schedule that sets the three-point estimates between the -15% and +15% ranges.

While the templated quick risk is usually not enough information to provide an accurate answer or provide traceability to sell an answer, it is a fantastic tool for testing the quality and flow of the network logic. Although it is widely used in industry for the final answer, we find it impossible to sell that every activity in the schedule has the exact same level of uncertainty. We will position the duration quick risk as a schedule maturity tool instead of a risk analysis input.

## Risk Menu Item: Templated Quick Risk...

Risk events go in a risk register. We consider the templated quick risk and uncertainty (or productivity) register. Users are able to setup groupings to load the three-point estimates. It might be hard to sell that every construction activity in a project plan has the same level of uncertainty; however it is much more logical to setup a grouping by discipline and say that we separated each discipline and we are loading the minimum, most likely, and maximum by group due the historical data we have for productivity across our disciplines. The productivity or uncertainty factor will be applied for all tasks within the discipline. Many strategies exist for creating groups, however the thought is to group activities in the most logical fashion for the project team without requiring they know the nuts and bolts of the risk tool.

The template quick risk is a reusable register that combines the functionality of a filter with the percentages-based risk range loading capability of the quick risk.



## Risk Menu Item: Resource Quick Risk

The RESOURCE QUICK RISK functions similar to the DURATION QUICK RISK outlined above. Three-point estimates are created for all or selected resources and applied to the number of remaining units. Risk analysis always focuses on remaining amounts whether it is duration or units. In this section users are able to put variability on the cost of materials, number or man hours, or put other three-point estimates on the number of units. The variability in the units can change the cost as the units are then multiplied by the rate.

## Risk Menu Item: Percentage Lags Quick Risk

This feature will allow users to turn fixed lags into a percentage-based lag which is calculated based on the uncertainty of activities. A reduction or increase in the activity duration during simulation will then increase or reduce the duration of the succeeding lag.

## Risk Menu Item: Weather Modeling

Primavera Risk does have the ability to handle weather modeling by application of the weather conditions to a calendar. For example the construction calendar can have a hurricane season weather condition applied to it. The weather modeling functionality can also be applied to model things such as political unrest, labor stoppages, etc.

## Risk Menu Item: Risk Factors

The RISK FACTORS menu item allows users to set different levels of uncertainty based on multiple factors on one activity. Analysts can set uncertainty percentages for items such as weather, complexity, technology, subcontractor, etc.

## Risk Menu Item: Correlation

The CORRELATION menu item is a statistically critical part of a risk analysis on large project schedules. Correlation can help overcome issues such as the impact of the central limit theorem and merge bias. This correlation menu allows users to set uncertainty correlation groupings manually. The templated quick risk allows users to set correlations by grouping as well. Training modules in the Primavera Risk and Risk Theory sections will be dedicated to the importance of correlation.

## Risk Menu Item: Task Sensitivity Settings

The TASK SENSITIVITY SETTINGS can also be set from within the tornado chart. These settings affect the calculations used to generate the tornado chart metrics and rankings such as Spearman's rank correlation versus Pearson's product moment.

## Risk Menu Item: Risk Percentiles

The Pertmaster RISK PERCENTILES MENU can also be loaded via the RISK ANALYSIS OPTIONS. The feature allows users to create user-defined fields based on the Monte Carlo simulations. For example, a user could create a column for probability 50% start and finish dates to create an overlay on the Gantt chart.

### Risk Menu Item: Export Risks..., Import Risks

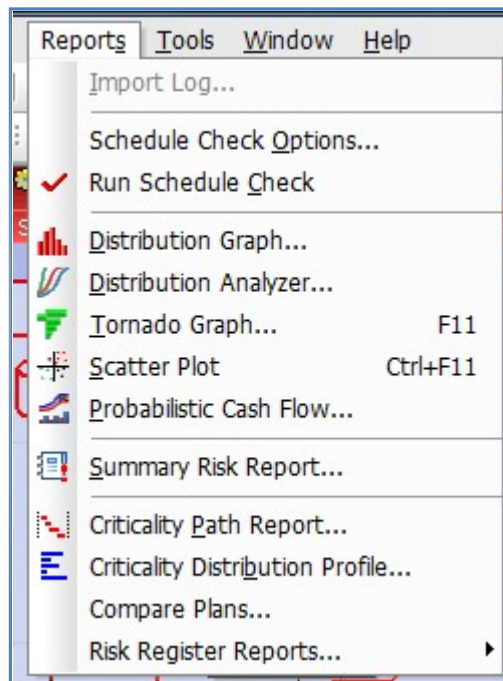
The IMPORT and EXPORT RISK ITEMS allow users to push data to and from .csv files for editing in Microsoft Excel. All risk data loaded in Primavera Risk will be sent to Excel and can be edited and re-imported.

### Risk Menu Item: Risk Summary (F7)

The RISK SUMMARY FUNCTION allows users to see all of the loaded risk data and search through different tabs in a pop-up. It probably will not be used a great deal by the typical user.

## Oracle | Primavera Risk: Pertmaster Reports Menu

The Oracle | Primavera Risk (Pertmaster) reports menu contains all of the schedule maturity and risk output reports in the Pertmaster product. While many of the most important charts can be run quicker by right-clicking on an activity in the Gantt chart or from the icons in the tool bar, some of the reports can only be found under the reports menu. In our 7 step process we consider the reports the final step relative to the tool, although explaining the reports is really another step.



### Reports Menu Item: Import Log...

The Primavera Risk import log lists all changes that were made as the schedule was imported from Primavera P3, Primavera P6, or Microsoft Project. These are not schedule check flags. These items are issues that Pertmaster actually changed to import the data. Issues such as removing actual dates in the future, rounding fractional days, removing loops, and other



items that Pertmaster cannot import are found here. Some changes are acceptable. However, some items may completely invalidate the risk analysis. This is the first area to check after importing a project plan.

### Reports Menu Item: Schedule Check Options..., Run Schedule Check

The Pertmaster schedule check lists flags that may have an impact on running a proper Monte Carlo analysis. A flag found by the schedule check does not mean that the item is wrong; however, it does mean it should be investigated. Fifty flags might not impact the risk analysis results while one critical flag may derail the entire Monte Carlo simulation. We will focus on this in many of the modules; however, it is important to note that the schedule check functionality is more proper than many other tools on the market and is truly designed to help make the schedule better. It will find problems that the Primavera P6 log does not find.

### Reports Menu Item: Distribution Graph...

The distribution graph is also known as the confidence or probability histogram. This is one of the two charts which are used for every risk analysis. The histogram will show the probability of hitting on or before/under a metric. A schedule histogram will show the chance or probability of hitting on or before a schedule date. A cost histogram will show the percent chance of hitting on or under a budget amount. This chart is used to set contingency early in a project or detect potential overruns in later phases of the project. Simply stated, this chart shows "where am I at?"

### Reports Menu Item: Distribution Analyzer

The distribution analyzer takes any curve generated by the distribution graph and allows the risk analyst to view the curves in one chart. Pertmaster users can show 2 scenarios for finish dates, a schedule and a cost curve, man hour and float curves or other charts they wish to sell. Users can also highlight the delta between multiple curves and show an unlimited number of items side-by-side.

### Reports Menu Item: Tornado Graph (F11)

The tornado chart is the second chart that is used in every risk analysis. The histogram shows where the project is at and a tornado shows how to fix things. The tornado chart is based on correlation metrics. It highlights the 80/20 rule, which shows that 20% of activities have 80% of the impact on project or milestone delivery. This chart can be run for the entire project or to individual activities or milestones such as substantial completion or the end of engineering. This chart can be run for cost or schedule and is read the same way. The tornado chart is often explained incorrectly, so we will have many modules to make certain that this is not an issue on your project. Other metrics, such as criticality or the percentage of time a task is on the critical path during the simulation can be shown.

### Reports Menu Item: Scatter Plot (Ctrl+F11)

The scatter plot shows a confidence level of hitting a budget amount and a schedule metric at the same time. A single plot is put on the graph for the cost and schedule number for every



simulation. This is not a widely used report, not because it is not useful but due to the challenges of keeping a fully cost loaded schedule in Primavera P3, Primavera P6, Microsoft Project or any scheduling tool.

#### Reports Menu Item: Probabilistic Cash Flow

The probabilistic cash flow will show a time-phase cost or resource curve. This is another chart that is easy to create. The challenge is having a properly cost or resource loaded schedule. If man hours are loaded properly in the scheduling tool, then this chart can have a huge benefit.

#### Reports Menu Item: Summary Risk Report

The summary risk report provides a narrative risk report based on a simple check box wizard. It may not be comprehensive enough to submit as a final report, however if it gets you 80% of the way there, then it can be a huge time saver.

#### Reports Menu Item: Criticality Path Report

The criticality path report shows how the critical path switched through different streams of activities during the Monte Carlo simulations. This can be an important chart to show which tertiary critical paths could become critical in your project.

#### Reports Menu Item: Criticality Distribution Profile

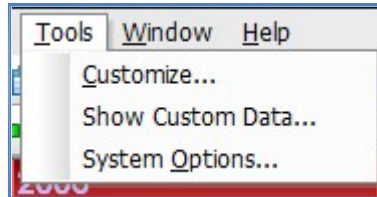
The criticality distribution profile shows the number and percentage of activities that were critical during Monte Carlo simulations. For example, it may show that 32 tasks were critical in 100% of the simulations and 12 tasks were critical between 50% and 60% of the Monte Carlo iterations. This is another valuable report to show how many tasks are truly driving the finish date.

#### Reports Menu Item: Compare Plans

The compare plans report is very similar to the claim digger report from Primavera P6. It compares the changes between any two project plans. This is a great report for plan version control and claims analysis.

## Oracle | Primavera Risk: Pertmaster Tools Menu

The Oracle | Primavera Risk (Pertmaster) tools menu contains system options that are important for standalone and server setups.



### Tools Menu Item: Customize

The CUSTOMIZE OPTION allows the risk analyst to edit the toolbars, setup hot keys, change the menu styles, and toggle on-screen tips

### Tools Menu Item: Show Custom Data

This section will allow Pertmaster users to view the coding and flag settings for various screens and reports, such as weather modeling, histogram, or probabilistic cash flow. Most users will probably edit these settings via the graphical on-screen interfaces, however the raw data and settings can be seen using the FILE MENU item as well.

### Tools Menu Item: System Options

The SYSTEM OPTIONS has a few critical settings for both the risk analyst and for an IT department looking at server setups. A training module will be dedicated to an in-depth look at the system options. There are two very important options in this section.

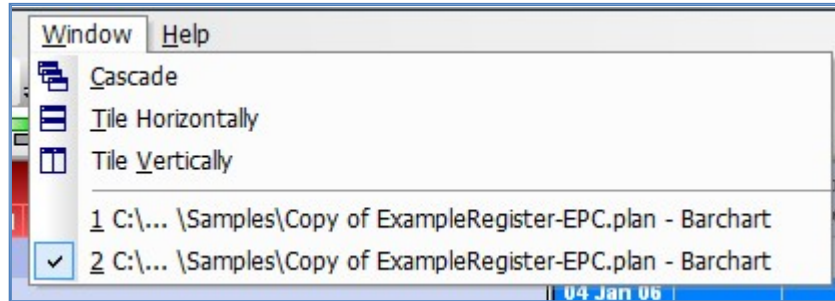
The first critical option is for the risk analyst or scheduler to toggle on and off the live scheduling. On large files it will recalculate too frequently and cause delays if live scheduling, or recalculating the CPM schedule network live is left "on". Users can change this option so that it will reschedule the CPM schedule network only upon pushing the F9 button on the keyboard. The user can make 10 changes, and then hit F9 to calculate the entire network based on all changes. This F9 scheduling option is in-line with Primavera P6 scheduling. Microsoft Project users will be familiar with live scheduling. Turning the F9 to schedule option "on" is usually desirable for large project plans.

The second critical option allows the Pertmaster user or the IT department map where the user's folder and the shared folders will be. The user folder can be mapped to the PC or to a server. The shared folder is usually mapped to a shared server location so filters, templates, and plans can be accessed by multiple users.



## Oracle | Primavera Risk: Pertmaster Window Menu

The Oracle | Primavera Risk (Pertmaster) window menu allows users to switch between multiple open Primavera Risk .plan files. This menu is especially useful when users are running multiple scenarios or comparing plans and may have a large number of open files.



### Window Menu Item: Cascade, Tile Horizontally, Tile Vertically

These options allow users to organize multiple Pertmaster plans on the screen to be viewed at one time. Based on the size of the computer monitor it is often easier to switch back and forth to plans instead of having them all viewable at one time, however this may help for working on multiple scenarios simultaneously.

### Window Menu Item: 1, 2, 3, etc.

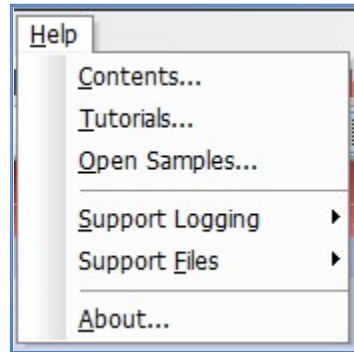
When a user has multiple Primavera Risk .plan files open, each file will be listed with a number and the file name. The selected file will be the only file active for editing. This is often the easiest way to risk analyze multiple scenarios concurrently.





## Oracle | Primavera Risk: Pertmaster Help Menu

The Oracle | Primavera Risk (Pertmaster) help menu will take users to tutorials and the help file similar to Microsoft Office products. There are also options for support logging of software bugs and crashes.



### Help Menu Item: Contents, Tutorials

The Primavera Risk HELP menus and tutorials are well written. The CONTENTS option will open a searchable interface which will help guide users to find detailed information on most button clicks. The tutorials are more process-driven walkthroughs and can be a great place to tie together the button clicks with the risk analysis process.

### Help Menu Item: Support Logging

The support logging functionality allows recordings to be taken during product use in order to help the Oracle support department find bugs and errors with the software. This function will not be used by all users and the Oracle support team will walk users through the process if an error log file is needed.

### Help Menu Item: Support Files

The SUPPORT FILES section allows Pertmaster users to quickly find the INSTALLATION folder for Primavera Risk, the APPLICATION DATA folder, the TEMPORARY folders, and the pertmaster.ini file which contains the SOFTWARE options. The pertmaster.ini file can be edited to change the options when Pertmaster loads.



## Help Menu Item: About...

The ABOUT menu will give the Oracle | Primavera Risk version number and other license information. If you are looking to retire early, then you can double-click on the SOFTWARE icon to get randomized lottery numbers!

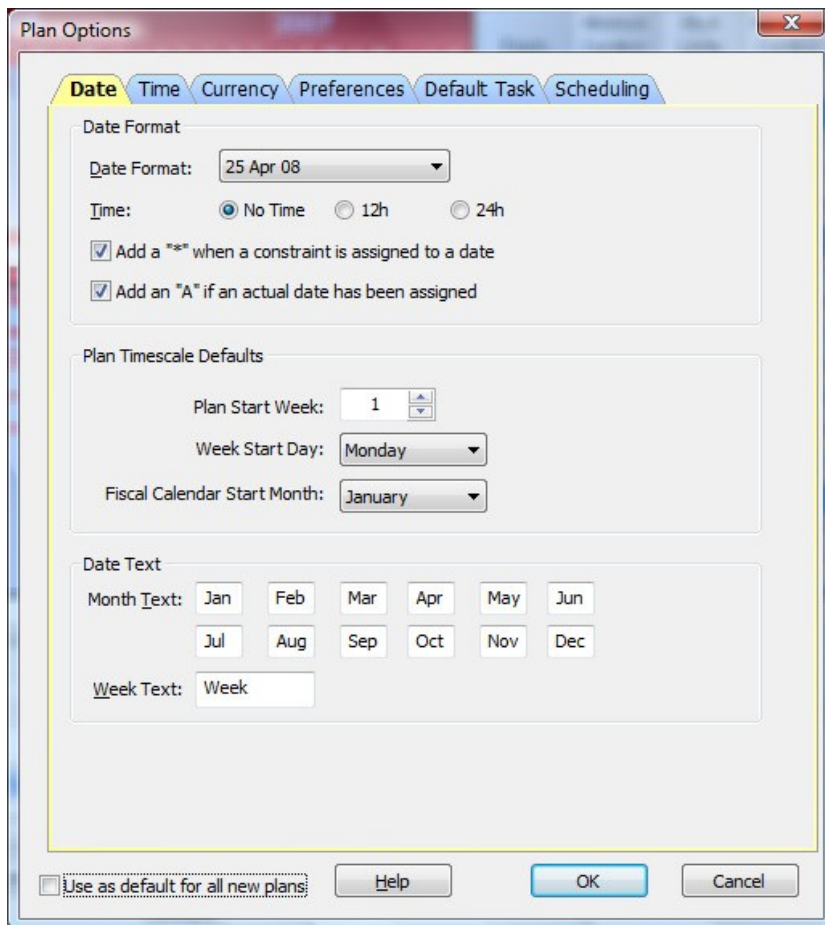
# Overview Section 3: Key Functionality

## Oracle | Primavera Risk: Pertmaster Plan Options

The Oracle | Primavera Risk (Pertmaster) plan options contain some of the critical elements needed to adjust the graphical user interface. The SCHEDULING OPTIONS TAB will be used to make certain that imported files have the same options as the original scheduling tool. The plan options can be opened by click PLAN in the menu bar and selecting PLAN OPTIONS.

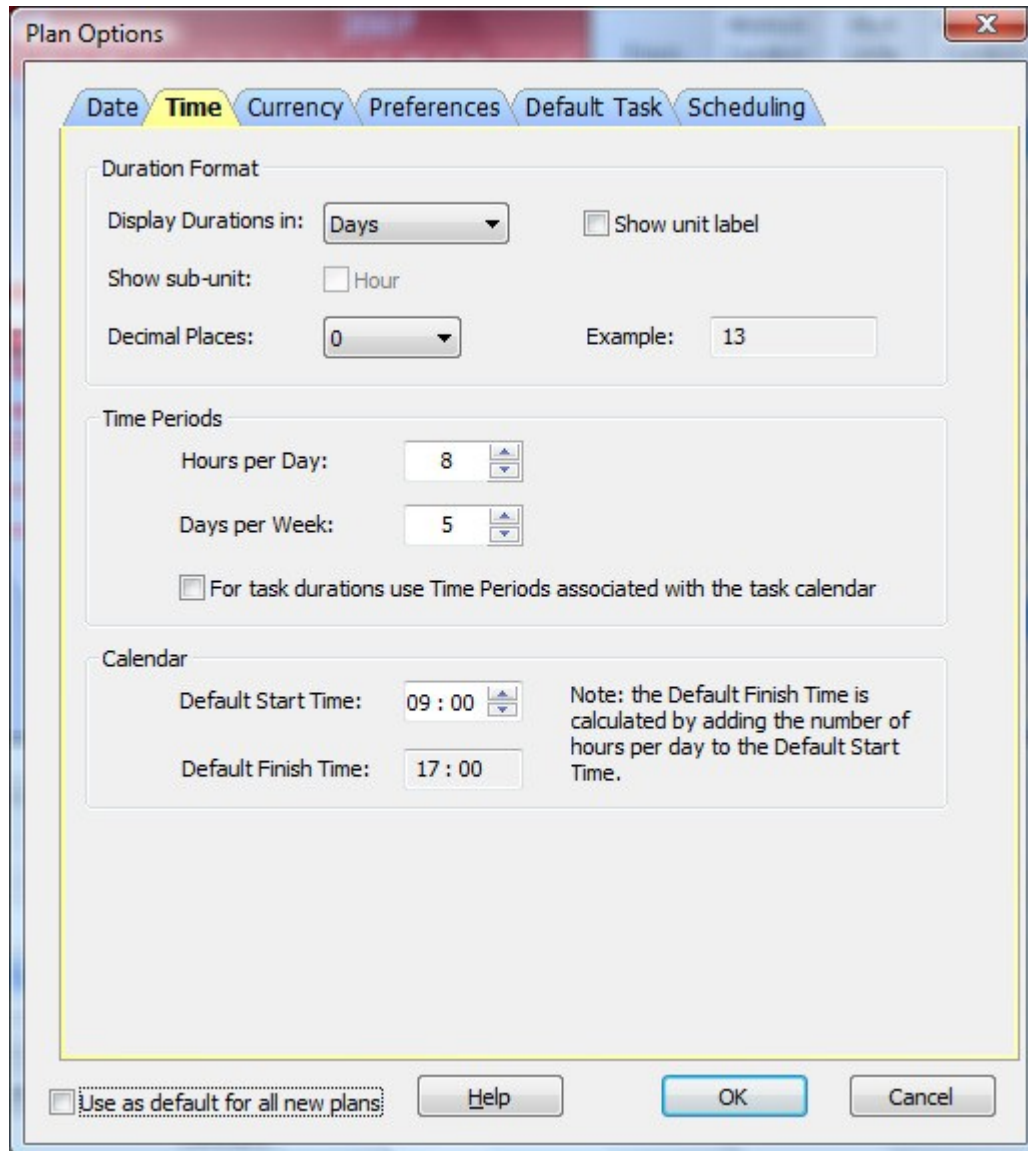
### Section Tab: Date

The DATE TAB allows users to set the default date format for all screens in the Pertmaster interface. The DATE FORMAT drop-down has pre-defined date formats to choose. Many scheduling tools put a prefix for dates with constraints or actual starts and actual finishes. Users can turn off this feature if desired. The risk analyst may want to remove these features if they are copying and manipulating data in Microsoft Excel. The timescale on the Gantt chart can also be adjusted in this tab.



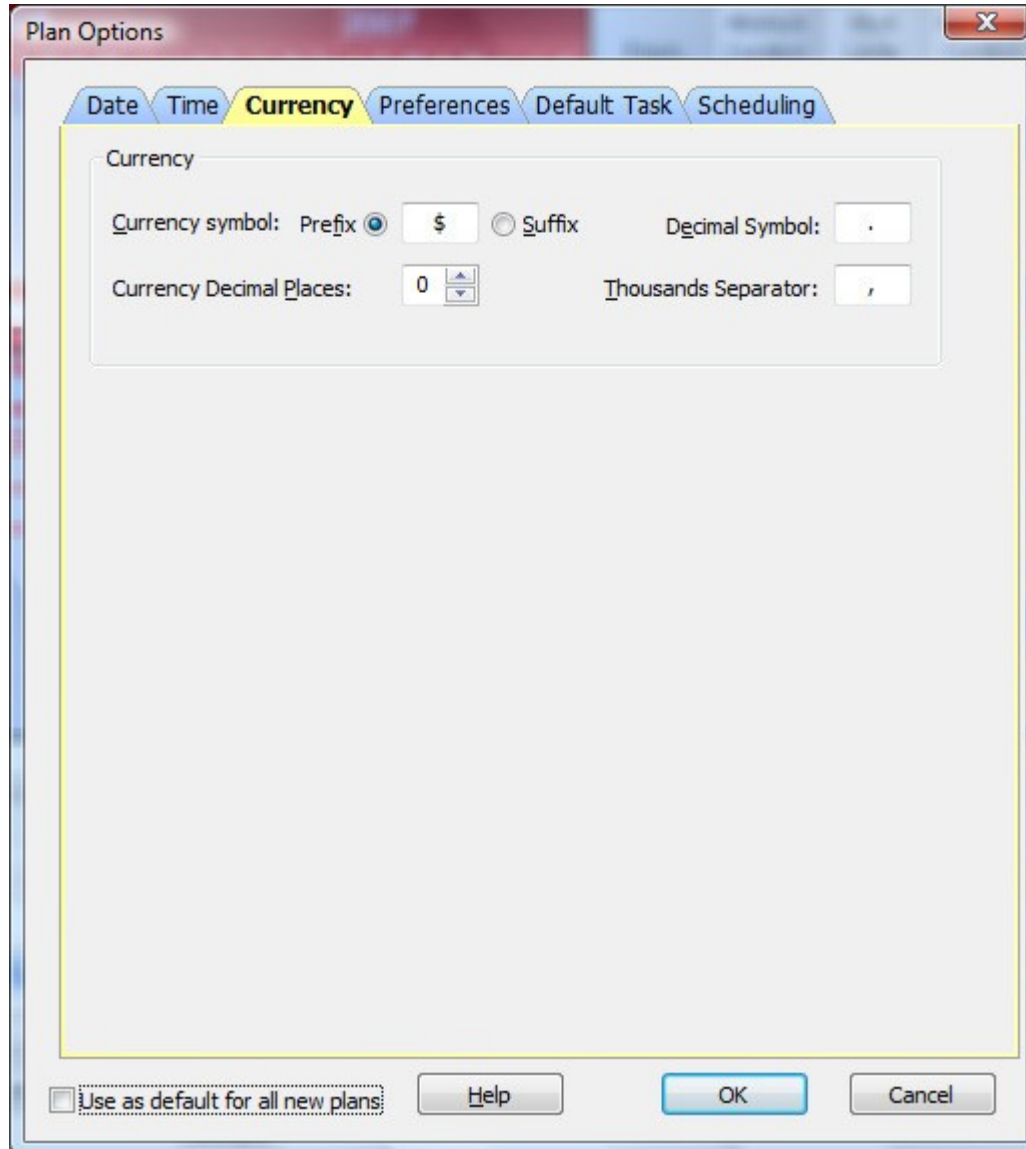
### Section Tab: Time

The TIME TAB has settings for how the duration is displayed, such as whole days, hours, etc. Primavera Risk users can set their default hours per day and days per week in this section. The default start is entered in this section as well. The default finish is automatically populated based on the hours per day and the default start time.



### Section Tab: Currency

The CURRENCY TAB allows the risk analyst to setup a currency format to match any region of the world. The currency symbol is entered manually, as well as the decimal places, decimal symbol, and the thousands separator.



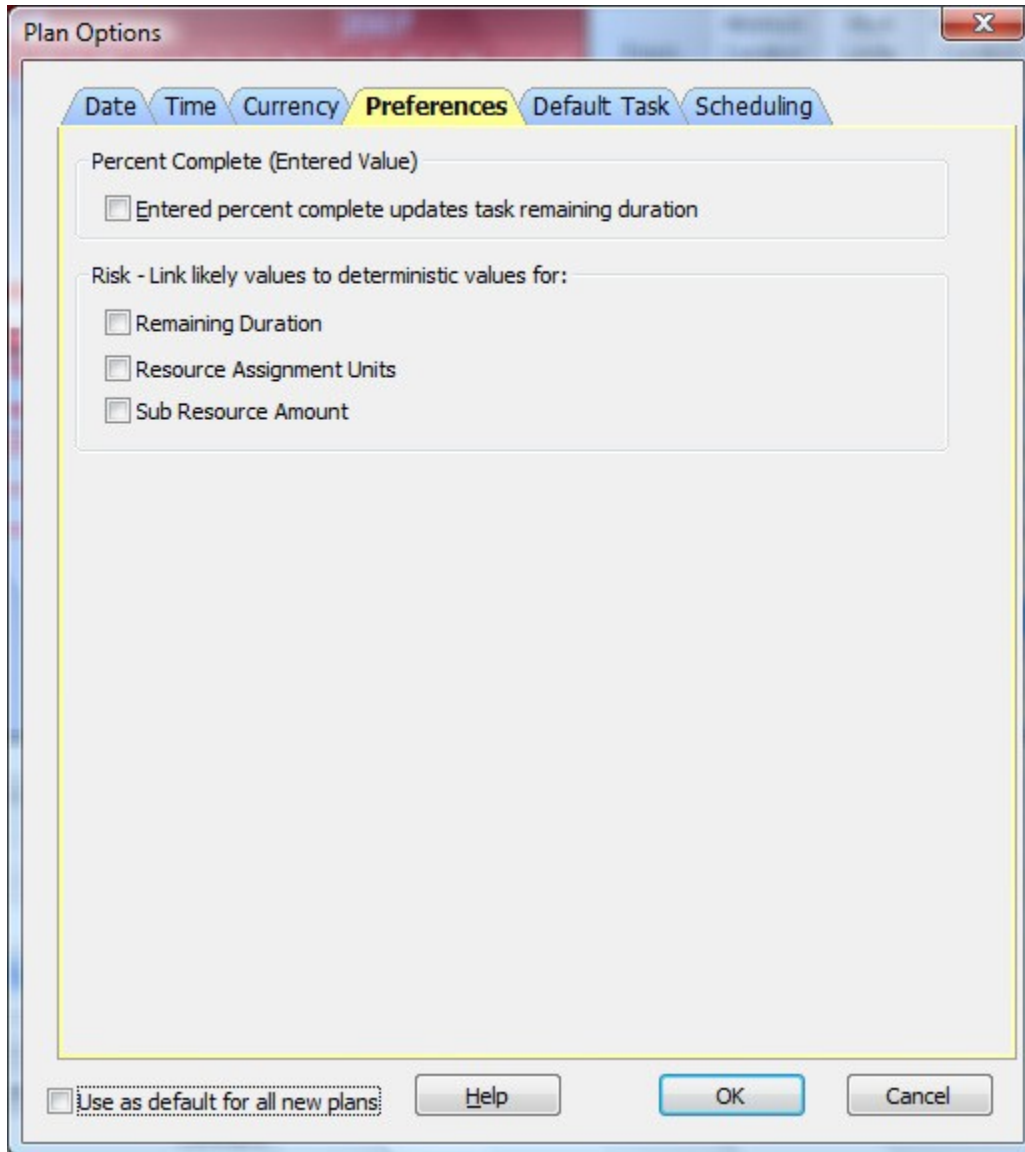
### Section Tab: Preferences

The first option in the PREFERENCES TAB is to define whether entered values in the percent complete field will automatically calculate the remaining duration of an activity. If this item is not checked, then statusing percent complete on a task will not calculate a new remaining duration.

The other options all relate to linking the probabilistic "most likely" field to the remaining duration, remaining units, or sub-resource amounts. Often risk analyses are done where it is assumed that the values in the schedule are always the most likely value for the three-point estimate. This requires a thorough review of the basis of estimate for durations or cost. Pertmaster can automatically link the remaining values to the most likely column if the



schedule is truly considered to be scheduled to the most likely values.



### Section Tab: Default Task

The DEFAULT TASK TAB allows Primavera users to set the default values for a new task that is created. Users can edit the default ID format, description, remaining duration, WBS, OBS, calendar, priority, and percent complete calculation method. For example, a user could set all new activities to have an ID of ENG10 and increment each new activity by +10, a description of New Engineering Activity, a remaining duration of 20 days, and a 5 day work calendar if they desired. If the risk analyst does not edit this section the Primavera Risk defaults will be used.



Users can then edit the activity after creation.

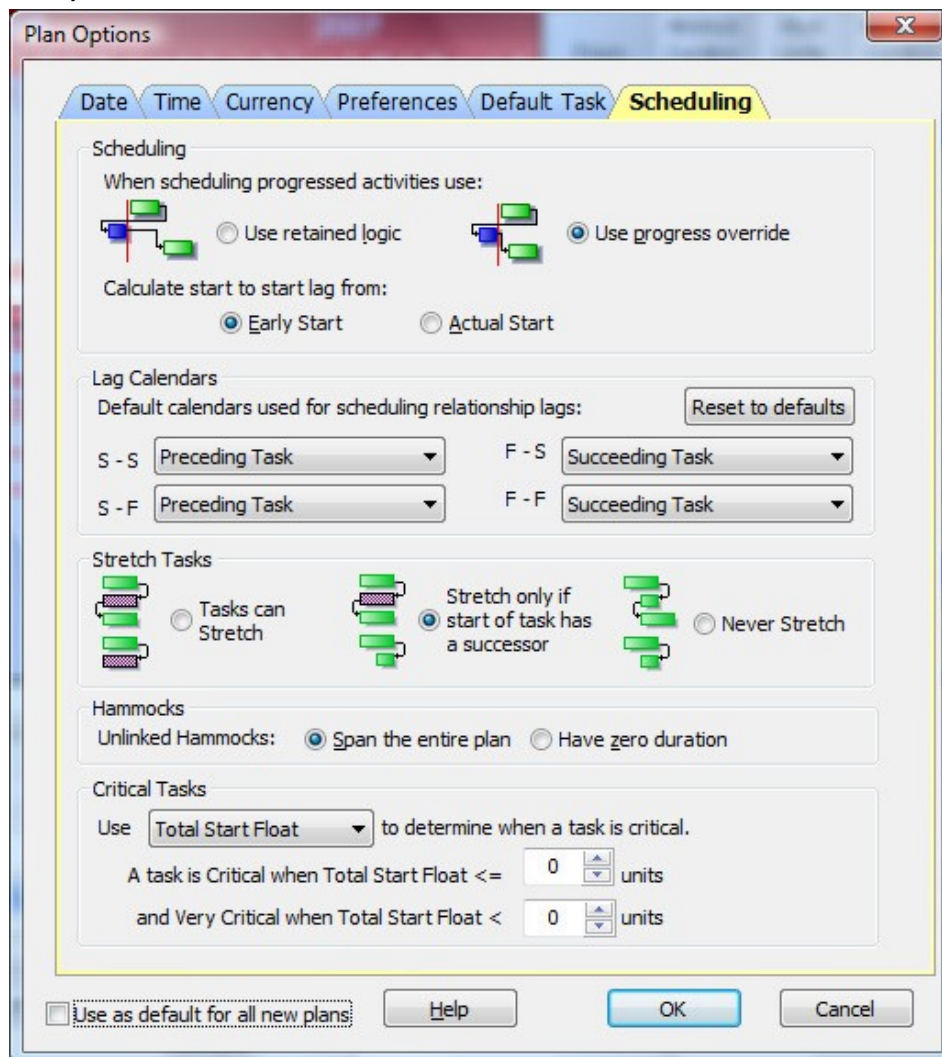
The screenshot shows a 'Plan Options' dialog box with the 'Default Task' tab selected. The dialog contains the following fields and controls:

- Task** section:
  - ID: A350+10
  - Description: New Task
  - Remaining Duration: 5
  - W.B.S.: (empty text box)
  - O.B.S.: (empty text box)
  - Comment: (empty text box)
  - Calendar: Standard (dropdown menu)
  - Priority: 50
  - % Complete Definition: Define... (button)
- Bottom section:
  - Use as default for all new plans
  - Help (button)
  - OK (button)
  - Cancel (button)

### Section Tab: Scheduling Options

The SCHEDULING OPTIONS TAB is one of the most important settings sections in the Primavera Risk product. Users are able to define how the CPM scheduling network is calculated by the scheduling engine. The scheduling options will be inherited from the original scheduling tool. If a planner has turned on progress overrides in Primavera P6, then Pertmaster will see this option upon import. The calendar used on the lag will be set based on the setting of the original scheduling tool as well. Many scheduling tools put the calendar for a lag on the same calendar as the predecessor; however this is not standard for all scheduling tools. This is important because putting a 7 day lag when the lag calendar is 5 days could create up to 11 calendar days of lag time, instead of the intended 7 calendar day lag.

The options in this section include retained logic versus progress override, lag calendar relationships, how to handle stretched tasks, how to handle an unlinked hammock, and options for calculating the critical path. Although all options should import from the original scheduling tool, it is a best practice to always check the options before starting a Monte Carlo analysis.





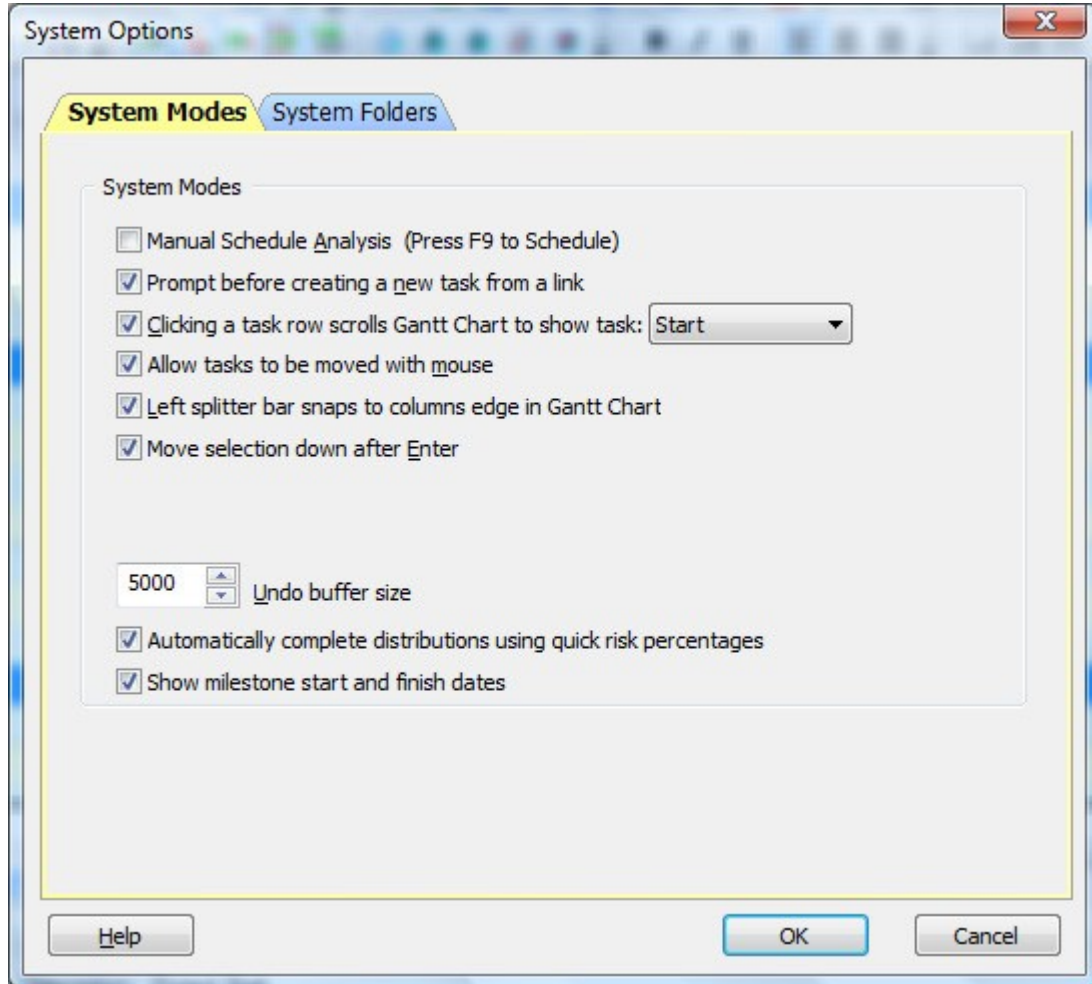


## Oracle | Primavera Risk: Pertmaster System Options

The Oracle | Primavera Risk (Pertmaster) system options contain software functionality and usability settings that are important for standalone and server setups. The system options can be accessed under TOOLS in the main menu bar. Most options will only need to be set one time by the risk analyst or an IT department for a server install. A few options, such as using F9 to schedule, may be toggled on and off by the user.

### Section Tab: System Modes

The first option in the system modes tab, MANUAL SCHEDULE ANALYSIS (Press F9 to Schedule), is one of the more widely used options in the Primavera Risk product. Schedulers can choose whether the CPM scheduling engine will recalculate the network live after every change or if they can make multiple changes and choose to schedule the network manually by pressing the F9 key. Microsoft Project users will be familiar with live scheduling, while Primavera P6 users will use the F9 feature more commonly. This option is very important because large networks can take a significant amount of time to recalculate. If a planner is going to make ten changes before running a scenario, will it be optimal for the network to recalculate on every change or only after all of the desired changes have been input? Live scheduling can be convenient on smaller schedules; however it is usually time consuming on larger CPM schedules.

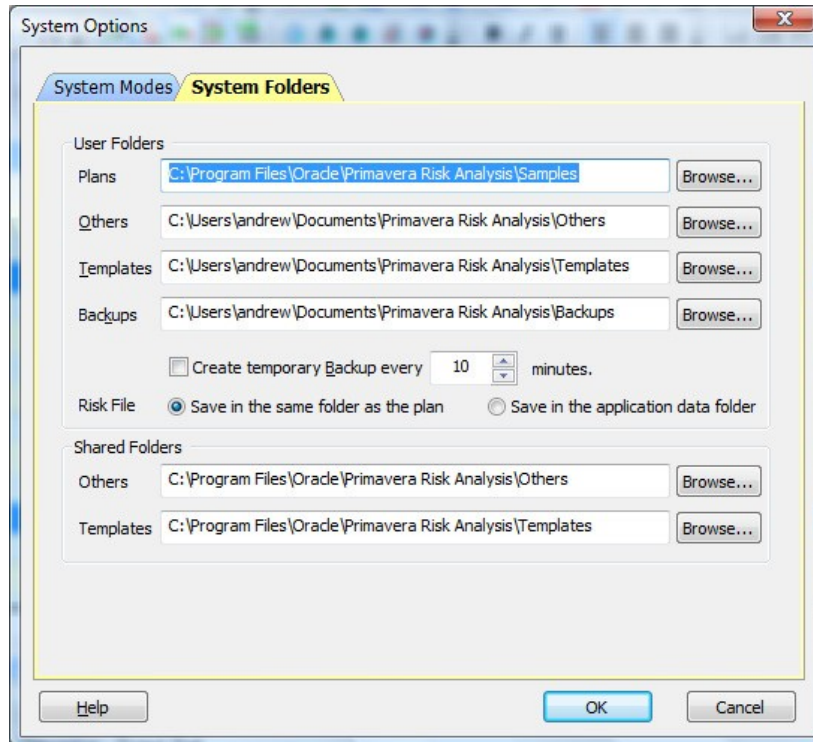


Additional Options are listed:

- PROMPT BEFORE CREATING A NEW TASK FROM A LINK - Typing in a link to an ID that does not exist will create a new activity with the entered ID name. This prompt will create a pop-up box before creating the task.
- CLICKING A TASK ROW SCROLLS GANTT CHART TO SHOW TASK (X) - When a user clicks a task the screen will snap to that activity on the Gantt chart. This option chooses what location to snap to on the activity bar.
- ALLOW TASKS TO BE MOVED WITH MOUSE - Activities can be moved left and right by hovering over a task bar on the Gantt chart and left-clicking. This option can be disabled.
- LEFT SPLITTER BAR SNAPS TO COLUMNS EDGE IN GANTT CHART - The splitter bar on the left Edge of the Gantt chart will snap to the end of one column when double-clicking if this option is not selected. It will snap to the last column if this option is checked.
- MOVE SELECTION DOWN AFTER “ENTER - Clicking enter on a column will move down to the next cell if this option is selected. If the option is not selected the selection will stay within the current highlighted box. There is no option to have the selection move to the right.

### Section Tab: System Folders

The SYSTEM FOLDERS TAB allows users or an IT department to setup the user's personal and shared folders. The user and shared folders can be mapped to anywhere users have system access. It is common for user folders to be mapped to the local machine for analysis and the shared folders to be mapped to a server location. This allows multiple users to share templates. On shared PCs or laptop computers, the shared folder may be mapped to a location on the local machine that any logged in user can access.



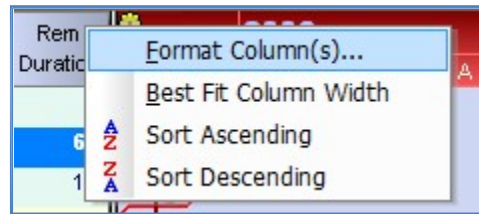
The user folder for plan backups is near the middle of the page. Primavera Risk utilizes flat files and not a database back-end. Analysts must manually save their Pertmaster .plan files frequently, similar to Microsoft Excel files, to avoid losing data. An option can be set to create backup files on a set time increment to protect the risk analyst or planner against unexpected shut downs. If this item is unchecked all unsaved data will be lost in the event of a system or program crash.

## Oracle | Primavera Risk: Pertmaster Gantt chart

The Oracle | Primavera Risk (Pertmaster) Gantt chart view has a similar look and feel to many popular scheduling tools on the market, such as Microsoft Project or Primavera P6. This module will go over the main functions that a risk analyst or project scheduler would use. Timescale manipulation has been covered in another module.

### Adding and Removing Columns

The screen to ADD, REMOVE AND EDIT columns can be found opened by double-clicking on any column header or by clicking COLUMNS under the FORMAT menu. The interface contains a list of available fields on the left, active fields in the current view on the right side, and field details at the bottom. Users can add and remove fields by clicking the left and right arrows located between the left and right side windows. A separate module will describe this process in detail.



### Selecting Multiple Columns or Multiple Rows of Activities

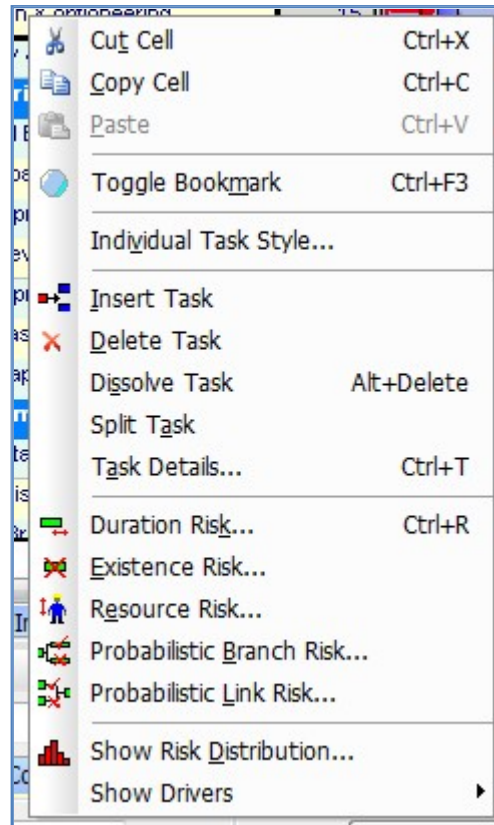
Users can select multiple columns or rows in Pertmaster much like in Microsoft Excel. Clicking the column header will select the entire column based on all activities that are not filtered out. Clicking the blue space to the left of the first column will allow a project manager to select the entire row of data. Left-clicking and dragging the pointer to include multiple columns or rows will allow multiple selections concurrently.

