



Deltek Acumen Risk >

Analysis and Reports Series

Quick Reference Guide

Click on the topics to go directly to that page.

Risk Analysis	1
Risk Mitigation	3
Cost Risk Analysis Process	4
Risk Analysis Outputs	6
Risk Modelling	8
Risk Advisor	9
Risk Mapping	11
Risk Analysis Exposure	13
Risk Analysis Reports	15

Acumen Risk 8.2 - Risk Analysis

This infographic highlights the tools and features which can be used to manage Risk Analysis.

Importing Project Data

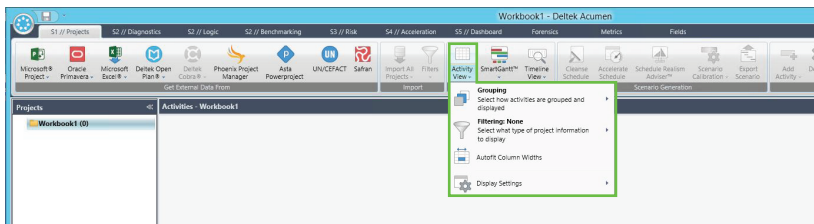
Activities												
Id	Description	Remaining...	Duration	Uncertainty	Type	%	CLT	Cor...	Rem...	Start	Finish	T...
Current Schedule	Current Schedule P...	504d								100w	1/1/2010 9:00 AM	2/4/2014 3:30 PM
Current Schedule	Current Schedule	504d								100w	1/1/2010 9:00 AM	2/4/2014 3:30 PM
0090	Handover	0d				100 %				0w	12/26/2013 3:30 PM	12/26/2013 3:30 PM
0100	Project Finish	0d				100 %				0w	2/4/2014 3:30 PM	2/4/2014 3:30 PM
0110	Project Start	0d				100 %				0w	1/1/2010 9:00 AM	1/1/2010 9:00 AM
Current Schedule.0010	Concept	0d								0w	1/1/2010 9:00 AM	3/1/2012 8:00 AM
Current Schedule.0020	Early Design	0d								0w	6/14/2010 9:00 AM	9/28/2010 5:00 PM
Current Schedule.0030	FEED	48d								9w	11/12/2010 9:00 AM	5/8/2012 12:30 PM
Current Schedule.0040	Detailed Design	48d								9w	11/9/2010 9:00 AM	5/7/2012 1:30 PM
Current Schedule.0050	Procurement	155d								31w	2/1/2010 9:00 AM	10/4/2012 11:30 AM
0350	Bid reviews	30d				100 %				5w	8/27/2012 1:30 PM	10/4/2012 11:30 AM
0360	Initial Long Lead it...	90d				100 %				16w	3/9/2012 1:30 PM	7/5/2012 10:30 AM
0370	Vendor B	15d				100 %				2w	7/11/2012 4:30 PM	8/1/2012 7:30 AM
0380	Vendor A	25d				100 %				4w	3/1/2012 8:00 AM	4/3/2012 11:30 AM
0390	Outsourced PMO	95d				100 %				17w	2/1/2010 9:00 AM	7/3/2012 12:30 PM
0400	Secondary Long Le...	60d				100 %				11w	3/14/2012 11:30 AM	5/31/2012 9:30 AM
0680	Vendor C	20d				100 %				3w	8/1/2012 7:30 AM	8/27/2012 1:30 PM
Current Schedule.0060	Manufacturing	77d								15w	10/10/2012 9:30 AM	1/24/2013 3:30 PM
Current Schedule.0070	Construction	224d								44w	1/24/2013 3:30 PM	12/5/2013 8:30 AM
Current Schedule.0080	Commissioning	74d								14w	9/4/2013 4:30 PM	12/18/2013 11:30 AM

- Project Data can be imported into Acumen Risk which is then displayed in S1//Projects.
- Data analysis can be performed on Projects, Snapshots and Scenarios.
- Within the S3//Risk model, data is Grouped by WBS as default but field grouping can be set up.

