



NetRisk

Quickstart Guide

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Getting Started

NetRisk is a Monte Carlo-based schedule risk modeling tool featuring qualitative and quantitative analysis. NetRisk includes both Critical Path Method (CPM) as well as Graphical Path Method (GPM) scheduling algorithms, the latter introducing a number of innovative concepts to the practice of schedule risk analysis.

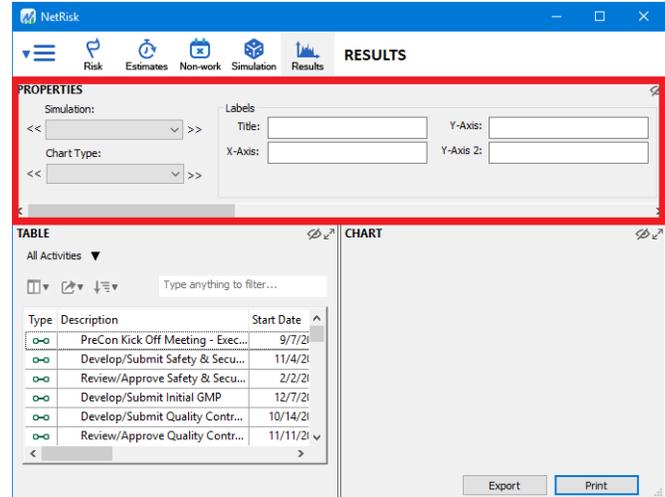
Drivers

Drivers are the main icons at the top of the application. Selecting a driver changes the content displayed in the panes below. There is one driver for each main area of functionality, as follows:

Driver	Description
 Risk	For modifying the risk register and assigning risks to activities.
 Ranging	For estimating duration ranges or apply floating or pacing to activities.
 Non-work	For adding windows or events and assigning them to activities.
 Simulation	For managing and running simulations.
 Results	For viewing the output of a simulation (i.e. charts).

Panes

A pane can be moved by clicking and dragging its title with the mouse. The final destination will be indicated by a blue rectangle. The pane can also be dragged outside the application to its own window (un-docked).



Dock or Undock Panes

Double-click the name of any pane to un-dock it. Once un-docked, double-click the name to re-dock it.

Creating Projects



When importing XER files, please ensure that the project was scheduled and summarized after the latest changes were made in P6 and BEFORE exporting it as an XER file.

A NetRisk project is created by importing a schedule file and then saving the project. Supported schedule files include P6 XER files (.xer) and NetPoint project files (.np4/.npz).

1. In NetRisk, click the **Main Menu**  icon in the upper left corner.
2. Choose New Project from File .
3. In the lower right-hand corner, choose either P6 XER File (*.xer) or NetPoint File (*.np4/*.npz) .
4. Navigate to the desired file and click Open.



The following features of P6 will not be maintained after importing into NetRisk: calendar exceptions, resource calendars, lag calendars set to use the calendar of the successor activity.



Activity Uncertainty

Duration Ranging

Duration ranging is a method for modeling uncertainty in activity durations. As opposed to a single duration estimate, a set of possible durations is defined. The activity's duration is then sampled from its range for every iteration in the simulation.

1. Click the **Ranging**  driver.
2. Click the View button above the top list and choose Duration Ranging .
3. Scroll to the desired activity.
4. In the **Include** column, check the box.
5. In the **Distribution Type** column, click to choose a desired distribution type.
6. Enter a value in each of the required columns.

 Required columns will display a Warning  icon. If none of the required columns are visible, they must be turned on (see [Customizing Columns](#)). So long as any column contains a warning, the entire row will be colored red.

Looking for Something?

If you're wondering how to do something, there's probably a column for it. Columns can be added to or removed from any table list by clicking the Add/Remove Columns icon above any list or by right-clicking on any column header.

- Turn on the Unit column to control whether the ranges to be entered will be in days or in percent variance.
- Turn on the Constraint Behavior column to control how constraint behaves during simulation.
- Turn on the Sampling Behavior column to control how in-progress activities are sampled.

Floating and Pacing

Traditional schedule simulation places all activities on early starts, ignoring the impact of float use and overestimating probabilities of completion. Unique to NetRisk and the Graphical Path Method (GPM), non-critical activities can be made to start on their late dates through a process called floating.

A true probability of completion can be inferred as somewhere in between the early curve and the late curve.

 As a rule of thumb, once a simulation has been ran and probabilistic completion dates have been determined, an additional simulation should be ran where all non-critical activities are floated using the following steps:

1. Click the **Ranging**  driver.
2. Click the View button above the top list and choose Floating .
3. Scroll to the desired activity.
4. In the **Include** column, check the box.
5. Set the **% of Iterations** to 100%.
6. In the **Distribution Type** column, choose **Constant** and set the Most Likely to 100%.