ID	Description	Rem Duratic
<b>A010</b>	<b>Project Start</b>	
<b>A020</b>	<b>Pre-Bid &amp; Bid</b>	6
A030	Characterisation	1
A040	Pre design & optioneering	1
A050	Feasibility & Design	5
<b>A060</b>	<b>Engineering</b>	22
A070	Front End Eng Design	4
A080	Scheme paper	6
A090	Board approvals	1
A100	Design development	8
A110	Contract process	12
A120	Safety case	5
A130	External approvals	5
<b>A140</b>	<b>Procurement</b>	11



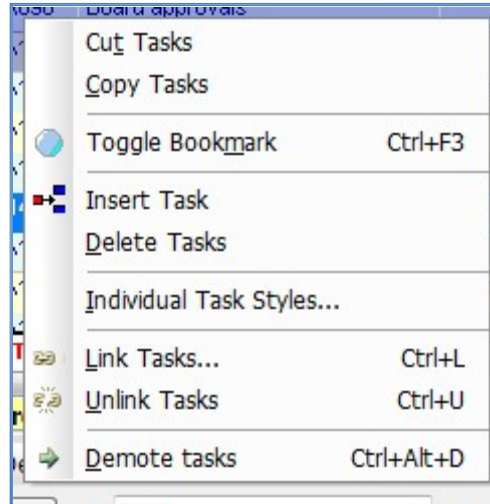
## Right-Click Activity Options

The following options are available when right-clicking a single activity or single row:



- Cut Cell (CTRL+X), Copy Cell (CTRL+C), Paste (CTRL+V)
- Toggle Bookmark (CTRL+F3)
- Individual Task Style
- Insert Task, Delete Task, Dissolve Task (Alt+Delete), Split Task, Task Details... (CTRL+T)
- Duration Risk (CTRL+R), Existence Risk, Resource Risk, Probabilistic Branch Risk, Probabilistic Link Risk,
- Show Risk Distribution, Show Drivers >
- Demote tasks (CTRL+Alt+D) and Task Details (CTRL+T) can also be seen when selecting a single row instead of a single

Users get the following options when right-clicking multiple rows of activities:



- Cut Tasks, Copy Tasks
- Toggle Bookmark (CTRL+F3)
- Insert Task, Delete Tasks
- Individual Task Styles
- Link Tasks (CTRL+L), Unlink Tasks (CTRL+U)
- Demote tasks (CTRL+Alt+D)

The SHOW RISK DISTRIBUTION and SHOW DRIVERS options found when right-clicking a single activity will allow the risk analyst to run a confidence level histogram or tornado chart directly for that activity or milestone.

### Cutting, Copying, and Pasting Data

The options for copy and pasting data can be found by right-clicking data, clicking the edit menu, or by using the hot-keys (CTRL+C & CTRL+V). The ability to cut, copy, and paste data is fairly clear. It is important to note that the cells in Pertmaster function similar to the cells in Microsoft Excel. Users are able to copy and paste to and from multiple cells at one time by left-clicking and selecting multiple cells, then using the copy or paste function. Users can also select an entire column and paste data to and from an Excel spreadsheet.

### Promoting and Demoting Activities

The work breakdown structure, or WBS, functions like Microsoft Project with a PROMOTE and DEMOTE activity function. Primavera P6 users will find this to be a large difference as the WBS is created and managed separately in P6. To demote an activity the planner will select an activity directly below the desired parent activity. A child activity can be promoted to the same level as the parent activity as well. The structure can be somewhat difficult to manage and users may want to click the undo button if a mistake is made. Clicking PROMOTE to undo a DEMOTE will not always have the desired impact; however the undo button will always remove the last change made.



The PROMOTE and DEMOTE functions can be used by:

- Right-clicking one or more rows
- Under the TASKS > OPTION in the EDIT menu
- The CTRL+Alt+P (Promote) and CTRL+Alt+D (Demote) hot-keys
- The left and right green arrows in the PLAN TOOLBAR

### Expanding and Collapsing the WBS or Sort Hierarchy

The work breakdown structure or activity code sort structure can be expanded or collapsed to show or hide child activities.

The EXPAND and COLLAPSE function can be used by:

- Double-clicking the + or - sign in first column (blue separator column)
- Under the TASKS > OPTION in the EDIT menu
- The CTRL+Alt+X (Expand) and CTRL+Alt+C (Collapse) hot-keys
- The double + or - icons in the PLAN TOOLBAR

### Hovering over Activities

Hovering over the activity bar in the Gantt chart will give Primavera Risk users multiple options based on the position of the pointer:

- Middle of the activity: Users will see a double arrow and will be able to move the activity to the left or right by left-clicking and dragging.
- Finish edge of the activity: Users will see a single arrow and can increase or decrease the task duration.
- Directly outside of the activity edge: Users will see an S or an F (start or finish) and will be able to left-click and drag a link to the start or finish of another activity.

### Bookmarking Tasks

Users can bookmark activities so they may quickly find or filter for the activity later. The PERTMASTER schedule check will automatically bookmark schedule flags. The bookmark functions allow users toggle bookmarks, go to the next or previous bookmark, clear all bookmarks, and filter for bookmarked activities. Some or all bookmark functions can be found in the following locations:

- Right-clicking a single or multiple activities
- Under the BOOKMARKS > OPTION in the EDIT MENU
- The CTRL+F3 (Toggle), Shift+F3 (Previous), and F3 (Next) hot-keys
- The circular light-blue bookmark icons in the GANTT TOOLBAR

## Oracle | Primavera Risk: Pertmaster Timescale

The Oracle | Primavera Risk (Pertmaster) Timescale at the top of the Gantt chart can be manipulated by hovering the cursor over various sections of the timescale or by editing the timescale options in a pop-up.



### Moving the Scale Left and Right

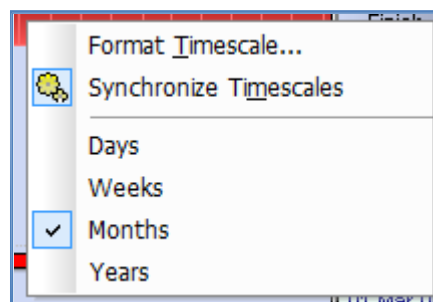
The Primavera Risk TIMESCALE is a red bar at the top of the Gantt chart. The timescale has 2 rows. The first row has blue text by default and will always list the year. Hovering over the first row with the cursor will change the cursor to a double arrow with a hand symbol. Clicking and dragging on the menu bar with this icon showing will allow the project manager to move the entire Gantt charts comments to the left or right. This option can help bring the desired activities into view.

### Zooming In and Out

The second row of the timescale has white text or is sometimes blank. The increment is smaller on the second line. If the first lines show the year, the second line may show the month, etc. Hovering over the second row with the cursor will display a double arrow icon with a + and - sign above it. Clicking and dragging right toward the + symbol on the cursor will allow users to zoom into the Gantt chart. Clicking and dragging left will decrease the size of the tasks displayed on the Gantt chart.

### Format Timescales Pop-up

The TIMESCALE MENU can be accessed by right-clicking anywhere on the timescale and clicking FORMAT TIME SCALES. The timescales pop-up menu has 4 tabs as listed below.

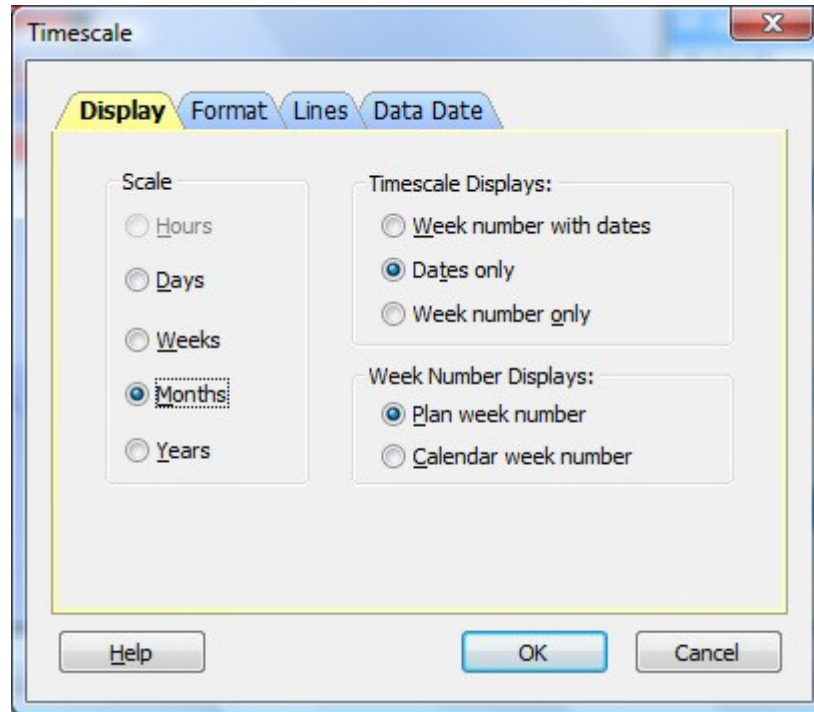


- DISPLAY TAB - Allows a planner to change the unit and information format shown.





- FORMAT TAB - Allows users to change the color or text font of the timescale.
- LINES TAB - Different vertical line formats can be added to the Gantt chart based on a time unit.
- DATA DATE - Sets the style of the vertical line to represent the data date on the Gantt chart.



### Synchronize Timescales

This option can be found by right-clicking the TIMESCALE or under the VIEW MENU. When risk analysts are using more than one view in a sheet, such as a resources sheet and Gantt chart or multiple Gantt charts, they are able to click the SYNCHRONIZE TIMESCALE BUTTON to align the secondary view with the active view. The timescales will not be synchronized by default. Once the timescales are synchronized, editing one scale will change the active and secondary timescale.

### Scale Unit (Days, Weeks, Months, Years)

Right-clicking on the TIMESCALE will allow the user to quickly set the timescale unit without entering a pop-up menu. The active unit will have a check mark next to it.



## Oracle | Primavera Risk: Pertmaster Resources

The Oracle | Primavera Risk (Pertmaster) resource options can be found by clicking RESOURCES under the plan menu. Primavera Risk allows resources to be imported from other scheduling tools or to be created manually. Pertmaster calculates all cost based on resource units and rates. The cost calculations for a cost estimate or schedule is always derived from the resource data.

### Standard View Tab

The STANDARD VIEW TAB is setup like a spreadsheet. The following columns are available:

- ID, Description
- Type - expenses, labor, materials, non-labor, TEAM
- Default Loading - back, front normal, spread
- Cost (cost per unit)
- Cost Uncertainty - none, distribution, escalating
- Unit of Measure - manual entry field
- Calendar - drop-down of all available calendars
- Supply - constant, infinite, profile
- Level - yes, no

Resources

File Help

Standard View Advanced View

ID	Description	Type	Default Loading	Cost	Cost Uncertainty	Unit of Measure	Calendar	Suppl	Leve
DAM	Damages	Expenses	Normal	\$1	None		7 Day	Infi...	Yes
RISKCOST	Risk Cost	TEAM	Spread	\$1			7 Day	Infi...	No
ZFIX	Fixed cost	TEAM	Spread	\$1			7 Day	Infi...	Yes
ZLAB	Day rate	TEAM	Normal	\$2,500			7 Day	Infi...	Yes
ZVAR	Variable cost	TEAM	Normal	\$1			7 Day	Infi...	Yes
ZZZ	Total cost	Expenses	Normal	\$1	None		7 Day	Infi...	Yes

Details for DAM (Damages)

No Profiled Supply

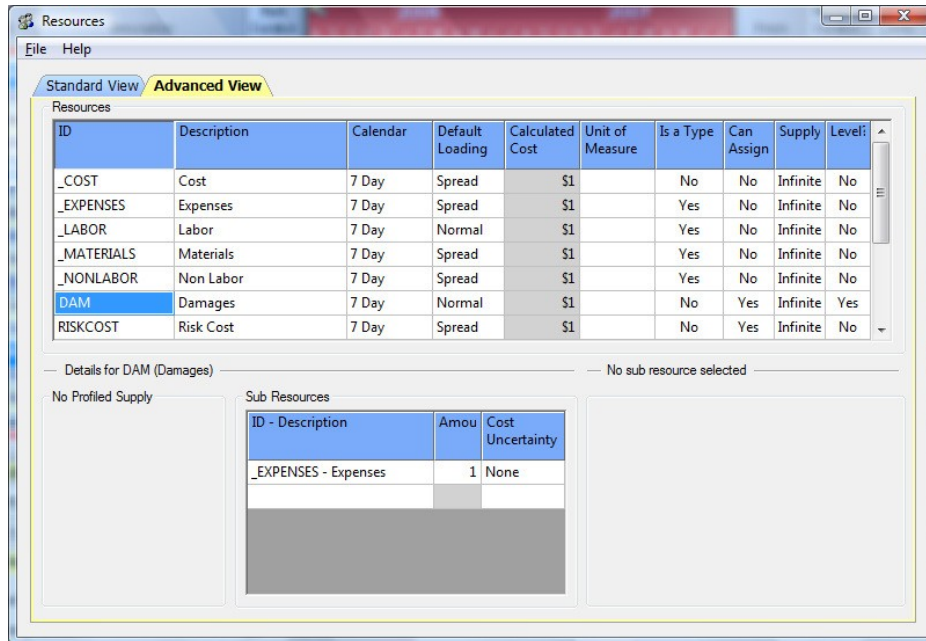
No Team Resources

No Cost Uncertainty

All existing resources should import from Primavera P3, Primavera P6, or Microsoft Project. It is important to set the loading type properly to allow time to drive cost in a representative manner. A spread cost will not increase as the durations increase or decrease. Items like materials should be loaded as spread resources. A normal loaded cost will increase or decrease based on time. A daily or burn rate should be loaded as a normal cost. Costs are commonly loaded as a lump sum in many planning and scheduling departments. If normal and spread costs are not separated it could negatively impact or invalidate the results of cost data.

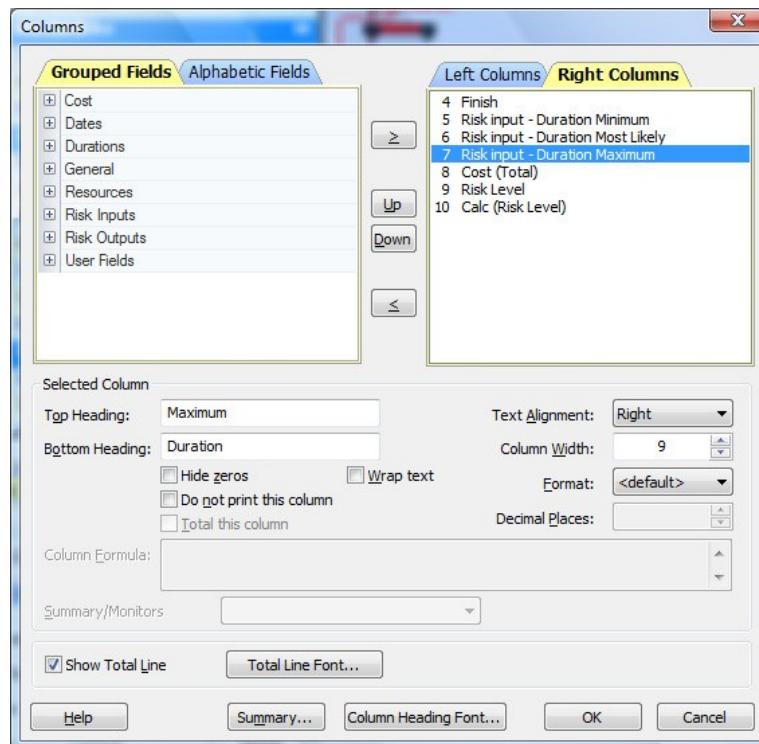
### Advanced View Tab

Schedulers are able to assign sub-resources in the advanced tab. The planner could setup a resource named "crew1" and the sub-resources could be 1 manager, 3 workers, and 2 trucks. This would allow users to assign the crew resource, rather than manually assigning the three sub- resources to an activity.



## Oracle | Primavera Risk: Pertmaster Adding and Removing Columns

A project manager can add and remove columns from the active view in Oracle | Primavera Risk (Pertmaster)



### Adding and Removing Columns

The screen to add, remove, and edit columns can be opened by double-clicking any column header or by clicking COLUMNS under the FORMAT menu. Upon opening the columns interface there is a box on the left side and the right side. Each box has two tabs. The box on the left allows users to browse all columns available in the product. Any column can be added to the Gantt chart view. The tabs on the left allow users to browse fields by category and the second tab will allow users to search for fields based on alphabetic order. The right side window allows users to see all fields that have been added to the current view. Pertmaster has two sets of columns, one on the left and one on the right side of the Gantt chart. Each side has a corresponding tab.

Between the left and right windows displaying the columns are four buttons. The arrow pointing right allows risk analysts to move items from the field list to the active view. The left arrow removes a field from the active view. The UP and DOWN buttons allow users to sort the order of the fields added in the right side window. Select a field name, then click the UP and DOWN buttons to change the order. The order of the fields from top to bottom corresponds with the column view from left to right.

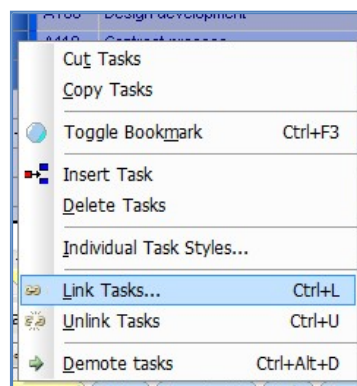
The bottom of the interface allows users to edit the columns appearance, such as the column header names and text wrapping. User-defined fields can also be created. A separate module will focus on creating user-defined fields in Primavera Risk.

## Oracle | Primavera Risk: PERTmaster Add, Remove, Link Activities

There are three main methods to add or remove links in Oracle | Primavera Risk (PERTmaster).

### Highlight Activities and Right-click

Activities can be linked by selecting multiply rows of activities and right-clicking on the selected area and selecting Link Tasks (CTRL+L) or Unlink Tasks (CTRL+U). Schedulers can select different types of logic such as finish-start or start-links. The lag can be set in this menu as well. The tasks will be linked from top to bottom based on the sort order. If activity 2 is directly above activity 1, then a link would be placed, regardless of logic type, using activity 2 as the predecessor and activity 1 as the successor. Clicking undo EDIT MENU would remove all links created in a single click.





### Drag Links in Gantt chart

Planners can use the interactive nature of the Gantt chart to link activities. The cursor can be placed directly before the start or after the finish of a predecessor activity. The cursor will change to S (start) or F (finish). Left-click and drag the link from one activity start or finish to another.

### Links Menu in the Navigation Pane

The navigation pane allows an analyst to add, remove, or edit links. Clicking a cell under the ID COLUMN will highlight a button with 3 dots [...]. Clicking the button will launch a searchable interface which will locate the activity which is targeted to be linked. The link type (finish-start, start-start, etc.,) and lag durations can be set in the columns after the activity has been set. Clicking delete on the keyboard or the delete button located between the predecessor and successor link window will allow users to remove a link. The GOTO button will allow a scheduler to trace the logic by jumping directly to a selected predecessor or successor task.

The screenshot shows the 'Links' menu in the software. The menu is titled 'Links' and includes sub-tabs for 'Resources', 'Costs', 'Risk and Uncertainty', 'User Fields', and 'Suspend and Resume'. The main table displays the following data:

Description	Relative Float	Start	Finish	Type
Safety case	121	16 Mar 06	30 May 06	fs
External appr...	0	31 Aug 06	15 Nov 06	fs

To the right of this table is a 'Successors' table:

ID - Descripti...	Task Type	Description	Relati
A190 - Reduc...	Normal	Reduce hazards	0

At the bottom of the interface, there are controls for 'Filter: None', 'Sort: ID', 'Actual: \$0', and 'Remaining: \$24,37'.



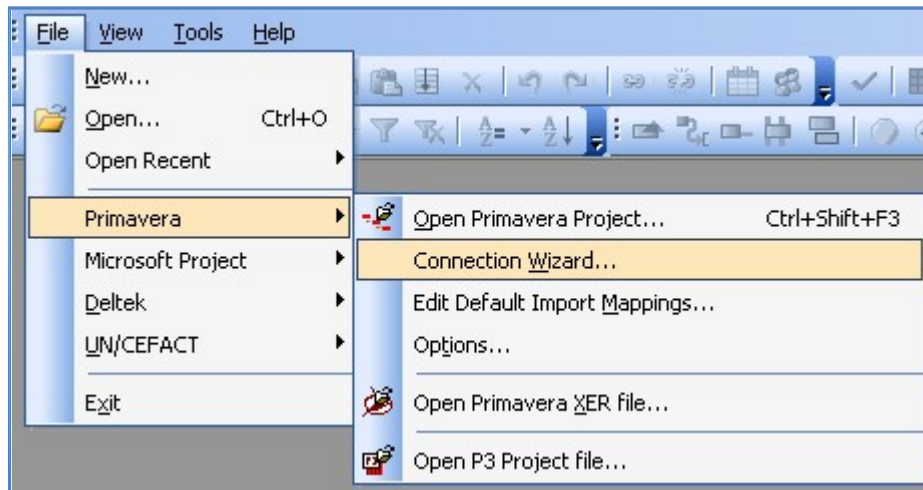
# Risk Process Step1: File Import

## Oracle | Primavera Risk: Pertmaster Connecting to a Primavera P6 Database

The first step of a typical Oracle | Primavera Risk (Pertmaster) Monte Carlo analysis is to import the file. This training session will outline how to import a project schedule into Pertmaster by connecting directly with a Primavera P6 database.

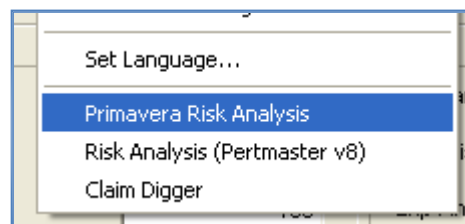
### Creating a Connection to the Primavera P6 Database

Users can connect to the database by one of two methods:



1. Follow the menu path FILE | PRIMAVERA | CONNECTION WIZARD
2. The connection wizard will launch. Click NEXT.
3. Select the "P6" option.
4. Users can select from NATIVE CONNECTION or PRIMAVERA INTEGRATION API.
5. Users should consult with their IT department or the help file article titled Primavera – Primavera Connection Wizard to use the correct options for IT department
6. Upon setup users will be able to import files from Primavera P6 via Enterprise Project Structure, EPS, directly in Pertmaster

OR





1. Open the desired files to be imported in Primavera P6.
2. Follow the menu path **TOOLS | PRIMAVERA RISK ANALYSIS**.
3. The import settings screen will launch.
4. The import options will be described in detail below.
5. Upon completing the import options, the file will import and the user can save the Project plan
6. The connection between the Primavera P6 and Primavera Risk will be set after the first Import:

## Import Process Overview

A significant difference between importing from a database connection and a .xer backup file is the available import mappings. All information in a .xer Primavera P6 backup file will be imported. When connecting directly to the Primavera P6 database, users will be able to select exactly which user-defined fields, activity codes, and resources will be transferred upon import. Users have two options for a direct Primavera P6 database connection:

- Initiate import in Primavera Risk: Follow the menu path **FILE | PRIMAVERA | OPEN PRIMAVERA PROJECT** to import a P6 file directly from the Primavera database.
- Initiate import in Primavera P6: The project(s) can also be directly imported from P6 by following the menu path **TOOLS | PRIMAVERA RISK ANALYSIS** as outlined above.

When initiating the import from within Primavera P6, all open files will be imported into Pertmaster. If the import is initiated in Pertmaster, then a pop-up box containing the ENTERPRISE PROJECT STRUCTURE, or EPS, will launch and allow the risk analyst or project manager to import one or more projects by placing a check mark next to the project name. Cross-project links will be included when importing multiple files.

## Import Mappings

The import mapping options can be opened by following the menu path **FILE | PRIMAVERA | EDIT DEFAULT IMPORT MAPPINGS**. Clicking OK will start the import process.





GENERAL TAB:

**Primavera Import Settings**

Many of the fields in Primavera are automatically mapped to appropriate fields in Primavera Risk Analysis. However, you can also map additional Primavera fields to the following Primavera Risk Analysis risk fields.

**General** | Tasks | Probabilistic | Resources and Costs | Activity Codes | User Defined Fields

Planning unit

Day      One day equals  hours

Hour

Quarter Hour

WBS

Import the WBS Project Structure

Workspace template

Currently selected - Primavera.wkspc     

Use as default for new projects                 

- The planning unit is set in this screen based on the setting in Primavera P6. Users can avoid entering the planning unit by selecting hours.
- The risk analyst can choose to set the work breakdown structure, or WBS, into Pertmaster. Planners can sort the project by activity codes after import so it is usually advisable to check the WBS box.
- The project manager can setup different workspace templates and change the default template. The GENERAL TAB allows the users to map a previously setup workspace as the default. The default workspace is usually sufficient for the Average user so this may not be necessary.



TASKS TAB:

**Primavera Import Settings**

Many of the fields in Primavera are automatically mapped to appropriate fields in Primavera Risk Analysis. However, you can also map additional Primavera fields to the following Primavera Risk Analysis risk fields.

**General** **Tasks** Probabilistic Resources and Costs Activity Codes User Defined Fields

**Duration distribution**

Create Distribution

Task, Minimum Duration

Task, Most Likely Duration

Task, Maximum Duration

Primavera values have been entered in:  Days  Hours

**Alternative duration distribution**

Create alternative distributions using a function contained within the following field:

---> Task, Duration Function

**Duration Correlation**

---> Task, Duration Correlation

**Task ID**

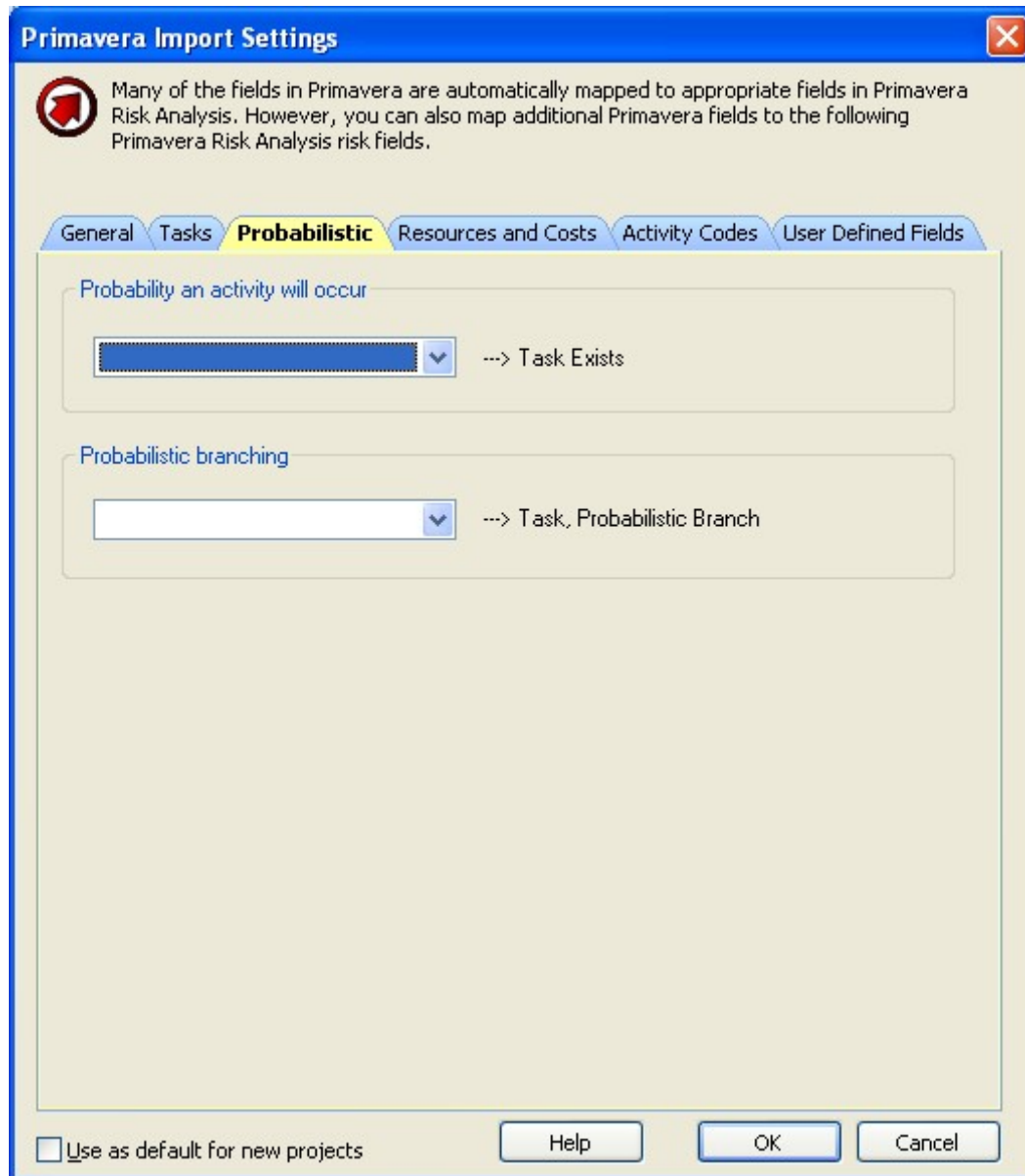
Prefix Task ID with project name

Use as default for new projects

- If the three-point estimates have been entered in Primavera P6 user-defined fields the duration distribution can be mapped to Primavera Risk. The Pertmaster product allows for quick and easy risk loading via templates, which makes it unnecessary to load uncertainty values in P6. However if the data exists, it will be mapped in this section.
- The uncertainty behavior can also be mapped in the duration correlation fields, although users will rarely setup correlation groups in Primavera P6, unless they were originally pushed back from Primavera Risk.
- If the project manager is importing multiple projects in one import, then they can choose to prefix task ID with the project ID by checking the option.



Probabilistic Tab:



- The probability of existence for a activity can be mapped to a user-defined field. An activity that is less than 100% probable is a risk event because its existence is not certain. Most users do not track the probability in Primavera P6 and will utilize the Pertmaster Risk Register instead.
- Probabilistic branching options can be setup in this section. It is rare that users will have a probabilistic branch user-defined field in Primavera P6 unless the data originated in Pertmaster and was pushed back to the Primavera database.

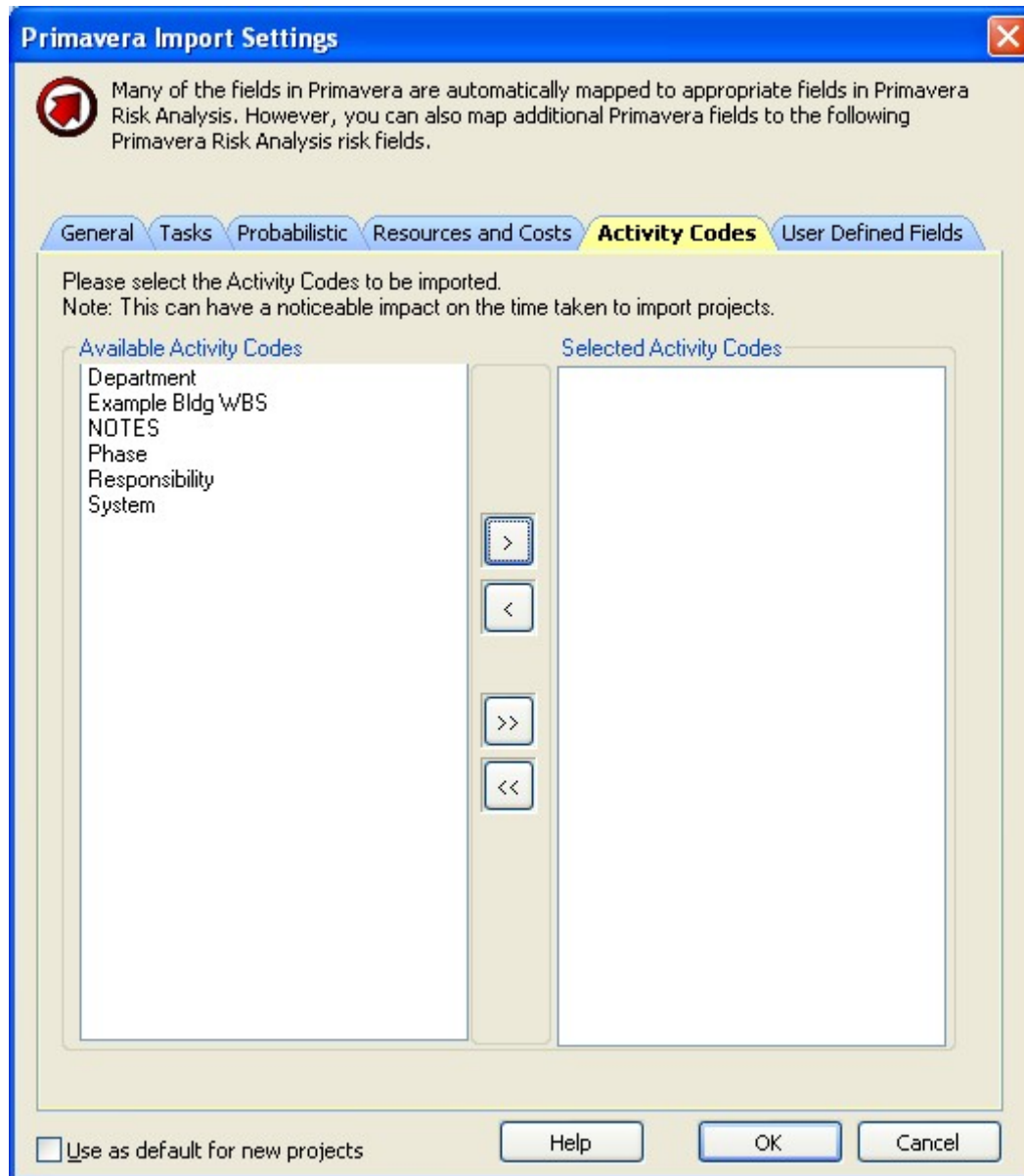


Resources and Costs Tab:

The screenshot shows the 'Primavera Import Settings' dialog box with the 'Resources and Costs' tab selected. The dialog has a blue title bar and a close button in the top right. Below the title bar is a red warning icon and a text box stating: 'Many of the fields in Primavera are automatically mapped to appropriate fields in Primavera Risk Analysis. However, you can also map additional Primavera fields to the following Primavera Risk Analysis risk fields.' Below this is a tabbed interface with five tabs: 'General', 'Tasks', 'Probabilistic', 'Resources and Costs' (selected), 'Activity Codes', and 'User Defined Fields'. Under the 'Resources and Costs' tab, there are three radio button options: 'Do not import any Resources or Costs' (selected), 'Import Roles, Resources, Assignments and Activity Expense Costs', and 'Import Activity Costs summarized as Labor, Non-Labor, Materials and Expenses as below'. Below these are four sections: 'Labor Costs', 'Non-Labor Costs', 'Material Costs', and 'Expenses'. Each section has three radio button options: 'Duration Dependent', 'Duration Independent', and 'Use Primavera Duration Type'. To the right of these are three options: 'Create', 'Minimum', 'Most Likely', and 'Maximum'. Each option has a corresponding input field with a dropdown arrow. At the bottom of the dialog, there is a checkbox for 'Use as default for new projects', a 'Help' button, and 'OK' and 'Cancel' buttons.

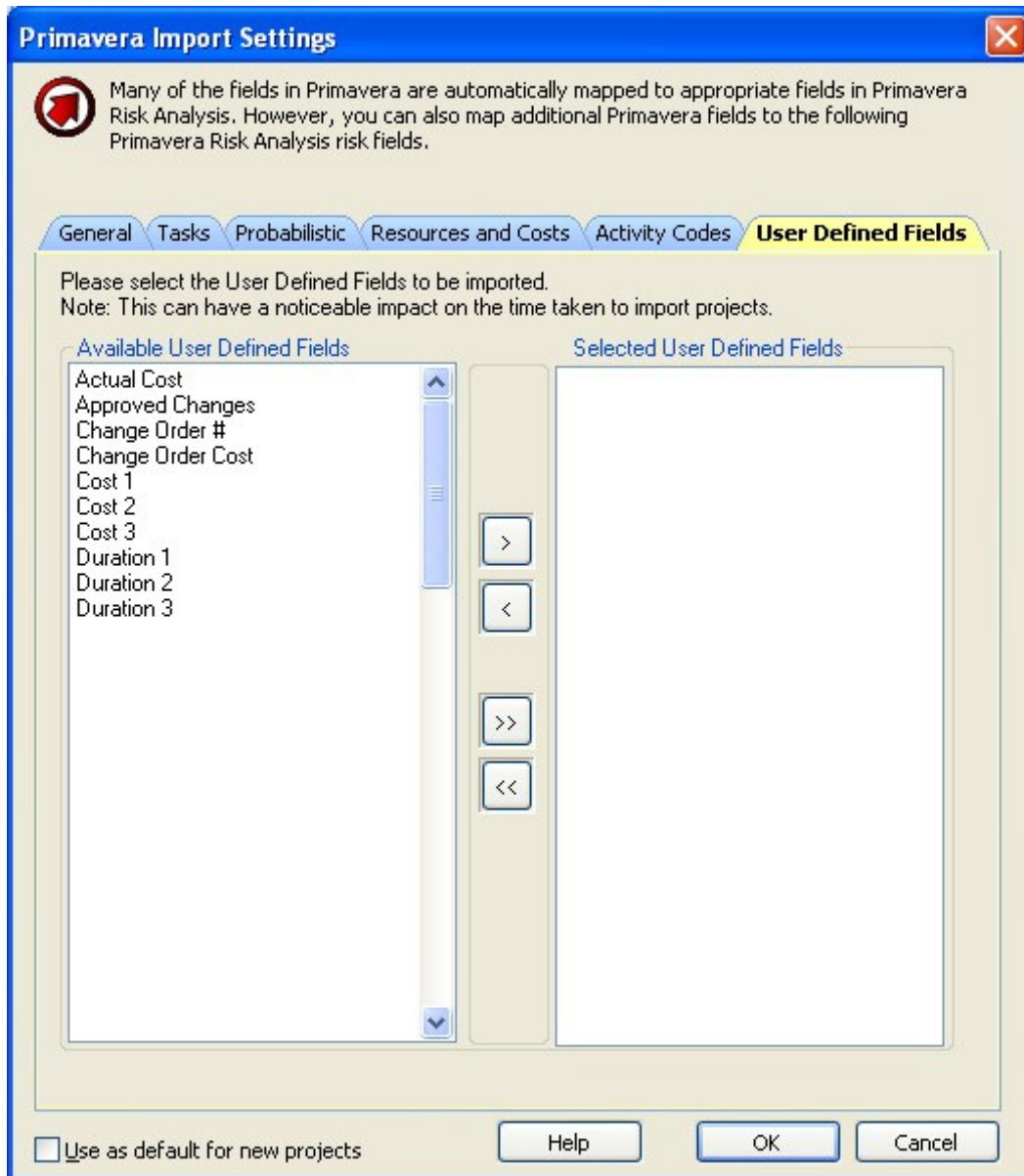
- The risk analyst is given three options for importing resources. The analyst can import no resources, import all resources, or summarize all assigned resources by labor, non-labor, materials, and expenses. If the user selects the SUMMARIZED RESOURCE BOX, then options such as SPREAD or NORMAL LOADING will be selected. Most project plans are imported with all resources if they have been properly loaded in Primavera P6.

Activity Codes Tab:



- The ACTIVITY CODES tab allows users to select which activity codes to import.
- The user can select from a bank of available codes in the left pane and move them to the selected code list on the right pane.
- The single arrow icons between the panes allow users to add or remove one item to the list. The double arrows allow the planner to add or remove all columns at once.

User Defined Fields Tab:



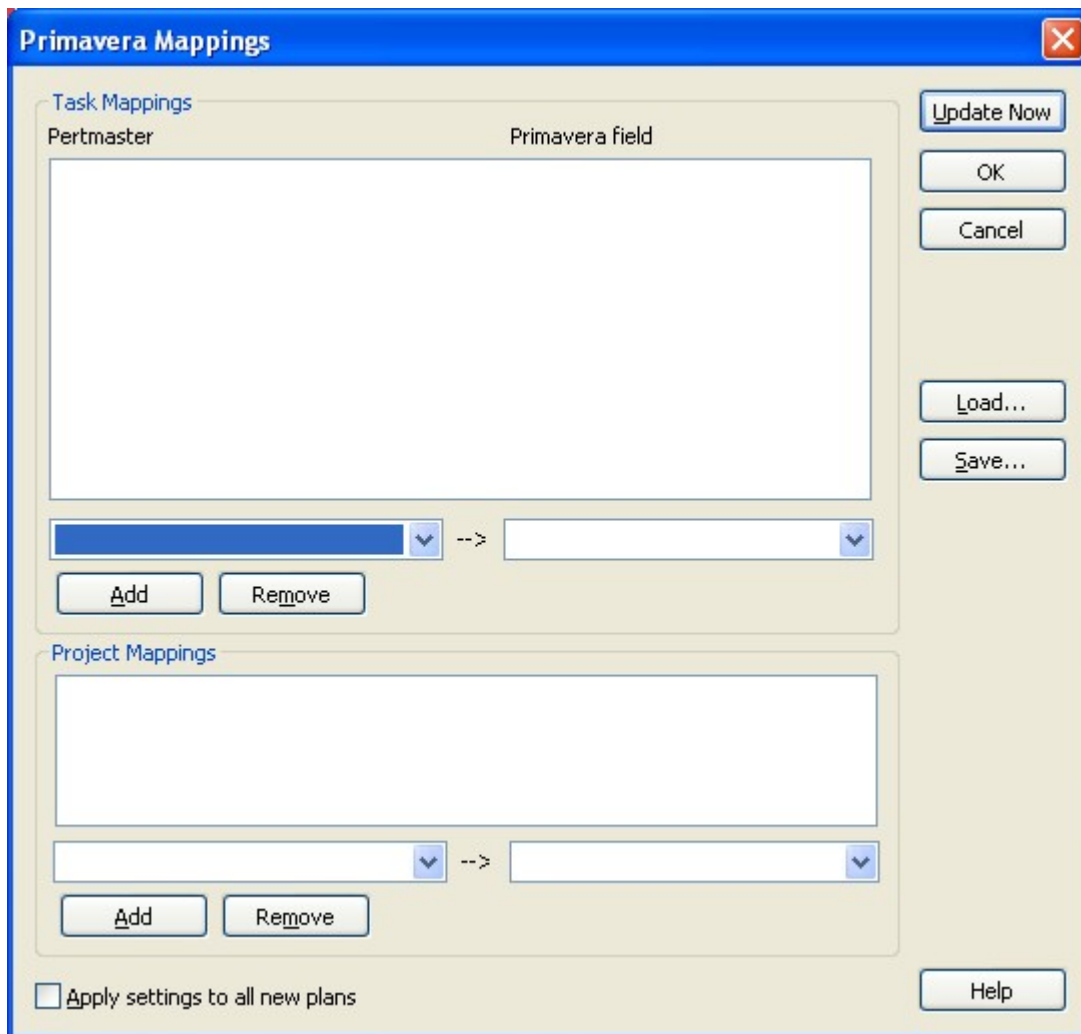
- The user defined fields can be added and removed in the same manner as the activity codes (listed above).

For audit purposes the values may have been loaded in Primavera P6. Schedulers may also have chosen to load each activity with a manual minimum, most likely, and maximum value. Occasionally users may have these situations however it is most common for no risk information to be loaded in the Primavera P6 schedule. The templates in Pertmaster provide users with some powerful and time-saving features for risk loading. If the fields are not brought in upon import, then they can be synchronized after the import by following the menu path

FILE | PRIMAVERA | EDIT DEFAULT IMPORT MAPPINGS... After adding the desired fields the Project manager will click the SYNCHRONIZE PRIMAVERA DATA button, and the fields will be available in Primavera Risk.

### Pushing Primavera Risk (Pertmaster) Data Back to the Primavera P6 Database

To push data back to the Primavera P6 database follow the path FILE | PRIMAVERA | UPDATE PRIMAVERA PROJECT (CTRL+Shift+F4). The analyst will select the Primavera Risk column in the left Drop-down box and the column the data will be sent to in Primavera P6. The user will then click the ADD button. When all desired fields have been added, click UPDATE NOW. Data can only be pushed to user-defined fields (UDFs). To make data active in Primavera P6, push the data to a user-defined field in the Primavera database and execute a global change within Primavera P6.





Example: If a project manager wanted to make a probability 50 level schedule (P50 schedule), they could push back the P50 durations to a user-defined field in Primavera P6. The Primavera P6 planner could then execute a global edit, replacing the remaining durations with the P50 durations from the user-defined field. The Primavera P6 schedule will now have remaining durations equal to the P50 remaining durations calculated in Pertmaster.





## Oracle | Primavera Risk: Pertmaster Import from Primavera P6 .xer File

The first step of a typical Oracle | Primavera Risk (Pertmaster) Monte Carlo analysis is to import the file. This training session will outline how to import a project schedule into Pertmaster from a Primavera P6 backup (.xer) file.

### Import Process Overview

A significant difference between importing from a database connection and a .xer backup file is the available import mappings. All information in a .xer Primavera P6 backup file will be imported. Users cannot exclude activity codes, user-defined fields, and resources as they could in the Primavera P6 direct connection method. Users have two places to import a Primavera P6 backup (.xer) file:

- Import from the Primavera Menu Option: Follow the menu path FILE | PRIMAVERA | OPEN PRIMAVERA XER FILE. The open dialogue box will launch, and the file type will automatically be set to "Primavera (\*.xer)" in the bottom right corner. The user will browse to the file and either double-clicks the file or selects the file and hit the OPEN button to proceed with the import.
- Import from the Open Menu Option: Follow the menu path FILE | OPEN (CTRL+O). This option launches the same menu from above, however the user will see all files instead of only Primavera backup files. Users can change the file type in the bottom right corner to filter out file types.

### Import Mappings

For audit purposes the values may have been loaded in Primavera P6. Schedulers may have also chosen to load each activity with a manual minimum, most likely, and maximum value. Occasionally users may have this situation; however it is most common for no risk information will be loaded in the Primavera P6 schedule. The templates in Pertmaster provide users with some powerful and time-saving features for risk loading. If the fields are not brought in upon import, then they can be synchronized after the import by following the menu path FILE | PRIMAVERA | EDIT DEFAULT IMPORT MAPPINGS. After adding the desired fields, project manager will click the SYNCHRONIZE PRIMAVERA DATA button and fields will be available in Primavera risk



### Import Options Popup:

Primavera XER Import Options

Project Selection

Please select the required project: ExampleRegister

Import all projects in the selected file:

Combined Project Name:

Planning unit

Day One day equals  hours

Hour

Quarter Hour

WBS

Organize by the project WBS structure

Workspace template

Currently selected - Primavera.wkspc

- When importing from a Primavera backup (.xer) file users will be able to import multiple projects if there is more than one project saved in the .xer file. The users will be able to select one specific project or all sub-projects when going through the import wizard. If there are three projects or more, users cannot load only two projects. The option will allow for one specific project to be imported or all projects to be imported.
- The planning unit is set in this screen based on the setting in Primavera P6. Users can avoid entering the planning unit by selecting hours.
- The risk analyst can choose to set the work breakdown structure (WBS) into Pertmaster. Planners can sort the project by activity codes after import, so it is usually advisable to check the WBS box.
- The project manager can setup different workspace templates and change the Default template. The GENERAL TAB allows the users to map a previously setup workspace as the default. This may not be necessary as the default workspace is generally sufficient for the average



## Import Mappings Tasks Tab:

The screenshot shows the 'Primavera XER Import Mappings' dialog box with the 'Tasks' tab selected. The dialog has a title bar with a close button (X). Below the title bar is a red arrow icon and a text box stating: 'Many of the fields in Primavera are automatically mapped to appropriate fields in Pertmaster. However, you can also map some additional Primavera fields to the following Pertmaster Risk fields.'