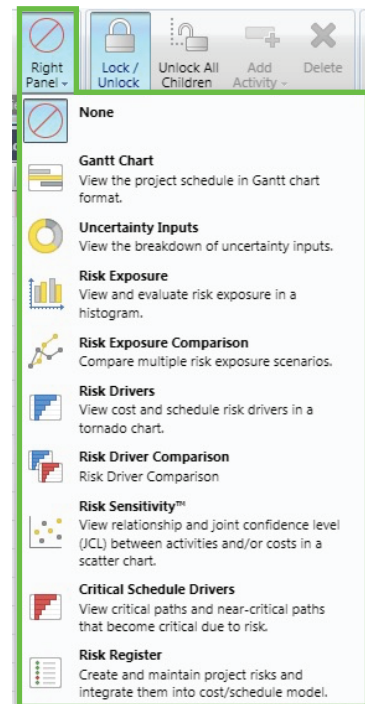
Set up Views

The setup of the **S3//Risk tab** follows the standard Acumen platform set-up. **Sub-views** can be selected through the **left/right panel menu options**. The sub-views have the options to set the left and right panels to different views.

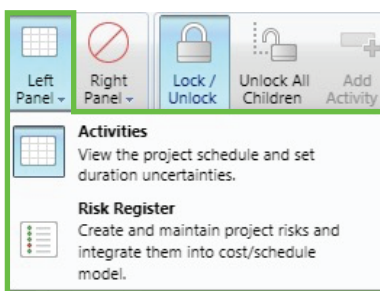
1 Activities View - This is the standard view that would be found in Acumen Fuse, Risk and 360.



3 Right Panel - Provides more options for viewing Risks.



2 Left Panel - Gives the option to view Activities or the Risk Register.



Acumen Risk 8.2 - Risk Analysis

CPM with Risk Analysis

Risk alters the critical path - lesser activities become important, causing unexpected changes

Takes both **Uncertainty** and **Risk Events** into account

Quantifies probability of completing project on time and budget

Uses estimates for durations and costs (min, most likely, max)

Numerical Analysis Methodology

- Monte Carlo or Latin Hypercube
- All methods subject to schedule logic, constraints, input types

Risk Analysis Process

1 Evaluate and Clean-Up Schedule	5 Select Mitigation
2 Assign Uncertainty Estimates for Schedule, Set up	6 Update Schedule and Cost Estimate
3 Discrete Risk Events for Schedule - Run Worst Case	7 Publish P-value Schedule and Cost Estimate
4 Brainstorm Mitigation - Run Option Analysis	

Analyse Components

The validity and reliability of the Risk Analysis results are directly impacted by the quality of the schedule. If the schedule is not good quality, a **schedule check** should be run before any further analysis is conducted.

Schedule <ul style="list-style-type: none"> Constraints Missing Logic Leads/Lags Redundant Logic 	Duration Uncertainty <ul style="list-style-type: none"> Normal Variation Stop signs or stop lights 	Discrete Risk Events <ul style="list-style-type: none"> Individual Event Probability Consequence/Impact Car accident or train crossing
---	---	---

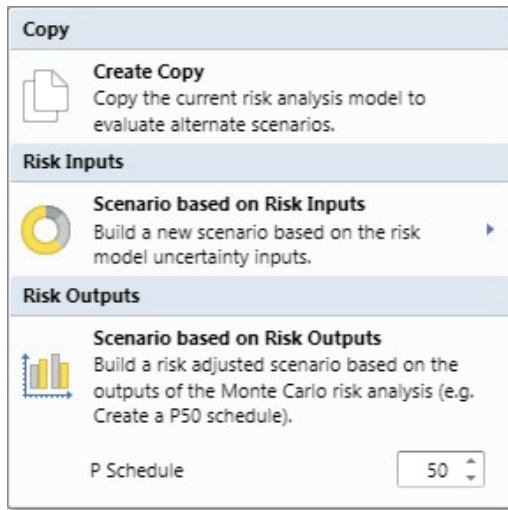
Analyse Schedule Quality

Constraints 	Missing Logic/Open Ends
Lags/Leads (negative lag) 	Redundant Logic

Acumen Risk 8.2 - Risk Mitigation

Scenario Creation

Scenario generation is very flexible in Deltek Acumen Risk®. A new scenario can be created to look at varying uncertainty levels for a **specific set of activities**, or **different cost uncertainty levels**, or **different sets of discrete risk events** with the same assumptions on uncertainty.