Duration Correlations

Duration correlations make it possible to relate the sampling of durations between multiple activities. Duration correlations are defined using coefficients from -1 to 1.

Goal	Example	Coefficient
Strong	A sampled high, B sampled high	High positive, e.g. "1"
Weak	A sampled high, B sampled somewhat high	Low positive, e.g. ".25"
Weak inverse	A sampled high, B sampled somewhat low	Low negative, e.g. "-0.25"
Strong inverse	A sampled high, B sampled high	High negative, e.g. "-1"

 Correlations are **ONLY** available between activities, not between hammers, LOE's, WBS summaries, milestones, or benchmarks.



Qualitative Analysis

The goal of qualitative analysis is to identify potential risks to the project, the probability they may occur, and the impact they may have.

✔ Qualitative Analysis Only?

To perform a qualitative analysis without a schedule, import a blank XER or NetPoint file to enable the interface.

Probability/Impact Thresholds

The probability/impact matrix is a grid for defining the probability and impact thresholds (e.g. L, M, H), which are used for ranking risks in the risk register. Two separate schemes can be saved: one for threats and one for opportunities.

1. Click the **Risk**  driver.
2. Click the Rating button in the Risk Properties pane.
3. Click the dropdown in the upper right-hand corner and choose between Threat and Opportunity .
4. To change the number of probability thresholds, click the dropdown to the left of the Probability (%) column.
5. Adjust the numerical probability value for each threshold as desired.
6. To change the number of impact thresholds, click the dropdown below the **Impact (Days)** row.
7. Enter an impact in days for each threshold.
8. When finished, click the X icon to save and close the window.

 When setting the qualitative probability for a risk in the risk register, the value from the Qualitative Thresholds window will be copied over to the quantitative probability, but only if the quantitative probability is empty. Subsequent changes to the qualitative probability or updating the value in the Qualitative Thresholds window will have no effect.

Risks

A risk may impact each assigned activity either individually or as a group.

Behavior	Definition	Use Case	How
Individually	A risk impacting two activities at 80%; OR one activity at 80% and another at 70% <i>will not</i> necessarily occur in the same iterations	Activities which take place in different time frames, for example, one in January 2015 and another in June 2020	Uncheck the box in the "Correlate Probability" column next to each assignment
As a group	A risk impacting two activities at 80% <i>will</i> occur in the same 80% of iterations	Activities in close proximity to one another, e.g., a labor strike affecting all work in September	Check the box in the "Correlate Probability" column

Scenarios

Scenarios are for capturing mitigation states or what-if scenarios of a given risk.

Adding Risks/Scenarios

1. Click the **Risk**  driver.
2. Click the View button above the top list and choose Risk Register .
3. Click the **New Risk** or New Scenario button in the Risk Properties pane or underneath the list.
4. Configure the properties as desired.

 The Qualitative Probability and the Qualitative Impact cannot be modified until the Category has been set.



Quantitative Analysis

The goal of quantitative analysis is to assign the risks with the highest ratings to specific activities, giving them numerical probabilities and impact distributions.

Inherited Risk-Activity Impacts

In NetRisk, quantitative probability and impact may be entered at the risk/scenario-level in the risk register. This saves time when making individual activity assignments, as the probability and impact are inherited automatically and do not need to be entered one-by-one. Any subsequent modifications to the probability or impact in the register are automatically carried down to each assignment.

 An inherited assignment is identified by an icon  next to each value that has been inherited.

1. Click the **Risk**  driver.
2. Click the View button above the top list and choose Risk Register .
3. Select the desired risk or scenario in the upper list.
4. Enter a value in the Probability (Quantitative) column.
5. In the **Distribution Type** column, click to choose a desired distribution type.
6. Enter a value in each of the required columns.
7. In the lower list, check the box in the Assign column next to the desired activity(s).

View All Assignments?

To force all activity assignments to the top, click the Sort



icon, uncheck Organize by WBS , click Assign twice

until the down arrow  shows up next to it (descending order) and then scroll the list all the way to the top.

Un-inheriting Risks/Scenarios

If an inherited risk assignment has any value modified at the activity level, any modifications to the probability or impact in the register will *no longer* be carried down to each assignment.

Individual vs. Grouped Assignments

By default, all assignments underneath a given risk with the same probability of occurrence will be impacted in the same iterations as each other *as a group*. To impact activities individually, uncheck the box in the Correlate Probability column in the lower list. If the column isn't visible, it must be turned on first.

Activity View

Whereas the Risk Register view is useful for assigning activities to designated risks, the All Activities view is useful for assigning risks to designated activities.

1. Click the **Risk**  driver.
2. Click the View button above the top list and choose All Activities.

 In the activity view, risks cannot be created or modified.

Sampling In Parallel vs. In Series

By default, all risk impacts are sampled in parallel. This can be set individually for each risk impact by clicking the dropdown in the Sampling Order column and choosing between In Series and In Parallel.