The 'Tasks' tab is highlighted in yellow. Below it, there are two sub-tabs: 'Tasks' (active) and 'Probabilistic'. The 'Tasks' sub-tab contains the following sections:

- Duration distribution:** A section with a 'Create Distribution' checkbox (unchecked). Below it are three dropdown menus: 'Task, Minimum Duration' (set to 'P50 Finish'), 'Task, Most Likely Duration' (set to 'Remaining Duration'), and 'Task, Maximum Duration' (set to 'P80 Finish'). At the bottom of this section are radio buttons for 'Primavera values have been entered in: Days (selected) / Hours'.
- Alternative duration distribution:** A section with the text 'Create alternative distributions using a function contained within the following field :'. Below this is a dropdown menu set to '<nothing>' and a label '---> Task, Duration Function'.
- Duration Correlation:** A section with a dropdown menu set to '<nothing>' and a label '---> Task, Duration Correlation'.
- Task ID:** A section with a checkbox 'Prefix Task ID with project name' (unchecked).

At the bottom of the dialog, there is a checkbox 'Set as default when opening XER files' (unchecked), and three buttons: 'Help', 'OK', and 'Cancel'.

- If the three-point estimates have been entered in Primavera P6 user-defined fields, the duration distribution can be mapped to Primavera Risk. The Pertmaster product allows for quick and easy risk loading via templates, so it is not necessary to load the uncertainty values in Primavera P6. However if the data exists it will be mapped in this section.
- The uncertainty behavior can also be mapped in the duration correlation fields. It is very rare that users will setup correlation groups in Primavera P6, unless they were originally pushed back from Primavera Risk.
- If the project manager is importing multiple projects in one import, then they can choose to prefix task ID with the project ID by checking the option.



### Import Mappings Probabilistic Tab:

The screenshot shows the 'Primavera XER Import Mappings' dialog box with the 'Probabilistic' tab selected. The dialog contains the following elements:

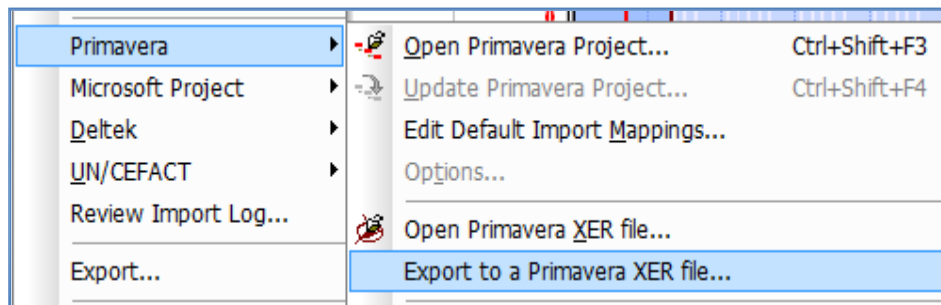
- Header:** A red arrow icon and text: "Many of the fields in Primavera are automatically mapped to appropriate fields in Pertmaster. However, you can also map some additional Primavera fields to the following Pertmaster Risk fields."
- Navigation:** Two tabs: 'Tasks' and 'Probabilistic' (the active tab).
- Mapping Section 1:** A text label "Probability an activity will occur" above a dropdown menu showing "<nothing>" and an arrow pointing to "Task Exists".
- Mapping Section 2:** A text label "Probabilistic branching" above a dropdown menu showing "<nothing>" and an arrow pointing to "Task, Probabilistic Branch".
- Footer:** A checkbox labeled "Set as default when opening XER files" (unchecked), and three buttons: "Help", "OK", and "Cancel".

- The probability of existence for an activity can be mapped to a user-defined field. An activity that is less than 100% probable is a risk event because its existence is not certain. Most users do not track the probability in Primavera P6 and will use the Pertmaster Risk Register instead.
- Probabilistic branching options can be setup in this section. It is rare that users will have a probabilistic branch user-defined field in Primavera P6 unless the data originated in Pertmaster and was pushed back to the Primavera database.



## Exporting a Project Plan from Primavera Risk to a Primavera P6 Backup File (.xer)

In order to push data back to the Primavera P6 database, the project planner will need to import via a connection to the Primavera P6 database. Users can export a Pertmaster plan as a Primavera backup (.xer) file. The export option is listed under the path FILE | PRIMAVERA. The file will be created directly from Pertmaster. This is usually not a desirable option as it will completely rewrite the file based on Pertmaster's CPM scheduling engine and options. Although the file will be reasonably clean it is still not advisable in many situations due to small differences in the scheduling engines.





## Oracle | Primavera Risk: Pertmaster Import from a Microsoft Project.mpp file

The first step of a typical Oracle | Primavera Risk (Pertmaster) Monte Carlo analysis is to import the file. This training session will outline how to import a project schedule into Pertmaster from a Microsoft Project plan (.mpp) file.

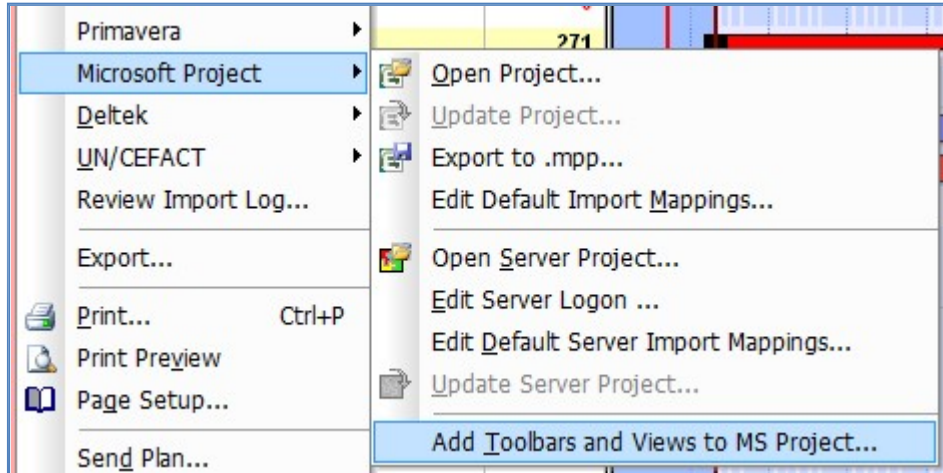
### Important Notes

For this training example it is assumed three-point estimates need to be pushed back to Microsoft Project (MSP) for audits by government bodies such as the DCMA and DCAA. This may not always be necessary: however Microsoft Project is much more common on government projects than in other industries. Three-point estimates can be used by an auditor to replicate the answer in Pertmaster or in other risk analysis tools such as @Risk.

1. The duration 1, duration 2, and duration 3 columns must be clear in the Microsoft Project file. The column cannot contain look-up or formula values. These columns will be used to contain the minimum, most likely, and maximum values for use in other risk products. These columns must be clear in the master project file and all sub-project files.
2. If the Microsoft Project file has sub-projects, then a blank number field will be needed to store the MSP Unique IDs during the import into Pertmaster. Any number field can be used. The field must be clear of formatting like the durations fields listed above.

### Add Toolbar to Microsoft Project (MSP)

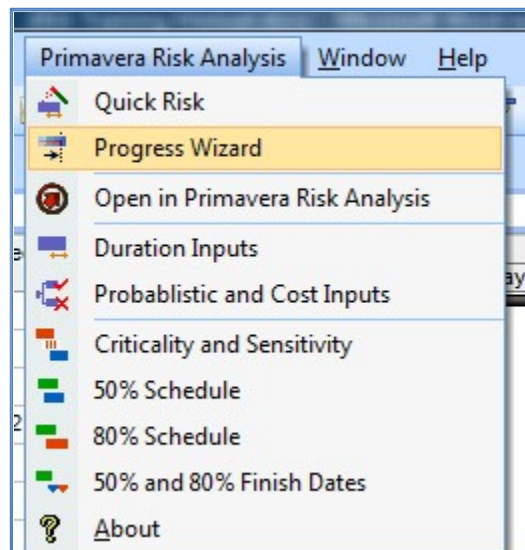
Before importing a Microsoft Project file for risk analysis, the Pertmaster toolbar should be added to Microsoft Project. The files can be imported directly into Pertmaster from the file menu, however when dealing with sub-projects the import must come from within MSP with the master project schedule open. The toolbar will also give the user other important features directly in MSP such as a progress wizard to run prior to import.



1. Open Primavera and click FILE | MICROSOFT PROJECT | ADD TOOLBARS and VIEWS to MS Project. A warning pop-up in Primavera will let the scheduler know that the default MSP template will be edited. Click yes.
2. A message should launch that confirms the toolbar was installed. Click OK. If there are errors, then the computer may need to be restarted or there may be permissions issues on the computer or server.
3. Microsoft Project Planners should now see a Primavera Risk Analysis menu and a corresponding toolbar with 9 options.

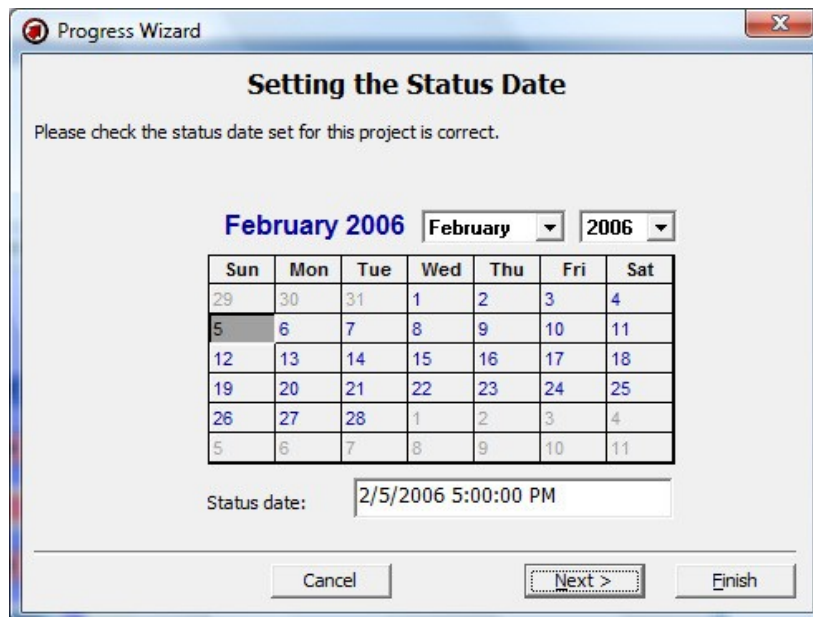
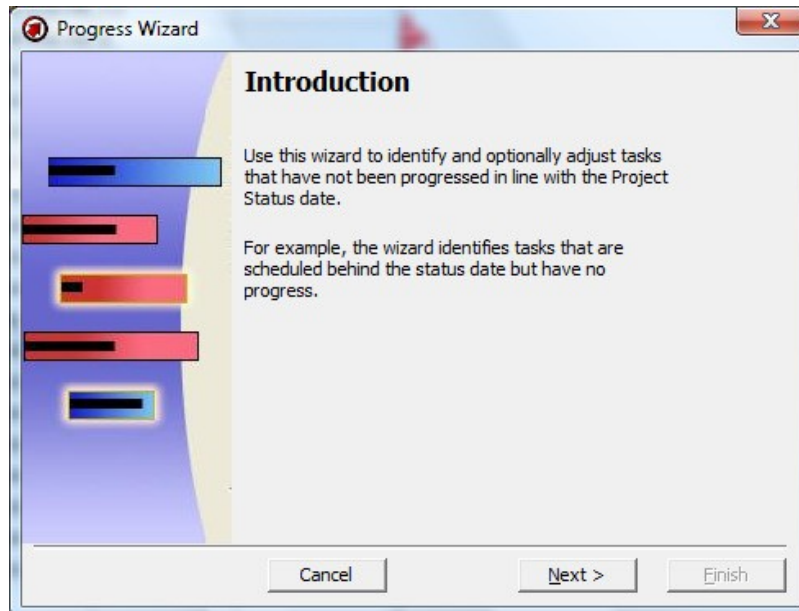
## Import Process and Progress Wizard Overview

1. Copy the Microsoft Project files to the Primavera directory on the local machine or server directory. It is best to work off a copy of the files to avoid making undesired changes to the base files.
2. Open Primavera and select the MENU OPTION for Primavera Risk. A corresponding Primavera Risk toolbar has the same options listed in the menu.



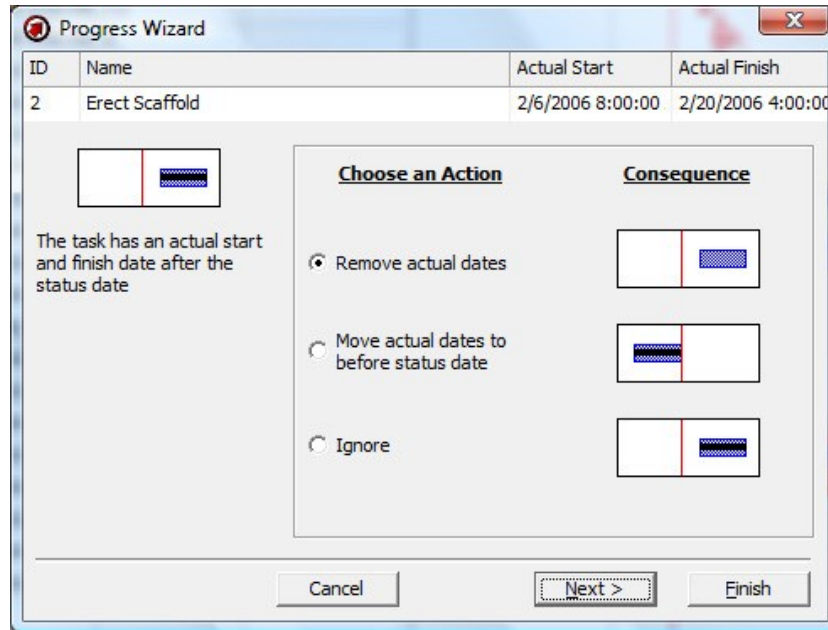


3. Before starting the import, run the PROGRESS WIZARD. The progress wizard will go step-by-step through the schedule and locate areas where the schedule status is out of alignment. For example, actual dates in the future and remaining duration in the past will be highlighted. Other issues will often be found due to the method percent complete is often used to calculate earned value in Microsoft Project. The wizard will ask for the status date which should be populated automatically.

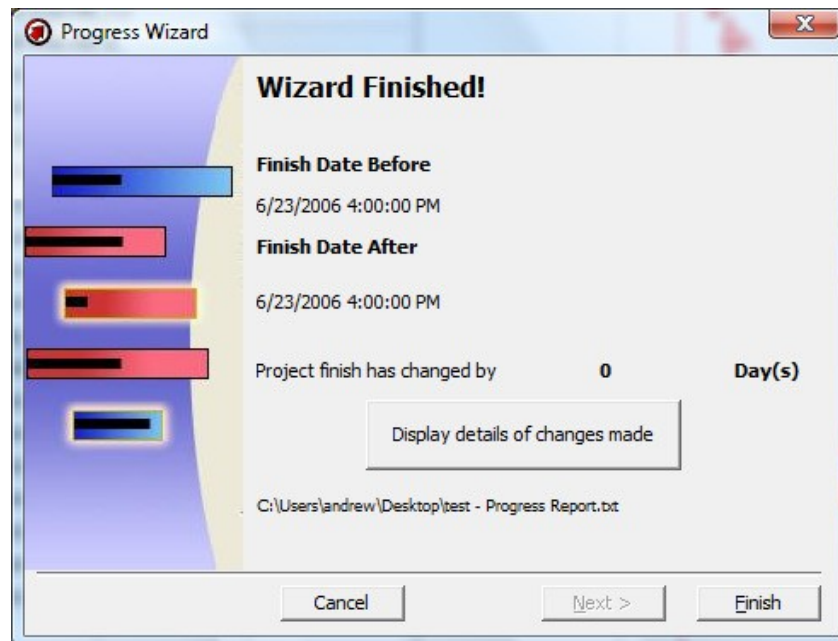


4. When the progress wizard finds an issue in the Microsoft Project schedule, it will launch a pop-up box with a message to fix the status. This wizard will make a change directly to the Microsoft schedule and may have an impact on the earned value calculation among other things.





5. The MSP schedule can be discarded or saved after the import process.



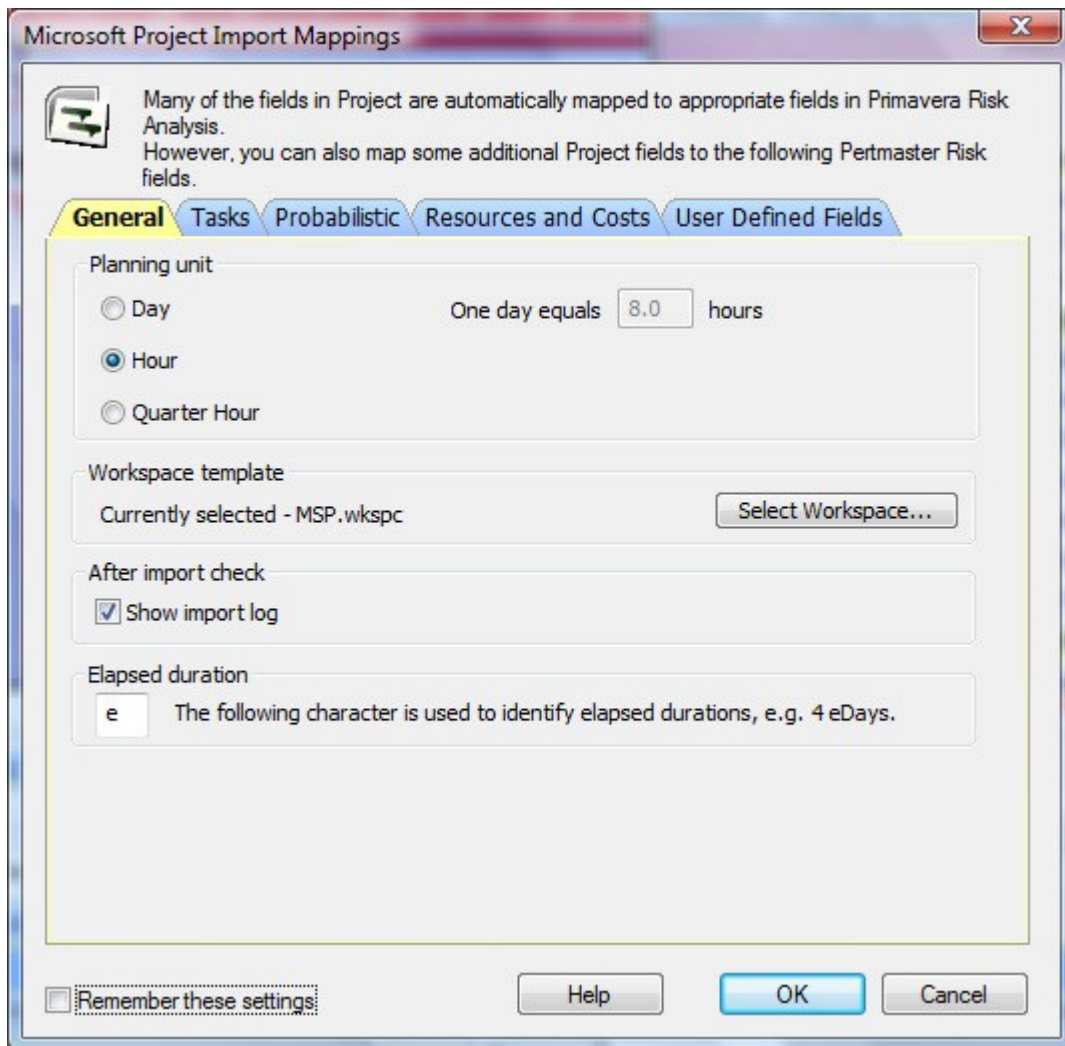
The progress wizard simply ensures that Pertmaster reads in the data the way it was intended from Microsoft Project. Make certain to carefully select the correct options during the wizard, as the schedule import relies on this. Many of the changes can be accomplished by progressing the project and subproject files to time now via **TOOLS | TRACKING | UPDATE PROJECT IN MICROSOFT PROJECT**. The progress wizard will conclude with a summary of the changes. Once the progress wizard has been completed, the file may be imported into Pertmaster.

### Microsoft Project Import Mappings

For audit purposes the risk ranges (minimum, most likely, and maximum) may have been loaded in MSP. Schedulers may have also chosen to load each activity with a three-point estimate. Occasionally users may have this situation; however it is most common for no risk information will be loaded in the Microsoft Project schedule. The templates in Pertmaster provide users with some powerful and time- saving features for risk loading. If the fields are not brought in upon import, then the user will be required to re-import the Microsoft Project (.mpp) file.

1. To import a file, click on OPEN IN PERTMASTER under the PERTMASTER MENU in MSP. The file can be imported directly from Primavera Risk only if there are no sub-project files.
2. The pop-up will launch with multiple tabs containing the import options.

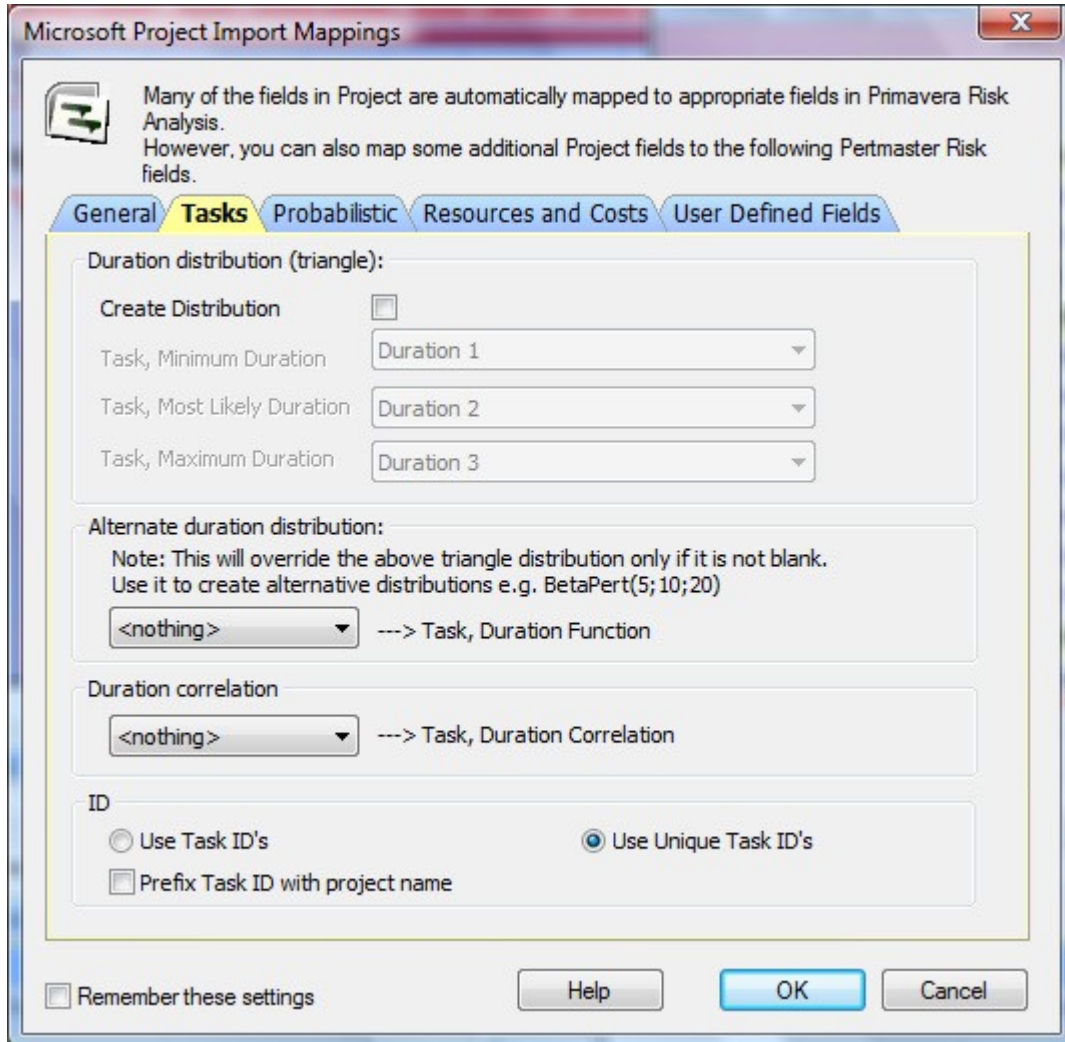
Import Mappings General Tab:





- It is critical that the STORAGE FOR UNIQUE ID is mapped to a column which is completely clear of formula and look-up values. If these columns contain formulas in the master or any of the sub-projects the import data will be corrupted. This option will only appear if the project has sub-projects inserted.
- The planning unit is set in this screen based on the setting in Microsoft Project. Users can avoid entering the planning unit by selecting hours.
- The risk analyst can choose to set the work breakdown structure, or WBS, into PERTmaster. Planners can sort the project by user-defined fields after import, so it is usually advisable to check the WBS box.
- The project manager can setup different workspace templates and change the default template. The GENERAL TAB allows the users to map a previously setup workspace as the default. The default workspace is usually sufficient for the average user, so this may not be necessary.
- A check box exists to show the import log after import. A risk analyst should always view the import log regardless of the option selected here.
- Users will define the identifier for elapsed durations in Microsoft Project. It should almost always be left at the default value of "e."

## Import Mappings Tasks Tab:



Microsoft Project Import Mappings

Many of the fields in Project are automatically mapped to appropriate fields in Primavera Risk Analysis. However, you can also map some additional Project fields to the following Pertmaster Risk fields.

**General** **Tasks** Probabilistic Resources and Costs User Defined Fields

Duration distribution (triangle):

Create Distribution

Task, Minimum Duration

Task, Most Likely Duration

Task, Maximum Duration

Alternate duration distribution:

Note: This will override the above triangle distribution only if it is not blank. Use it to create alternative distributions e.g. BetaPert(5;10;20)

---> Task, Duration Function

Duration correlation

---> Task, Duration Correlation

ID

Use Task ID's  Use Unique Task ID's

Prefix Task ID with project name

Remember these settings

Help OK Cancel

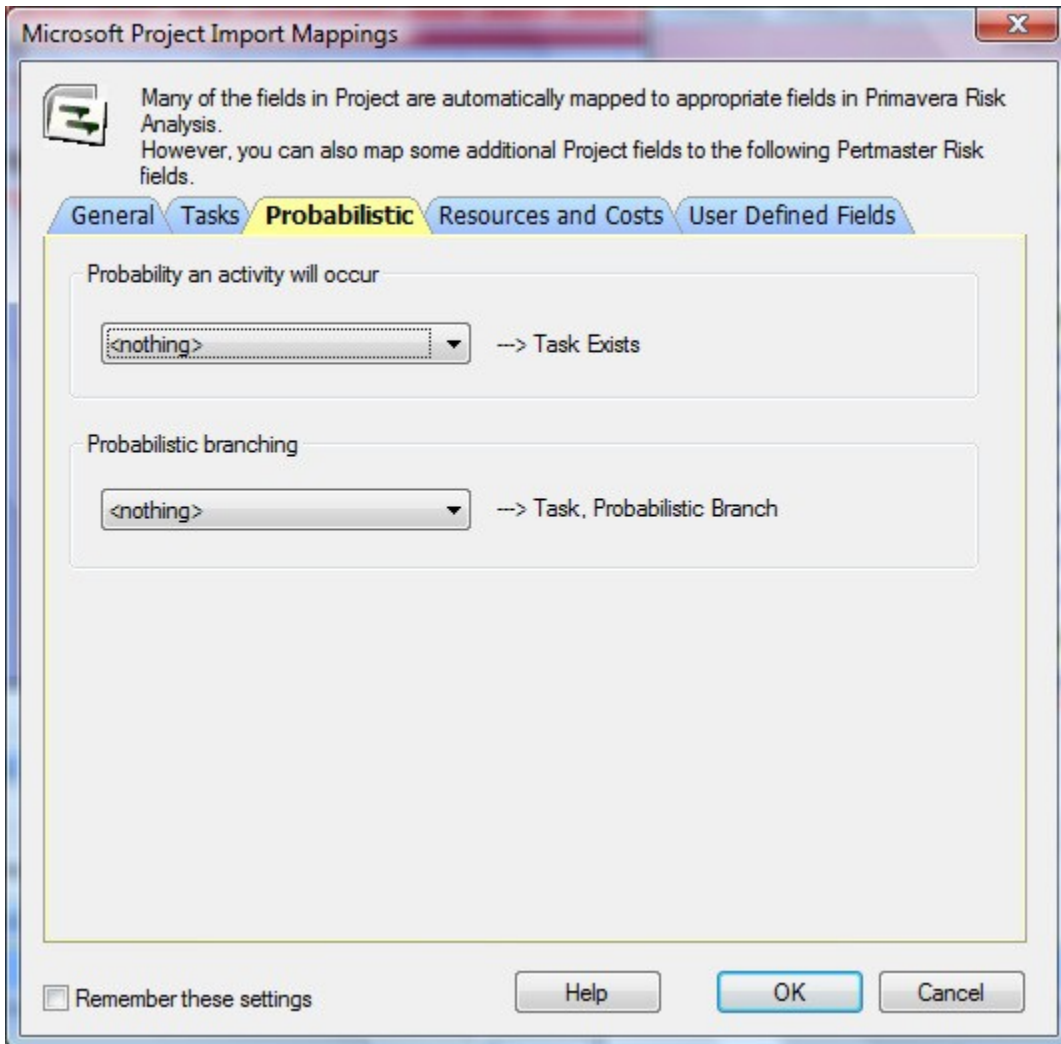
- If the three-point estimates have been entered in Microsoft Project user-defined fields, then the duration distribution can be mapped to Primavera Risk. The Pertmaster product has templates that allow for quick and easy risk loading. It is not necessary to load the uncertainty values in MSP, however if the data exists it will be mapped in this section.
- The uncertainty behavior can also be mapped in the DURATION CORRELATION FIELDS; however it is very rare that users will setup correlation groups in Microsoft Project, unless they were originally pushed back from Primavera Risk.
- Users can choose to load the Pertmaster IDs based on the ID in Microsoft Project or the MSP Unique ID. The unique ID should never change in Microsoft Project; therefore if users will make their risk templates based on ID in Pertmaster it is preferable to use the unique ID option. Microsoft Project changes the ID number each time a task is



added or removed based on the line number, it is common for ID numbers to change each month.

- If the project manager is importing multiple projects in one import they can choose to prefix task ID with the project ID by checking the option.

## Import Mappings Probabilistic Tab:





- The probability of existence for an activity can be mapped to a user-defined field. An activity that is less than 100% probable is a risk event because its existence is not certain. Most users do not track the probability in Microsoft Project and will utilize the Pertmaster Risk Register instead.
- Probabilistic branching options can be setup in this section. It is rare that users will have a probabilistic branch user-defined field in MSP unless the data originated in Pertmaster and was pushed back to Microsoft Project.



Import Mappings Resources and Costs Tab:

Microsoft Project Import Mappings

Many of the fields in Project are automatically mapped to appropriate fields in Primavera Risk Analysis. However, you can also map some additional Project fields to the following Primavera Risk fields.

General Tasks Probabilistic **Resources and Costs** User Defined Fields

Project resources

- Import Resource Calendars
- Import all the Project resources and assignments:
- Import only the project resource costs:
  - Linked to Task Duration (Normal loading)
  - Not Linked to Task Duration (Spread loading)

Create a triangle cost distribution from:

- Create a cost distribution

Cost 8	---	Task, Minimum Cost
Cost 9	---	Task, Most Likely Cost
Cost10	---	Task, Maximum Cost

Create an alternative cost distributions using:

Note: This will override the above triangle distribution only if it is not blank. Use it to create alternative distributions e.g. COST[Uniform(500;700)]

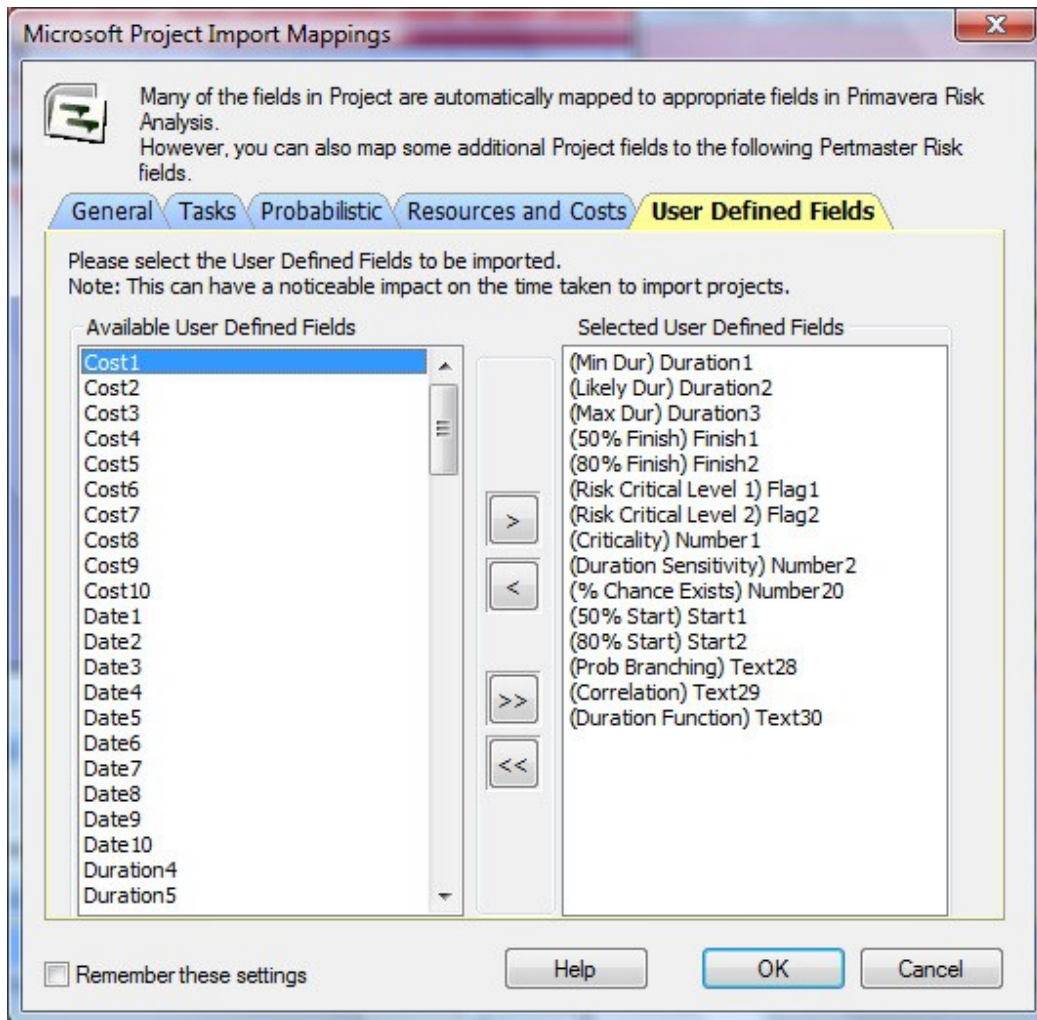
<nothing>	---	Task, Resource Function
-----------	-----	-------------------------

Remember these settings

Help OK Cancel

- The risk analyst is given a few options for importing resources. The analyst can import all resources or just those resources that have a normal or spread loaded cost.
- Users choose whether to import resource calendars.
- Resource distributions (three-point estimates) can be created upon import.

Import Mappings User Defined Fields Tab:



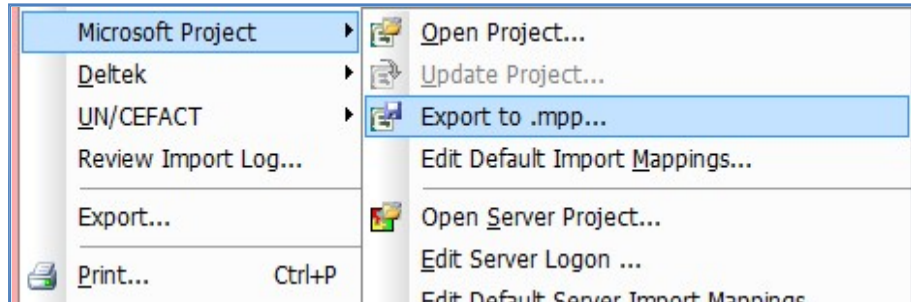
- The USER DEFINED FIELDS TAB allows a project manager to select which activity codes to import.
- The user selects from a bank of available codes in the left pane and moves them to the selected code list in the right pane.
- The single arrow icons between the panes allow users to add or remove one item to the list. The double arrows allow the planner to add or remove all columns at once.





### Exporting a Project Plan from Primavera Risk to Microsoft Project

Users can export a Pertmaster plan as a Microsoft Project (.mpp) file. The export option is listed under the path FILE | MICROSOFT PROJECT. The file will be created directly from Pertmaster. Microsoft Project will need to be installed on the machine to create an export from Pertmaster. This is usually not a desirable option as it will completely rewrite the file based on Pertmaster's CPM scheduling engine and options. Although the file will be reasonably clean it is still not advisable in most situations due to small differences in the scheduling engines.



### Pushing Primavera Risk (Pertmaster) Data Back to the Original Microsoft Project File

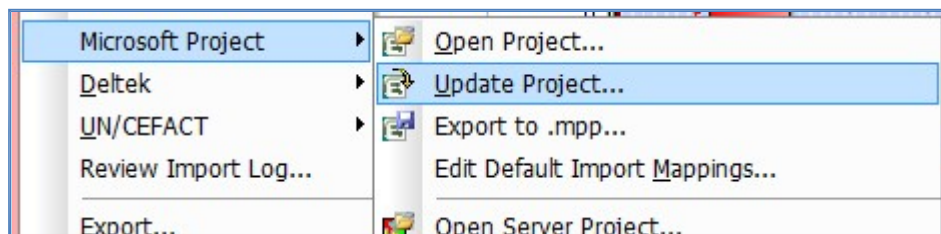
The risk ranges or other information can be imported back into the Microsoft Project schedule in order to run and audit the analysis using different risk products. The process can be somewhat difficult because multiple versions of the MSP schedule may be used. The basic process will be:

1. Bring the MSP schedule to time now.
2. Load the risk values in Pertmaster.
3. Replace the MSP schedule or schedules with the version of the Microsoft Project schedule to be loaded with the risk values or other data. The file being written to must be in the original location from which the MSP file was imported. Pertmaster also requires that the file name is exactly the same as the originally imported file.
4. Import the risk ranges to the MSP file or files.



It is only necessary to replace the file if the time now version of the schedule has different remaining durations than the original file due to the progress wizard. The time now version could be considered the new working file, however some companies choose to use % complete in Microsoft Project to track earned value, which edits the remaining duration field. This is not a recommended way to update earned value as the % complete field is actually the duration % complete field. It seems to be a common issue that the true remaining duration is allowed to be edited in order to track earned value to push to Products like Cobra. There will be mismatches between the true risk ranges and the remaining durations in Microsoft Project in these situations. If earned value isn't a concern in the audit file the time now version of the schedule should be used and no file replacements are needed.

To update the file:



1. Follow the path FILE | MICROSOFT PROJECT | UPDATE PROJECT.
2. Users select the PERTMASTER FIELD on the left drop-down box and the corresponding MSP FIELD to push the data to in the right drop-down box.
3. Notice that the file name is hard coded and cannot be changed. This is the reasoning for copying the files into the exact location (if file replacement is needed).
4. Click UPDATE NOW. Microsoft Project will launch, and the schedule will be populated with the risk ranges.



Microsoft Project Mappings

File to update: C:\Program Files\Oracle\Primavera Risk Analysis\Samples\House01.mpp

Task Mappings	Permaster	Microsoft Task Codes
	Cost (Actual)	-> Cost5

Cost (Actual) --> Cost5

Open project in MSP after Update

Apply settings to all new plans



# Risk Process Step 2: Import Validation

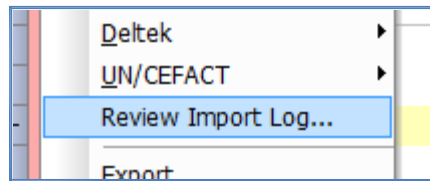
## Oracle | Primavera Risk: Pertmaster Import Log

The second step of a typical Oracle | Primavera Risk (Pertmaster) Monte Carlo analysis is to validate the import for differences between the original schedule file and the Pertmaster CPM schedule calculations. The Import log shows the project manager any information that was changed upon import.

### Import Log

Certain information such as actual finishes in the future or remaining durations on activities in the past must be fixed before import. If schedulers do not fix the issues before import, then Primavera Risk will make assumptions on how to fix them. The import log will list everything Pertmaster changed. Some items may be less important than others. Some flags may require the user fix the schedule and re-import the file.

The import log can be accessed two ways:



1. Follow the path FILE | REVIEW IMPORT LOG
2. Follow the path REPORTS | IMPORT LOG

The Microsoft Project import log is in a web-based format.

The Primavera P3 and Primavera P6 logs are in a .txt file. The P6 log file will list the settings found in Primavera P6. Although the log file lists more than just the warnings found, the warnings are the most critical issue in the log file. The data should be fixed in the main scheduling tool. The warnings show items where Pertmaster actually changed the data because it did not match with the Primavera Risk CPM scheduling engine. For example, Pertmaster does not allow impossible logic such as actual finish dates that are in the future. The warnings are listed with a prefix, "WARNING" in a similar format to the example below:

- WARNING: 1010 Duration changed from 6.25 days to 6.00 days



```
ImportWarnings.txt - Notepad
File Edit Format View Help
Opening project from...C:\Program Files\Oracle\Primavera Risk
Analysis\Samples\Register-EPC.xer
Reading Project Information ...
Project Information Loaded...
Creating calendars
Calendar Information Loaded...
Loading resources
Resource Information Loaded...
Loading resources
Resource Information Loaded...
Loading WBS Structure...
WBS Information Loaded...
Loading scheduling options...
Info: Scheduling Options - Link Lag Calendar set to SUCCESSOR
Info: Scheduling options - Use Actual start for Start-Start links set to False
Scheduling Options Loaded...
Reading User Defined Fields...
User Defined Fields Loaded...
Loading tasks
Task Information Loaded...
Reading Relationships...
Relationships Loaded...
Assigning resources
Warning A030 LAB1
Warning A070 LAB1
Warning A080 LAB1
```

Some of the common warnings that are found in the log file are:

- A link was removed that caused a loop. Pertmaster may interpret loops differently than other scheduling tools. This isn't a common error compared to others.
- An activity has a remaining duration in past. If an activity is truly in the past, then it cannot have a remaining duration before the time now line.
- An activity has an actual date set in the future. Pertmaster will not schedule actual dates that are after the time now line.
- A resource curve may be removed. Primavera can handle complex resource curves that Pertmaster cannot. The resources will be imported although the Curve may be removed.
- A cross-project link has not been imported. If the project containing the link is not imported, then Pertmaster uses a constraint to hold the dates as the actual cross-project logic is not available.

## Oracle | Primavera Risk: Pertmaster Schedule Planning Options

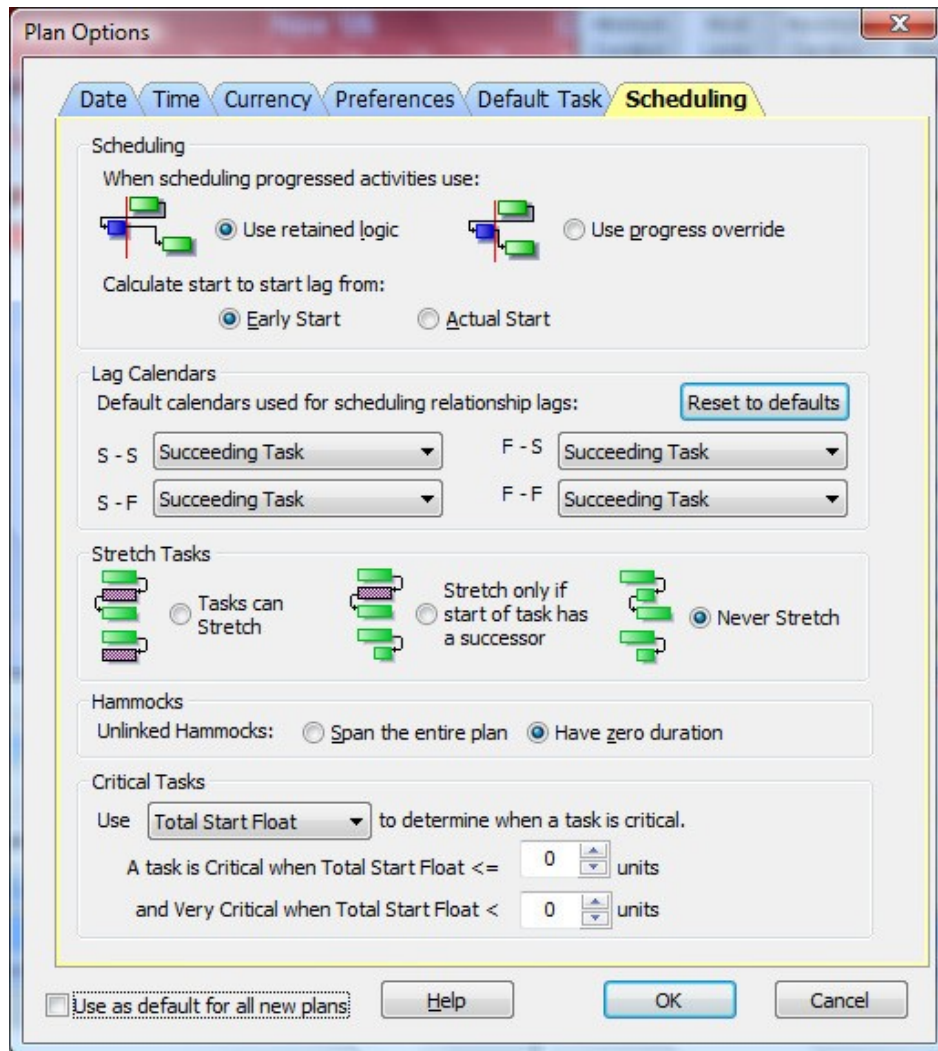
The second step of a typical Oracle | Primavera Risk (Pertmaster) Monte Carlo analysis is to validate the import for differences between the original schedule file and the Pertmaster CPM schedule calculations. The schedule planning options should be automatically set based on the

options set into your scheduling tool (Microsoft Project, Primavera P6, etc), however it is a best practice to review the settings and ensure that they were imported correctly.