Comparison Situations

- Quantitative Measure of Impact on activities/events
- Knock-On Effect of Sequence
- Impact of Specific Risk Event
- Impact of Mitigation Options

Note: When a scenario is created, it adopts all of the project schedule characteristics, including the base uncertainty, risk register, and mapped risk event(s). The scenario, at the moment of creation, is an exact duplicate of the original schedule risk model.

Mitigation Set Up

Mitigation steps are the activities that are added to a project to reduce the probability and/or impact of a risk event. The best mitigation steps reduce both probability and impact. Typically, a mitigation step only impacts one or the other.

Enabled	Step	Description	Duration	Cost	Probability	Schedule	Cost	Score
<input checked="" type="checkbox"/>	1	Procure Yard Early	0d	\$500,000	Very Low	Very High	High	5
<input checked="" type="checkbox"/>	2	Daily Yard Schedule Meeting	0d	\$10,000	Very Low	High	High	4

Identify Top Risk Drivers

- 1 Put Mitigation in Risk Register
- 2 Single or Steps (Sequential)
- 3 Single sums up the individual steps

The results of the mitigation analysis can be sent to Risk Comparison to determine if the benefits of the mitigation balance out against the costs and time commitment.

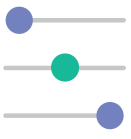
Acumen Risk 8.2 - Cost Risk Analysis Process

Cost Risk Analysis Process

- | | |
|---|---|
| 1 Evaluate and Clean-Up Schedule | 5 Select Mitigation |
| 2 Assign Uncertainty Estimates for Schedule, Set up | 6 Update Schedule and Cost Estimate |
| 3 Discrete Risk Events for Schedule - Run Worst Case | 7 Publish P-value Schedule and Cost Estimate |
| 4 Brainstorm Mitigation - Run Option Analysis | |

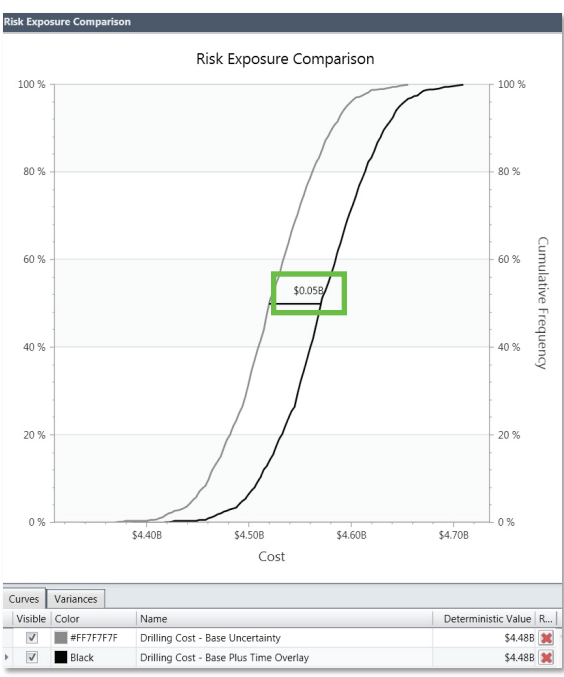
Uncertainty Factor™ Template for Base Cost Uncertainty

The Uncertainty Template is used by both the **Risk Advisor** and the **Uncertainty Factor™** features. These Templates contain a finite number of levels of uncertainty that define the percentages from which the **minimum**, **most likely**, and **maximum** durations are calculated.