Option	Definition
In Parallel	Largest impact taken
In Series	All impacts added together



Non-work Modeling

 Non-work calendars are not applied to link gaps (GPM) or lags during simulation.

Weather and Events

Events can be continuous or non-continuous. The behavior depends on the probability entered. The min, most, and max columns will switch automatically.

Probability	Behavior	Example
100%	Non-continuous, ranged in terms of total days lost between start and end	Cold weather in January: <ul style="list-style-type: none"> Start: 01/01 End: 01/31 Recurrence: Yearly Probability: 100% Days Lost: 5-10
<100%	Continuous, ranged in terms of duration	Labor strike in 2018: <ul style="list-style-type: none"> Start: 01/01/2018 End: 12/31/2018 Recurrence: Once Probability: 50% Duration: 1-30 days

Adding Events/Calendars

1. Click the **Non-work**  driver.
2. Click the View button above the top list and choose Weather and Events .
3. Click the New Calendar button.
4. Fill in the min, most likely, and max days lost, or delete the default months if not needed.

 If an event is selected in the upper list, the lower list will be disabled, as activities cannot be assigned to events themselves, only to calendars.

 Underneath the hood, the distribution is always triangular.

Non-work Windows

Windows are useful for modeling any period of time during which work will not be able to take place, such as shutdowns due to weather.

Adding Windows/Calendars

1. Click the **Non-work**  driver.
2. Click the View button above the top list and choose Non-work Windows .
3. Click the New Calendar button.
4. By default, a single window will be added. Fill in the minimum, most likely, and maximum start and end.

Creating Multi-year Windows

Any window which spans December 31st between the start maximum and the finish minimum must have the Recurrence set to Once and have the year incremented in order to be accepted. Without the year, the finish would be lower than the start month and be invalid.

A Multi-year Recurring Window

To create a multi-year window with yearly recurrence, you can create two windows, the first one ending at the end of the first year (December), and the second one beginning at the beginning of the next year (January).

Interruptible vs. Continuous Activities

When confronted with a window, some activities can see their work stopped during the window and picked back up again afterwards; other activities cannot tolerate such interruptions and should not be started at all. By default, all activities in NetRisk are set as Interruptible. This can be set per assignment by clicking the dropdown in the Behavior column and choosing between Interruptible or Continuous .



Simulation and Results

✓ Side-by-side?

To view any result chart next to risk or ranging inputs, open the same file in another instance of NetRisk and snap them each side-by-side.

Running

During simulation, NetRisk chooses between CPM and GPM scheduling algorithms, the latter being invoked if floating or planned-dates are detected in the schedule.

1. Click the **Simulations**  driver.
2. Click the **New** button in the Simulation Properties pane.
3. Modify the parameters as needed.
4. Click Run.

Risk Priority

With risk priority, a simulation is ran multiple times, each time removing the risk with the highest *risk sensitivity*, resulting in a tornado chart of risks organized by the potential number of days that could be gained if they were to be mitigated.

⚠ Any risk with a strategy of "Accept" in the risk register will NOT be removed, regardless of its sensitivity. Only risks with a checkmark in the "Include in Simulation" column will take place during simulation. Non-working calendars are NOT treated as risks/removed.

Results Charts

i In the Table Pane, activities and their data correspond to the state when the simulation was ran, regardless of whether or not the model has been updated.

Distribution graphs show the number of iterations a given value occurred as bars, as well as the total percentage of iterations a given value occurred via the cumulative curve.

Tornado charts show results organized from high to low for a variety of data sets.

1. Click the **Results**  driver.
2. Click the **Simulation** dropdown in the Chart Properties pane and choose a desired simulation.
3. Click the Chart Type dropdown in the Chart Properties pane and choose accordingly.

✓ Tornado Scrolling

When the number of results is too large, bars will be merged to make them fit on a single screen. To view every bar individually, scroll the mouse wheel up to "zoom in". The chart can then be panned up and down.

Selected Chart Properties

Property	Definition	Available for
Hide values between	A toggle for filtering out values from being displayed. To hide negative values, enter -100 & 0. To hide positive values, enter 0 & 100.	<ul style="list-style-type: none"> • All tornado charts
Significance Level	The significance value, for example 80%, tells us the likelihood that the result is truly correlated vs. just random (for example, 20%).	<ul style="list-style-type: none"> • Cruciality Index • Priority Index • Risk Sensitivity
Show Values	A toggle for showing the values of the bars.	<ul style="list-style-type: none"> • All charts

Adding/Removing Markers

Markers are a way for annotating distribution graphs.

1. Click the **Results**  driver.
2. In the Chart Properties pane, click the Add button next to the Markers list.
3. Click the dropdown in the Type column to change marker types.
4. To remove, select the row in the list and click Remove.