[Plan Options \(Menu Path: Plan | Plan Options\) Section Tab: Scheduling Options](#)

The SCHEDULING OPTIONS TAB is one of the most important SETTINGS sections in the Primavera Risk product. Users are able to define how the CPM scheduling network is calculated by the scheduling engine. The scheduling options will be inherited from the original scheduling tool. For example, if a planner has turned on progress overrides in Primavera P6, then Pertmaster will see this option upon import. If users changed a setting without rescheduling the project, then a mismatch is possible.

The calendar used on the lag will be set based on the setting of the original scheduling tool as well. Many scheduling tools put the calendar for a lag on the same calendar as the predecessor; however this is not standard for all scheduling tools. This is important because putting a 7 day lag when the lag calendar is 5 days could create up to 11 calendar days of lag time, instead of the intended 7 calendar day lag.





All options should import from the original scheduling tool, it is a best practice to always check the options before starting a Monte Carlo analysis. The options in this section include:

- Does the project or scheduling tool use retained logic or progress overrides. Retained logic is recommended as progress overrides are actual incorrect logic. The progress overrides schedule correctly.
- The users can set which calendar, predecessor or successor, drives the lag calendar.
- A scheduler can decide how to handle logic that will stretch a task. Depending on the setting, a task is handled similar to a hammock or level of effort based on the setting and situation.
- Pertmaster has multiple options on how to handle an unlinked hammock. Does the hammock have zero duration or span the entire project?
- A scheduler can set different options for the critical path calculation. This setting will impact the probabilistic criticality outputs in the product such as the criticality tornado chart.

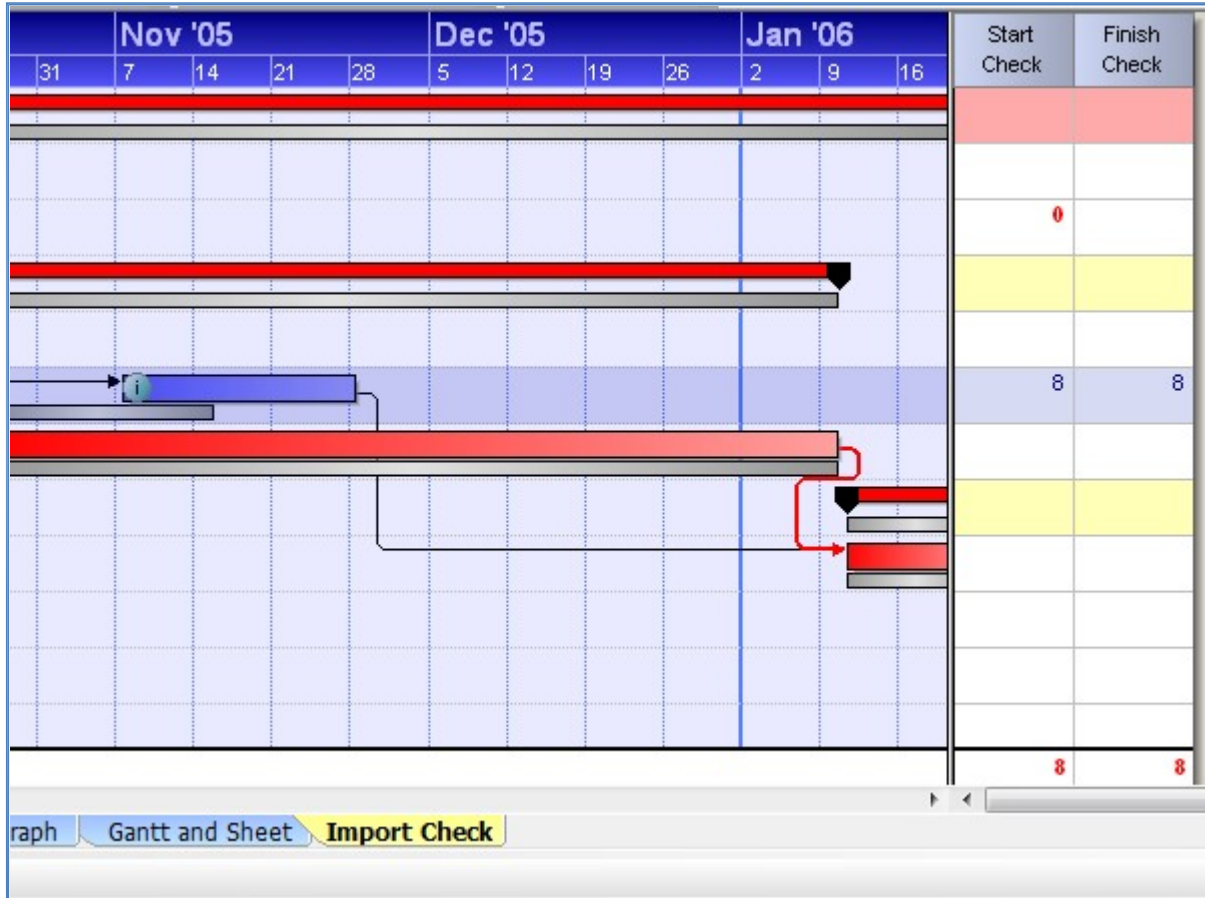
## Oracle | Primavera Risk: Pertmaster Import Check Tab

The second step of a typical Oracle | Primavera Risk (Pertmaster) Monte Carlo analysis is to validate the import for differences between the original schedule file and the Pertmaster CPM schedule calculations. The Import check worksheet tab shows the project manager any the difference between the start and finish dates in the original scheduling tool (Microsoft Project, Primavera, etc.) versus the Primavera Risk CPM calculation.

### Import Check Worksheet Tab

After reviewing the import log and schedule settings it is vital to verify the schedule import check. The worksheet tab IMPORT CHECK will contain a Gantt chart view showing all Pertmaster activity bars based on the CPM calculation and an overlay of the bars from the original scheduling tool.

The start and finish check column will list the amount of days the schedule is out of line with the original schedule. The import check will look the same whether the original scheduling tool is Microsoft Project, Primavera P3, or Primavera P6. A negative number will show the Pertmaster schedule started or finished early. A positive number will show the schedule started or finished late. The silver bars on the Gantt chart represent the bars in the original scheduling tool. Regardless of the import check, it is important to follow the import check by running the schedule check report. The import log and schedule check reports will often guide users to find issues in the original schedule. Changes may need to be made in the base schedule and the file re-imported before proceeding



Often the difference in scheduling engines can cause slight variations here. Errors such as improper logic, planning unit, progress overrides, and rounding can cause issues. Problems with the Primavera database can also cause issues. A few tips for working through the import check tab on small and large schedules is listed below:

- Filter for normal activities that are less than 100% complete. Completed tasks, milestones, and summary tasks are usually in-line if the normal tasks are perfect. Try to filter the data to avoid information overload.
- Look for the root cause of the issue. One activity can cause a ripple through the entire project.
- If the Primavera P6 file was migrated from Primavera P3, then duration issues may exist. Pertmaster often interprets the Primavera P3 data better than Primavera P6.
- Fix items in the original scheduling tool and re-import the new file.
- Do not pay too much attention to one or two day variances. Focus on the reporting milestone variances and work backward.
- Review the schedule check, import log, and scheduling options for clues.
- Look for items that have the same start and finish check values. These items came in with the correct duration regardless of the values. If the start and finish check values are different the duration came in wrong. This allows a user to trace the cause.





Fixing a schedule with huge date variations from an import can be one of the most difficult parts of the Pertmaster Monte Carlo analysis process. Hopefully this will not be an issue; however the root cause is usually the schedule import and not the Primavera Risk product.

## Oracle | Primavera Risk: Pertmaster Common Import Issues and Problems

The second step of a typical Oracle | Primavera Risk (Pertmaster) Monte Carlo analysis is to validate the import for differences between the original schedule file and the Pertmaster CPM schedule calculations. Sometimes the schedule import is not flawless. This article will detail some of the key reasons that a schedule import may be flawed.

### Common Issues Importing a File to Primavera Risk

Listed below is a list of common issues with a Primavera Risk import:

- The schedule has out of sequence logic.
- Progress Overrides vs. Retained Logic setting came over incorrectly.
- Data dates for sub-projects are not aligned.
- The planning unit setting caused duration rounding.
- There may be issues with the Primavera P6 database. This is often seen after a Primavera P3 file is migrated to Primavera P6.
- An incorrect planning unit was used for import.
- Primavera Risk does not read secondary constraints.
- The lag calendar settings could have been imported incorrectly. The settings should be checked.
- The Primavera P6 plan was not scheduled (F9) before exporting.
- A Microsoft Project plan with sub-projects was not imported from the Microsoft Project toolbar (Review the MSP import module).
- The project or sub-projects status was not set to time now. The project contains actual dates in the future or remaining duration in the past.
- The % COMPLETE is driving earned value in Microsoft Project. The % COMPLETE field may be adjusting the remaining duration value.



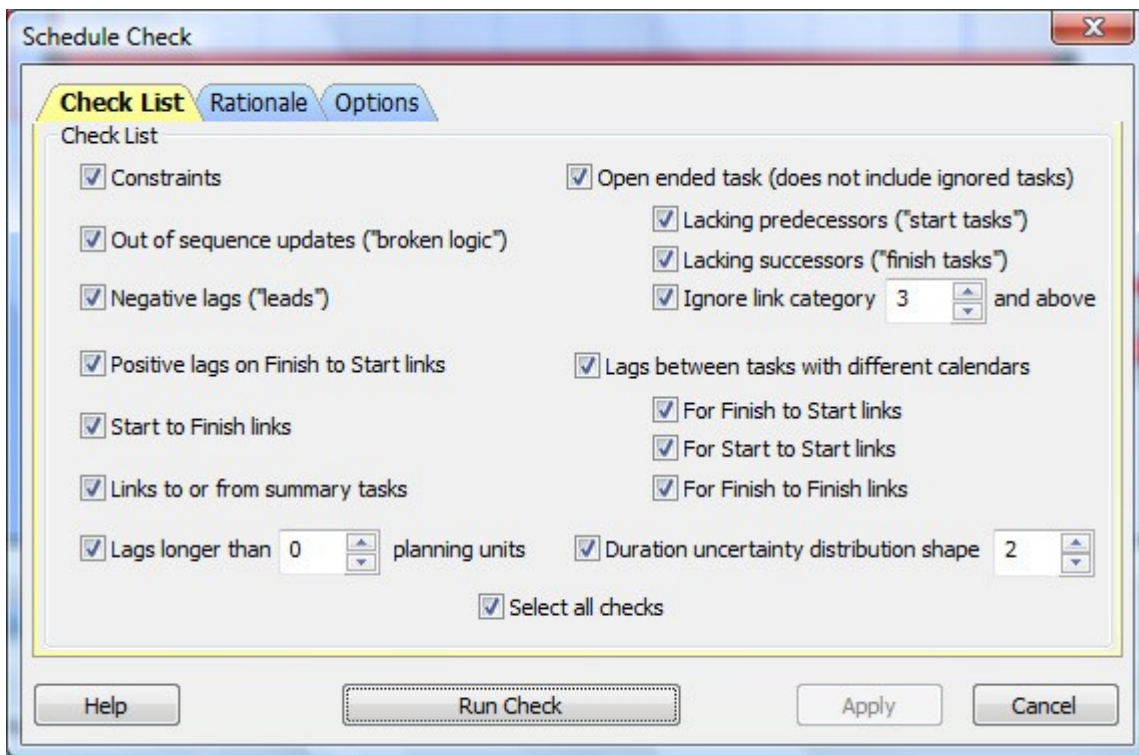
## Risk Process Step3: Schedule Check

### Oracle | Primavera Risk: Pertmaster Schedule Check Options

The third step of a typical Oracle | Primavera Risk (Pertmaster) Monte Carlo analysis is to validate the integrity of the schedule logic. The Primavera Risk schedule check will flag areas of concern or note in the schedule. This training article will review the schedule check options that are set prior to running the report.

#### Schedule Check Options: Checklist Tab

This section will review not only the individual schedule checks that can be run but also why Primavera Risk checks for certain items that other scheduling tools do not. We will note areas where the schedule check overlaps with those in other tools and areas where Pertmaster sees things slightly different due to the risk analysis focus. It is important to keep in mind that a flag does not mean the area of the schedule is bad or must be fixed; it is flagging a condition that could be a concern.



There is no schedule check in the world that can detect if a schedule is "good," however a schedule checker can find fundamental flaws in the logic that would indicate the schedule is not clean. It is a good rule of thumb that if you choose not to clean a flaw, you should document why the flaw is acceptable. A poor schedule invalidates a schedule Monte Carlo

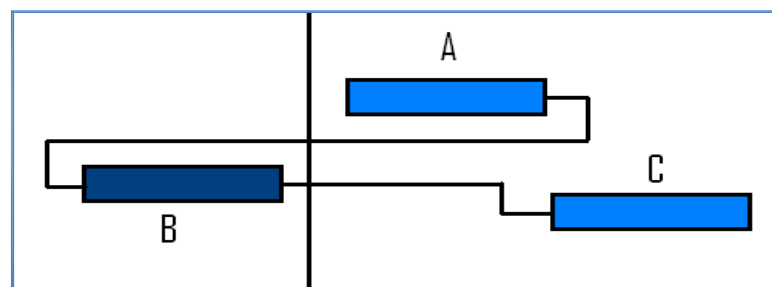


analysis. It is better to show and explain flaws than to have an analysis ruled as wrong. We will break these flags down by our view of order of importance relative to running an accurate schedule Monte Carlo analysis. Keep in mind that a check marked as low impact could potentially have more impact than a high flag in some cases.

Open the schedule check options by following the menu path **REPORTS | SCHEDULE CHECK OPTIONS**

Critical Schedule Check Flags:

- Constraints - Hard constraints such as must-finish-on constraints are generally seen as the most damaging constraint. Hard constraints should be looked at very carefully and documented if they are truly correct. A hard constraint is basically taking the place of logic, so if an activity has a hard constraint and predecessors the scheduler should determine if the task is logically or constraint driven. Soft constraints can be equally damaging in a schedule Monte Carlo analysis. Soft constraints should be used; however it is important that they are used properly. Often constraints and lags are interchanged which is a critical problem in many schedules. A lag has a static duration that will not change as durations in the schedule change. A constraint is generally used to hold float in the appropriate place. One constraint in the wrong place can completely destroy the validity of a Monte Carlo analysis.
- Out of Sequence Logic ("broken logic") - Out of sequence logic is technically wrong. Based on the progress override or retained logic setting, the analysis will still run, however activity splits and other unexpected issues may occur during the analysis. Although Pertmaster can technically handle out of sequence logic, by definition it is incorrect logic and casts doubt on the validity of the analysis. If a scheduler cannot follow a logic chain, then it might be concluded that they are even less equipped to deal with a logic chain that now has uncertainty and risk events entered into the equation. Often Scheduler's status items out of order due to time issues. It is more time consuming to break the logic than to status items out of order. It is a shortcut used when workloads become too heavy. That being said, breaking the logic and correctly statusing a project should be the desired method, especially before running a schedule Monte Carlo analysis on the logic.



- Open Ended Task (Lacking Predecessor, Successor) - Pertmaster views open-ended tasks differently, and more correctly, than Primavera P6 and some other scheduling tools. A true open end is an item that does not have a predecessor connected to the activity start or a successor connected after the activity finish. Many scheduling tools



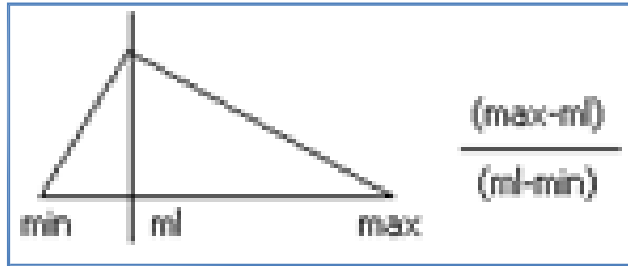
look for a predecessor or successor relationship. For example, if an activity has only a start-start predecessor and a start-start successor, then nothing is connected to the end of the task. PrimaveraP6 does not see this as open-ended, however Primavera Risk disagrees. The task has float to the end of the schedule because there is no link from the finish of the activity. If the item has 90 days of float, connecting an important 60 day risk to this task would show no schedule slip on the completion milestone. This issue can be seen by looking at the float calculations in any scheduling tool; however it is unfortunate that some scheduling tools do not check for open-ends in the same fashion. One open-ended task in a vital location can compromise the results of the Monte Carlo analysis. Although scheduling theory says that there should only be two open-ends, at the beginning and end, it is preferable not to link everything to the end of the project to avoid a schedule check flag. The logic becomes very hard to trace and the scheduler looks sloppy. If the activity truly cannot be a driver, then it would be preferable to discuss a path forward internally. Documenting these open-ends can often save a headache during an audit. Whether you link the activities or not, it should always be documented that an open-ended activity is in the schedule but cannot under any circumstance be a driving activity.

- Start to Finish Links - Start-finish links can be seen as backwards logic. There may be cases where the start-finish links were used intentionally; however it is normally done by accident. The start- finish link will accomplish basically the same logic as a finish-start link with an as-late-as-possible constraint, so it could be used intentionally, although it is generally a flag that incorrect logic was put in the schedule by accident or the impact of the link type was misunderstood by the scheduler.
- Lags Longer than (x) Planning Units - Lags are quite simply an absence of logic. A one day absence of logic can do very little damage. A 30 day lag can do much more damage. It is important to realize why the lag is being used. Is the lag being used because the schedule has float? The scheduler should use a constraint to hold float instead of a lag. Does the lag represent something that will happen but is not actually an activity like concrete curing time? Having a hard coded lag time might be a reasonable option. Does the lag represent many activities that should probably be loaded with risk? Sometimes the lag should be converted to an activity. Lags are like boxers, the bigger ones look much scarier. Long lags are one reason that Monte Carlo analysis on a summary schedule becomes challenging. Large lags and great quantities of representative logic exist in many summary schedules.



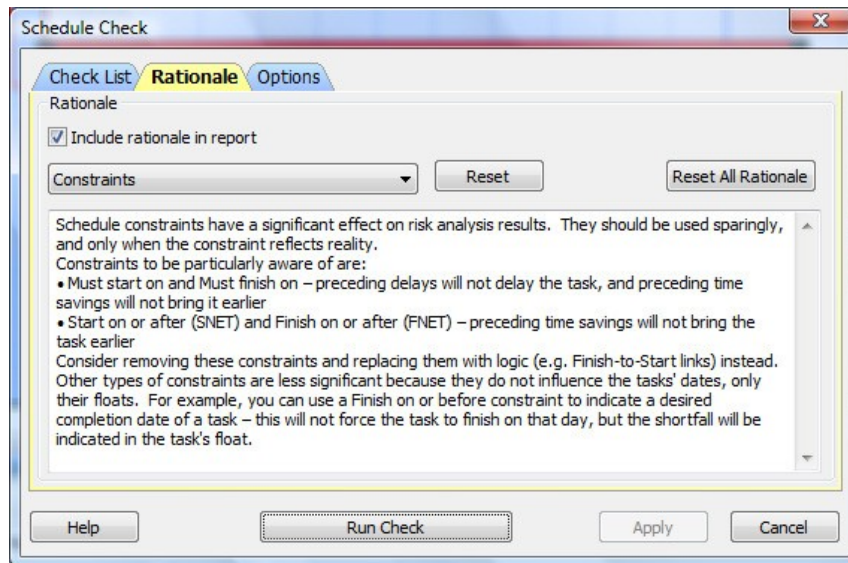
## Lower Risk Flags:

- Negative Lags ("leads") - Negative lags are often seen as a bad word in scheduling environments. Pertmaster handles negative lags logic correctly. Whether negative lags are allowed in your company or not, it is important that the negative lags are converted properly. The most common method is to create a start-start link with a positive lag. If the finish of the predecessor or activity is the driver, then the start-start link is wrong. The planner should either be using a small negative lag or breaking the activity into multiple parts. In the start-start link scenario, if the predecessor activity increases in duration, then it would not push out the successor because they are tied with a start-start relationship. An incorrect start-start relationship is much worse than a negative lag. Large negative lags are definitely a red flag just like large positive lags. It is always important to ask the question if an activity is being driven by the start or finish of the predecessor. If the activity is being driven by the finish of an activity, then using a start-start link is unacceptable.
- Positive Lags on Finish to Start Links - Pertmaster flags all lags so that the user can verify them.
- Links to or from Summary Tasks - Microsoft Project allows users to create links to and from summary tasks. This is not generally considered good form. It can work if the scheduler did this on purpose, however generally it is a mistake.
- Lags between Tasks with Different Calendars - Many commercial scheduling tools handle these links differently. A lag is usually put on the predecessor task, successor task, or a seven day calendar. It is important to realize how your scheduling tool handles lag calendars and make certain that the entered lag durations are in-line with the software. A seven day lag put on a five day calendar can cause up to eleven days of schedule impact without any other non-working periods. It is important that schedulers are inputting lag dates that are in-line with the calendar. An example would be a link between an engineering activity on a five day calendar and a construction activity on a six day calendar. The link may be on a five day calendar based on the engineering calendar; however the lag is entered at 6 days because the scheduler is thinking about the construction calendar. This is not a huge issue but can cause some problems.
- Duration Uncertainty Distribution Shape - The duration uncertainty shape has nothing to do with schedule logic. This check is used to find three-point estimates that are skewed to the maximum value. The more a risk range is skewed in a pessimistic manner, the more likely that a risk event exists in the activity and should be documented and put into the risk register. When the risk event is separated, the remaining risk range will probably change. This check is designed to help risk analysts separate uncertainty and productivity from discrete risk events.



### Schedule Check Options: Rationale Tab

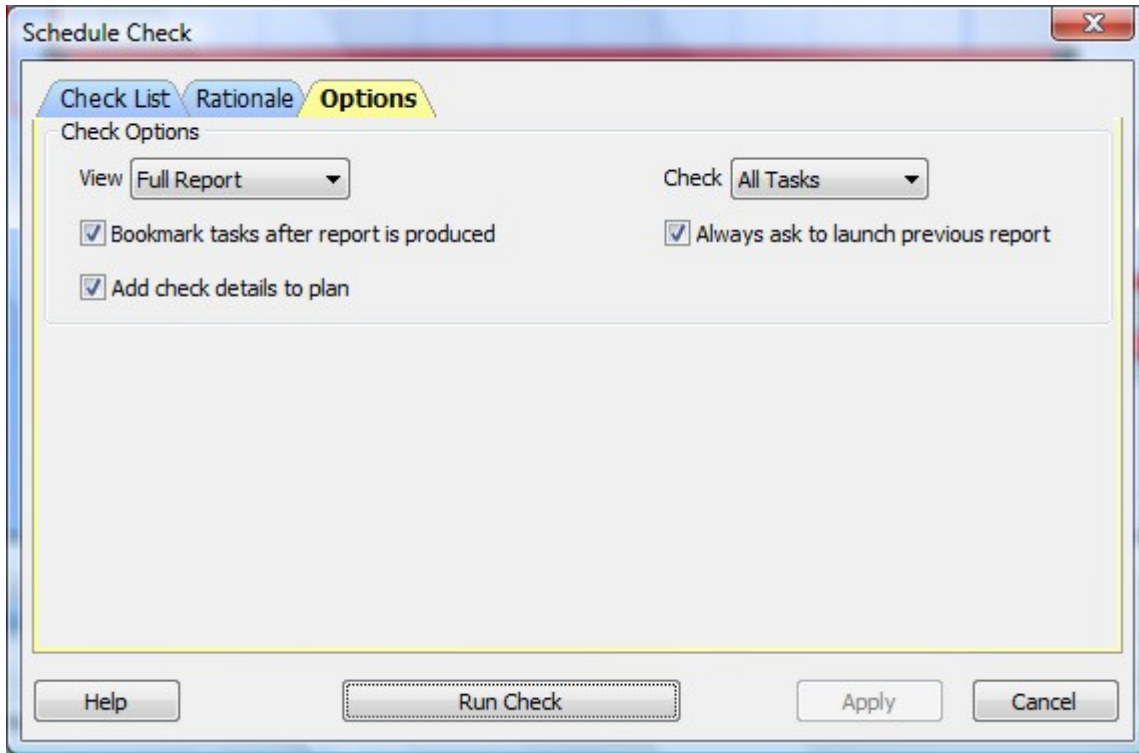
The SCHEDULE RATIONAL TAB gives the Oracle reasoning behind each check. Users can choose to have the rationale put in the report as documented or with user-defined edits.





### Schedule Check Options: Options Tab

The OPTIONS TAB has a few check box and drop-down options for running the report. The options are related to how the data is displayed in the report and not which checks are run. The options can be edited based on user or company preferences; however the default settings can be used for most project managers.

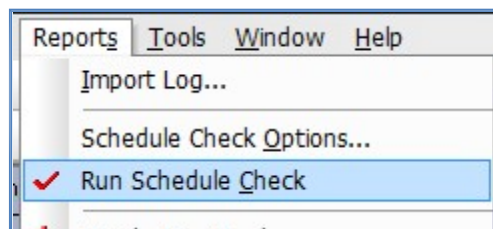


## Oracle | Primavera Risk: Pertmaster Running a Schedule Check

The third step of a typical Oracle | Primavera Risk (Pertmaster) Monte Carlo analysis is to validate the integrity of the schedule logic. The Primavera Risk schedule check flags areas of concern or note in the schedule. This training article will give the steps and some hints for running the schedule check report.

### Running the Schedule Check Report

Running the schedule check is a simple process.





1. Set the schedule check options via the menu path REPORTS | SCHEDULE CHECK OPTIONS
2. Click the RUN CHECK button in the options or follow the menu path REPORTS | RUN SCHEDULE CHECK

## Bookmarking Activities

Primavera Risk will bookmark all flagged activities unless the option is turned off in the schedule check options. The bookmarked activities will allow the planner to create filters or jump to the problem areas of the project schedule very quickly. This is a great interactive planning tool. The MANUAL BOOKMARK OPTIONS are located under the EDIT MENU and on the Gantt toolbar.

ID	Description
EXAMPI	ExampleRegister-EPC
A010	Project Start
A011	Project Completion
EXAMI	Pre-Bid & Bid
A030	Characterisation
A040	Pre design & optioneering

## Saving and Sending the Schedule Check Report

An .html or web-based report is generated each time the schedule check report is run. If the report options are changed and the report is rerun, then the previous report will be overwritten. The schedule check report will be saved in the same folder that the Pertmaster plan (.plan) file is located. Users can choose to save a copy of the schedule check from within the internal Pertmaster report viewer. With the schedule report open in Pertmaster, the project manager can open the file menu for options to export the file to a web-based, Microsoft Word or, text file format

teORACLE		Schedule Check Report	
<b>PRIMAVERA RISK ANALYSIS</b>			
<b>Plan Summary</b>			
Title	ExampleRegister-EPC		
File name	C:\Users\andrew\Desktop\ExampleRegister-EPC.plan		
Plan finish date	01/15/08 16:00	Tasks with no progress	
Plan remaining duration	825	In progress tasks	
Normal tasks	00	Completed tasks	





## Pushing Schedule Check Data to Primavera P6 or Microsoft Project

Other sections outline the process of pushing data back to Microsoft Project and Primavera P6. The schedule check data is one area where users often push data back to the original scheduling tool. The original schedule file should be cleaned in the base tool, and the file should be re-imported. When the schedule check is run, the data is saved to user-defined fields for each check. Certain checks, such as the open-ended activities which are seen differently in Primavera Risk, can be pushed back to user-defined fields so that users can create filters in the main schedule. This can be a huge time saver for schedule cleanup instead of the scheduler going through a printed report manually. It is also advisable that any flag that is not cleaned is documented for audit purposes. If a scheduler leaves in a hard constraint, then they should justify why it is acceptable or most auditors will consider it wrong without even analyzing the situation.

## Oracle | Primavera Risk: Pertmaster Test Monte Carlo Iterations

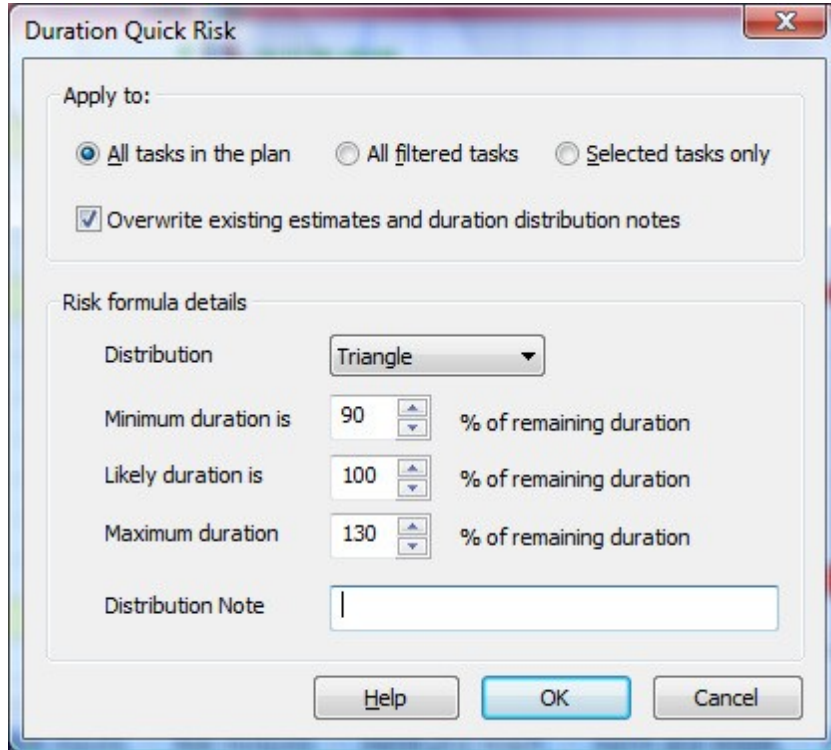
The third step of a typical Oracle | Primavera Risk (Pertmaster) Monte Carlo analysis is to validate the integrity of the schedule logic. Running test simulations will speed up the process of schedule audit and cleanup. Project managers must validate that the logic is realistic before running and delivering the final reports.

### The Value and Strategies Associated with Running Test Simulations

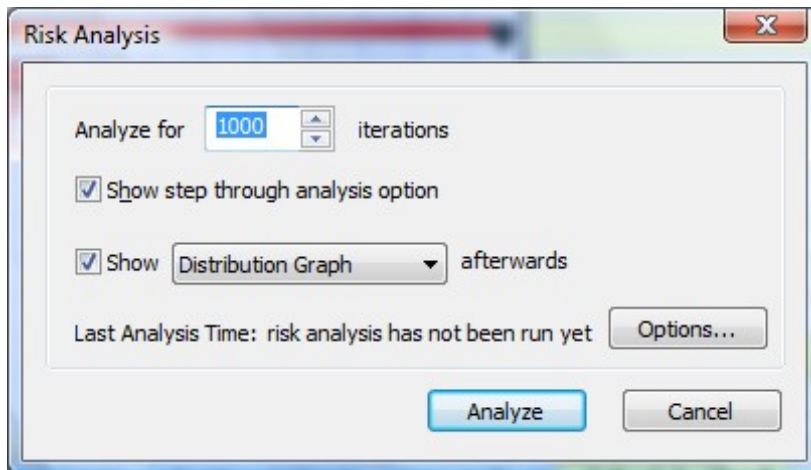
Test simulations allow a project manager or risk analyst to test the network logic without having a scheduler's detailed knowledge. It also allows planners and schedulers to see what the logic does during a simulation without visually tracing the logic. Risk analysts will put random levels of uncertainty or three-point-estimates on the schedule in order to test how the network of activities moves and to view the driving activities in the schedule. It is a very simple process and project managers who do not have a scheduling background can usually interpret the histogram and tornado chart data more easily than massive chains of predecessors and successors. Experienced schedulers can get great value as thousands of activities are filtered down to much more manageable amounts to trace the root cause of the schedule issue.

### Test Simulation Steps

1. Add uncertainty to the schedule via the duration quick risk, using menu path: RISK | DURATION QUICK RISK. Risk analysts may want to use optimistic and pessimistic values to see how the logic network reacts to different levels of risk.



2. Run the risk analysis, using menu path: RISK | RUN RISK ANALYSIS.

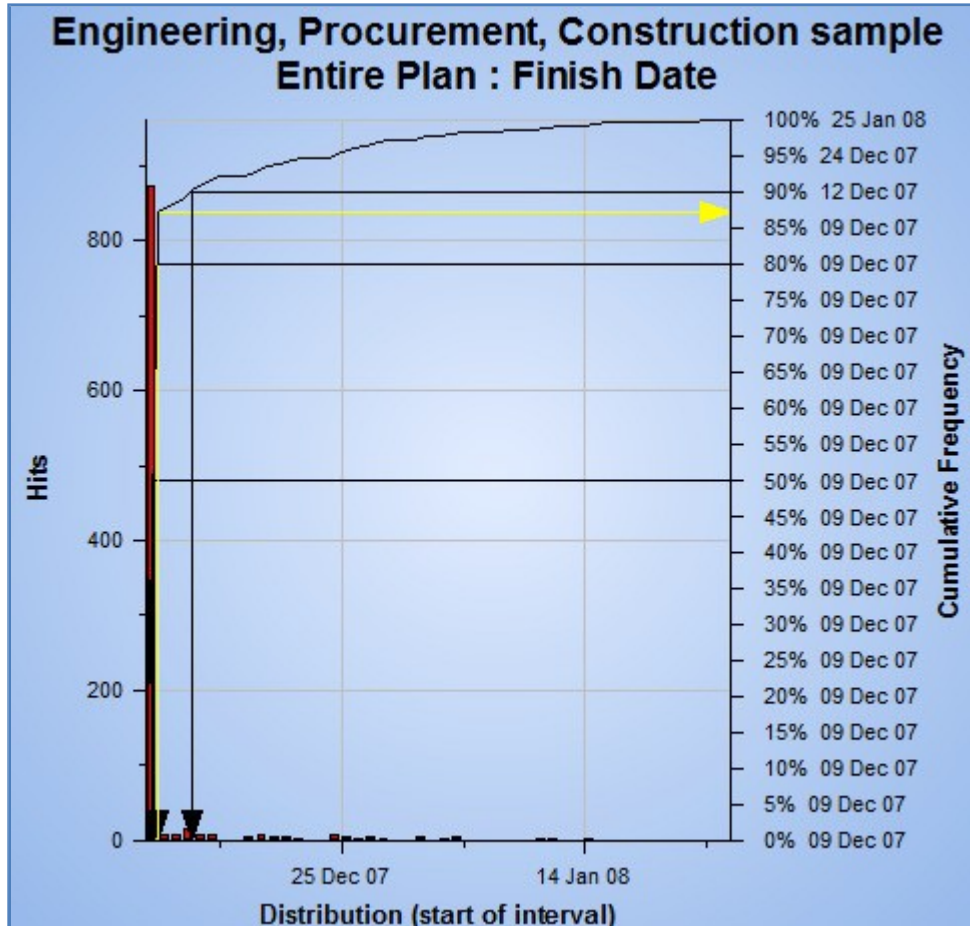


3. Analyze the confidence-level histogram (distribution graph) and the tornado chart (tornado graph). The charts are both located under the REPORT MENU; however it is recommended to right-click the REPORTING MILESTONES in the Gantt chart and run the chart from the pop-up menu. This will run a report that isolates the reporting milestones instead of including activities in the schedule that may be considered noise more than main logic chains.



### What to Look for in the Reports

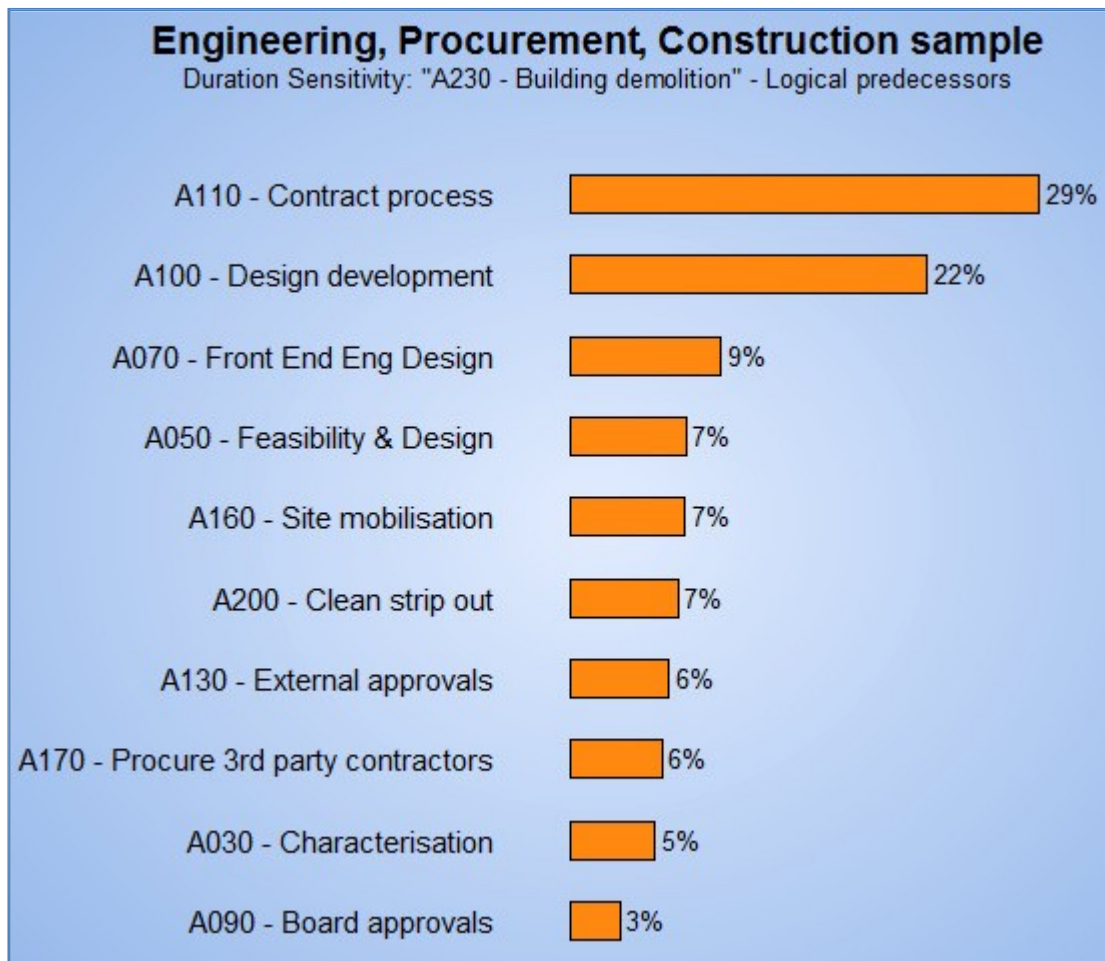
What does the histogram highlight?





- Gaps in the graph may show issues with constraints, non-working periods or static paths like milestones strings are driving the schedule.
- A large spike at the beginning of a histogram often shows an activity cannot finish earlier than a finish-on-or-after constraint.
- The difference between the deterministic dates should make sense relative to the risk inputs. If the project has two years left and the risk inputs are skewed to the maximum (95%, 100%, 120%), then it would make no sense if the answer did not push out multiple months. Since the value is skewed 15% to the maximum you would expect at least a 12 to 18% push (applied to the 2 year duration) on activities. The push could be worse based on near critical paths, etc. This is simply a rule of thumb, but the answers should be somewhere close or there is an indicator that the network has breaks in logic or other issues.
- The percent chance of completion should give a hint about how the network is working.
  - If the risk analyst put optimism in the schedule, the percent chance should be fairly high.
  - If the user put a symmetrical level of risk (plus and minus the same value) on the schedule, then an optimistic reading would highlight bad logic or very few parallel and near critical paths. A more moderate reading would seem to dictate that the critical path is fairly linear and does not move much. A pessimistic answer would indicate that the confidence level is reducing due to the amount of critical path movement. As the amount of near critical paths increase, the confidence level should decrease.
  - If the risk analyst uses a pessimistic distribution the answer should be very negative. A reasonable confidence level would dictate that the network has very few driving activities or the logic is broken in general.

What does the tornado chart highlight?



- The tornado chart will list the activities that are driving the milestone or activity.
- If a project manager knows engineering should be a driver but it does not show up on the tornado chart, then the schedule is probably missing a link from the engineering chain of activities.
- If a risk analyst sees a non-driving activity on the chart there is probably a link that should be in the base schedule.
- A general rule is that the tornado chart should list mostly activities that people expect or the schedule does not reflect the project management team's expectations. In this case either the schedule is linked incorrectly or the project team does not understand how the job is being worked.
- When the tornado chart does not make sense, the base schedule should be revised. This process should be repeated until the logic reacts in a realistic fashion. There is no value running a risk analysis unless the team believes the sequencing reflects reality.



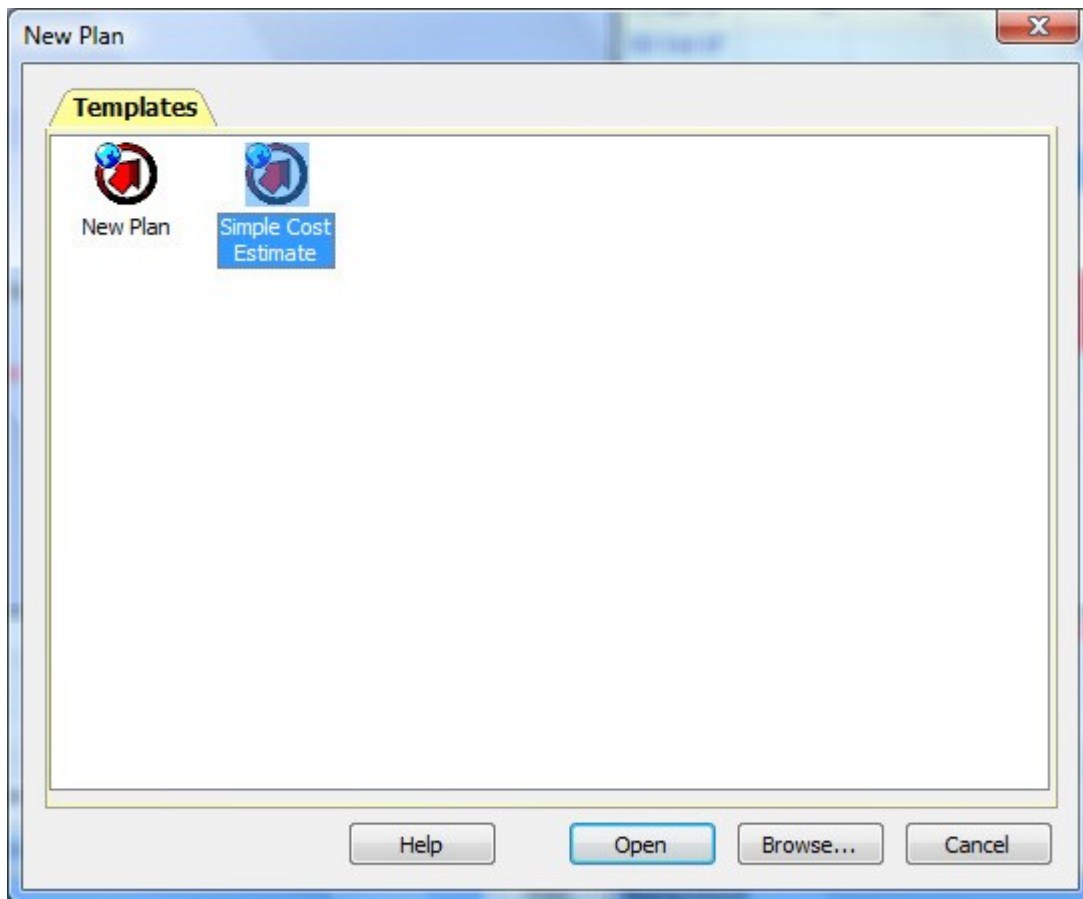
## Risk Process Step4: Adding Uncertainty

### Oracle | Primavera Risk Simple Cost Estimate

Primavera Risk is not just used for running schedule risk analyses. The Pertmaster tool allows users to run cost based Monte Carlo analysis as well.

#### Getting Started

When running a Monte Carlo analysis on a full cost estimate, a risk analyst or cost estimator may setup a template to paste the entire estimate into Primavera Risk from a Microsoft Excel sheet. In this overview a blank template will be used.



- The standard cost estimate template can be opened by following the menu path File | New and double-clicking the SIMPLE COSTESTIMATE icon. A blank template spreadsheet will be loaded.



- Double-click on a blank row or type a value in the description field to create a cost line item
- Type \$20,000 in the likely fixed cost field. This cost element will be used to examine the layout and backend on how the cost estimate will run.

### Cost Estimate Layout

- Click the GENERAL TAB in the NAVIGATION PANE at the bottom of the screen.

General Dates Constraints Links Resources Costs Risk and Uncertainty

Original Duration: 0  
Remaining Duration: 0  
% Complete: 0.00% Define...  
Can stretch: Default

Calendar: <No Calendar >  
Type: Normal  
Priority: 50  
Ignore:

Duration, calendar, and many schedule related elements associated with the cost item will be displayed. Although the cost element is a schedule activity, all schedule related elements will be ignored and only the cost ranges will be analyzed.

- Click the RESOURCE TAB in the NAVIGATION PANE.

Details				Units	
ID	Unit of Measure	Loading	Units/period	Remaining	Budget
ZFCOST - Fixed Cost		Spread	100,000	0	0

A resource has been added named ZFCOST. The ZFCOST resource will show “spread” as the loading type. A spread loaded resource will not be affected by the duration of the activity; therefore the schedule has been separated from the cost line item. All resources in the cost estimate will be loaded as spread resources. To the risk analyst or cost estimator the schedule engine backend is transparent.