- | | | |
|----------------------------|--|---|
| Save/Load Templates | Customize Templates | Advantages: |
| | <ul style="list-style-type: none"> Names Number of Levels Distribution Type Values | <ul style="list-style-type: none"> Standardizes across project, program, organization Percentages apply to daily or hourly schedule durations |

Cost of Time Contribution



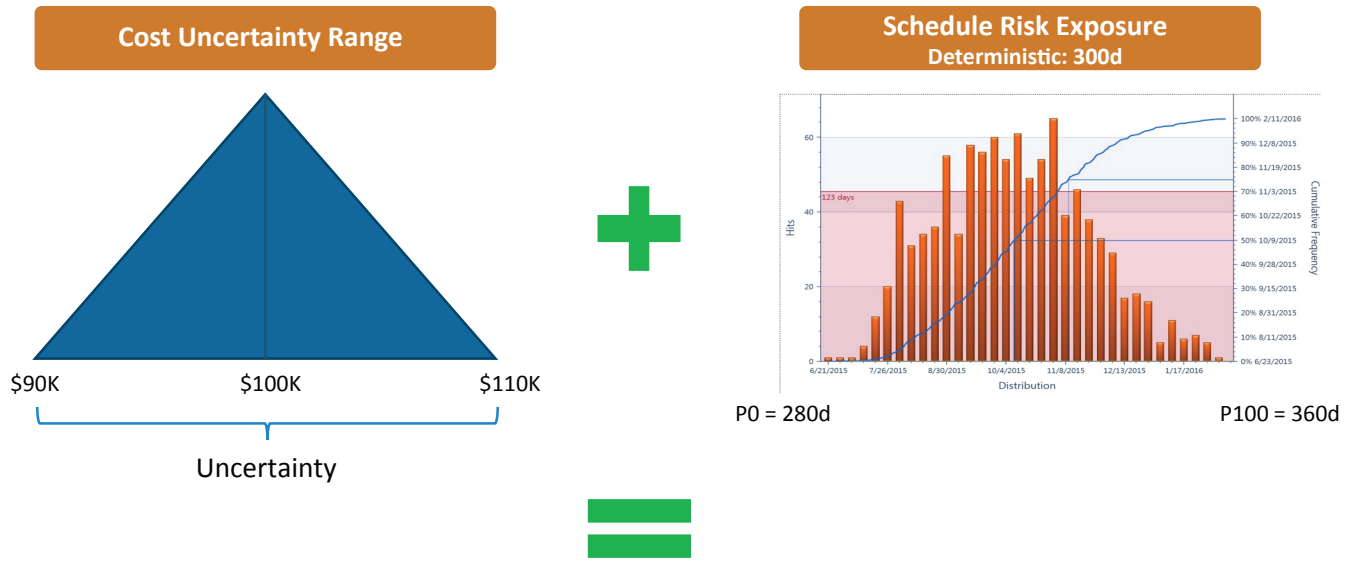
Difference Between Base Uncertainty and Time Overlay

- Difference Between Base Uncertainty and Time Overlay To Save the \$50,000,000 – go after the Time Not the Price

Acumen Risk 8.2 - Cost Risk Analysis Process

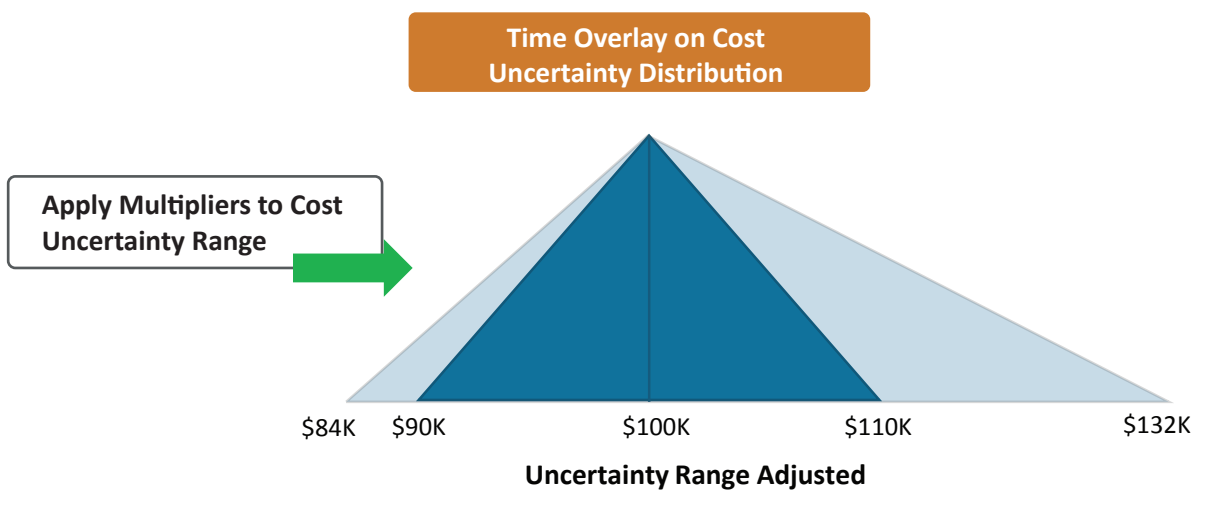


Schedule Impact on Cost Risk



Calculate Multipliers

Min Side Multiplier	Max Side Multiplier
$P0 \div \text{Deterministic}$	$P100 \div \text{Deterministic}$
$280 \div 300 = 93\%$	$360 \div 300 = 120\%$

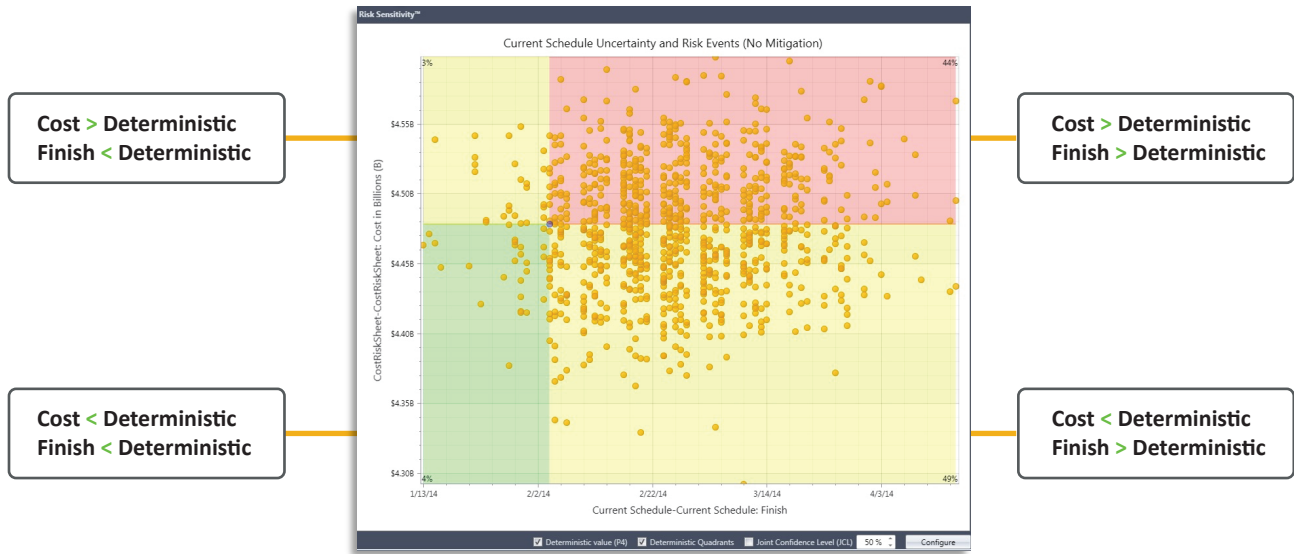


Acumen Risk 8.2 - Risk Analysis Outputs



Risk Sensitivity

Risk Sensitivity chart shows the relationship and **Joint Confidence Level (JCL)** between activities and/or costs in a scatter chart format. The Risk Sensitivity chart is viewed by selecting it from the Right Panel pull-down. The chart displays quadrants that show where cost and/or finish date were less than or greater than their deterministic values. The axes can be individually defined and are typically set for a cost vs. finish date analysis.