- The remaining units should equal the amount typed into the likely column.



Description	Probability of occurrence	Deterministic cost	Min Fixed Cost	Likely Fixed Cost	Max Fixed Cost	Mini
test		\$0	\$90,000	\$100,000	\$200,000	
test 2		\$0	\$1,800	\$2,000	\$4,000	

The cost dollars from the spreadsheet actual translate to a resource assignment tied to the activity. The cost per unit of the resource is set to \$1 per unit for the ZFCOST resource. A user entering a value in the likely cost column will adjust the number of units which will then adjust the cost. Once again, for the estimator it appears that the dollar values entered in the spreadsheet are simply cost values.

The resource quantities are important. When the likely value does not equal the estimate remaining units must be adjusted to match the estimate. Items such as risk events may have a remaining unit amount set to zero as there is no contingency value in the cost estimate. Zero remaining units would set the deterministic cost of the line item to zero.

- The probability of occurrence column is used if the line item is a risk event.

ID	Description	Probability of occurrence	Deterministic cost	Min Fixed Cost
1940	test		\$0	\$90,000
1950	test 2		\$0	\$1,800

The risk register does not have to be used for risk events. Entering a value in this column will manually edit the RISK INPUT | TASK EXISTENCE field.

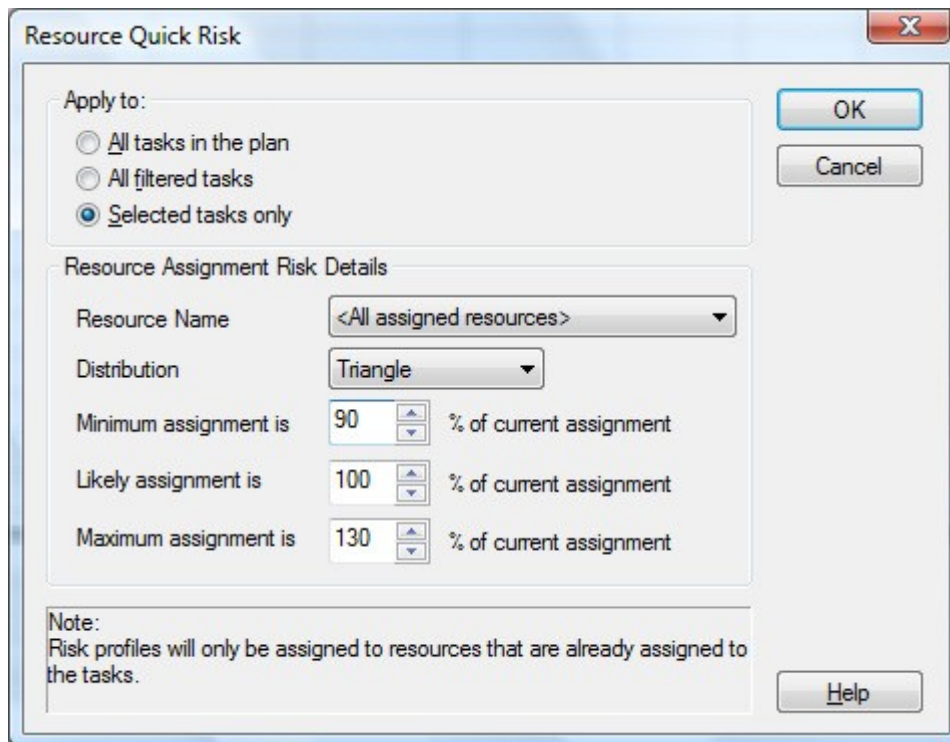


### Resource Quick Risk Strategy – Adding Uncertainty

The risk ranges can be entered by manually typing the values into the columns or pasting cells from Microsoft Excel, however Primavera Risk has an option to put a percentage-based risk spread on a resource or group of resources.

- Follow the menu path RISK | RESOURCE QUICK RISK

The user is given three options for the risk spread. Apply to:



The screenshot shows the 'Resource Quick Risk' dialog box. It has a title bar with a close button (X). The dialog is divided into several sections:

- Apply to:** Three radio button options: 'All tasks in the plan', 'All filtered tasks', and 'Selected tasks only' (which is selected).
- Resource Assignment Risk Details:** A section containing:
  - Resource Name:** A dropdown menu currently showing '<All assigned resources>'. To its right is an 'OK' button.
  - Distribution:** A dropdown menu currently showing 'Triangle'. Below it is a 'Cancel' button.
  - Minimum assignment is:** A numeric input field with '90' and a '% of current assignment' label.
  - Likely assignment is:** A numeric input field with '100' and a '% of current assignment' label.
  - Maximum assignment is:** A numeric input field with '130' and a '% of current assignment' label.
- Note:** A text box containing the message: 'Risk profiles will only be assigned to resources that are already assigned to the tasks.' Below this is a 'Help' button.

1. All tasks in the plan (all items in the estimate).
2. All filtered tasks (any task that is visible after applying a filter).
3. Selected tasks only (tasks that have been highlighted before entering the Resource quick risk

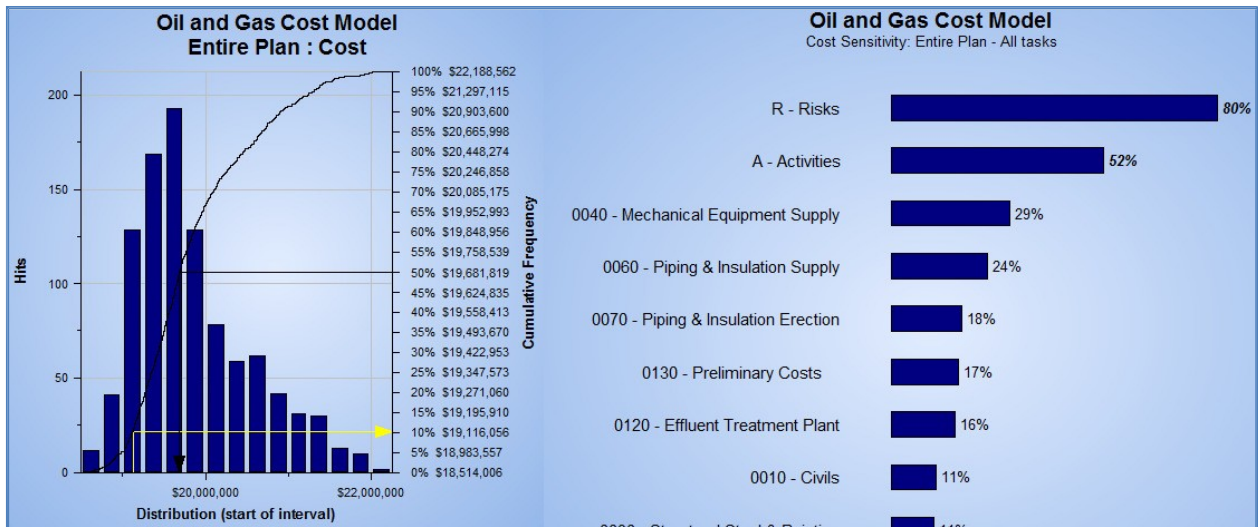
The RESOURCE ASSIGNMENT RISK DETAILS section allows users to decide:

1. Which resource will be loaded with a risk range (drop-down box).
2. Which risk distribution (drop-down box for triangular, beta pert, etc).
3. The risk percentages that will be applied to the remaining units.

Upon clicking “ok” the Minimum, Likely, and Maximum remaining units will be adjusted in the cost estimate. The remaining units will then control the price as one unit is the equivalent of one dollar.

### Cost Estimate Reports

Once the risk ranges have been entered, the risk analyst can run the risk analysis via the menu path RISK | RUN RISK ANALYSIS. The cost histogram and cost sensitivity tornado charts can be explained in the same way as the finish date histogram and the duration sensitivity tornado chart which will be outlined in the reporting section.



## Oracle | Primavera Risk: Pertmaster Resource Quick Risk

The fourth step of a typical Oracle | Primavera Risk (Pertmaster) Monte Carlo analysis is to load uncertainty or productivity ranges on the network activities. The previous examples have outlined loading uncertainty on duration. This training module will discuss loading uncertainty on resources for both schedule and cost estimate Monte Carlo analyses.

### Overview of Resource and Cost Uncertainty in Primavera Risk

- Uncertainty can be applied to the unit amount in the resource quick risk (Risk menu) or manually.
- Uncertainty can be applied to the cost per unit in the resource setup via the menu path PLAN | RESOURCES.



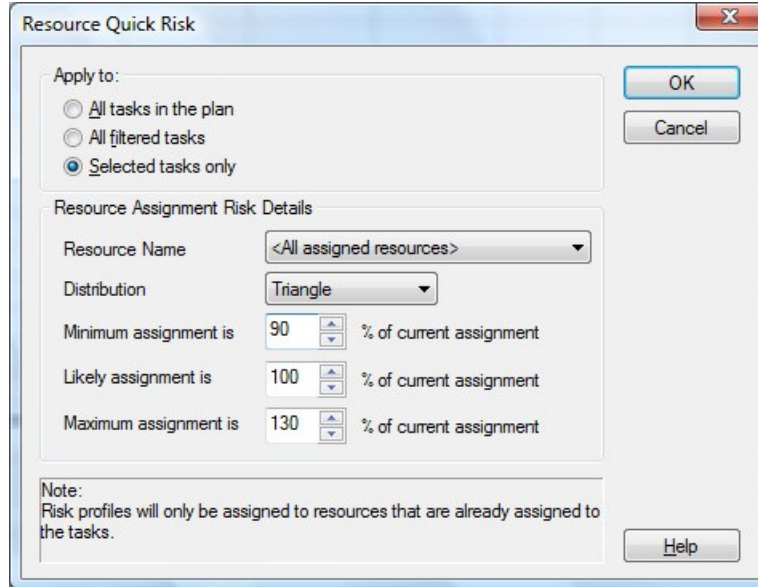
## Manually Loading Resource Uncertainty

1. Select an activity on the Gantt chart view that is loaded with resources.
2. Click the RISK and UNCERTAINTY TAB in the navigation pane.
3. A sub-tab will appear for RESOURCE UNCERTAINTY.
4. Check the box "On" for any resource with uncertainty.
5. Click the resource to add uncertainty.
6. Select the distribution type from drop-down box.
7. Input the minimum, most likely, and maximum units.

ID	Description	Probability of occurrence	Min Fixed Cost	Likely Fixed Cost	Max Fixed Cost	Total Cost
<b>A</b>	<b>Activities</b>					
0010	Civils		\$850,000	\$950,000	\$1,210,000	\$950,000
0020	Buildings		\$300,000	\$320,000	\$351,000	\$320,000
0030	Structural Steel & Painting		\$900,000	\$1,100,000	\$1,300,000	\$1,100,000
0040	Mechanical Equipment Supply		\$3,500,000	\$4,000,000	\$4,255,000	\$4,000,000
0050	Mechanical Equipment Erectio		\$1,300,000	\$1,350,000	\$1,556,000	\$1,350,000
0060	Piping & Insulation Supply		\$1,500,000	\$1,750,000	\$2,250,000	\$1,750,000
0070	Piping & Insulation Erection		\$2,400,000	\$2,600,000	\$2,950,000	\$2,600,000
0080	Electrical Supply		\$250,000	\$275,000	\$315,000	\$275,000
0090	Electrical Erection		\$310,000	\$320,000	\$365,000	\$320,000
0100	Instruments Supply		\$100,000	\$150,000	\$300,000	\$150,000
0110	Instruments Erection		\$350,000	\$440,000	\$500,000	\$440,000
0120	Effluent Treatment Plant		\$1,235,000	\$1,458,000	\$1,650,000	\$1,458,000

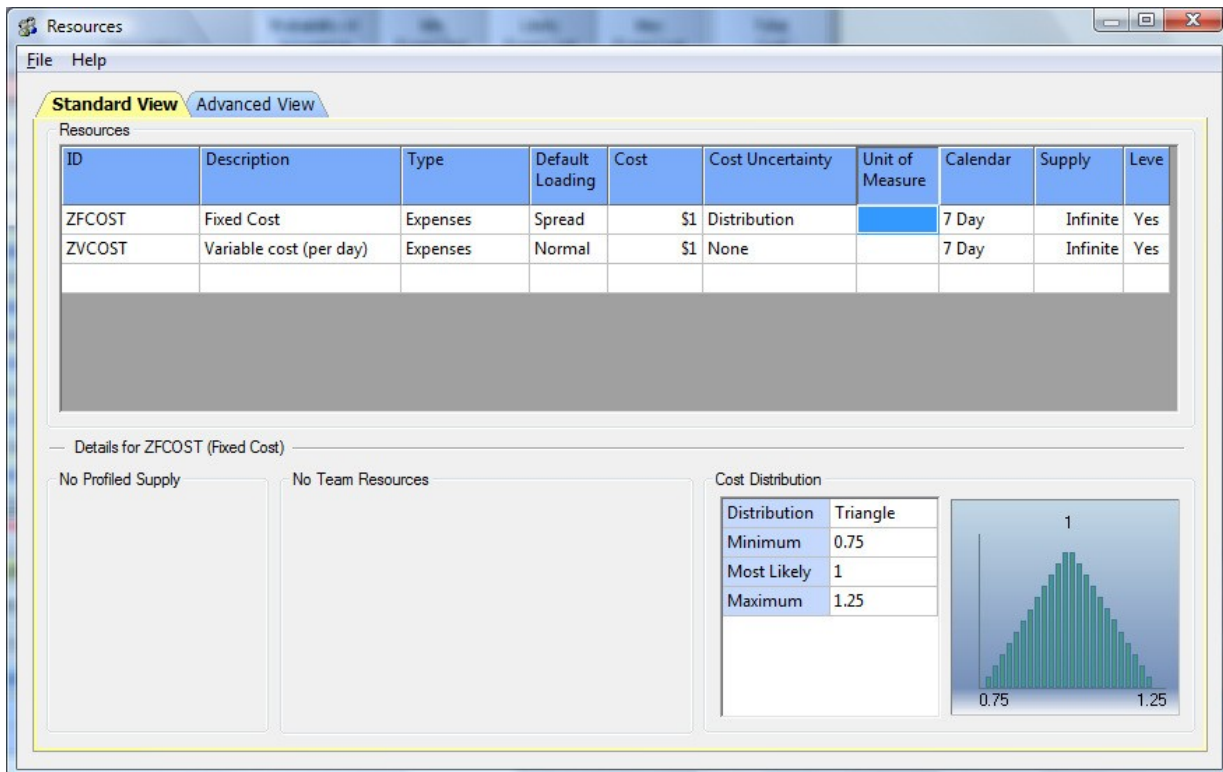
## Resource Quick Risk Steps

1. Follow the menu path RISK | RESOURCE QUICK RISK
2. Select the option for ALL TASKS IN THE PLAN, ALL FILTERED TASKS, or SELECTED TASKS ONLY.
3. Select the desired resource from the drop-down box or select the option for ALL ASSIGNED RESOURCES.
4. Select distribution (Triangle, Beta Pert, etc).
5. Set the minimum, most likely, and maximum percentage values.
6. Click "OK" to apply.



### Adding Cost (Price per Unit) Uncertainty Steps

1. Open the resources interface via the menu path PLAN | RESOURCES.
2. Change the Cost Uncertainty drop-down column to "Distribution."
3. Select the distribution shape, minimum, most likely, and maximum cost in the bottom-right pane.
4. Resources will be saved upon saving the Pertmaster .plan file.





## Oracle | Primavera Risk: Advanced Cost Estimate Strategy

Many estimates are broken down by more than simple fixed costs. This article will demonstrate how to create a cost estimate template to match the layout used on a typical project.

### Beyond the Simple Cost Template

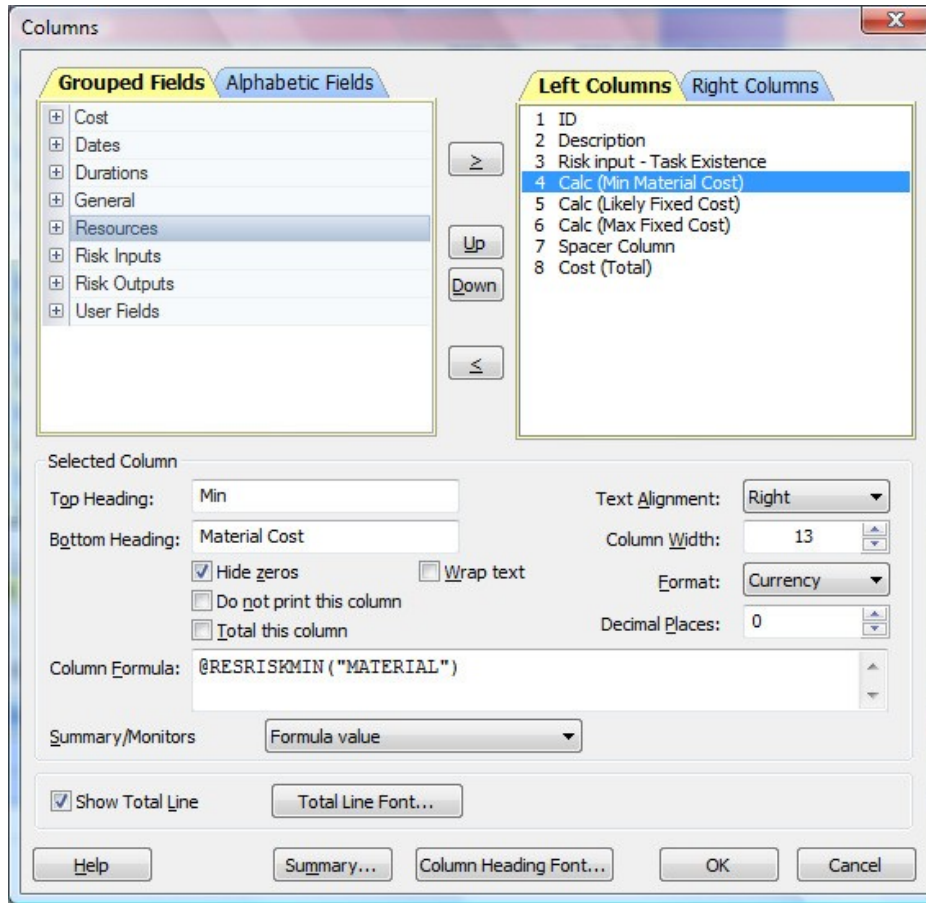
We will use an example of breaking the labor and materials out for the Monte Carlo analysis.

To setup resources, start with the SIMPLE COST TEMPLATE OPEN:

1. Open the resource menu via Plan | Resources.
2. Create two resources (labor & materials).
3. Change the default loading to “spread.”
4. Change the cost column to \$1.

ID	Description	Type	Default Loading	Cost	Cost Uncertainty	Unit of Measure	Calendar	Supply	Level
ZFCOST	Fixed Cost	Expenses	Spread	\$1	Distribution		7 Day	Infinite	Yes
ZVCOST	Variable cost (per day)	Expenses	Normal	\$1	None		7 Day	Infinite	Yes
RES_1	Labor	Labor	Normal	\$1	None		<No Cale...	Infinite	Yes
RES_2	Materials	Labor	Normal	\$1	None		<No Cale...	Infinite	Yes

A minimum, likely, and maximum column will now be added for each resource.



1. Make certain the SIMPLE COST TEMPLATE is loaded and the COST sheet is active.
2. Double-click on the column header area and open the EDIT COLUMNS interface.
3. Columns 4 to 10 are risk range cells created by using a calculated value column.
4. Each cell can be reproduced by changing the resource name. Example:  
Calc (deterministic cost) has the formula @dem ("ZFCOST"). This can be changed to @dem ("labor") to setup the labor ranges column.
5. The DEFAULT TEMPLATE has seven calculated value fields to help load risk. Each field can be replicated with a different resource name based on the breakout in the estimate.

Example:

The original simple cost template has calculated value columns for:

- Deterministic Cost
- Minimum Cost
- Likely Cost
- Max Cost
- Minimum %
- Likely %
- Max %



The new template for the company can be changed to indicate the following estimators:

ID	Description	Probability of occurrence	Min Material Cost	Likely Material Cost	Max Material Cost	Total Cost
<b>A</b>	<b>Activities</b>					
0010	Civils			\$950,000	\$1,210,000	\$950,000
0020	Buildings			\$320,000	\$351,000	\$320,000
0030	Structural Steel & Painting			\$1,100,000	\$1,300,000	\$1,100,000
0040	Mechanical Equipment Supply			\$4,000,000	\$4,255,000	\$4,000,000
0050	Mechanical Equipment Erectio			\$1,350,000	\$1,556,000	\$1,350,000
0060	Piping & Insulation Supply			\$1,750,000	\$2,250,000	\$1,750,000

- Deterministic Labor Cost, Labor Minimum, Labor Likely, Labor Max
- Deterministic Materials Cost, Materials Minimum, Materials Likely, Materials Max
- Deterministic Equipment Cost, Equipment Minimum, Equipment Likely, Equipment Max
- Deterministic Indirect Cost, Indirect Minimum, Indirect Likely, Indirect Max

The format from the estimate should now match Pertmaster's format, allowing the user to copy and paste Microsoft Excel estimators directly to Pertmaster.

### Resource Quick Risk

Other resources can be broken out in the ESTIMATE TEMPLATE, providing the risk analyst or cost estimator with added flexibility when utilizing the RESOURCE QUICK RISK. The drop-down box RESOURCE NAME offers additional options such as labor, materials, equipment, etc.



Resource Quick Risk

Apply to:

- All tasks in the plan
- All filtered tasks
- Selected tasks only

Resource Assignment Risk Details

Resource Name: <All assigned resources>

Distribution: RES\_1, Labor

Minimum assignment is: ZFCOST, Fixed Cost

Likely assignment is: 100 % of current assignment

Maximum assignment is: 200 % of current assignment

Note:  
Risk profiles will only be assigned to resources that are already assigned to the tasks.

OK  
Cancel  
Help

A spread of 90%, 100%, 110% could be applied to the equipment group. Labor may be a riskier group and a 95%, 100%, 120% spread can be applied by changing the resource name in the drop-down box before applying the percentages.





## Oracle | Primavera Risk: Pertmaster Loading Risk Manually

The fourth step of a typical Oracle | Primavera Risk (Pertmaster) Monte Carlo analysis is to load uncertainty or productivity ranges on the network activities. Loading three-point estimates (minimum, likely, and maximum) manually can be very time consuming for large projects, however it may be very useful for summary schedules or key areas of the project schedule.

### Overview and Steps

- The Primavera and Microsoft Project Gantt Chart views have the minimum, most likely, and maximum columns shown.
- The DURATION UNCERTAINTY COLUMN can be added to any view. The columns are Risk Input - Duration Minimum, Risk Input - Duration Most Likely, Risk Input - Duration Maximum.
- The distribution type (Triangle, Beta Pert, etc) can be added to any view by adding the Risk Input - Duration Distribution column.
- The risk analyst can type directly in the columns to manually set the 3-point estimates.
- The minimum, most likely, and max can be equal, however the durations cannot be out of logical order. For example, the minimum cannot be bigger than the most likely or maximum.

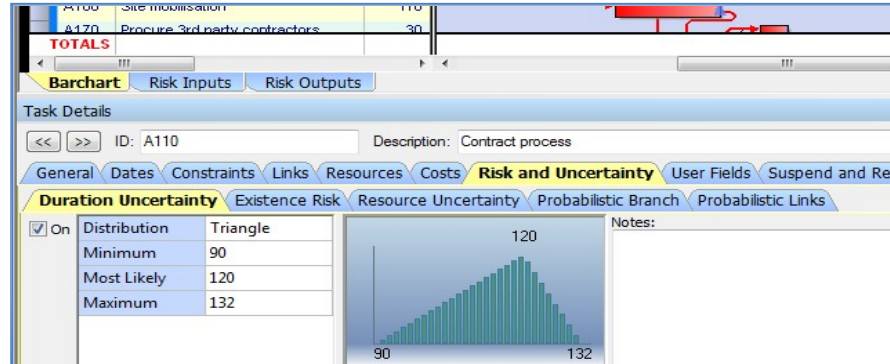
Rem Duration	Finish	Minimum Duration	Most Likely	Maximum Duration	Total Cost
0	12 Oct 05				
60	04 Jan 06				\$625,000
10	26 Oct 05	9	10	11	\$75,000
15	16 Nov 05	14	15	17	\$300,000
50	04 Jan 06	45	50	55	\$250,000
225	15 Nov 06				\$8,734,865
40	01 Mar 06	36	40	44	\$2,456,490

### Viewing Risk Data in the Navigation Pane

- The risk data can also be manually manipulated via the RISK and UNCERTAINTY TAB in the navigation pane.
- The risk analyst or auditor can find any risk information for the project located In the RISK and UNCERTAINTY TAB, such as three-point estimates and Probability of Occurrence



- A second layer of tabs will appear when the RISK and UNCERTAINTY TAB is selected. Project managers can change the three-point estimates and distributions in the DURATION UNCERTAINTY TAB located in the second layer.

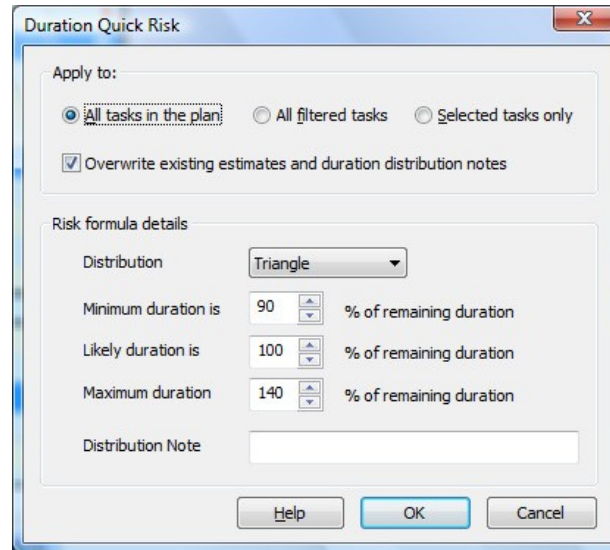


## Oracle | Primavera Risk: Pertmaster Duration Quick Risk

The fourth step of a typical Oracle | Primavera Risk (Pertmaster) Monte Carlo analysis is to load uncertainty or productivity ranges on the network activities. Loading three-point estimates (minimum, likely, and maximum) across an entire project can be very useful for testing the schedule logic and for very high-level project analysis. This strategy is not usually justifiable to generate an in-depth and accurate Monte Carlo analysis.

### Duration Quick Risk Overview

The duration quick risk will allow a scheduler or risk analyst to load three-point estimates on a large amount of activities at once. In most industries a large majority of projects are analyzed by simply applying the same spread of uncertainty across all activities in the project. This strategy is very difficult to justify as it shows very little thought was put into the inputs, and it was assumed that every activity in the entire project has the exact same level of uncertainty. The answer will come out quickly, but there is very little value outside of testing the activity Logic network



### Quick Risk Options and Steps

1. The duration quick risk can be opened by following the menu path RISK MENU | DURATION QUICK RISK.
2. Choose whether to apply the uncertainty ranges to all tasks, filtered tasks or only the selected tasks.
3. Select whether to overwrite any existing three-point estimates by checking or unchecking the overwrite box.
4. Select the distribution type via the drop-down box. Four of the most common distribution types are listed. Other distribution types can be added manually.
5. Select the minimum, most likely, and maximum percentages. The percentage will be applied to all activities with a remaining duration. If the percentages are 80%, 100% and 110%, then a 10 day activity will have a risk spread of 8, 10, and 11 days.



## Oracle | Primavera Risk: Pertmaster Templated Quick Risk (recommended)

The fourth step of a typical Oracle | Primavera Risk (Pertmaster) Monte Carlo analysis is to load uncertainty or productivity ranges on the network activities. The templated quick risk or uncertainty register will allow a risk analyst to load risk from a summary level while still utilizing the full logic from a detailed schedule of any size. Project managers can get very good results with this method by providing accuracy and traceability. Often the schedule maturity is more challenging than the risk analysis.

### What is the Theory and Strategy?

The templated quick risk crosses the duration quick risk strategy with filters. The duration ranges are strategically applied to filtered groupings instead of to all activities. The filters are saved and the duration ranges can be quickly updated and managed as the project progresses. The templated quick risk can demonstrate the results of an analysis more clearly than hurriedly throwing risk on every activity in order to generate a random chart. This strategy is justifiable if done well and much less time consuming than manually loading the risk values on each activity.

### What Problems Does it Solve

- The templated quick risk is much quicker than manual risk loading.
- The inputs have increased traceability as there a manageable and comprehend- able amount of groupings.
- The templates are easy to update and manage for recurring reporting cycles.
- Filters can take into account schedule changes.
- The groupings may help with activity correlation instead of trying to correlate activities manually.
- Grouping activities helps all team members provide input without a heavy Statistics Background



Field	Value	Tasks	Distributi...	Min	Likely	Max	Correlati...	Description
Summary Task	= A020 - Pre-Bid & Bid	3	Triangle	90%	100%	110%	100%	
Summary Task	= A060 - Engineering	7	Triangle	90%	100%	130%	100%	
Summary Task	= A140 - Procurement	3	Triangle	95%	120%	150%	none	
Summary Task	= A180 - Construction	5	Triangle	90%	100%	140%	100%	
Summary Task	= A290 - Post Implementation	2	Triangle	90%	100%	140%	none	

## Templated Quick Risk Steps

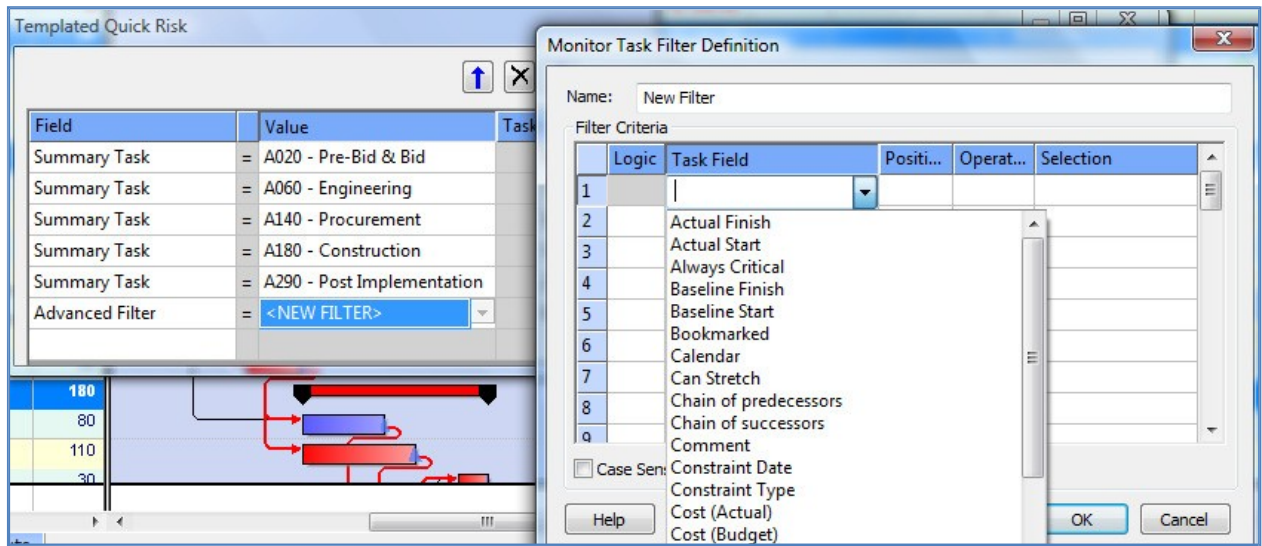
1. Follow the menu path RISK | TEMPLATED QUICK RISK.
2. The risk analyst selects a value in the FIELD COLUMN. The FIELD COLUMN lists all activity codes, user-defined fields, and has a selection to create an advanced filter.
3. The VALUE COLUMN allows users to select or input data to filter based on the field chosen. If ADVANCED FILTER was chosen in the FIELD COLUMN the user can select an existing filter or create a new filter.
4. The TASKS FIELD will automatically populate with the number of activities found based on the filter.
5. The DISTRIBUTION FIELD allows the project manager to select an uncertainty distribution (triangle, beta pert, etc) to apply to the activity grouping.
6. The risk analyst will type in the minimum, most likely, and maximum percentages. These percentages will be applied to all normal activities that have remaining duration in the activity grouping.
7. The CORRELATION VALUE can be input between 0 and 100. This will apply the correlation coefficient to the entire grouping of activities.

## What is the Correlation Field?

- The field allows a scheduler to create activity groupings that have similar behavior.
- It may not make sense to correlate activities when they are not truly related.
- Correlation may overcome the undesired cancellation effect of the central limit theorem in certain situations.
- Correlation may stop critical path switching in groups that have been placed in parallel for representation of work but not the sequenced accurately due to lack of scope or other issues.
- Example correlation: A project manager could correlate a grouping of activities for a construction crew as their productivity may extrapolate to all activities in their scope of work. If they are performing well it will apply to all activities in iteration.

## Advanced Filter Steps

1. Set the FIELD COLUMN to ADVANCED FILTER.
2. Set the VALUE COLUMN to NEW FILTER, EDIT FILTER, or DELETE FILTER.
3. If a filter has been previously setup, then select the filter from the drop-down box.
4. Filters are created in the templated quick risk exactly like the filters that can be made via the filter option in the menu bar.



## Examples and Hints

- Do not setup groups that overwrite other groupings.
- Make the groupings based on reusable info such as activity codes, resource codes or WBS.
- Relate the risk groupings with the audience. If the project team tracks productivity based on a discipline or subcontractor, then it would make sense to create risk groupings based on how the team already analyzes the project.
- The values must be input as percentages, however some audiences think better based on duration. Sometimes converting durations to percentages helps the audience.
- Get an answer that represents reality as quickly as possible. Michelangelo took years to paint the Sistine Chapel. Bob Ross painted "Happy Clouds" in less than an hour on television while stoned. Michelangelo did better work, however you don't have years to analyze risk. You must paint a good picture of reality as quickly as possible.



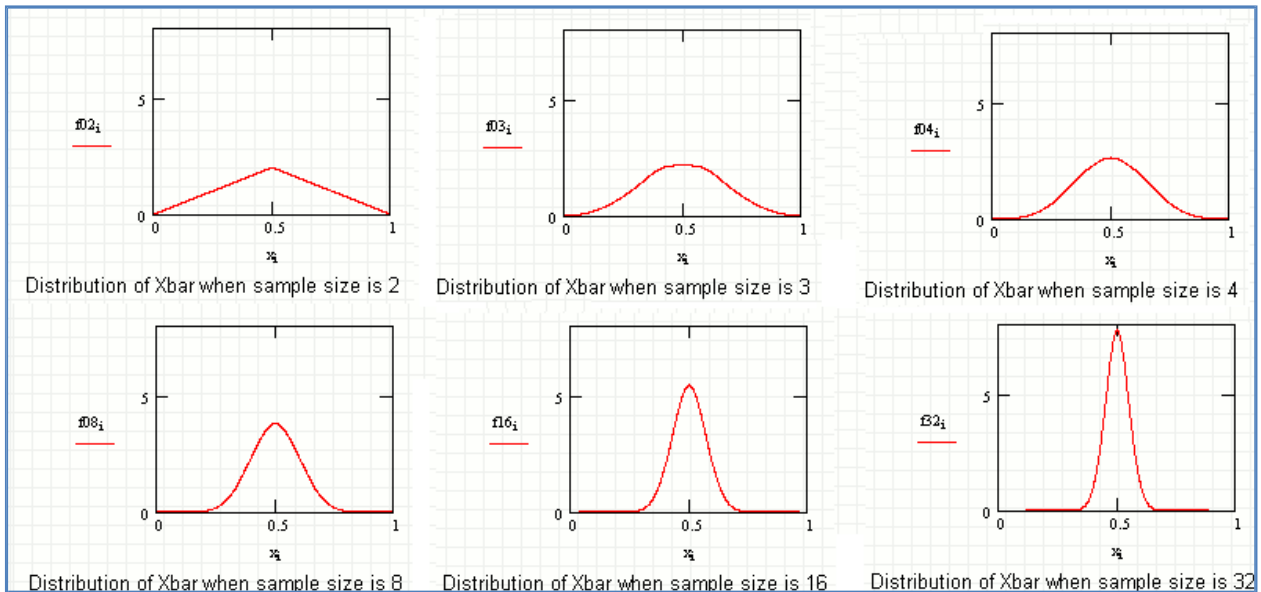
## Oracle | Primavera Risk: Pertmaster Correlation

The fourth step of a typical Oracle | Primavera Risk (Pertmaster) Monte Carlo analysis is to load uncertainty or productivity ranges on the network activities. Correlation is an important part of obtaining a proper statistical Monte Carlo analysis. Without understanding and implementing correlation properly, a risk analyst may have issues with duration cancellation, unintended critical path switching, and merge bias. This training module will attempt to explain difficult statistical concepts without overwhelming users who have not taken Statistics class in many years.

### Statistical Issue: Central Limit Theorem

The Central Limit Theorem states that the distribution of an average tends to be Normal, even when the distribution from which the average is computed is decidedly non-Normal. A great pictorial demonstration of the Central limit Theorem is located at:

[http://www.statisticalengineering.com/central\\_limit\\_theorem.htm](http://www.statisticalengineering.com/central_limit_theorem.htm).



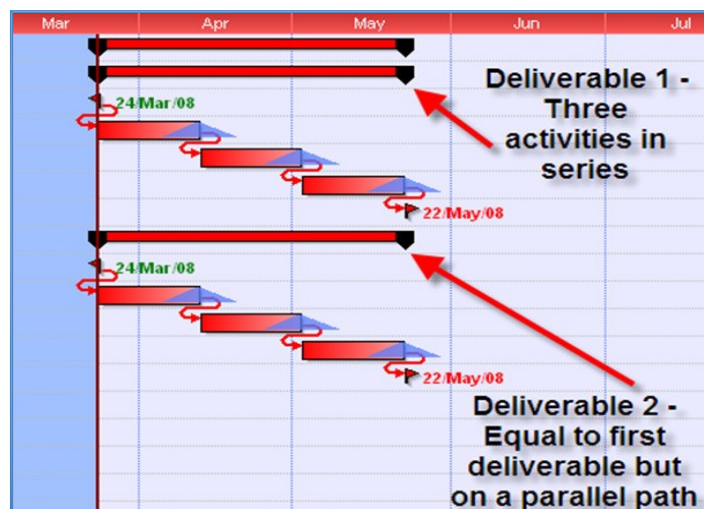


The basic result of the Central Limit Theorem on the Monte Carlo analysis will be the results pushing toward the mean. A risk analyst might notice that the confidence-level histogram is very tall and skinny due to the cancellation effect. Correlation should not be added to simply engineer an answer; however there are reasons that justify correlation.

For example, a contractor has worked between a .95 and 1.2 productivity factor on our last 10 jobs. If their productivity factor is a 1.2 on a certain job, then most activities held a value close to that range. It would not be expected that many of the activities were completed at a .95 productivity factor on that same job. Without correlation, for each iteration will have an equal amount of hits on both sides of the triangle, causing a cancellation effect. Some activities will hit toward a .95 productivity factor while a similar amount will hit toward a 1.2 productivity factor. With correlation, iterations will occur where the 1.2 productivity factors is applied to the contractor's entire grouping of activities. This will give a much more accurate answer if the correlation grouping can be justified.

#### Statistical Issue: Merge Bias

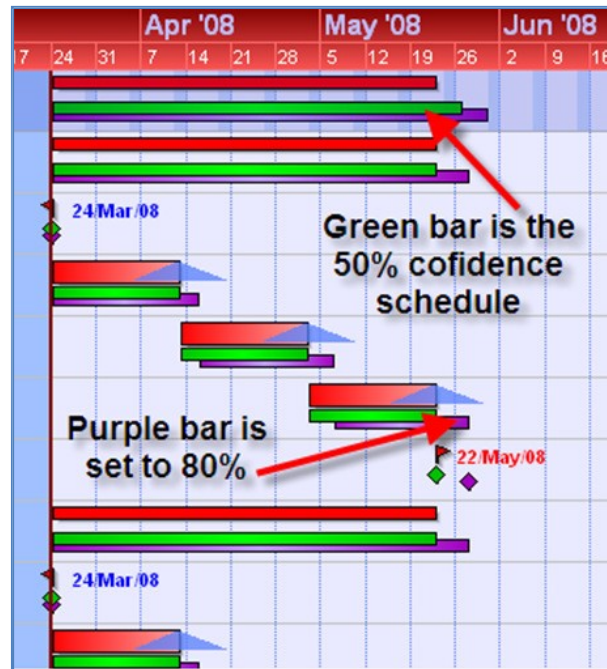
Merge bias relates to the schedule risk at merge points based on multiple paths running in parallel. Parallel paths can be related to a coin flip. There is a 50% chance of flipping the head-side of a coin one time. There is a 50% chance of flipping the same on a second coin. If both are flipped simultaneously, then there is only a 25% chance that both coins will hit heads on the same flip. Parallel paths work the same way. If each path has a 50% chance of finishing on time, the number of parallel paths will dictate the chance of success, much like the number of coin flips would dictate the chance of winning in a casino. The chance of flipping 4 heads on the same iteration is 6.5%.



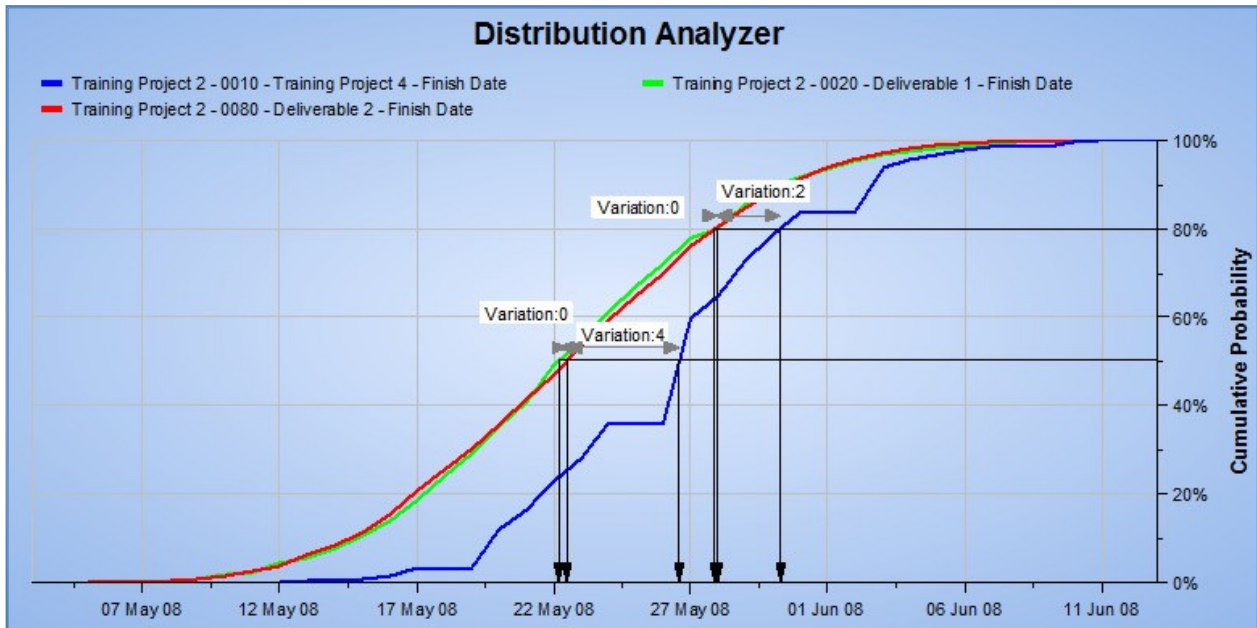




Planners and schedulers often have parallel paths that are representative of when the work is being done but does not take into account the true logic of the events. We may be doing four concrete pours at basically the same time based on site availability. The pours were not linked finish-start by the scheduler because they did not know the true sequence of events. The events may have been placed in parallel to represent that they will all be worked on during the same time frame. The network will not see 4 parallel paths and there may be merge bias issues where there are not true parallel paths.



A symmetrical distribution will always give a near 50% probability of success on a series of activities. A symmetrical distribution has an equal upside and downside. An 80%, 100%, 120% risk spread is symmetrical as it will have 20% on each side of the triangle. The chance of success on a symmetrical distribution for a series of activities is around 50%. The probability of success based on 6 parallel paths would be roughly 15%. A symmetrical distribution can give a very low chance of success and cause a massive push out. This may be very true in how a project actually works.