Risk Sensitivity (Scatter Chart)

- Activity Finish vs. Cost
- Definable Axes

Joint Confidence

Joint Schedule/Cost Analysis is accessed by first running the Risk Sensitivity and then putting a check in the Joint Confidence box at the bottom of the analysis screen. The level of Joint Confidence is also selected through the pull-down box on the same analysis screen.



Joint Confidence Level (JCL)

- Meet **BOTH** Schedule and Cost Criteria

Acumen Risk 8.2 - Risk Analysis Outputs



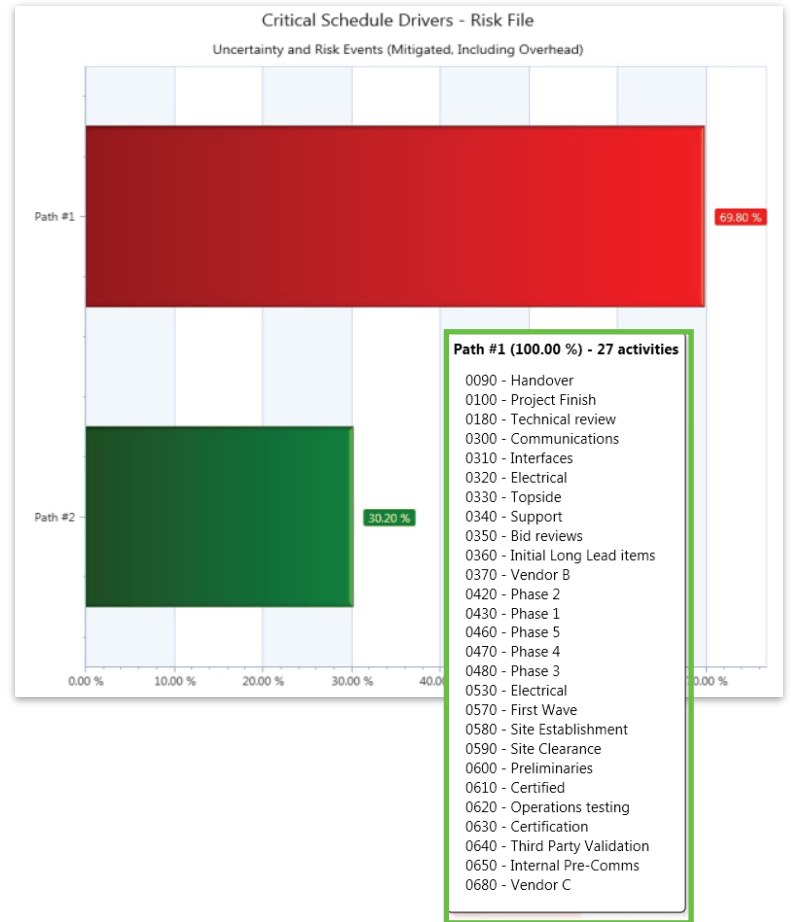
Critical Schedule Drivers

Each Iteration:

- Calculates a new critical path
- Keeps track of activities on/off the critical path

Displays the Common Critical Paths

- Hover and display list of activities
- Create a SmartGantt™ filter
- Apply filter in S1//Projects Tab and Risk Tab