Deliverable 1 (about 50%):

**Training Project 2 - Deliverable 1 : Finish Date**

Cumulative Probability	Finish Date
100%	12 Jun 08
95%	01 Jun 08
90%	30 May 08
85%	28 May 08
80%	27 May 08
75%	26 May 08
70%	25 May 08
65%	24 May 08
60%	23 May 08
55%	22 May 08
50%	22 May 08
45%	21 May 08
40%	20 May 08
35%	19 May 08
30%	19 May 08
25%	18 May 08
20%	17 May 08
15%	16 May 08
10%	14 May 08
5%	12 May 08
0%	05 May 08

**Statistics**

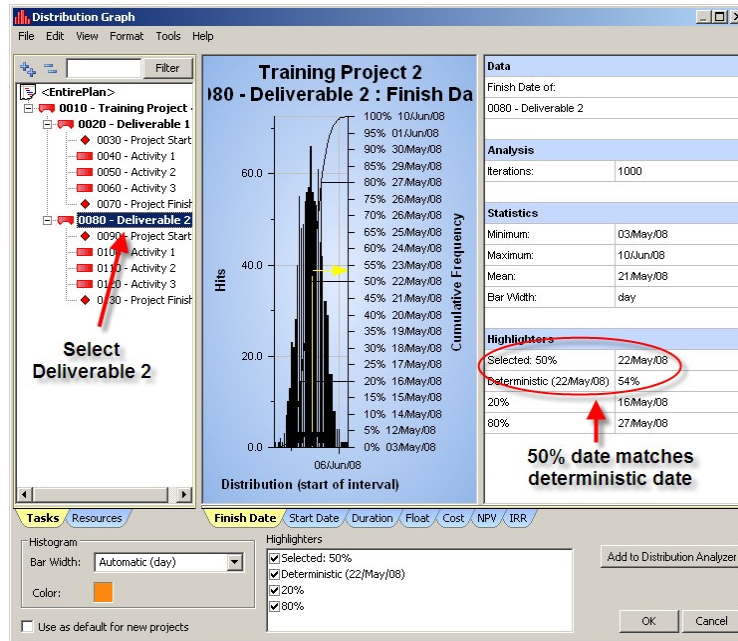
Minimum:	05 May 08
Maximum:	12 Jun 08
Mean:	22 May 08
Bar Width:	day

**Highlighters**

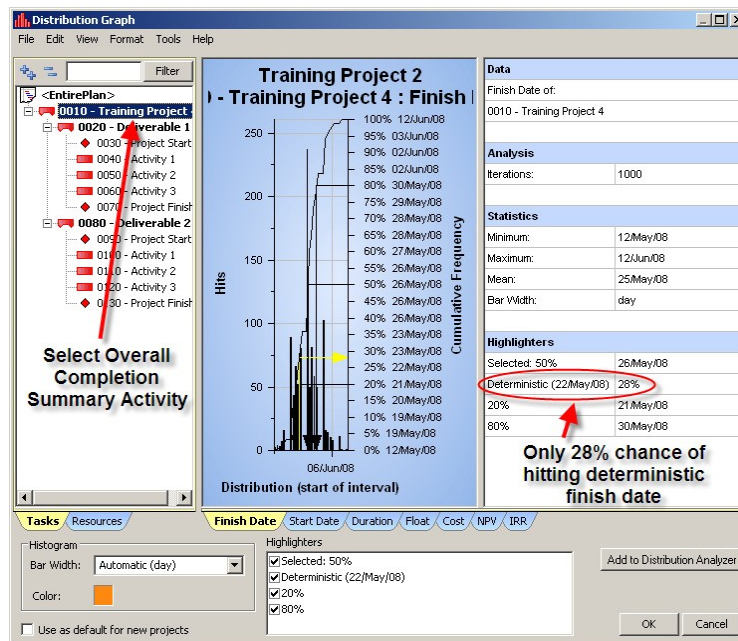
Selected: 50%	22 May 08
Deterministic (22 May 08)	55%
20%	17 May 08
80%	27 May 08

**The 50% date matches the deterministic date**

Deliverable 2 (about 50%):



Completing Both Deliverables in the Same Iteration (about 25%):





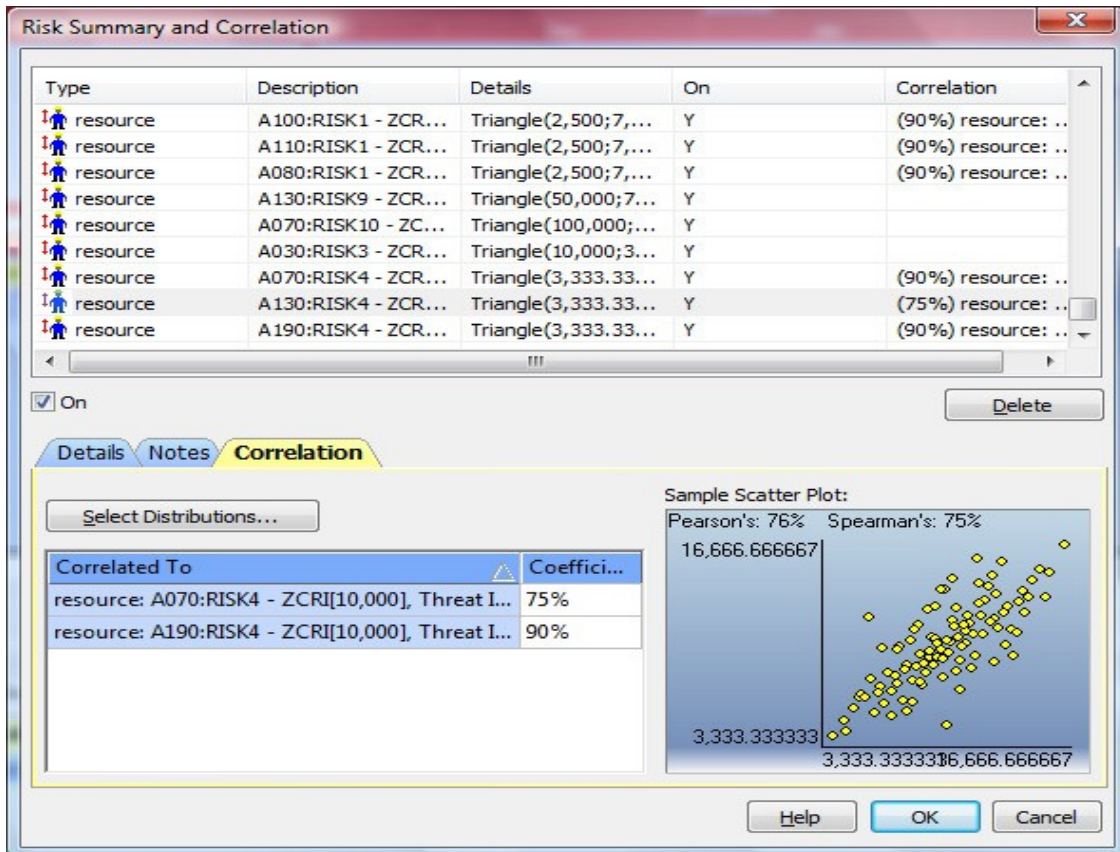
If we are doing three tasks at one time, then the item with the longest duration will be the critical path. That being said, it is important that false parallel paths are not allowed to create extra slip due to representative logic, etc. Proper correlation will often help with this impact. In some cases the parallel paths are valid. We are receiving parts from three vendors and the Deliveries are independent of each other. There is no correlation on the procurement activities

### Correlation Percentage to Use

Often project managers, risk analysts, and statisticians will argue over the correct number to use for correlation. A risk analysis is usually trying to paint a good picture of reality and fighting over percentage points is generally not a useful endeavor. If you do not have statistical evidence based on historical data, then how will you have detailed knowledge on 82% versus 93% correlation? Try to get the number somewhere in the ballpark and make it justifiable. Included below is a very rough rule of thumb.

- Very High : 80% -
- High : 60%- 80%
- Medium : 40% - 60%
- Very Low : 0% - 40%

A project manager can look at the scatter plots for these ranges by manually correlating two activities that have fairly wide ranges via the menu path RISK | CORRELATION. Notice that the scatter plot of 65% does not look much different from 75%. Statistically the results will be fairly similar.



**Risk Summary and Correlation**

Type	Description	Details	On	Correlation
resource	A 100:RISK1 - ZCR...	Triangle(2,500;7,...	Y	(90%) resource: ..
resource	A 110:RISK1 - ZCR...	Triangle(2,500;7,...	Y	(90%) resource: ..
resource	A 080:RISK1 - ZCR...	Triangle(2,500;7,...	Y	(90%) resource: ..
resource	A 130:RISK9 - ZCR...	Triangle(50,000;7...	Y	
resource	A 070:RISK10 - ZC...	Triangle(100,000;...	Y	
resource	A 030:RISK3 - ZCR...	Triangle(10,000;3...	Y	
resource	A 070:RISK4 - ZCR...	Triangle(3,333.33...	Y	(90%) resource: ..
resource	A 130:RISK4 - ZCR...	Triangle(3,333.33...	Y	(75%) resource: ..
resource	A 190:RISK4 - ZCR...	Triangle(3,333.33...	Y	(90%) resource: ..

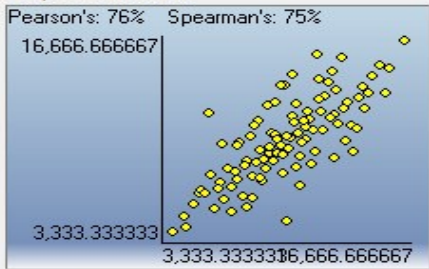
On Delete

**Correlation**

Select Distributions...

Correlated To	Coeffici...
resource: A070:RISK4 - ZCRI[10,000], Threat I...	75%
resource: A190:RISK4 - ZCRI[10,000], Threat I...	90%

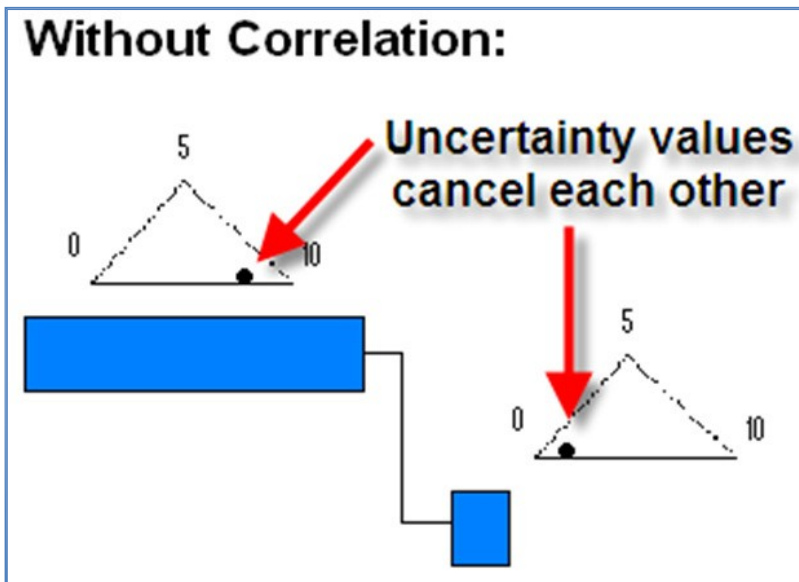
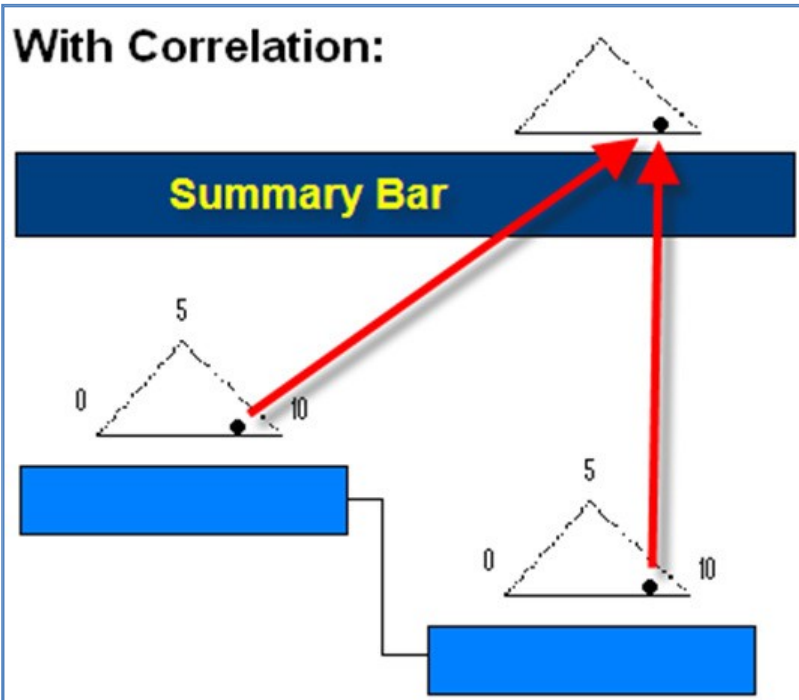
Sample Scatter Plot:  
Pearson's: 76% Spearman's: 75%



Help OK Cancel



A justification for correlation might work for factors such as welders. Welders typically work on a .9 to 1.3 productivity factor. If they are working at a 1.3 factor, it usually extrapolates to all of their activities, so we have used a very high correlation of 90%. Using very low correlation would not make sense as the welders would be completing some activities with amazing productivity while doing very poorly on others in the same iteration. Using a very low correlation might raise a flag that the model could be statistically improved.





## Manual Duration Correlation Steps

1. Follow the menu path RISK | CORRELATION...
2. Select an activity to correlate.
3. Click the SET DISTRIBUTIONS button.
4. The bank of available activities is located on the left side and the active correlations on the right side.
5. Click the ADD and REMOVE buttons to switch tasks between the available and active activity pools.

**Risk Summary and Correlation**

Type	Description	Details	On	Correlation
calendar	WeatherDelay	{01/Oct/05;31/Oc...	Y	
duration	A120 - Safety case	Triangle(49;54;59)	Y	
duration	A100 - Design dev...	Triangle(72;80;150)	Y	
duration	A050 - Feasibility ...	Triangle(45;50;55)	Y	
duration	A190 - Reduce ha...	Triangle(32;35;39)	Y	
duration	A200 - Clean strip...	Triangle(36;40;44)	Y	
duration	A240 - Post Imple...	Triangle(5;5;6)	Y	
duration	A030 - Characteri...	Triangle(9;10;11)	Y	
duration	A070 - Front End ...	Triangle(36;40;44)	Y	

On Delete

Details Notes **Correlation**

Select Distributions...

Correlated To	Coefficient
---------------	-------------

Sample Scatter Plot:

This risk has no correlation

Help OK Cancel



## Applying Groups of Correlation in the Templated Quick Risk

The templated quick risk allows correlation by group. Users simply type in a correlation percentage. The correlation will be created for all tasks in the selected group. This concept is almost like looking at risk from a summary schedule point-of-view without destroying the detailed logic that planners and schedulers have pains takingly compiled. Therefore this approach is a hybrid between a summary schedule risk analysis and manual risk loading on a detailed schedule the inputs can be gathered quickly in a collaborative fashion and applied to the detailed schedule logic. This will force schedule improvement and avoid working with two schedules in parallel.



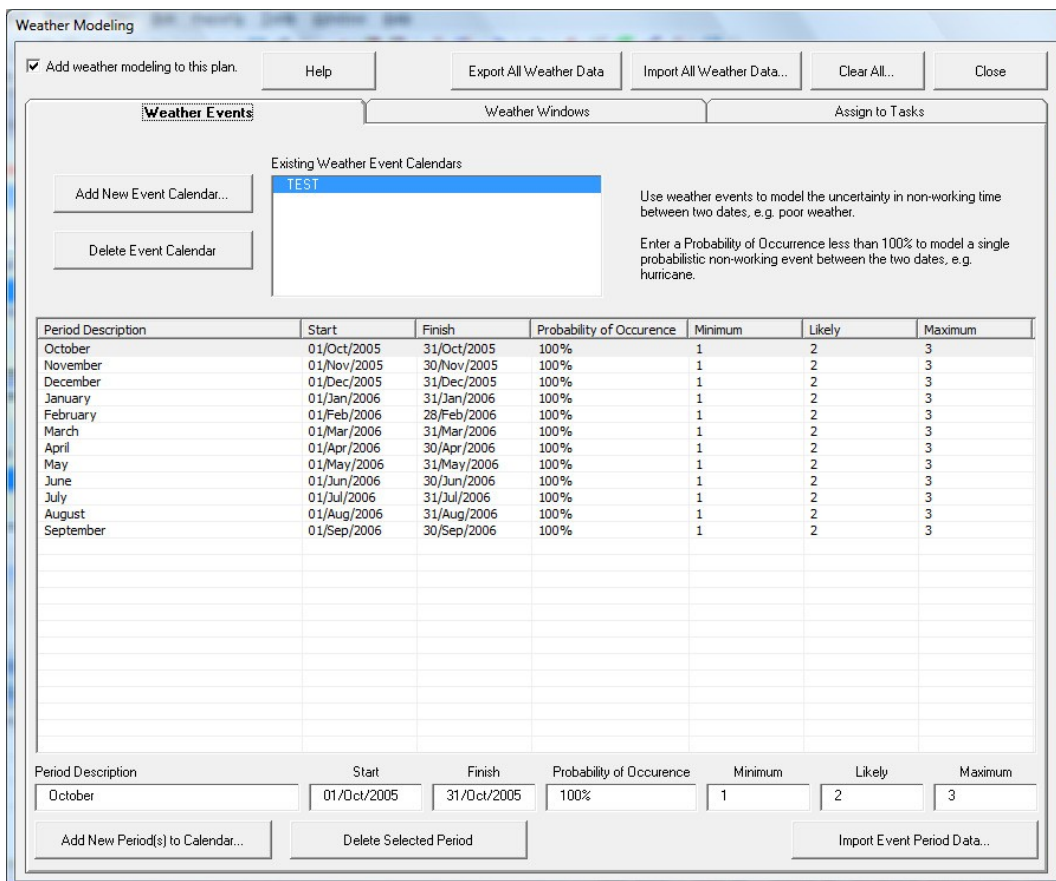
## Oracle | Primavera Risk: Weather Modeling

Weather events and seasonal periods can be modeled using the risk register or a weather model interface which can be considered a weather register.

### Overview of the Weather Model Interface

The weather register has three tabs:

- **WEATHER EVENTS TAB**– This option allows the risk analyst to create a discrete weather risk event with a probability of occurrence and duration uncertainty. The chance of a hurricane can have a probability of occurrence associated much like the risk register. The period name, start date, finish date, probability, and minimum/likely/maximum are entered in this section. A calendar will be created that can be assigned to an activity in the third window. An example of how to use this section is a hurricane risk event is entered at a 20% chance of occurrence between June and November.



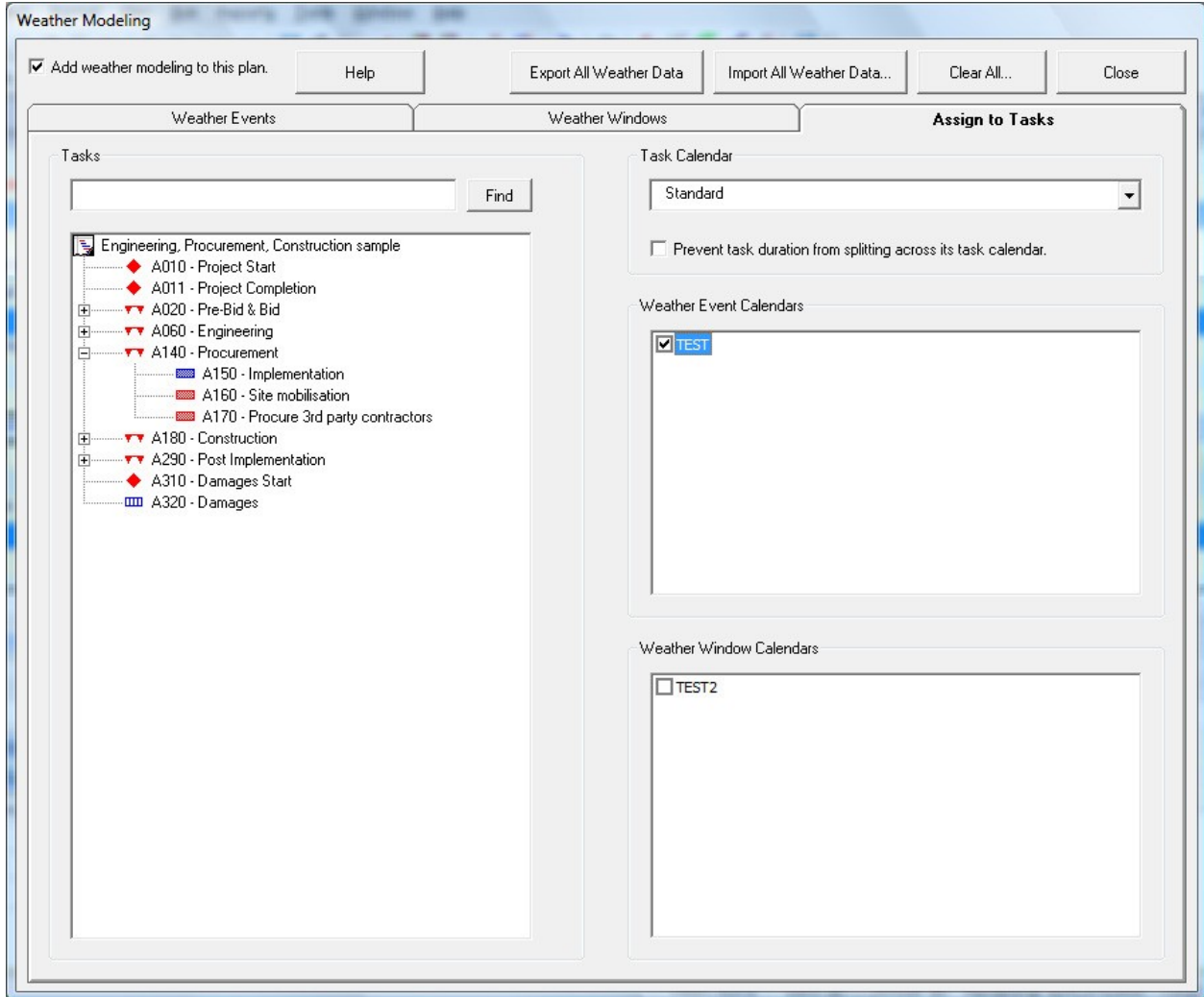
The screenshot shows the 'Weather Modeling' application window with the 'Weather Events' tab selected. The interface includes a toolbar with buttons for 'Add weather modeling to this plan.', 'Help', 'Export All Weather Data', 'Import All Weather Data...', 'Clear All...', and 'Close'. Below the toolbar, there are three tabs: 'Weather Events', 'Weather Windows', and 'Assign to Tasks'. The 'Weather Events' tab contains a section for 'Existing Weather Event Calendars' with a list containing 'TEST'. To the left of this list are buttons for 'Add New Event Calendar...' and 'Delete Event Calendar'. To the right, there is explanatory text: 'Use weather events to model the uncertainty in non-working time between two dates, e.g. poor weather.' and 'Enter a Probability of Occurrence less than 100% to model a single probabilistic non-working event between the two dates, e.g. hurricane.' Below this is a table with columns: 'Period Description', 'Start', 'Finish', 'Probability of Occurrence', 'Minimum', 'Likely', and 'Maximum'. The table lists months from October to September with their respective dates and a 100% probability of occurrence. At the bottom, there are input fields for 'Period Description', 'Start', 'Finish', 'Probability of Occurrence', 'Minimum', 'Likely', and 'Maximum', along with buttons for 'Add New Period(s) to Calendar...', 'Delete Selected Period', and 'Import Event Period Data...'.

Period Description	Start	Finish	Probability of Occurrence	Minimum	Likely	Maximum
October	01/Oct/2005	31/Oct/2005	100%	1	2	3
November	01/Nov/2005	30/Nov/2005	100%	1	2	3
December	01/Dec/2005	31/Dec/2005	100%	1	2	3
January	01/Jan/2006	31/Jan/2006	100%	1	2	3
February	01/Feb/2006	28/Feb/2006	100%	1	2	3
March	01/Mar/2006	31/Mar/2006	100%	1	2	3
April	01/Apr/2006	30/Apr/2006	100%	1	2	3
May	01/May/2006	31/May/2006	100%	1	2	3
June	01/Jun/2006	30/Jun/2006	100%	1	2	3
July	01/Jul/2006	31/Jul/2006	100%	1	2	3
August	01/Aug/2006	31/Aug/2006	100%	1	2	3
September	01/Sep/2006	30/Sep/2006	100%	1	2	3





- **ASSIGN TO TASKS TAB** – Users are able to take a calendar created in the WEATHER EVENTS or WEATHER WINDOWS TABS and assign them to an activity or activities. An activity is selected in the left pane and matched to a probabilistic calendar on the right pane with a check mark.



Upon closing the window, the calendars will be adjusted. For the weather event or window to show up on the tornado chart, the risk analysis must be run for correlation of all tasks and not logical predecessors. The weather event or windows are added as activities however they are not linked into the stream of the activities.

The ALL TASKS tornado is the only way to show the weather event on the drivers.

# Risk Process Step 5: Risk Events

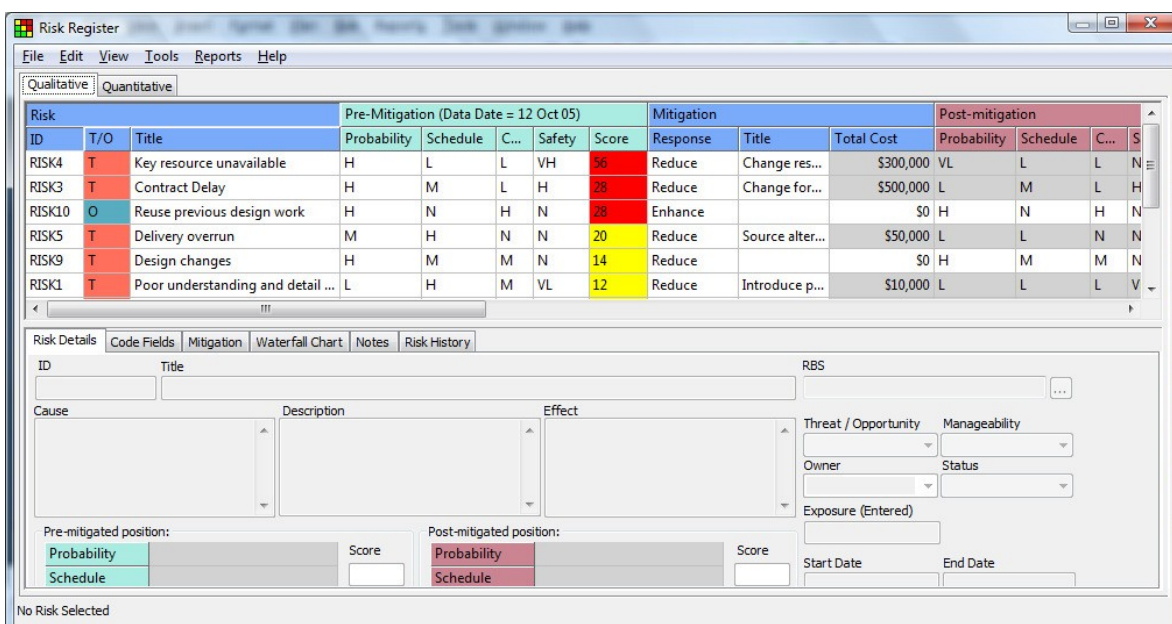
## Tracking Risk: Pertmaster Qualitative Risk Register Section

The fifth step of a typical Oracle | Primavera Risk (Pertmaster) Monte Carlo analysis is to track, quantify, and link risk events to the project schedule for the Monte Carlo analysis. The Pertmaster risk register is simple and easy to use. It provides a good format for users that do not have a risk register in another tool. However, Primavera Risk does not have a database back-end which limits project managers' ability to collaborate, track risk, create accountability, or roll risk up to portfolio levels.

### Section Overview

The qualitative side of the risk register is all about tracking and categorizing risk. There is no right or wrong way to setup a risk register. In its simplest form, a risk register or risk log is just a list of risks. We attach as much or little information as needed based on what an organization would like to track.

Some of the interesting fields in the Pertmaster Risk Register are often ignored by risk management teams, regardless of the risk register product or template they are using. The T/O field allows a project team to identify not only negative risks (threats), but opportunities as well. Sometimes projects do not save time because the project team has not invested effort into tracking opportunities. The mitigation steps and cost of mitigation will allow the schedule risk analyst to do a cost-benefit analysis of mitigation after the Monte Carlo analysis is run. The response type, status, and start & finish dates (risk window) are other fields that should be tracked on most projects.



Risk		Pre-Mitigation (Data Date = 12 Oct 05)						Mitigation			Post-mitigation			
ID	T/O	Title	Probability	Schedule	C...	Safety	Score	Response	Title	Total Cost	Probability	Schedule	C...	S
RISK4	T	Key resource unavailable	H	L	L	VH	36	Reduce	Change res...	\$300,000	VL	L	L	N
RISK3	T	Contract Delay	H	M	L	H	28	Reduce	Change for...	\$500,000	L	M	L	H
RISK10	O	Reuse previous design work	H	N	H	N	28	Enhance		\$0	H	N	H	N
RISK5	T	Delivery overrun	M	H	N	N	20	Reduce	Source alter...	\$50,000	L	L	N	N
RISK9	T	Design changes	H	M	M	N	14	Reduce		\$0	H	M	M	N
RISK1	T	Poor understanding and detail ...	L	H	M	VL	12	Reduce	Introduce p...	\$10,000	L	L	L	V

Pre-mitigated position:		Post-mitigated position:	
Probability	Score	Probability	Score
Schedule		Schedule	



## Menu Bar

- FILE MENU - Allows users to Import files, export the risk log to other products, such as Microsoft Excel, or save the risk register and plan.
- EDIT MENU - Options for copying data, pasting data, the risk scoring system setup, risk breakdown structure (RBS) setup, user-defined field setup, and how ID values are set for newly added risks (Next Risk ID).
- VIEW MENU - Contains data filters, show & hide columns, and an internal report view of the risk matrix (Show Risk Matrix).
- TOOLS MENU - Menu Options to integrate risks into the schedule (Build Impacted Risk Plans), Monte Carlo analyze risks without tying them to a schedule (Build Exposure Risk Plan), purge deleted risks, and the main risk register options.
- REPORT MENU - Standard risk reports including the risk matrix report, risk scoring report, and an easy to use report manager.

## Navigation Pane

- RISK DETAILS TAB - Contains basic risk info.
- CODE FIELDS TAB - Project managers can edit all user-defined fields.
- MITIGATION TAB - List of mitigation steps to be tracked and completed.
- WATERFALL CHART TAB - Time-phased burn-down chart highlighting how mitigation steps will decrease the risk score.
- NOTES TAB - A large text box for users to enter notes.
- RISK HISTORY TAB - List of all changes that have been made and saved to the risk register.

## Tracking Risk: Pertmaster Qualitative Risk Register Scoring System Setup

The fifth step of a typical Oracle | Primavera Risk (Pertmaster) Monte Carlo analysis is to track, quantify, and link risk events to the project schedule for the Monte Carlo analysis. The first step in creating a qualitative risk register is to setup a scoring system.

### Section Overview

A risk scoring system is designed to categorize risks by thresholds or tolerance level.

Open the register by following the menu path EDIT | RISK SCORING.

In the probability scale, impact scale, and tolerance scales listed below, users will be able to:

- Use the drop-down box to set the number of items in scale.
- Click the box that consists of three dots (...) to change the long name or abbreviation for each risk grouping or risk level.



The screenshot shows the 'Risk Scoring' window with the following sections:

- Probability Scale:** 'Items in the scale' is set to 5. The table below shows the probability ranges for each level.
- Impact Scales & Types:** 'Items in the scale' is set to 5. The table below shows the score ranges for 'Schedule', 'Cost', and 'Safety' impact types.
- Tolerance Scale:** 'Items in the scale' is set to 3. The table below shows the color and score ranges for each level.
- Probability and Impact Scoring (PID):** 'Risk score is based on:' is set to 'Highest Impact'. The table below shows the distribution of impacts across risk levels.

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

Impact Types	Score?	Very Low	Low	Medium	High	Very High
Schedule	<input checked="" type="checkbox"/>	<=10	>10	>20	>50	>150
Cost	<input checked="" type="checkbox"/>	<=\$10,000	>\$10,000	>\$50,000	>\$100,000	>\$500,000
Safety	<input checked="" type="checkbox"/>	Failure to meet a minor acceptance	Failure to meet more than one minor	Shortfall in meeting acceptance criteria	Significant shortfall in meeting acceptance	Failure to meet acceptance criteria

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

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

### Probability Scale (Top-Left Corner)

1. Set the names with the "..." button.
2. Set the number of items in the scale.
3. Setup the ranges for probability buckets by directly typing the values in the blank spaces.

### Set Impact Scales & Types (Top-Right Corner)

- The schedule and cost impacts are the default types.
- The add button allows a user-defined impact type to be added to the impact list.
- The delete button deletes an impact type. Cost and schedule impact cannot be deleted.
- The cost and schedule fields are numbers. All user-defined fields are text entry boxes.

### Tolerance Scale (Bottom-Left Corner)

1. The goal of the tolerance scale is to setup buckets or stop light values to categorize unacceptable levels of risk.
2. Set the names with the "..." button.
3. Set the number of items in the scale.
4. Set the colors by double-clicking directly on the color. A color selector will appear. Green, yellow, and red is the most commonly used color scale. Some



organizations use orange to separate the high-medium values from the low-medium values.

## Probability & Impact Scoring Matrix (Bottom-Right Corner)

- The project manager can type numbers directly into the squares. The numbers relate to the tolerance scale that has been setup.
- The numbers have no meaning except to control the tolerance scale. Any meaning to the numbers relates directly to process and procedures setup by the organization. Project managers are often irritated that the numbers have no real meaning in the software; however outside of the software the numbers do have significance. Based on software mechanics, the numbers just serve to paint the squares the proper color.
- The probability units are setup on the y-axis.
- The impacts buckets are setup on the x-axis.
- If 10 probability buckets were setup, then the y-axis will have 10 spots.
- The risk score will be calculated by finding the where the highest impact meets with the probability. If the probability is Medium and the highest impact is High, then the score for the risk will be the intersection point on the matrix.
- Scores can be calculated based on an average instead of the highest impact; however this method is not often used because it will artificially lower a score. For example, if the probability is high and the schedule impact is high a red risk score might be expected. If schedule, quality, and performance are all rated very low the overall risk score would be reduced (possibly to green) if averages are used. This would make viewing the risk score very deceptive as it is a high schedule risk.



## Tracking Risk: Pertmaster Qualitative Risk Register Mitigation Steps

The fifth step of a typical Oracle | Primavera Risk (Pertmaster) Monte Carlo analysis is to track, quantify, and link risk events to the project schedule for the Monte Carlo analysis. Project teams need to track not only the risk events, but the mitigation steps as well.

### Mitigation Tab Overview

The MITIGATION TAB is located in the navigation pane of the risk register. The post-mitigated position can also be scored in the main risk register section; however the steps cannot be detailed in the main risk register.

Mitigation actions for selected risk: RISK4 - Key resource unava...		Task/Work Details					
Description	Responsibil...	Start	Finish	Baseline St...	Baseline Fi...	Remaining ...	Actual C
Prioritise project resources	DP	12 Oct 05	12 Oct 05	12 Dec 05	12 Dec 05	\$200,000	
Renegotiate internal company project priority	DP	12 Oct 05	12 Oct 05	03 Jan 06	03 Jan 06	\$100,000	
Keep key resources updated with latest schedule...	DP	12 Oct 05	12 Oct 05	07 Jan 06	07 Jan 06	\$0	

To track the mitigation steps:

- Check USE DETAILED ACTIONS box.
- Mitigation steps can be added by manually typing the steps into the cells.
- Enter the post-mitigated score per step.
- The mitigation steps will allow risk analysts to generate a time-phased burn-down or waterfall chart of how the risk is being reduced based on each step (waterfall chart tab).
- Entering a mitigation cost will allow the project manager or team to create a post-mitigated scenario when doing the Monte Carlo scenarios.
- The TASK column in the mitigation steps allows users to map to task in schedule. Setting the mitigation to a task will auto-populate the start and finish dates for the steps. If the mitigations are already in the schedule the burn-down chart can be quickly made by mapping the mitigation steps.
- Other mitigation step information can be entered based on risks the project manager or the team would like to track.



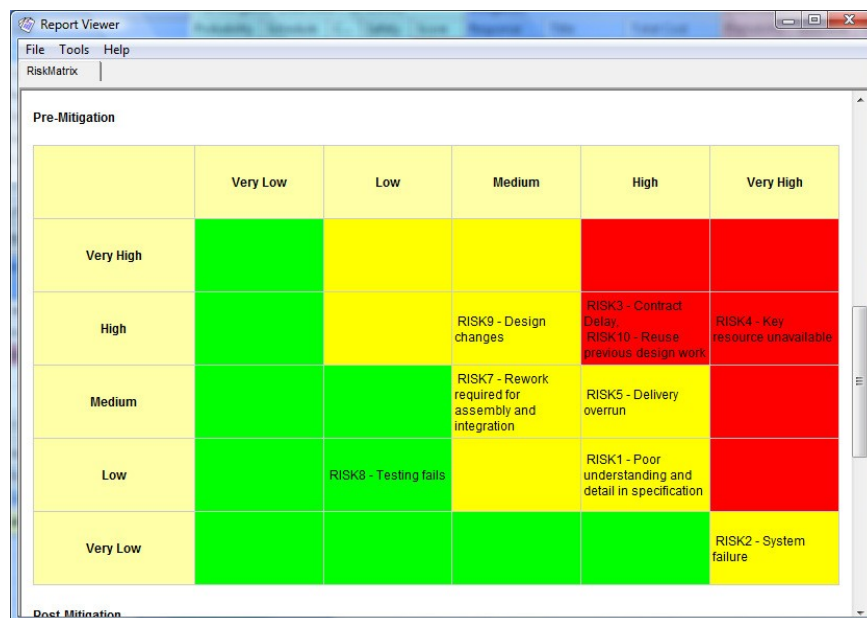
## Tracking Risk: Pertmaster Qualitative Risk Register Reports

The fifth step of a typical Oracle Primavera Risk (Pertmaster) Monte Carlo analysis is to track, quantify and link risk events to the project schedule for the Monte Carlo analysis. Pertmaster allows a project manager to create pre-defined or customized reports based on the qualitative risk data being tracked.

### Risk Reports Overview

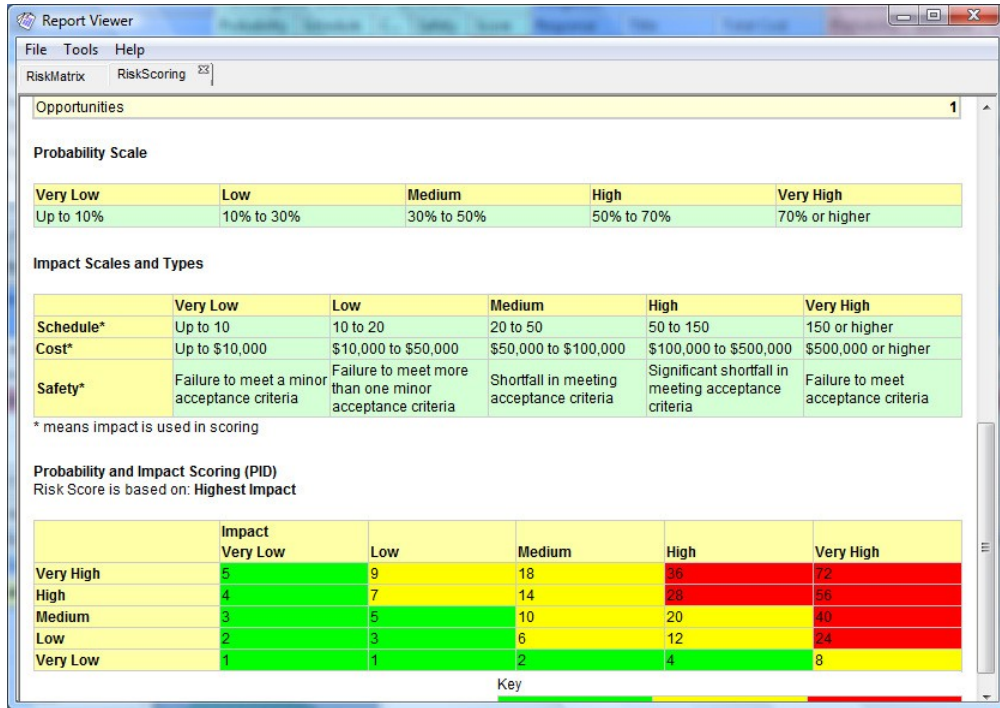
The built-in risk register reports are designed to be easy to use.

The risk matrix report Menu PATH - REPORTS | RISK MATRIX will show where the risk is on the probability and impact risk matrix.



	Very Low	Low	Medium	High	Very High
Very High					
High			RISK9 - Design changes	RISK3 - Contract Delay RISK10 - Reuse previous design work	RISK4 - Key resource unavailable
Medium			RISK7 - Rework required for assembly and integration	RISK5 - Delivery overrun	
Low		RISK8 - Testing fails		RISK1 - Poor understanding and detail in specification	
Very Low					RISK2 - System failure

The risk scoring system report MENU PATH – REPORTS | RISK SCORING outlines the entire scoring system that was setup previously.



Report Viewer

File Tools Help

RiskMatrix RiskScoring

Opportunities 1

**Probability Scale**

Very Low	Low	Medium	High	Very High
Up to 10%	10% to 30%	30% to 50%	50% to 70%	70% or higher

**Impact Scales and Types**

	Very Low	Low	Medium	High	Very High
<b>Schedule*</b>	Up to 10	10 to 20	20 to 50	50 to 150	150 or higher
<b>Cost*</b>	Up to \$10,000	\$10,000 to \$50,000	\$50,000 to \$100,000	\$100,000 to \$500,000	\$500,000 or higher
<b>Safety*</b>	Failure to meet a minor acceptance criteria	Failure to meet more than one minor acceptance criteria	Shortfall in meeting acceptance criteria	Significant shortfall in meeting acceptance criteria	Failure to meet acceptance criteria

\* means impact is used in scoring

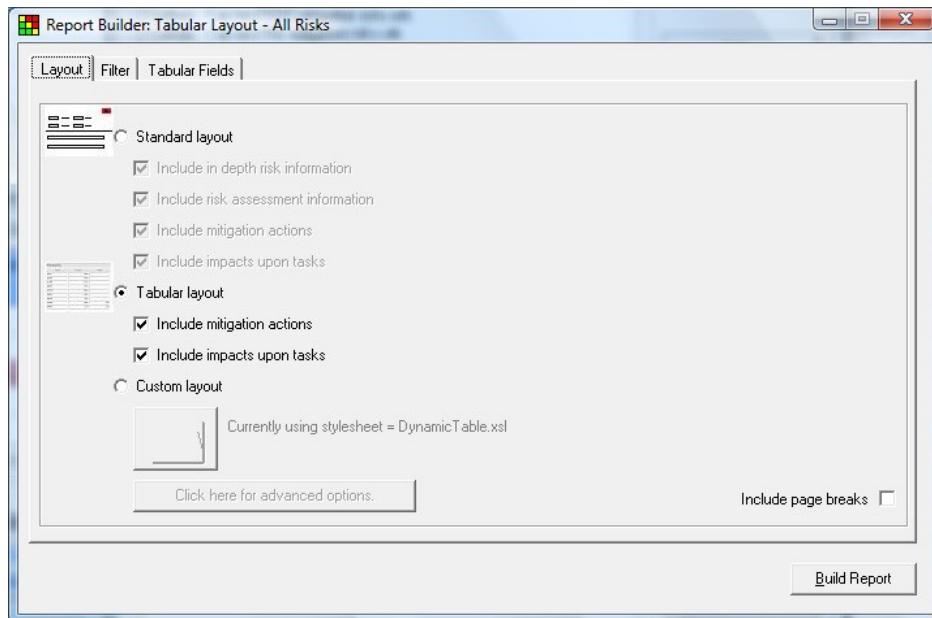
**Probability and Impact Scoring (PID)**  
Risk Score is based on: **Highest Impact**

	Impact Very Low	Low	Medium	High	Very High
<b>Very High</b>	5	9	18	36	72
<b>High</b>	4	7	14	28	56
<b>Medium</b>	3	5	10	20	40
<b>Low</b>	2	3	6	12	24
<b>Very Low</b>	1	1	2	4	8

Key

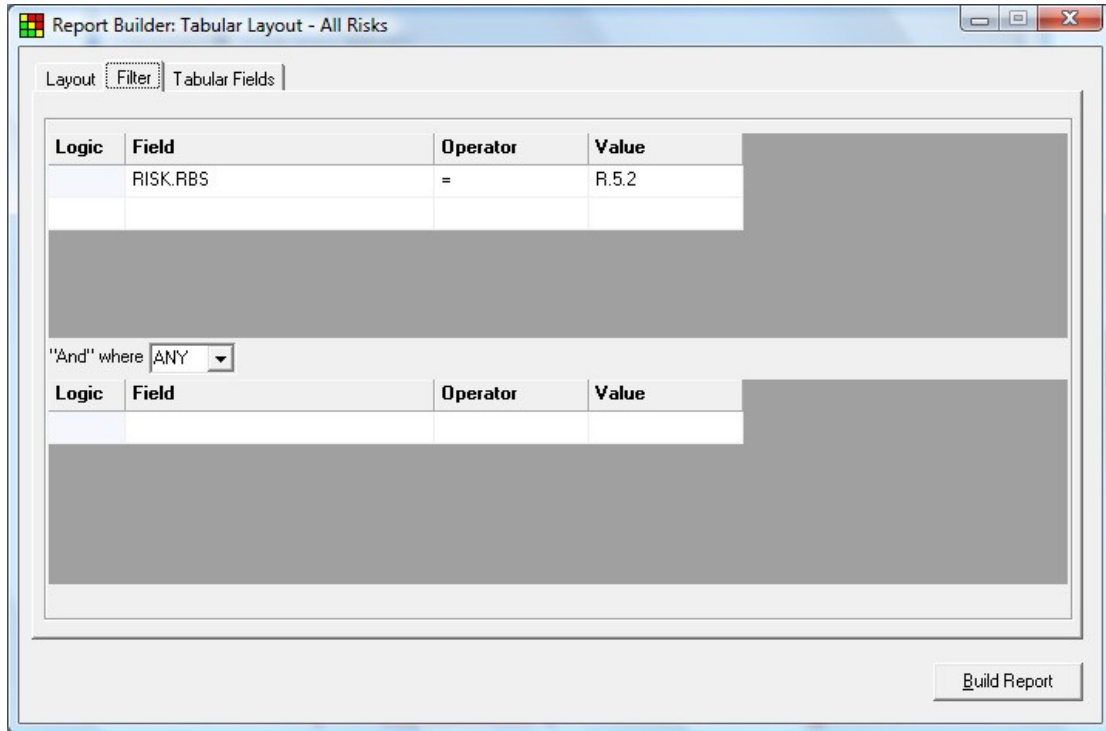
The risk report manager (MENU PATH - REPORTS | REPORT MANAGER will allow users to setup a simple custom report:

1. After opening the report manager, click the NEW REPORT button.
2. Input a name to save the report.
3. The LAYOUT TAB will allow users to pick between a standard or tabular layout.