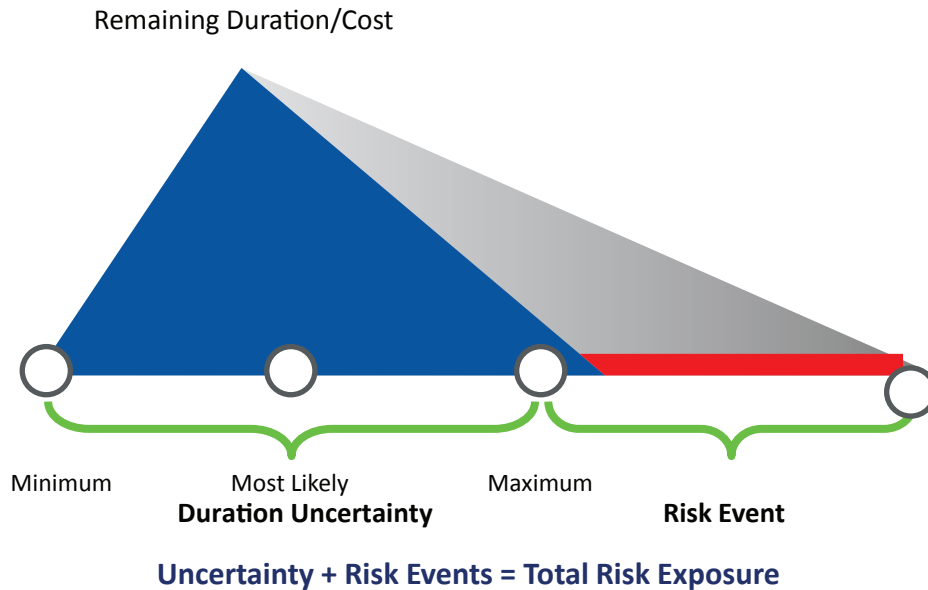
Acumen Risk 8.2 - Risk Modelling

This infographic provides a high level overview to Risk Modelling.



What is Risk Modelling?

Risk Modelling shows the relationship between **Estimate Uncertainty** and **Risk Events**. Risk Events are often included in Uncertainty Estimates and by identifying what they are, we can manage Risk Events within the Risk Register which allows for a more refined Estimate Uncertainty.



Terminology



Deterministic Finish Date or Deterministic Cost

Finish Date from the planning program or Total Cost from the cost estimate.



P-Value

Probability that the project will be finished by a selected date or earlier or selected cost or less.



Duration / Cost Uncertainty

Range of values that describes the minimum and maximum amount of duration or cost for an individual activity. Normal variability or wobble including, **personnel uncertainty, estimating uncertainty, activity scope uncertainty, past performance uncertainty, etc.**



Discrete Risk Event

These are individual risk events with a probability of happening and a consequence of additional time and/or money including, **adding/removing key personnel, scope addition, material delivered late, bad weather, decision delay, etc.**



Mitigation

Potential new work that reduces either the probability of a risk event happening **OR** lessens the consequences if it does happen.

Acumen Risk 8.2 - Risk Advisor



Risk Advisor™

The Risk Advisor™ makes uncertainty template suggestions based on **Schedule Quality, Historical Performance (Baseline vs. Current), an individual metric, or an individual field**. For each selection an uncertainty template is defined and then applied based on the mode selected and the criteria established.

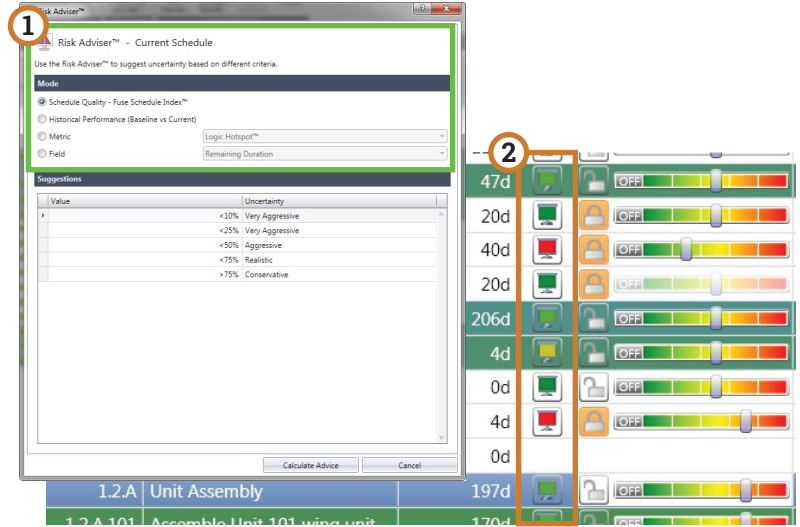
Provides External Input Based on a Metric or a Field

1 Set Up Advice

- Schedule quality per activity
- Historical Pperformance
- Metric Field (Standard or Custom)
- Field (User or Code Field)
- **MUST** be a numeric value