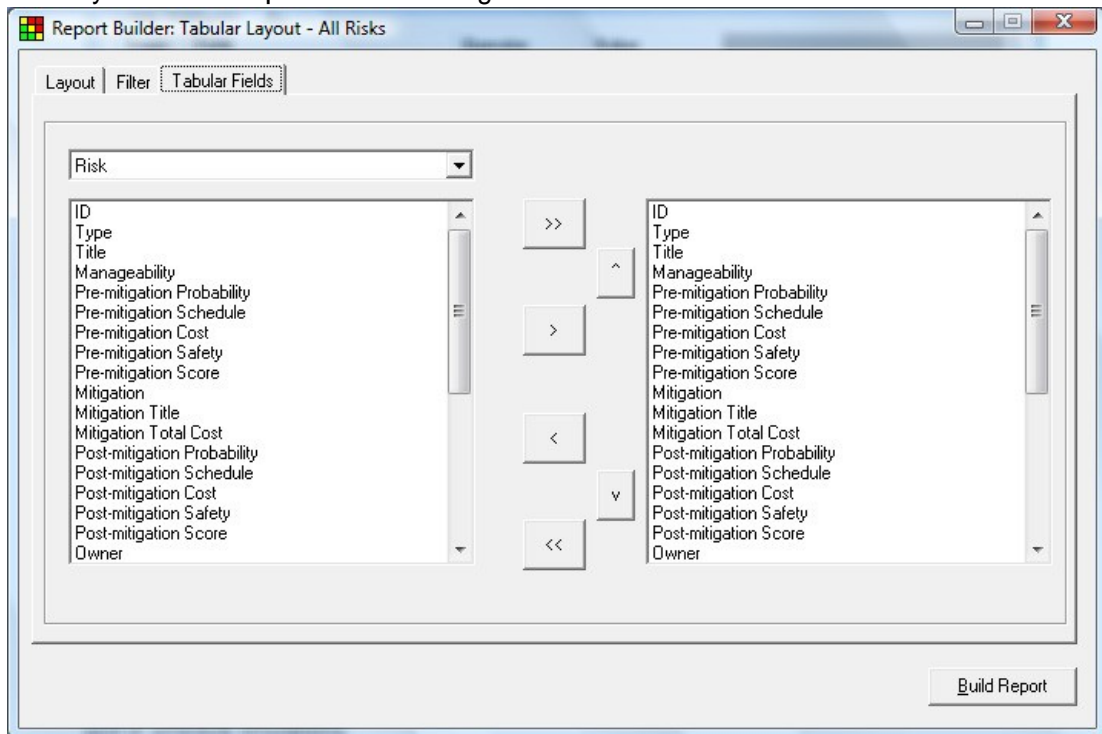




- The FILTER TAB enables the project manager to create a filter. For example, a risk analyst may only want to run a report on engineering risks.



- The TABULAR FIELDS allow users to choose which fields to show on a custom report. Any field in the qualitative risk register can be shown.

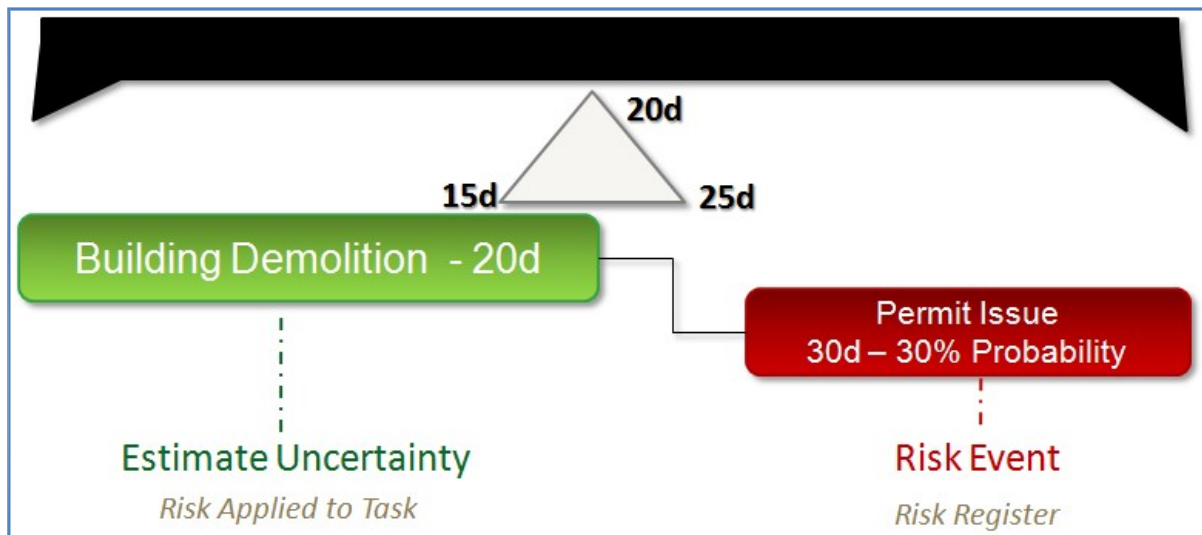
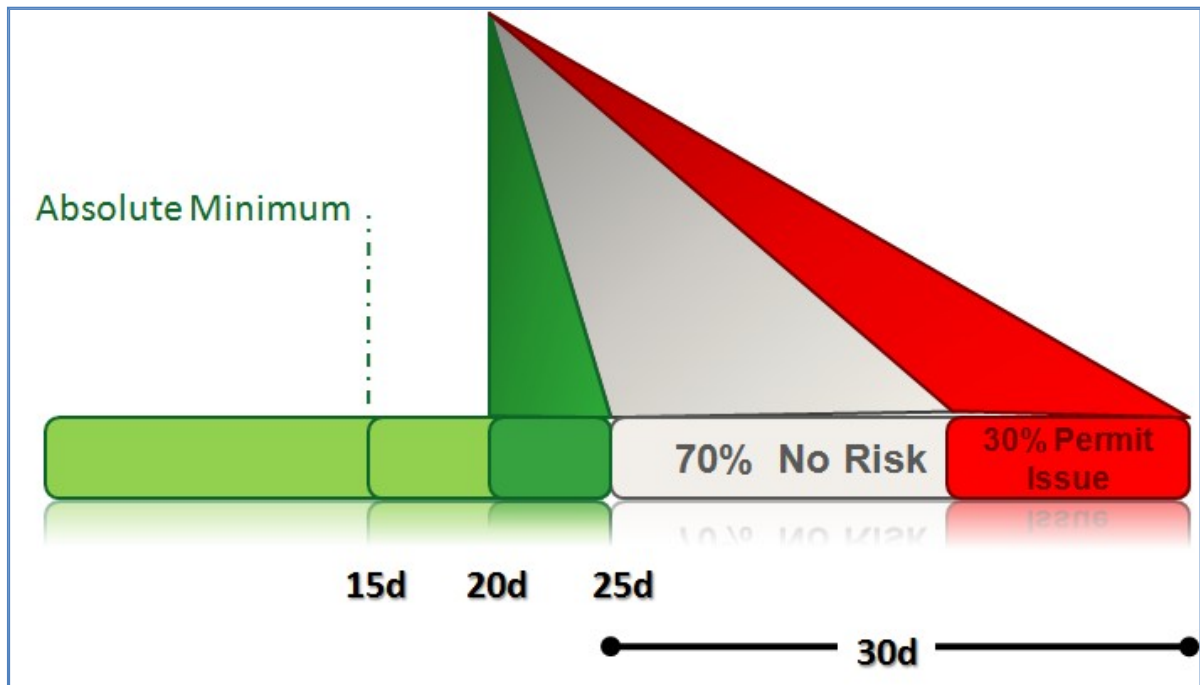




6. Click BUILD REPORT when the report has been completed.

## Monte Carlo Analysis: Pertmaster Quantitative Risk Register Section

The fifth step of a typical Oracle | Primavera Risk (Pertmaster) Monte Carlo analysis is to track, quantify, and link risk events to the project schedule for the Monte Carlo analysis. The quantitative risk register tab is where a risk analyst will turn risk events into probabilistic schedule activities for the Monte Carlo cost or schedule simulations.





## Quantitative Risk Register Section Overview

The Quantitative risk register tab is located directly under the menu bar. After clicking the QUANTITATIVE tab, the PRE-MITIGATED and POST-MITIGATED sub-tabs will appear below it. The third layer of tabs for the RISK VIEW and TASK VIEW will appear below the pre-mitigated and post-mitigated tabs.

### Risk View Tab

- The LIST OF RISKS is located in the left pane.
- The left panel contains the risk ID, risk title, threat or opportunity (T/O), as well as probability, whether or not the risk is quantified, probability, and the task ID the risk affects.
- The right panel contains all activities in the project plan. The project manager can filter tasks, sort activities, and check mark the tasks which link to a particular risk.

ID	T/O	Title	Quantified	Probabili...	Impacted Task ID(s)
RISK4	T	Key resource unavailable	<input type="checkbox"/>	60%	A190,A130,A070
RISK3	T	Contract Delay	<input type="checkbox"/>	60%	A030
RISK...	O	Reuse previous design work	<input type="checkbox"/>	60%	A070
RISK5	T	Delivery overrun	<input type="checkbox"/>	40%	A220
RISK9	T	Design changes	<input type="checkbox"/>	60%	A130
RISK1	T	Poor understanding and detail ...	<input type="checkbox"/>	20%	A080,A110,A100,A120
RISK7	T	Rework required for assembly ...	<input type="checkbox"/>	40%	A170
RISK2	T	System failure	<input type="checkbox"/>	5%	A200
RISK8	T	Testing fails	<input type="checkbox"/>	20%	A210
RISK6	T	Fabrication contractor goes bust	<input type="checkbox"/>	0%	A160

Impacts for Risk RISK4		Schedule			Cost				Correlate		
Task ID	Description	Shape	Min	Likely	Max	Shape	Min	Likely	Max	Impact Ranges	Event existence
A190	Reduce hazards	Triangle	3	5	6	Triangle	\$3,333	\$10,000	\$16,667	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
A130	External approvals	Triangle	3	5	6	Triangle	\$3,333	\$10,000	\$16,667	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
A070	Front End Eng Desian	Trianole	3	5	6	Trianole	\$3,333	\$10,000	\$16,667	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Pre-mitigated selected risk: RISK4 - Key resource unavailable

### Task View Tab

- The left panel contains all schedule activities.
- The right panel contains all risk events added to the risk model.
- Clicking an activity will show all risks that have been linked to that task.
- This tab is important because it allows a risk analyst to link the risk events in series or parallel when two or more risks affect one activity.



Impacts for Task A110			Schedule			Cost			Link in Series		
Risk ID	T/O	Title	Shape	Min	Likely	Max	Shape	Min	Likely	Max	
RISK1	T	Poor understandin...	Triangle	12	25	37	Triangle	\$12,500	\$18,750	\$25,000	<input type="checkbox"/>

## Bottom Pane for Risk Impacts

- The bottom panel lists the quantified impacts a risk has on a task and the task affected. The info is similar to an activity, such as duration and cost.
- Risk event existence and impact can be correlated. This will be covered in detail in another module.

## Risk Event Links to Activities

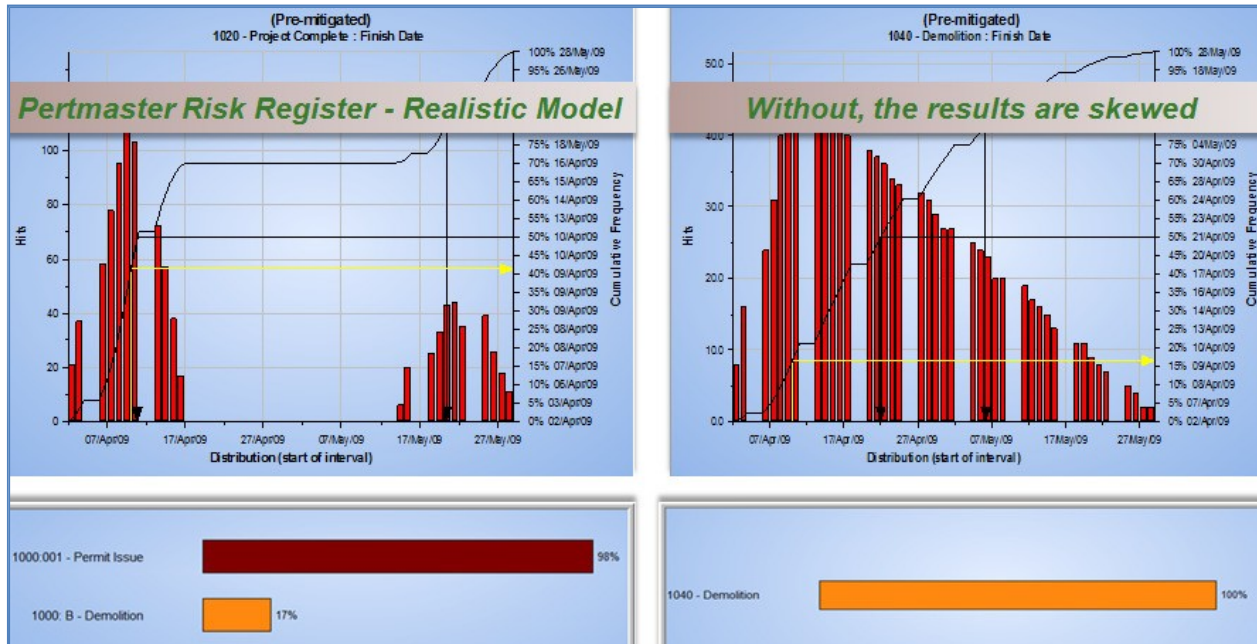
- Risk events link to an activity with a finish- start link.
- Risk events link in parallel by default.
- Risk can stack or be put in series using the TASK VIEW TAB.

## Overview of Risk Event Correlation (Risk View Tab)

- If risk ranges are correlated they will hit the same portion of the risk triangle just like a correlated activity. The check box will set the correlation coefficient to 100%.
- A risk can be tied to more than one activity. If the event existence is correlated, when a risk event occurs on one activity, it will occur on the other activities as well. For example, if a hurricane risk event is tied to the different tasks in the schedule, then it can occur in all places when the hurricane risk event happens. A general risk such as a procurement delay may not have correlated existence because one vendor can deliver on time while another vendor has a delay.

## Monte Carlo Analysis: Pertmaster Quantitative Risk Register Integration with Schedule

The fifth step of a typical Oracle Primavera Risk (Pertmaster) Monte Carlo analysis is to track, quantify, and link risk events to the project schedule for the Monte Carlo analysis. The Pertmaster methodology revolves around separating uncertainty & productivity from risk events to provide a more accurate and traceable risk model. The Primavera Risk software treats risk events as probabilistic activities with logical ties to the schedule in the same way it treats any other task.



### Risk Integration Overview

Once the risks have been linked to the schedule in the risk register the user will follow the path: TOOLS | BUILD IMPACTED RISK PLAN. Next, a wizard will launch, initializing the process of converting risk events into probabilistic activities.



**Build Impacted Risk Plan(s)** [X]

**Risk Plans**

- Pre-mitigated
- Post-mitigated

**Open Risks**

- RISK4(T) - Key resource unavailable
- RISK3(T) - Contract Delay
- RISK10(O) - Reuse previous design wor
- RISK5(T) - Delivery overrun
- RISK9(T) - Design changes
- RISK1(T) - Poor understanding and deta
- RISK7(T) - Rework required for assembl
- RISK2(T) - System failure
- RISK8(T) - Testing fails
- RISK6(T) - Fabrication contractor goes t

**Proposed Risks**

[Select All] [De-select All] [Select All] [De-select All]

Expand Tasks to Show Risks

[Build] [Cancel]





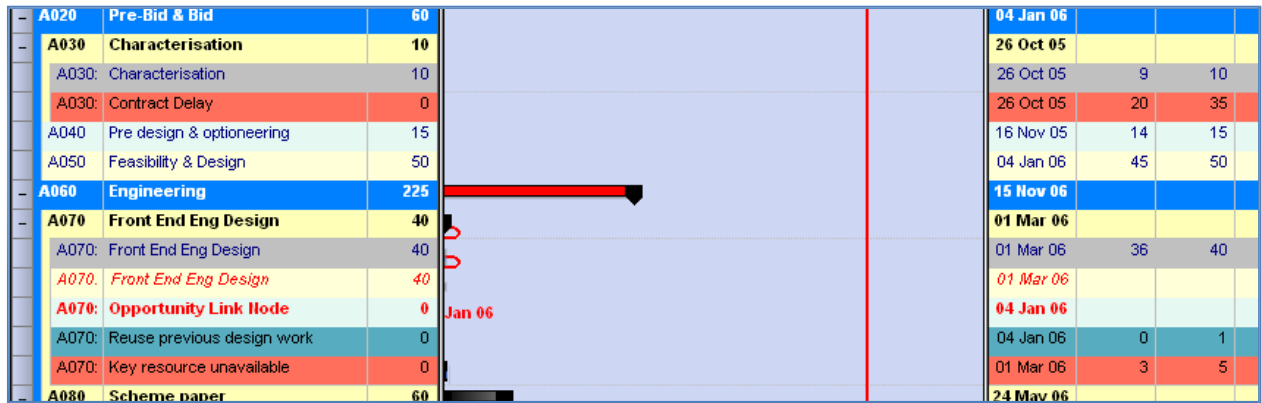
## Steps to Building an Impacted Risk Plan

1. Follow the menu path: TOOLS | BUILD IMPACTED RISK PLAN.
2. Check pre-mitigated, post-mitigated or checks both boxes. If no mitigated scenario has been created, the pre-mitigated scenario will be the only impacted risk plan needed.
3. Select the risk events to integrate into the risk model. The risk analyst will often check mark all risks to run a scenario for all documented risks.
4. Risks can only be modeled if they have a status of open or proposed in the qualitative risk register. If risks have been entered directly into the quantitative side of the risk register, then the status will always default to proposed
5. The EXPAND TASKS TO SHOW RISKS option in bottom-left of the screen controls whether and how the Gantt chart view will initially show the newly created risk summary tasks. The risk summary tasks can be expanded or collapsed manually after integration making this option unimportant.
6. Click the BUILD button



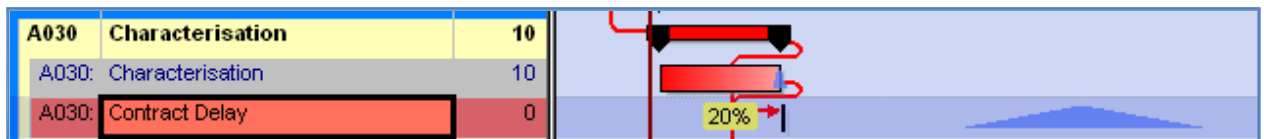
## Gantt chart View after Integrating Risk Events

- The WINDOW MENU bar option will list all open Primavera Risk plans. The scheduler can switch to any open play by clicking on the project title.
- Risk events will appear in the Gantt chart as activities with the main difference being a probability of occurrence less than 100% has been populated.
- Risk events can be quickly spotted as they will appear as highlighted red lines.



## Risk Event Logic

- Risk Event logic may look odd to a project manager or scheduler.
- The risk event is linked finish-start with the original or impacted activity as the predecessor.
- The original predecessor and successor links are moved to a risk summary bar.
- The linking method may create a small problem for viewing the drivers and critical path because the original activity and the risk event are not technically seen as predecessors.
- Only the risk summary bar will show up on the tornado chart unless some manual linking is done





# Risk Process Step 6: Monte Carlo

## Oracle | Primavera Risk: Pertmaster Simulation Options

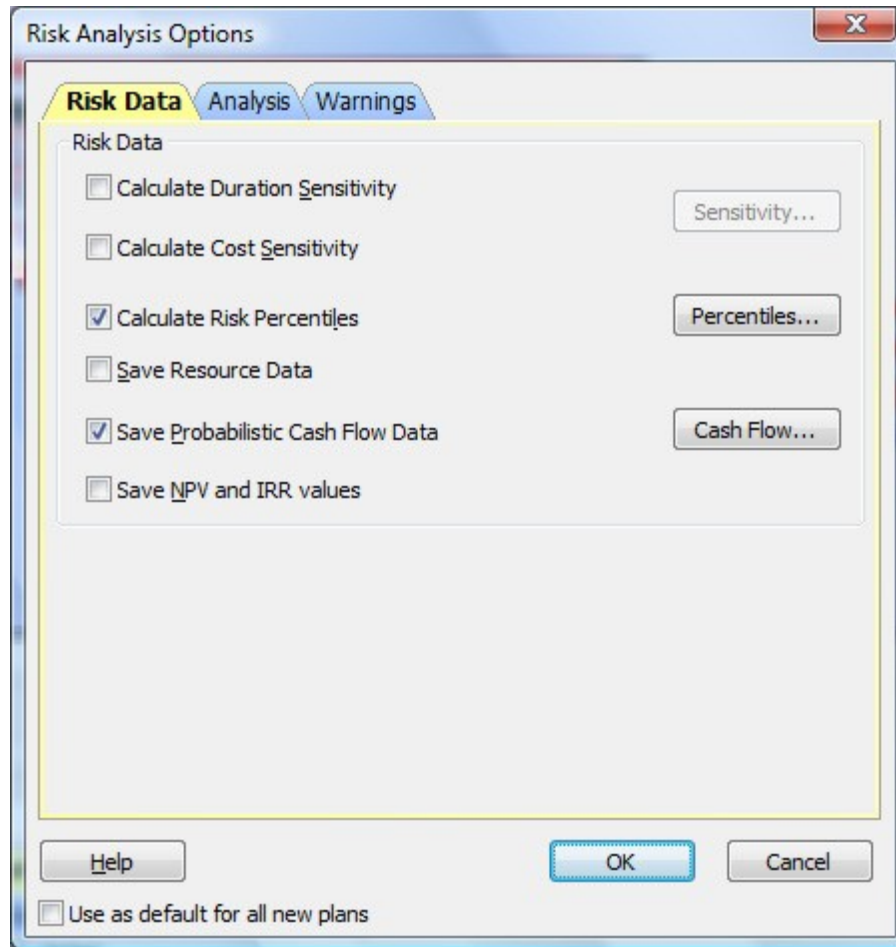
The sixth step of a typical Oracle | Primavera Risk (Pertmaster) Monte Carlo analysis is running the analysis. This step is tougher on the computer than it is on a project manager. This section will outline the risk analysis options that will be set prior to running the Monte Carlo simulations.

### Risk Analysis Options Overview

The project manager will follow the menu path Risk | Risk Analysis Options. The risk analysis options allow a risk analyst to control many of statistical options that will impact how the Monte Carlo analysis is run.

### Risk Data Tab

- CALCULATE DURATION SENSITIVITY - This feature allows users to let Primavera risk automatically calculate the duration sensitivity upon completion of the simulations. This is not a necessary option.
- CALCULATE COST SENSITIVITY - This feature is the same as the duration sensitivity Option listed above.
- CALCULATE RISK PERCENTILES - Primavera Risk can populate user-defined fields based on a desired confidence level. For example, field containing 80% confidence level dates or durations could be populated for every activity. This will allow a scheduler to create probabilistic schedules if desired.
- SAVE RESOURCE DATA - Pertmaster will record the resource usage for every iteration if this option is selected.
- SAVE PROBABILISTIC CASH FLOW DATA – Select this option in order to view pay period cash flow data. Clicking the CASH FLOW button will allow users to select resources on which data is to be accumulated.
- SAVE NPV and IRR VALUES - Net present value and internal rate of return data can be viewed in the histogram on the resource assignments



## Analysis Tab

- ANALYZE FOR <X> ITERATIONS - The risk analyst can be select the number of simulations to Be run.
- USE LATIN HYPERCUBE SAMPLING - Latin hypercube is a sampling method that converges in fewer iteration than a true Monte Carlo sampling. The results should be basically equal. Latin hypercube may be a good option for running quick scenarios in an interactive group.
- ANALYZE UNTIL CONVERGED OR MAXIMUM ITERATIONS ARE RUN - The simulation has reached convergence when the histogram curve changes plus or minus a set percentage over a pre- determined number of iterations. For example, if a curve Has changed less than plus or minus one percent over 200 iterations, then it might be considered converged.
- SHOW STEP THROUGH ANALYSIS OPTIONS - Step through analysis options will allow users to view or pause the simulations to see the cost or schedule risk analysis in motion.
- SET OWN SEED FOR RANDOM NUMBER GENERATOR - Setting a seed number will ensure that the random number generator will start at the same point each time allowing users to recreate a data set exactly. If this setting is not selected, then Pertmaster will use the clock time to set a seed number.



- RESTORE ALL IGNORED TASKS FOR ANALYSIS - If any tasks have been ignored using the ignore task column this option will override the setting for the risk analysis.
- IGNORE CORRELATION BETWEEN RISKS - Pertmaster can turn off all correlation values for risk modeling or scenario testing purposes.
- RESOURCE LEVEL AFTER EACH ITERATION - Primavera Risk has the ability to resource level during the iterations. A schedule risk analysis with resource leveling may be incredibly time consuming. Durations will be applied each iteration, and then activities will be leveled based on the resource leveling settings and priorities.
- SHOW <CHART NAME> AFTER ANALYSIS - a chart of the user's choosing will be displayed immediately after running the risk analysis. The default option is histogram chart.

The screenshot shows the 'Risk Analysis Options' dialog box with the 'Analysis' tab selected. The dialog is divided into three sections: 'Iterations', 'Analysis', and 'After Analysis'. In the 'Iterations' section, 'Analyze for' is set to 1000 iterations, 'Use Latin Hypercube Sampling' is checked, and 'Analyze until converged or maximum iterations are run' is unchecked with a 'Convergence...' button. In the 'Analysis' section, 'Show step through analysis options' and 'Set own seed for random number generator' (set to 1) are checked, while 'Restore all ignored tasks before analysis', 'Ignore correlation between risks', and 'Resource level after each iteration' are unchecked. A 'Leveling...' button is present next to the last option. In the 'After Analysis' section, 'Show' is checked and 'Distribution Graph' is selected in the dropdown menu. At the bottom, there are 'Help', 'OK', and 'Cancel' buttons, and a checkbox for 'Use as default for all new plans'.

**Risk Analysis Options**

**Risk Data Analysis Warnings**

**Iterations**

Analyze for 1000 iterations

Use Latin Hypercube Sampling

Analyze until converged or maximum iterations are run Convergence...

**Analysis**

Show step through analysis options

Set own seed for random number generator: 1

Restore all ignored tasks before analysis

Ignore correlation between risks

Resource level after each iteration Leveling...

**After Analysis**

Show Distribution Graph afterwards

Help OK Cancel

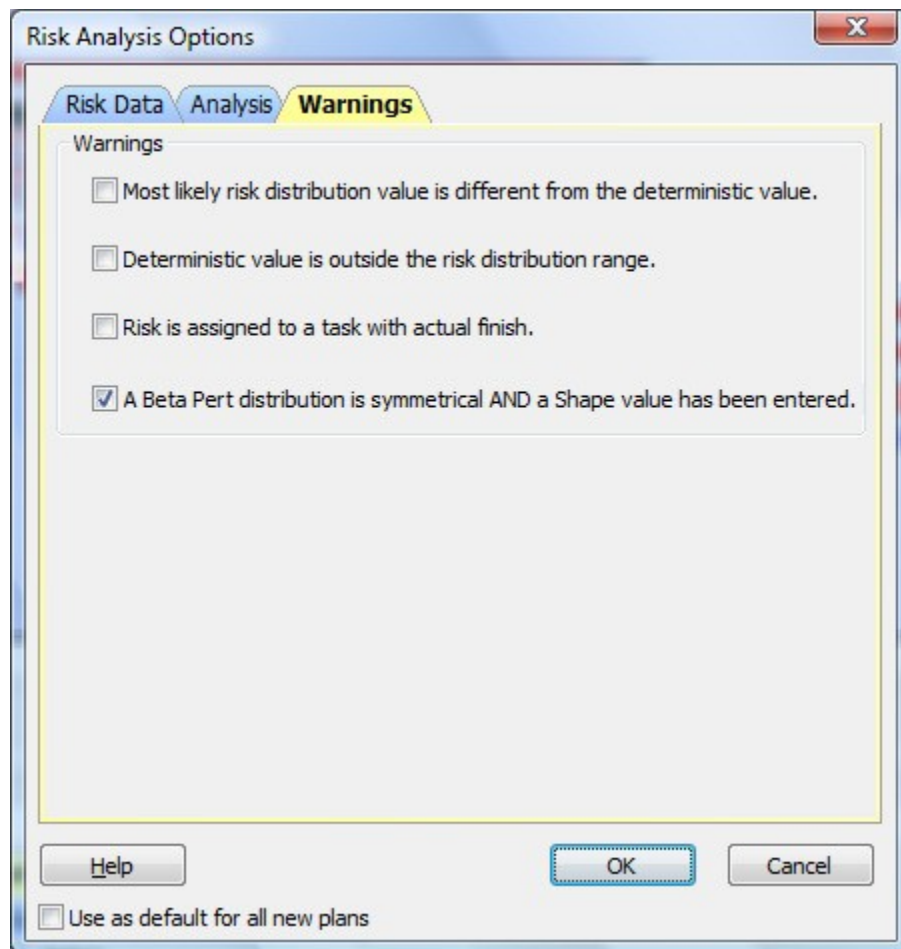
Use as default for all new plans



## Warning Tab

The warnings listed below do not mean that the inputs are flawed. They can be used as indicators that a mistake has been made.

- MOST LIKELY RISK DISTRIBUTION VALUE IS DIFFERENT FROM THE DETERMINISTIC VALUE - This warning is an indicator that the remaining durations in the schedule are Not considered to be most likely. It may indicate the values were entered incorrectly or some activities are not actually set to a "most likely" value.
- DETERMINISTIC VALUE IS OUTSIDE THE RISK DISTRIBUTION RANGE - This warning is similar to the item above except it is more extreme. The scheduled value is actually outside of the risk range. This may indicate that the risk ranges were input incorrectly or that the project team has viewed the activity to be outside of the scheduled duration.
- RISK IS ASSIGNED TO THE TASK WITH ACTUAL FINISH - Risk will not affect completed activities. It is best to remove risk on finished activities for audit purposes; however it will not affect the risk analysis results.
- A BETA PERT DISTRIBUTION IS SYMMETRICAL AND A SHPE VALUE HAS BEEN ENTERED - Pertmaster will ignore any shape input for a modified Beta Pert distribution other than the value of 4.



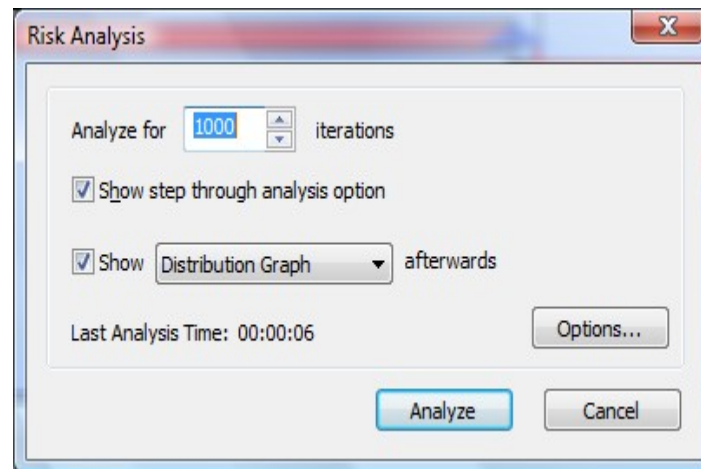


## Oracle | Primavera Risk: Pertmaster Running Simulations

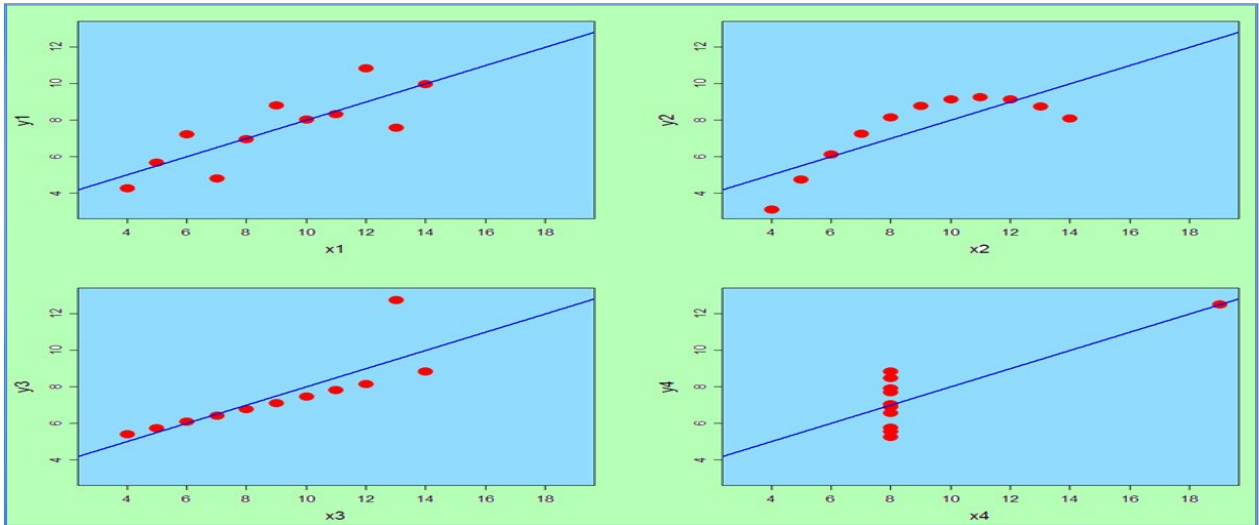
The sixth step of a typical Oracle | Primavera Risk (Pertmaster) Monte Carlo analysis is running the analysis. This step is tougher on the computer than it is on a project manager. This section will outline the steps involved in running the Monte Carlo simulations.

### Running the Risk Analysis

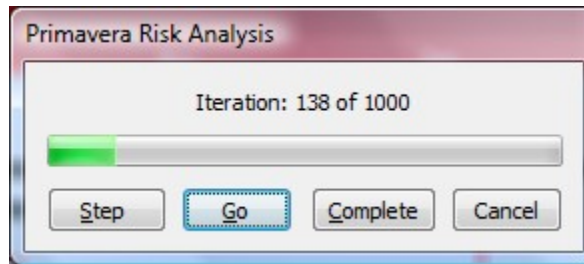
1. Follow the menu path RISK | RUN RISK ANALYSIS (F10).



2. Set the number of iterations. Many risk analysts use 1000 as a default number; however it is up to the project manager's preference. It is important to make certain that the graph has reached convergence after the simulations have been run.
3. Outliers can have a large impact if the sample size is not very large. Notice that the correlation percentage on the tornado chart would be the same for all four cases on Anscombe's Quartet. With a small sample size, one outlier can have a great impact.



4. Check SHOW STEP THROUGH OPTIONS.
5. The "Options" button will bring the risk analyst to the risk analysis options screen. This is not needed if the options have been previously set.
6. Set the desired chart to be displayed after analysis via the drop-down box OPTIONS. The chart does not matter as the risk analyst can display any chart after analysis.



7. Click ANALYZE to show the step through options screen.
8. The STEP option will run one full simulation.
9. The GO button will run simulations repeatedly while repainting the screen. The project manager or scheduler can watch the analysis run.





10. The COMPLETE option is the fastest method to run a risk analysis. Once the complete button has been clicked the user cannot use the GO and STEP options. CANCEL will Be the only option once the risk analyst has clicked COMPLETE.

If the project team decides to watch the analysis run, then they may be able to gather some interesting data to assist the project manager, scheduler, or risk analyst during the simulations:

- The simulation will highlight how often and where the critical path is changing.
- Filters can be applied to view how predecessor chains are rippling or disconnecting in the project.
- Logic views can also be shown to trace for missing or faulty links.
- The scheduler can judge if the milestone or activity movement seems correct and appropriate to find flaws in the logic.

# Risk Process Step 7: Risk Reports

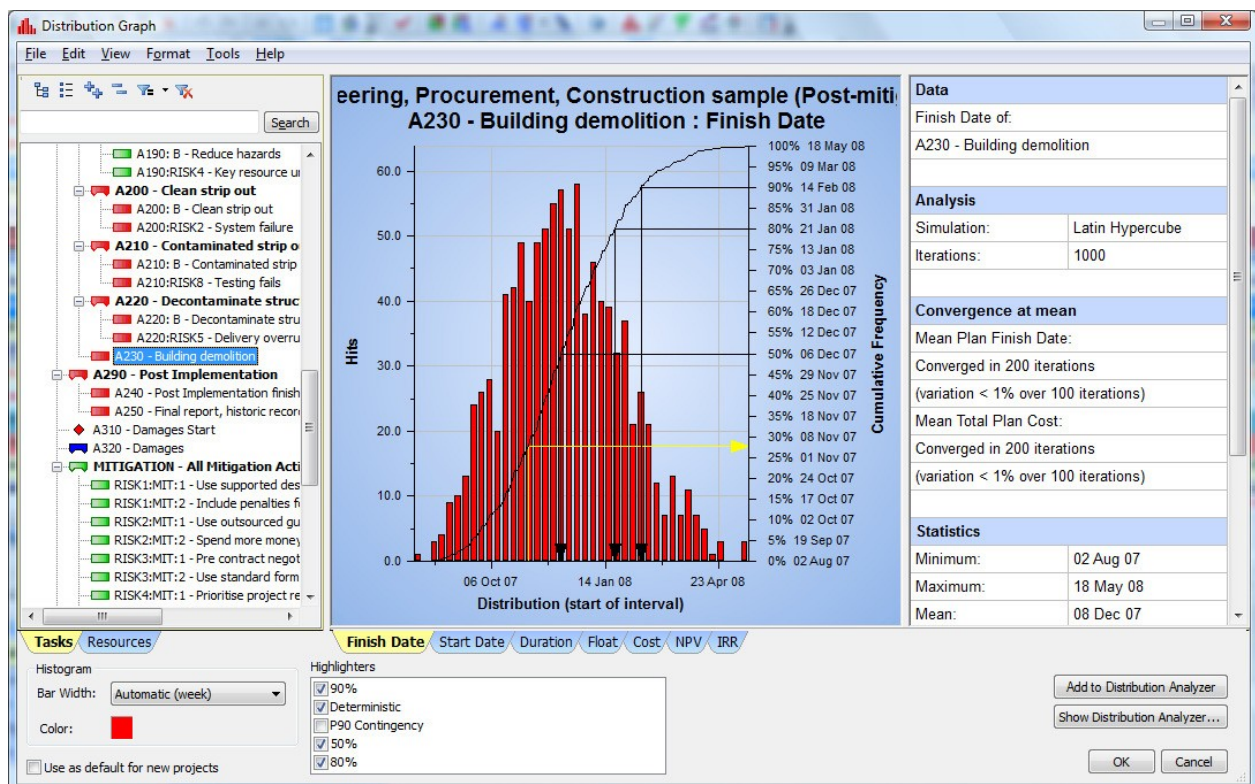
## Oracle | Primavera Risk: Pertmaster Confidence Level Histogram Report

The seventh step of a typical Oracle | Primavera Risk (Pertmaster) Monte Carlo analysis is to use standard risk reports for proactive planning and project management. This section will focus on generating and presenting the confidence-level histogram in a concise and understandable fashion.

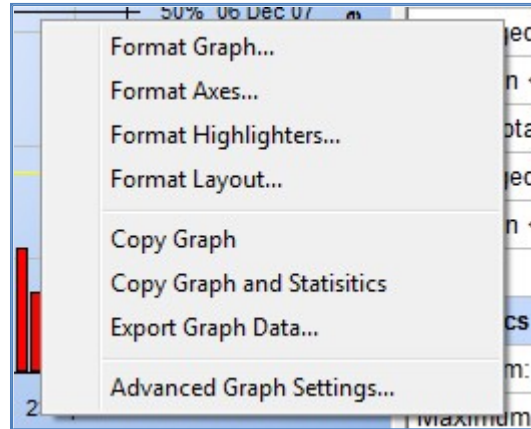
### Navigating the Confidence-Level Histogram

The risk analyst will open the histogram in one of three ways:

- Follow the menu path REPORTS | RISK DISTRIBUTION GRAPH.
- Click the orange SHOW DISTRIBUTION icon on the toolbar.
- Right-click on an activity or milestone and click SHOW RISK DISTRIBUTION (Recommended).

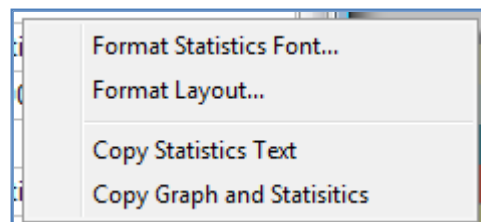


The left pane allows the user to select a task, including options such as filtering and searching. Right-clicking on the graph will give the following options:



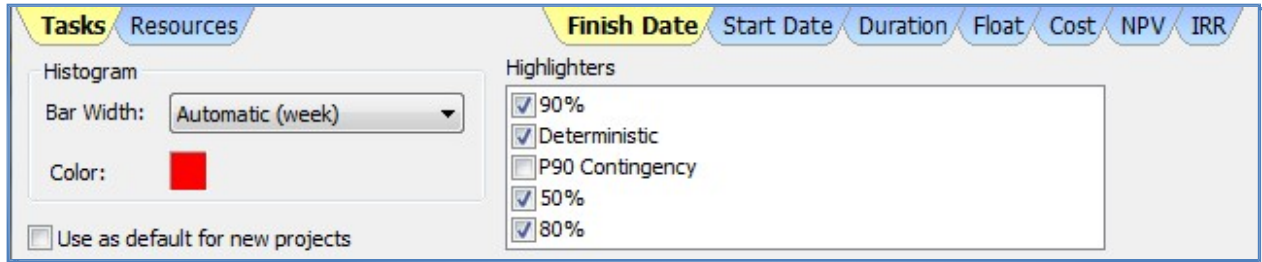
- Format Graph - allows users to change how the graph is displayed, such as changing the colors or hiding the histogram bars.
- Format Axes - allows the risk analyst to change how the axes are displayed on the graph.
- Format Highlighters - project managers can setup highlighters to show important data such as contingency levels.
- Format Layout - users can hide or show items such as various statistics.
- Copy Graph - copies the graph picture only to the clipboard. Users can paste the graph into products such as Microsoft Word. This will be a more graphically pleasing picture.
- Copy Graph and Statistics - copies the graph and the statistics to the clipboard as a single picture. The format makes the statistics difficult to read and removes the shading from the graph. This is not recommended for most reports as it makes the report difficult to read.
- Export Graph Data - the data can be exported to a .csv file which can be viewed In Microsoft excel. A project manager can recreate the reports in Excel if desired.
- Advanced Graph Settings - the graph has hundreds of options that can be manipulated to change the appearance.

Right-clicking on the statistics pane will give the user additional options:



- Format Statistics Font - the font can be changed based on the user's preference.
- Format Layout - users can hide or show items such as various statistics.
- Copy Statistics Text - the text will be copied into the clipboard and can be pasted into Microsoft Excel. This allows a project manager to format the data table before pasting it into an official report.
- Copy Graph and Statistics - copies the graph and the statistics to the clipboard as a single picture. This is not recommended for most reports as it makes the report difficult to read and removes the shading from the graph.

The histogram options are located in the bottom-left corner:

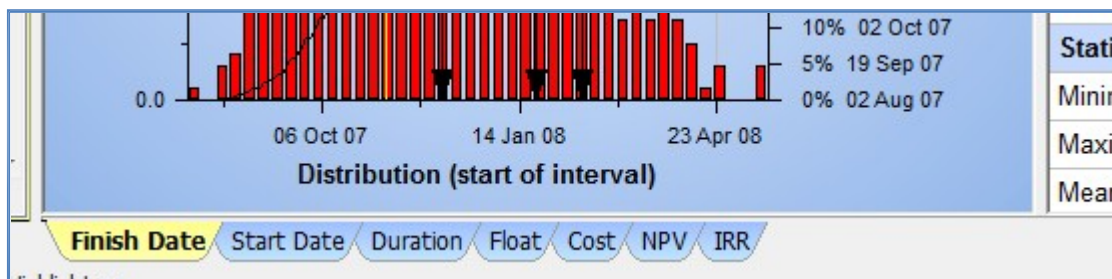


- Bar width drop-down - the bars on the histogram will represent monetary or time ranges. For example, a bar on the histogram chart can represent the iterations that landed in a seven day period.
- Color - changes the color of the histogram bars. The bars can be changed based on user preference or rotated based on holidays. Green bars for St. Patrick's Day can be quite festive.
- Use as default for new project - sets the current graph settings as the default for all new projects.
- Highlighters - allows the risk analyst to show or hide pre-defined highlighters when the graph is being copied to the clipboard. Removing the excess highlighters can make the graph less confusing.

ADD TO DISTRIBUTION ANALYSER and SHOW DISTRIBUTION ANALYSER are located in the bottom-right corner.

### Histogram Tabs

The TASK and RESOURCES tabs are located in the bottom left-corner. Most risk charts are created for the task finish date; however a resource histogram can also be generated to see the confidence level for cost or man-hours.



The finish date, start date, duration, float, cost, NPV (net present value), and IRR (internal rate of return) tabs are shown below the graph. Risk analysts can generate confidence level histograms based on any of these tabs for various reasons. The finish date of a milestone or activity is the most common chart.



## Histogram Menu Bar

- File - options to print the chart and export data.
- Edit - lists six options to copy the chart or the data.
- View - users can switch tabs in this section. Primavera Risk has an option to switch between the remaining and total amounts on the graph.
- Format - options to change the look, fonts, and highlighters.
- Tools - allows users to quickly add a curve to the distribution analyzer or launch the Distribution analyzer.

## What Does the Data Mean?

One of the most important areas of a risk analysis is explaining the data. This is quite a challenge. The risk analyst must understand the project plan completely, have a background in estimating or scheduling, understand statistics, create written reports well, and present a strong case verbally. If a risk analyst or project manager is unable to answer both simple and advanced questions relative to the histogram (or any) chart, then their credibility may be compromised.

The histogram chart has two y-axes. The left axis corresponds to the number of hits (orange bars). The right y-axis corresponds to the cumulative curve which highlights the confidence level or percentage value. The graph is always read to be "ON or UNDER" a budget amount or "ON OR BEFORE" a date. The cumulative curve does not highlight the chance of finishing ON a metric. It illustrates whether the simulations finish BY the metric. If the risk analyst runs 1000 simulations, an 80 percent confidence (probability) level can be explained as the date which 800 of 1000 (80%) iterations finished on or before the date. When viewing the chart notice that 80% of the histogram bars will be to the left of the 80% intersection mark of the Cumulative curve.

## Hints and Tips

- The histogram bars give insight into not only the risk data but how the schedule logic and milestones are sequenced. Spikes in the histogram, gaps in the data, large standard deviation, and data skew may highlight how the risk ranges are trending, constraints that are causing issues, and problematic non-working periods, etc.
- Setting up highlighters may be helpful to some audiences; however the increased complexity of the graph may confuse others. Make certain to explain the graph fully. Sometimes simple can be better.
- Do not show information that you do not want to explain. This does not mean that you should hide data because you do not understand it. Often a question on standard deviation or Latin hypercube sampling can overtake and dominate a risk finding session. Instead of explaining the importance of the data, a risk analyst may end up teaching a stats class as most of the audience falls asleep. Make people focus on the answer and show why the answer is critical to project success.
- Copy the chart and the data table separately. The format and neatness is critical. It is

Unfortunate but many people care more about a pretty graph than an accurate graph. Do not let the format get in the way of presenting a critical finding

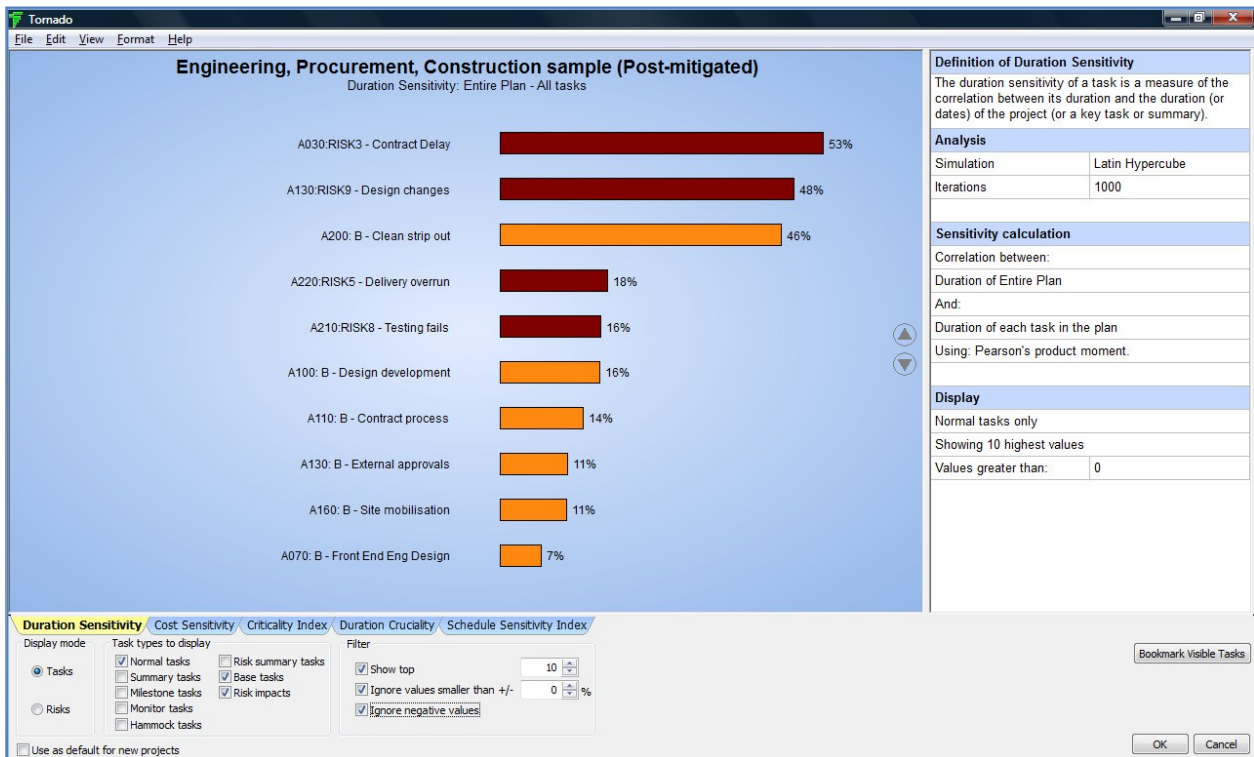
## Oracle | Primavera Risk: Pertmaster Tornado Chart Report

The seventh step of a typical Oracle | Primavera Risk (Pertmaster) Monte Carlo analysis is to use standard risk reports for proactive planning and project management. This section will focus on generating and successfully presenting the tornado chart for project drivers.

### Navigating the Tornado Chart

The risk analyst will open the tornado chart in one of three ways:

- Follow the menu path REPORTS | TORNADO GRAPH (F11).
- Click the green TORNADO (F11) icon on the toolbar.
- Right-click on an activity or milestone and click SHOW DRIVERS (logical predecessor option usually recommended when selecting a reporting milestone or activity). Users may need to run the chart for all tasks instead of logical predecessors to show risk events as red bars.





Right-clicking on the graph gives the project analyst formatting options, copy options, and the advanced settings interface. Right-clicking on the statistics will show options for formatting and copying the stats. The BOOKMARK VISIBLE TASKS BUTTON (Bottom-Right corner) will set bookmarks in the Gantt chart view. This will often help for quick mitigation scenario modeling. Task uncertainty and risk events are coded in different colors. Risk events will be in red on all tornado charts.

## Tornado Chart Menu Options

FILE – Provides options to print and export data.

EDIT - This option allows the analyst to change the sensitivity calculation settings,

Use various copy functions, and adjust the bookmark options.

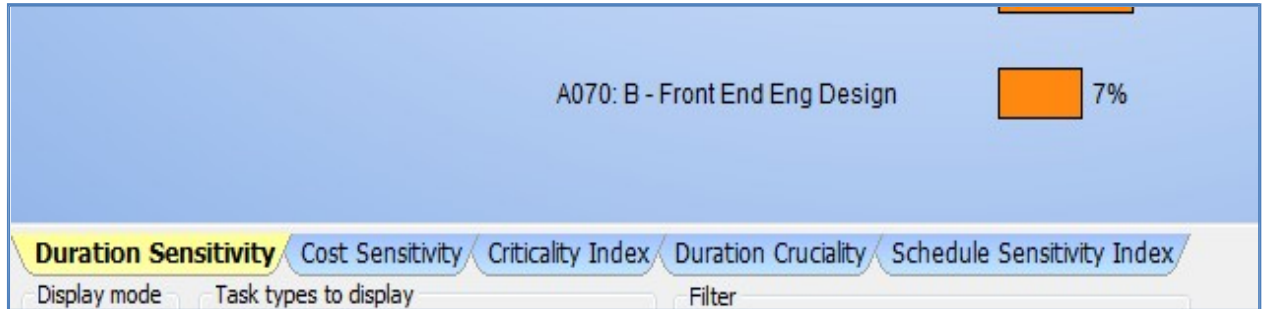
VIEW - Users can switch between task or risk mode. A risk analyst can also switch between tabs (cost, schedule, etc).

## Tornado Chart Tabs

- DURATION SENSITIVITY TAB - This chart is confusing for many users. In simple terms it shows what activity is driving another activity or milestone. It will look at two activities in a bubble and calculate the correlation of their duration. This can be shown looking at a scatter plot on one driving activity versus the reporting milestone. If the driver duration is placed on the y-axis and the duration to the reporting milestone is on the x-axis, then creating a scatter plot for each iteration will allow a project manager to see how the data set trends. If each time the driver increases in duration, the duration to the milestone increases, then the correlation percentage will be high. Simply put it sees that we can predict what the milestone will do based on what the activity does. If an increase in the driver duration seems to have very little impact on the reporting milestone duration, then the correlation should be quite low. The slope of the best fit or regression line through the data set can be used to determine the correlation percentage, although Primavera Risk does have a few different correlation metrics that may give slightly different answers. The larger the slope of the line, the stronger the correlation will be.
- COST SENSITIVITY TAB - The cost sensitivity and duration sensitivity chart are read in exactly the same manner.
- CRITICALITY TAB - This metric simply shows the percentage of iterations or simulations that an activity has on the critical path. If a risk analyst is reporting to a milestone or activity that is off the critical path, then the key drivers may show as 0% critical. They are still driving the milestone; however they are not on the overall critical path. An example is a contractual milestone that is off the critical path. The milestone will still have drivers shown on the DURATION SENSITIVITY TAB; however none of the drivers may jump onto the critical path.
- CRUCIALITY TAB - This metric simply takes the duration sensitivity percentage and multiplies it by the criticality number. This chart attempt to show not only whether the Activity is a driver to a reporting milestone or activity, but whether it is on the overall network critical path. A key driver for a contractual milestone that is not on the critical path may show up as 0% because the criticality might be 0%. It may be a key driver to that activity, but it is not driving the overall critical path.



- **SCHEDULE SENSITIVITY INDEX (SSI)** - The criticality index is multiplied by the task standard deviation and that number is divided by the project standard deviation. It calculates very quickly. Instead of looking at the duration to come up with a correlation coefficient like duration sensitivity, this metric is using the standard deviations of a driver and the standard deviation of the project to calculate the output. This metric is only useful for overall project drivers because the standard deviation of the entire project and not the standard deviation of a reporting milestones (or activity) are being used.



#### Options Located Under the Graph

- **TASK VS. RISK (Display Mode)** – TASK MODE will show a tornado chart of all activities and risk events. RISK MODE will show a tornado chart of risk events only.
- **TASK TYPES TO DISPLAY** - Users can choose to show all or only certain types of tasks. Showing normal tasks is most common because they are the only activities that can be loaded with three- point estimates. The left column will have all activity types and the right column will be grayed- out unless a risk register has been integrated into the Monte Carlo Simulation. The right column allows users to hide or show risk register data on the tornado chart.
- **RISK SUMMARY TASK** – This option shows a bar for the task plus the connected risk event.
- **BASE TASK** – This option shows a bar for the original task a risk is tied to.
- **RISK IMPACT** – This option shows a bar for the risk event.





The FILTER OPTIONS include:

- SHOW TOP <X> RISKS - This option allows the analyst to choose how many activities are shown on the tornado chart.
- IGNORE VALUES SMALLER THAN + or - <X> - The project team may want to ignore very small values. Very low values serve more as noise than usable data. Low numbers indicate that the task is not a driver.
- IGNORE NEGATIVE VALUES - The project team may also choose to hide negative numbers. Generally small negative numbers are seen as noise. The risk analyst may want to investigate if a large negative number appears. Large negative numbers are usually caused by opportunities. This is often correct and not a statistical issue.

### What Does It Mean?

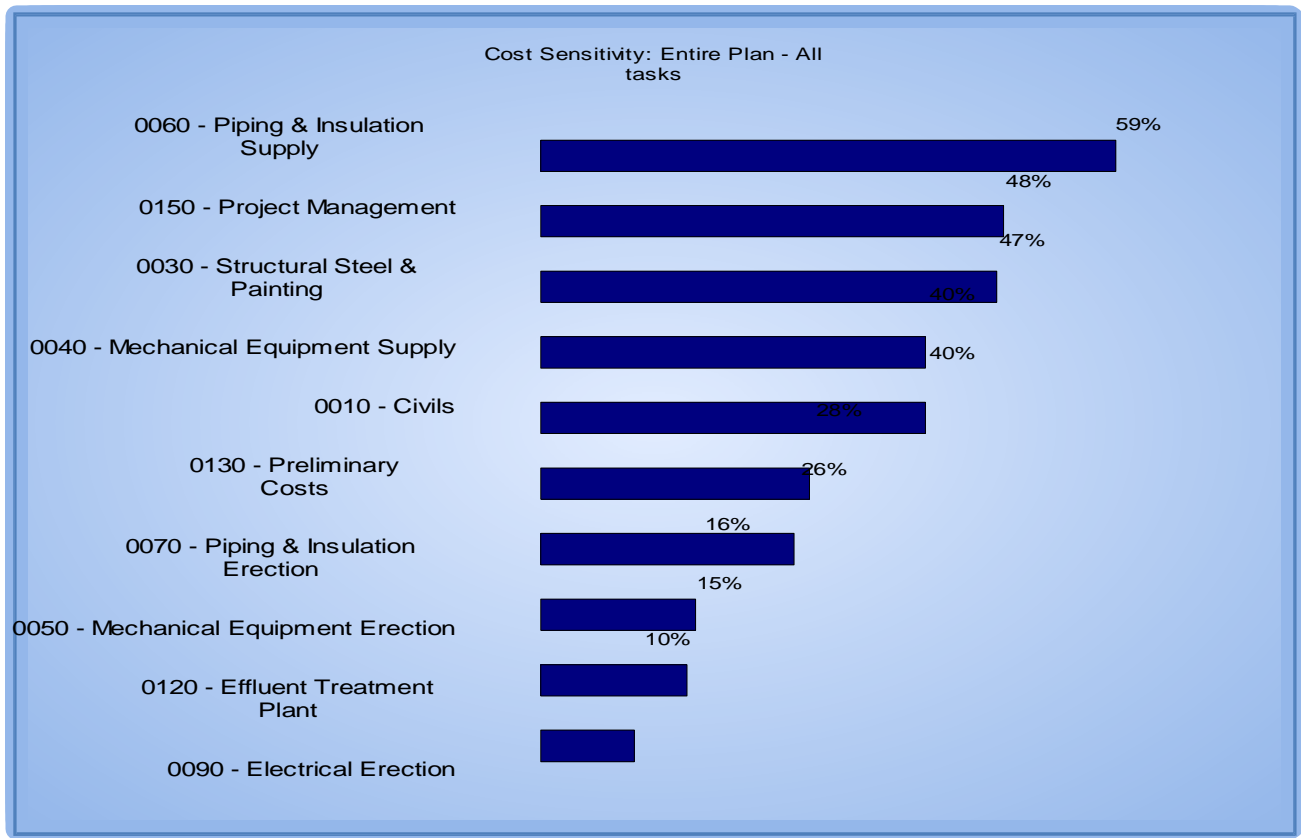
Which chart should I use? - The answer depends on what the analyst is trying to show, but duration sensitivity is often the best metric because it shows the correlation between a driver and a reporting activity. I do not need to take the overall network critical path into account if I know that the milestone delivery is inherently critical. Flaws in logic, linked sub-projects, maintenance activities or reports after the project completion and many other issues can cause problems with the calculation of the critical path. The duration sensitivity is not affected by any of those issues. The duration sensitivity will show the correlation between two activity durations to determine if one is driving the other. This is often the best metric for isolating a milestone and seeing what is driving its completion date.

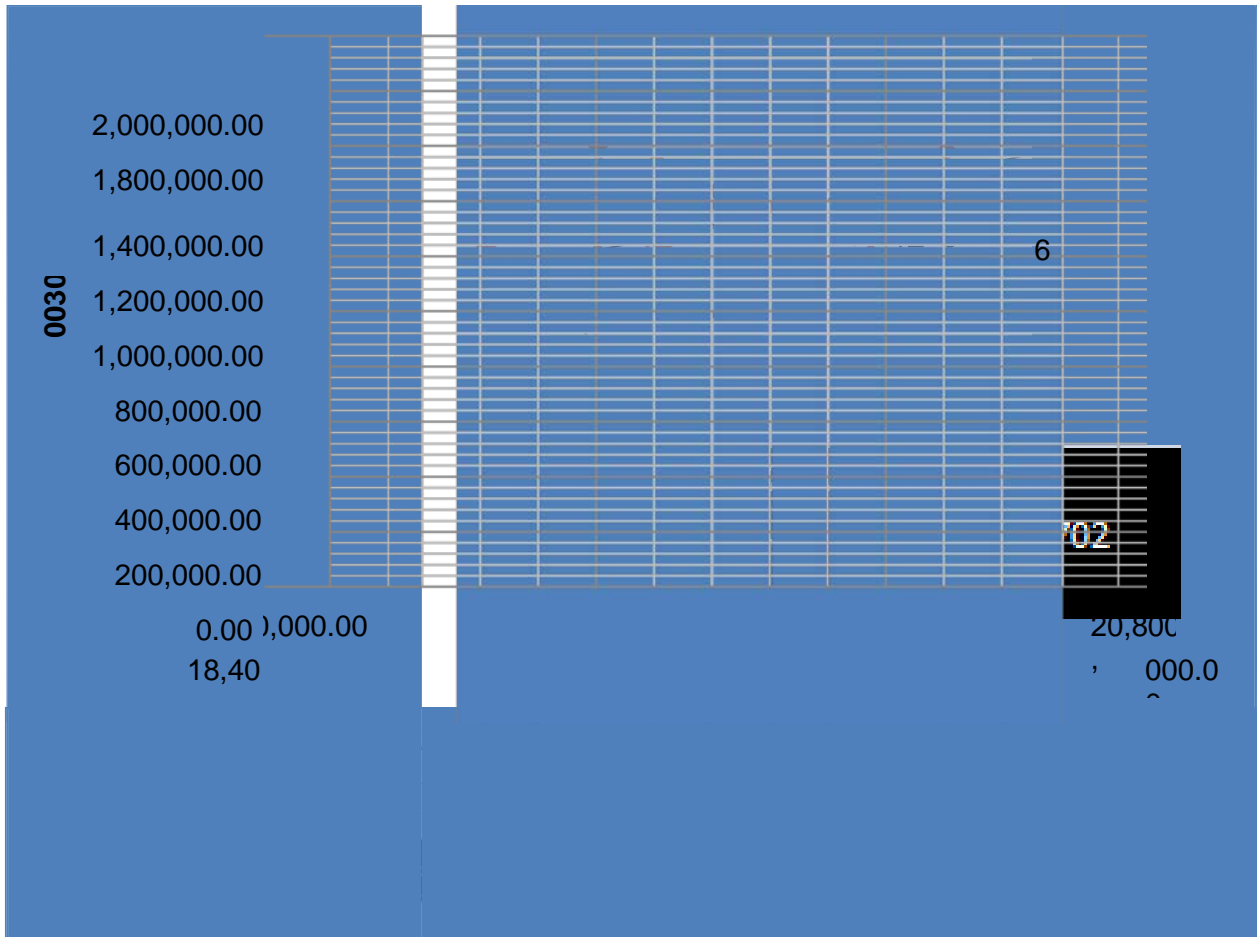
- What do the numbers mean on the criticality chart? - The numbers on the criticality chart are the number of iterations that an activity was on the critical path.
- The definitions above simplify the charts for the audience. Nobody wants to hear a class on statistics and correlation coefficients. People seem to understand words like driver, impact, best fit line, trend curve, etc. For example, a project manager may highlight a piping activity as being the most critical project driver as it has the greatest impact on the project completion. Keep the explanation simple to help a broad audience with diverse backgrounds. If someone wants detailed information on the calculations it is usually better handled outside of the interactive session or project team meeting.



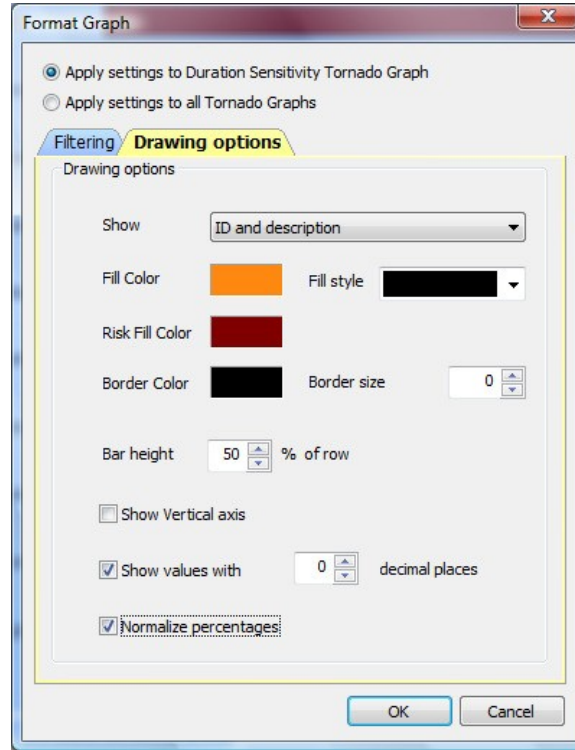
- What do the numbers on the duration and cost sensitivity chart mean? - Many users get tripped up on these charts. The numbers on the duration and cost sensitivity chart are a correlation metric. It shows how strong the correlation is between the activities to predict if one activity is driving the other. Showing a scatter plot with a regression or best fit line can often simplify the concept for an audience, but avoiding stats talk and focusing on what the data means can be extremely helpful.

### Oil and Gas Cost Model

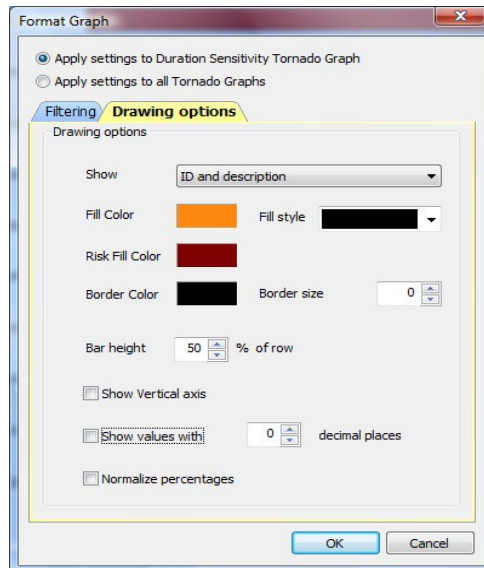


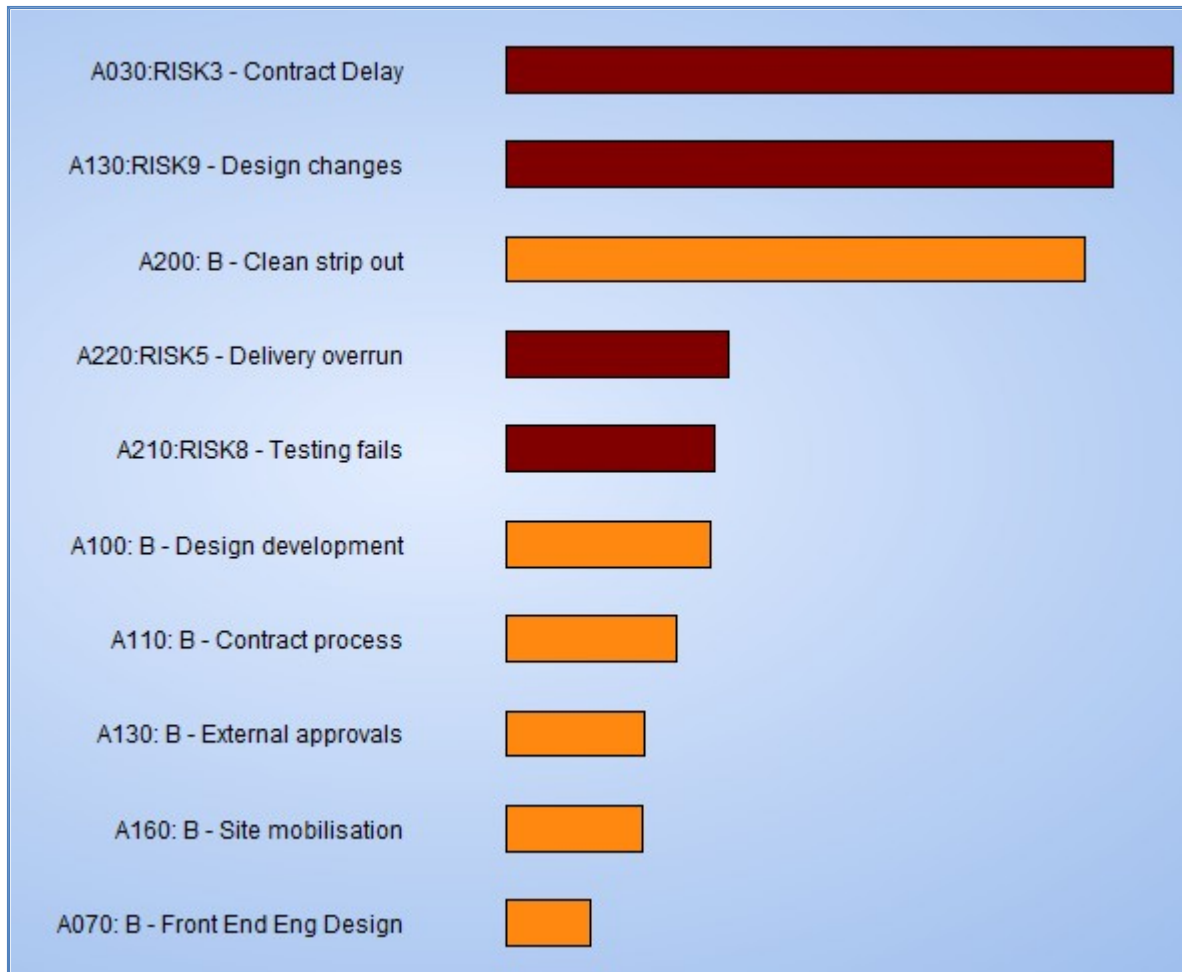


- The numbers on the sensitivity chart are confusing me. Why don't they add up to 100? - The fact that the numbers are a correlation metric and not a percentage of impact is hard to understand for many people. Users can normalize the percentages in the graph options **FORMAT MENU | GRAPH | DRAWING OPTIONS TAB**. This will put the driver's impact on a scale to 100.



- I normalized the percentages and it is still confusing. Can I make it simpler? - The numbers can be completely hidden in the graph options as well **FORMAT MENU | GRAPH | DRAWING OPTIONS TAB**. Most audiences can relate when they are told Big bars are bad, small bars are not so bad.





- Where do I go from here? - Use the data to run scenarios. The histogram told you where you are at. The tornado is telling you how to fix it. Use the data to run scenarios. The purpose of the analysis is to give proactive information to improve the probability of project success. The purpose of a risk analysis is not to give terrible news with no insight on how to fix it. Monte Carlo analysis is often seen as useless because the answer does not make sense or because we do not like the answer. The answer must make sense. Not liking an answer that makes sense is a different issue. If you don't like the answer, then the graph indicates we need to put steps in place to avoid the answer instead of sweeping the results under a giant carpet.



## Oracle | Primavera Risk: Pertmaster S Curve Analyzer

The seventh step of a typical Oracle | Primavera Risk (Pertmaster) Monte Carlo analysis is to use standard risk reports for proactive planning and project management. This distribution analyzer will allow users to compare cumulative probability curves side-by-side which is especially useful for scenario modeling. It is unfortunate that most risk analyses stop before outlining proactive steps to fix a project schedule or budget. The s-curves are used to illustrate how mitigation plans and workarounds can fix the project plan.

### Adding Curves to the Distribution Analyzer

Method 1:

**Import data to report**

Import	File Name	Title	Valid Risk file
<input checked="" type="checkbox"/>	Copy of ExampleRegister-EPC.plan	Engineering, Proc...	No
<input checked="" type="checkbox"/>	Copy of ExampleRegister-EPC.plan	Engineering, Proc...	No
<input checked="" type="checkbox"/>	ExampleRegister-EPC	ExampleRegister-E...	No
<input type="checkbox"/>	House01.plan	House	No
<input type="checkbox"/>	ExampleRegister-EPC.plan	ExampleRegister-E...	No
<input type="checkbox"/>	Untitled Plan 1	<No title>	No

Types of data to import

Finish Dates    Start Dates    Cost    Duration    Float    IRR    NPV

Common Tasks

- A010 - Project Start
- A011 - Project Completion
- A030 - Characterisation
- A040 - Pre design & optioneering
- A050 - Feasibility & Design
- A080 - Scheme paper
- A090 - Board approvals
- A100 - Design development

Tasks to import data from

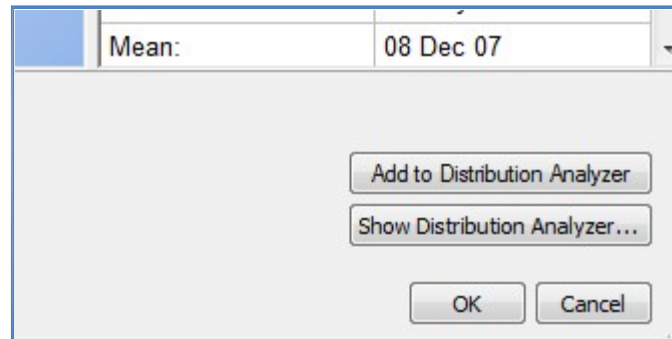
- Entire Plan
- A070 - Front End Eng Design

Buttons: Open Plan, Import Data, Cancel



1. Follow the menu path REPORTS | DISTRIBUTION ANALYZER.
2. If the chart is empty, a pop-up appears asking if the risk analyst would like to import curve(s).
3. The FILE MENU allows users to clear existing data from the graph.
4. Follow the menu path FILE | IMPORT DATA.
5. The top panel shows all open Pertmaster .plan files. Users can check mark the files For which they would like to generate curves.
6. A column will show if there is a valid risk file (risk simulation data) or if the Monte Carlo Analysis has been run. If the analysis has not been run, then it will be analyzed automatically before importing the curves.
7. The bottom-left panel will find all common tasks that exist in the selected projects. If 5 projects are selected but one has no common task names, the user will see No tasks listed. If the user had two files open with task ID 0010 - Project complete, Then this ID would be available in the common tasks panel.
8. Common tasks can be moved from the bottom-left box to the bottom-right box in order to Import the curves. The arrows between the two panels allow users to select data and Move it back and forth
9. Before importing the curves, the users will select the type of data curve to import from the check boxes located in the middle of the screen. The users can import curves for start date, finish date, cost, etc.
10. Click IMPORT DATA button.
11. A curve will be imported for each selected activity on all each project.

Method 2:





1. Open the histogram chart (REPORTS | DISTRIBUTION GRAPH and select any curve.
2. Click the ADD TO DISTRIBUTION ANALYZER button in the bottom-right corner. The option is also located under the TOOLS menu.
3. Add as many curves as desired. Curves can also be added from different Pertmaster .plan files that are open.
4. Click the VIEW IN DISTRIBUTION ANALYZER button in the bottom-right corner. This option is also under the TOOLS menu.

## Distribution Analyzer Menu Bar

- FILE - the menu contains options to import curves, clear the data, open a saved chart, save the active chart, and print.
- EDIT - copy options are located in the edit menu.
- FORMAT - these options all relate to the graph looks, labels, colors, highlighters, etc.

## Graph Interaction

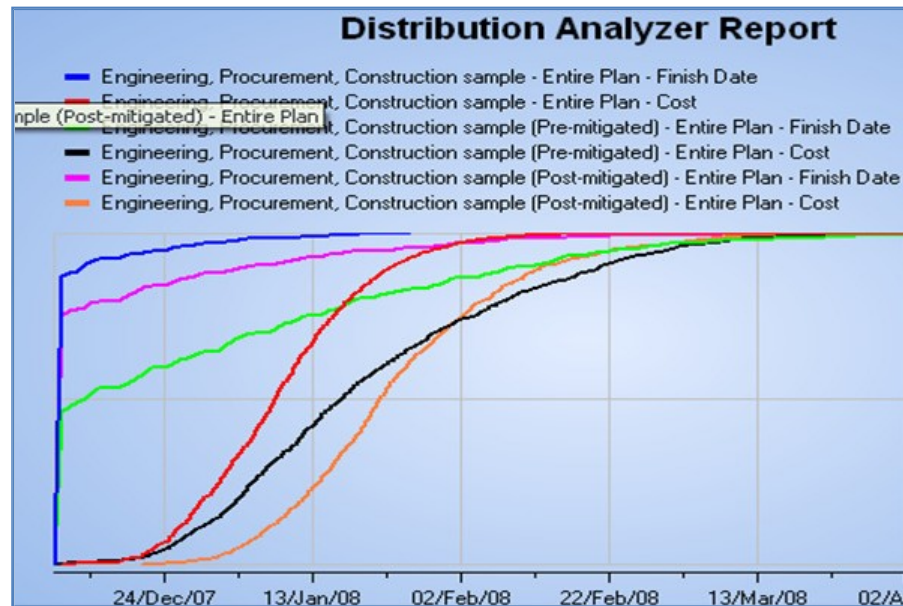
- Right-click on the graph to copy, format, or set annotations.
- Right-click the statistics to format the columns or copy the data table.
- Tabs are located in the bottom-left corner to isolate the type of curve shown. Different types of curves (all curves) can be shown at once if the risk analyst does not wish to isolate cost, duration, and date curves. If one type of curve such as cost is shown, then highlighters can show the delta between the curves on screen. For example, the difference between two cost curves at an 80% confidence level may be 2 million dollars





## Why is the Distribution Analyzer Important?

- The typical risk and Monte Carlo Analysis shows why things will fail and not how to fix them. Project teams, management, and owner companies are all very reluctant to accept bad news even if it is accurate. It is important to make the audience understand there is a problem before they will look at fixing it. Showing proactive scenarios will often soften the blow of the bad news. Instead of showing bad news, we can show how our proactive scenarios have increased the probability of project success. These charts become a sales tool for mitigation steps that may save the project.
- Scenario modeling is probably the most compelling reason to use the Primavera Risk product. The risk analyst can generate a curve with mitigation steps and without a mitigation plan to illustrate the impact of the mitigation strategy. Cost or resources can be applied to the mitigation strategy to enable a cost-benefit analysis. It is very difficult to ask for increased money or resources without data that backs the need.
- Project teams can work on multiple scenario options interactively. A good strategy is to slowly work backwards using a few mitigation steps each time to see the isolated impact of each step. Run the analysis. View the tornado chart. Mitigate the items that can give the biggest benefit. Rerun the analysis and repeat the process as the drivers may be constantly changing based on mitigation steps.



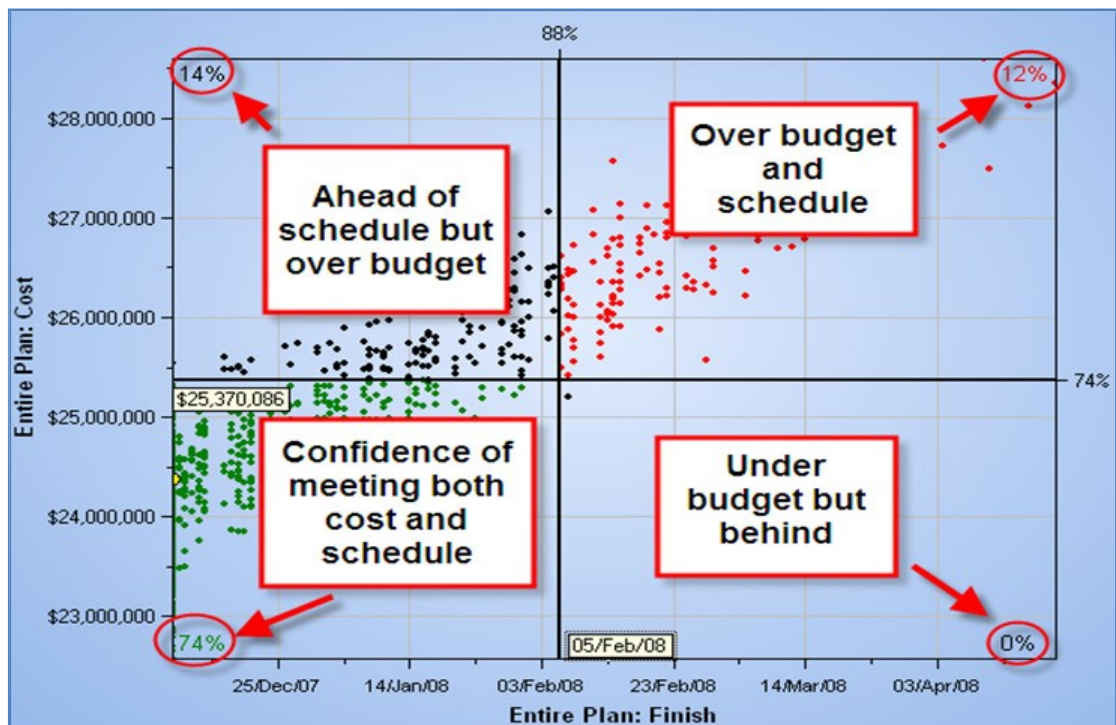
## Oracle | Primavera Risk: Scatter Plot Report

Primavera Risk can generate confidence levels for integrated cost and schedule  
Using the scatter plot report

### Report Overview

Click on SCATTER PLOT in the REPORTS MENU

The schedule must be cost loaded to generate scatter plot data. The scatter plot graph will show a confidence level for meeting a budget amount and a schedule date at the same time. The cost is on the y-axis by default and the finish date is on the x-axis. Each dot represents cost and finish date of one iteration or simulation.





The graph contains four quadrants:

- Lower left quadrant – The iterations in green are under budget and ahead of schedule.
- Top left – The iterations are over budget but ahead of schedule.
- Bottom right – All simulations are late but under budget.
- Top right – The iterations in red are over budget and behind schedule.

### Scatter Plot Menus

- FILE MENU – Contains the print and page setup.
- EDIT – Has copy options similar to the other reports.
- VIEW – The user can select whether to show remaining values or total amounts  
(Remaining values plus the actualized values)
- FORMAT – This section has font and graph settings.

### Report Navigation

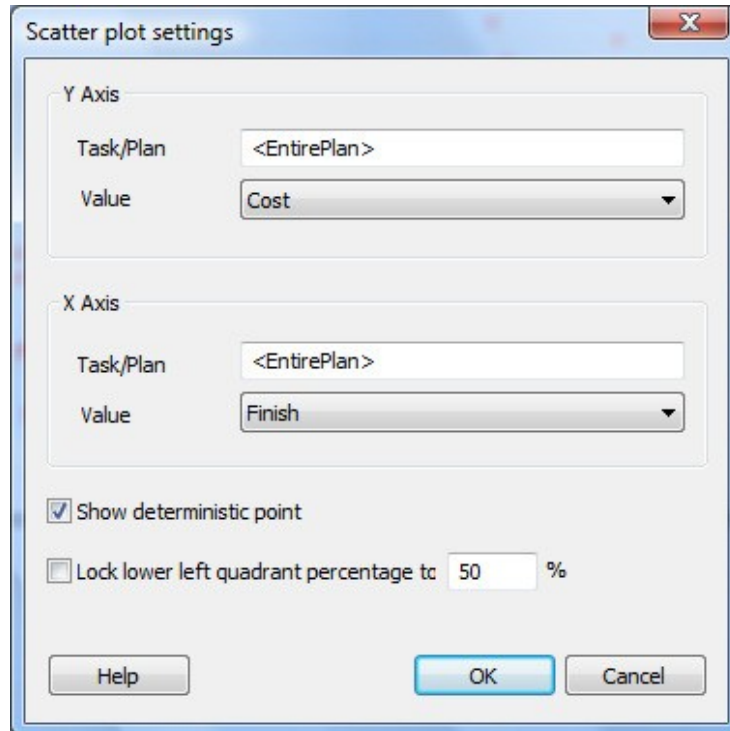
The black divider lines can be moved to a desired amount. The percentage of iteration ahead of schedule or under budget will display next to the line. A 50% finish date and a 50% budget can be selected. The number in each corner represents the chance of hitting both cost and schedule at the same time. The 50% chance of being at or below budget cost and the 50% chance of being on schedule may only show a 40% chance of satisfying both metrics simultaneously. This is shown in the green number in the bottom left.

The screenshot shows a dialog box titled "Entire Plan: Finish". Under the heading "Highlighter positions", there is a checked checkbox "Lock lower left quadrant to:" followed by a text input field containing "50" and a percentage sign "%". To the right of this is a button labeled "Set to Deterministic". Further right is a "Set to:" label followed by two text input fields: "x:" containing "50" and "y:" containing "50". At the bottom left of the dialog is an unchecked checkbox labeled "Use as default for new projects".

The highlighter position which can be typed at the bottom of the graph allows a user to lock the green area to a desired confidence such as 50% or 80%. Moving one divider line will then auto-adjust the second line to maintain the percent in the bottom left. For example, move the budget line down and the schedule line will move right so 50% of the iterations stay in the bottom left.

### Export Options

Right-clicking the graph or stats will give options to copy the clipboard; however the most critical right-click option is SCATTER PLOT DATA”



The SCATTER PLOT DATA OPTION allows users to set the desired criteria for the x and y axis. For example, the cost of the entire plan could be set to the y-axis and the finish of mechanical completion to the x-axis. Two finish dates could also be compared, such as the end of engineering and the completion of construction. Right-clicking the divider lines will also give some options, although they are mostly unimportant

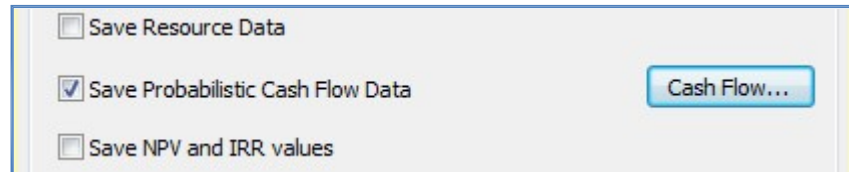


## Oracle | Primavera Risk: Probabilistic Cash Flow Report

Primavera Risk allows users to run a probabilistic cash flow chart to analyze time-phased cost or resource data.

### Creating Cash Flow Data

1. Click RISK ANALYSIS OPTIONS under the RISK MENU.
2. Check SAVE PROBABILISTIC CASH FLOW DATA.



3. Check the CASH FLOW BUTTON. The cash flow settings popup will appear.
  - Set collection, period time, scale, and start date.
  - Check the resources to collect data for in the top-left box.
  - Set any filters to apply, such as running resources for construction only, in the top-right box.
  - The bottom pane shows curves that will be generated based on settings in resource and filter boxes detailed above
  - Click the OK button.



Cash Flow Settings

Collection Period: month

Start Date: 12 Oct 05

Resources to collect data from	
<input checked="" type="checkbox"/>	_COST - Cost
<input type="checkbox"/>	_EXPENSES - Expenses
<input checked="" type="checkbox"/>	_LABOR - Labor
<input type="checkbox"/>	_MATERIALS - Materials
<input type="checkbox"/>	_NONLABOR - Non Labor
<input type="checkbox"/>	DAM - Damages
<input type="checkbox"/>	RISKCOST - Risk Cost

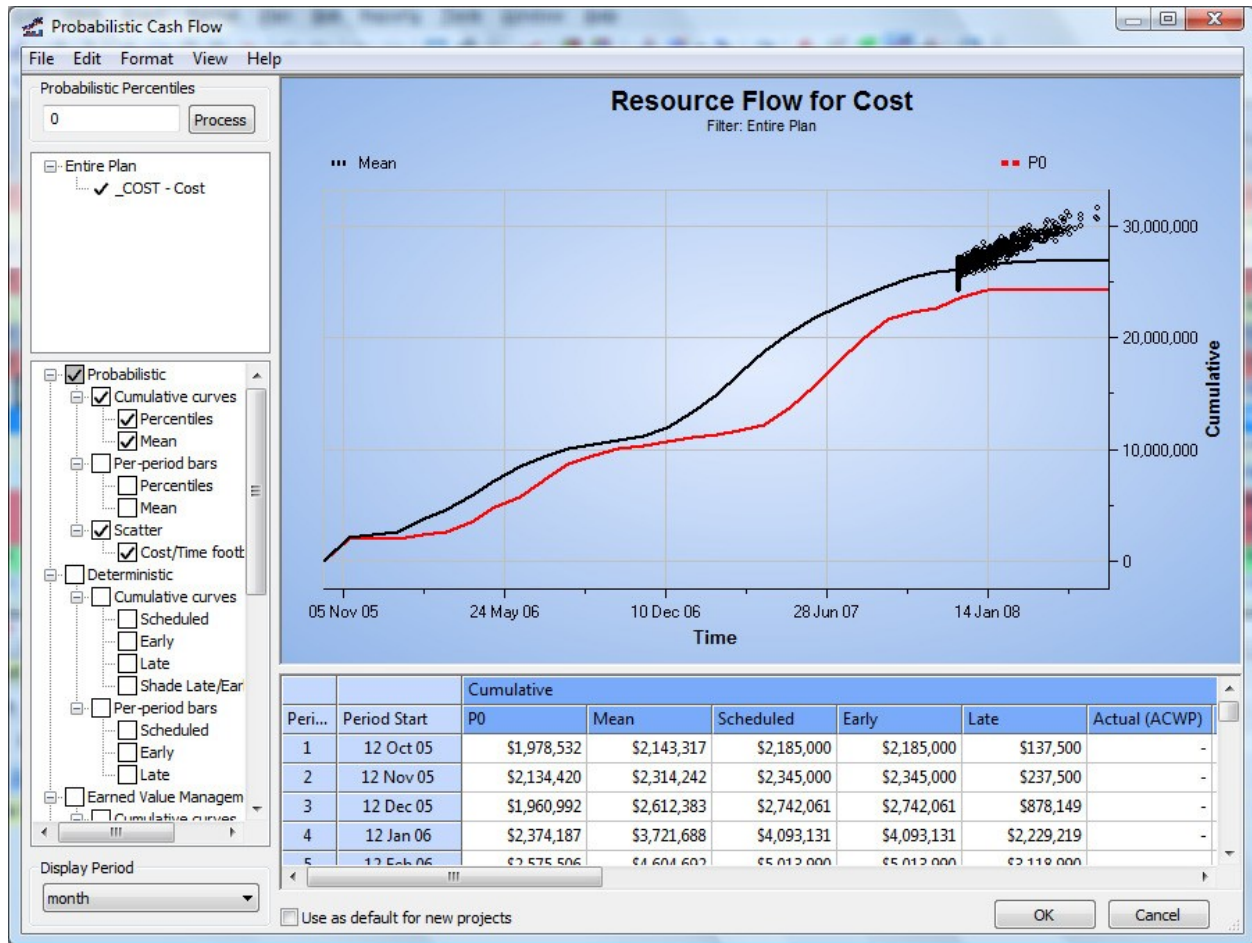
Filters to use during data collection	
<input checked="" type="checkbox"/>	Entire Plan

Combinations of Resources and Filters to save during data collection						
	Entire Plan					
_COST	<input checked="" type="checkbox"/>					
_LABOR	<input checked="" type="checkbox"/>					

4. Run the risk analysis
5. Click on PROBABILISTIC CASH FLOW under the REPORT MENU.

### Probabilistic Cash Flow Menus

- FILE – Contains the typical print options from each report.
- EDIT – Lists options to copy and export the graph.
- FORMAT – The graph settings, axis range, discount/difference settings, And advanced graph settings are all located in this section.  
This is the main menu to adjust the data and format on the graph.
- VIEW – Earned value settings popup will launch, which can be exported to Microsoft Excel.
- HELP – Has standard help options similar to other sections.



### Probabilistic Cash Flow Navigation

- In the top-left pane is the probabilistic percentiles which can be manually typed in. If multiple percentages are entered they are separated with a comma. Hit process button when percentiles are set. Entering “50, 80” would generate a curve for a 50% and 80% confidence level.
- Directly under probabilistic percentiles, the project manager can select which resource curve will be shown if multiple curves have been generated. The user can click and check the curve to display.
- Below the curve selection are all of the options such as curves, allocation amounts, and scatter plot data which can be shown on the chart. The risk analyst will check the desired options. There are about forty different options to choose from in this section.
- The bottom-left of the chart has the display period such as month, week, etc. The user will select this from the dropdown box.

To the right of the options is the graph and data table. This chart has limited options when Right-clicking as most options are controlled by the check boxes on the left side.