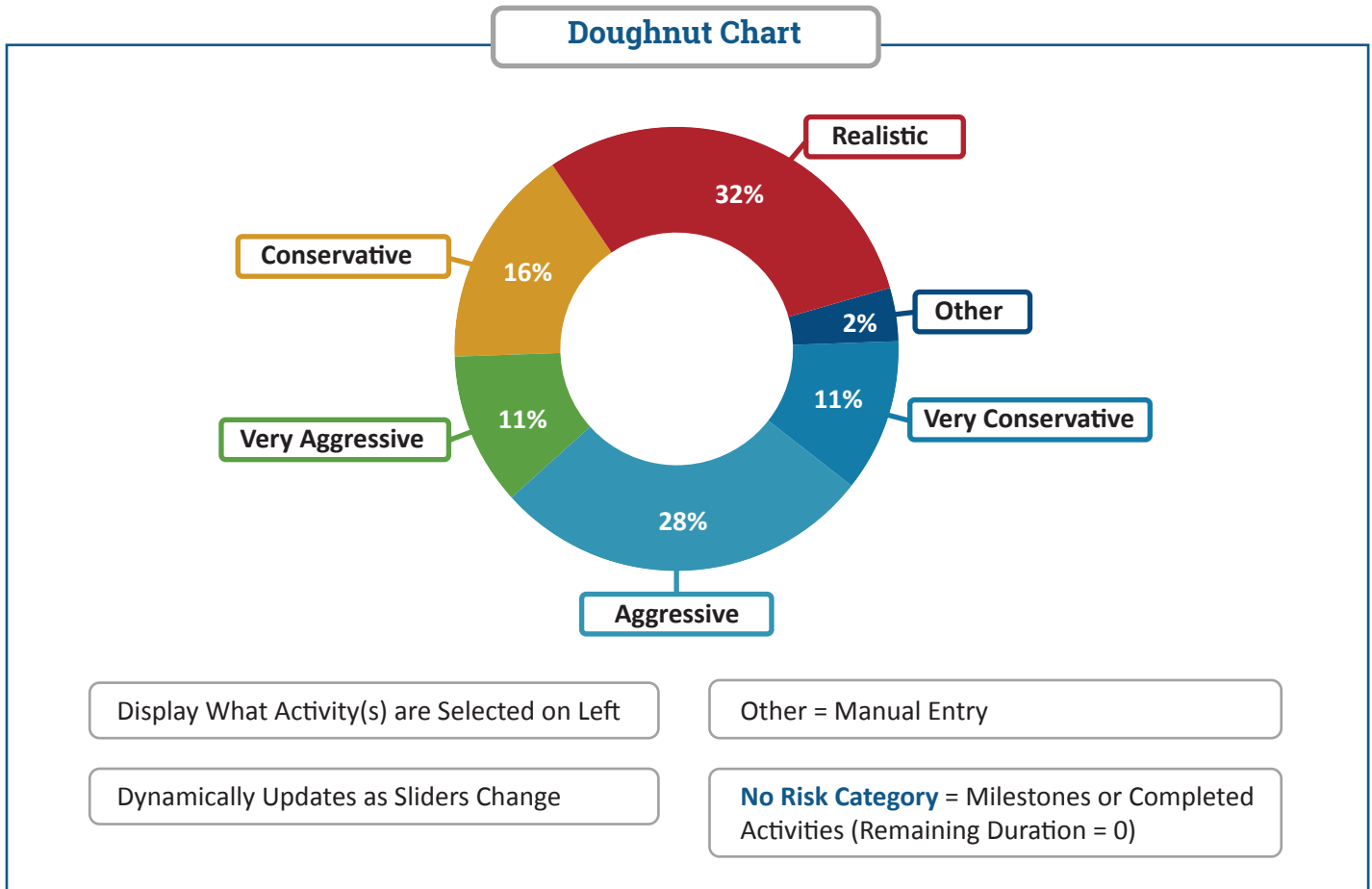
2 Apply Advice

- Summary or individual
- Shows colors on screen
- Matches advisor level to template



Viewing Uncertainty Profile

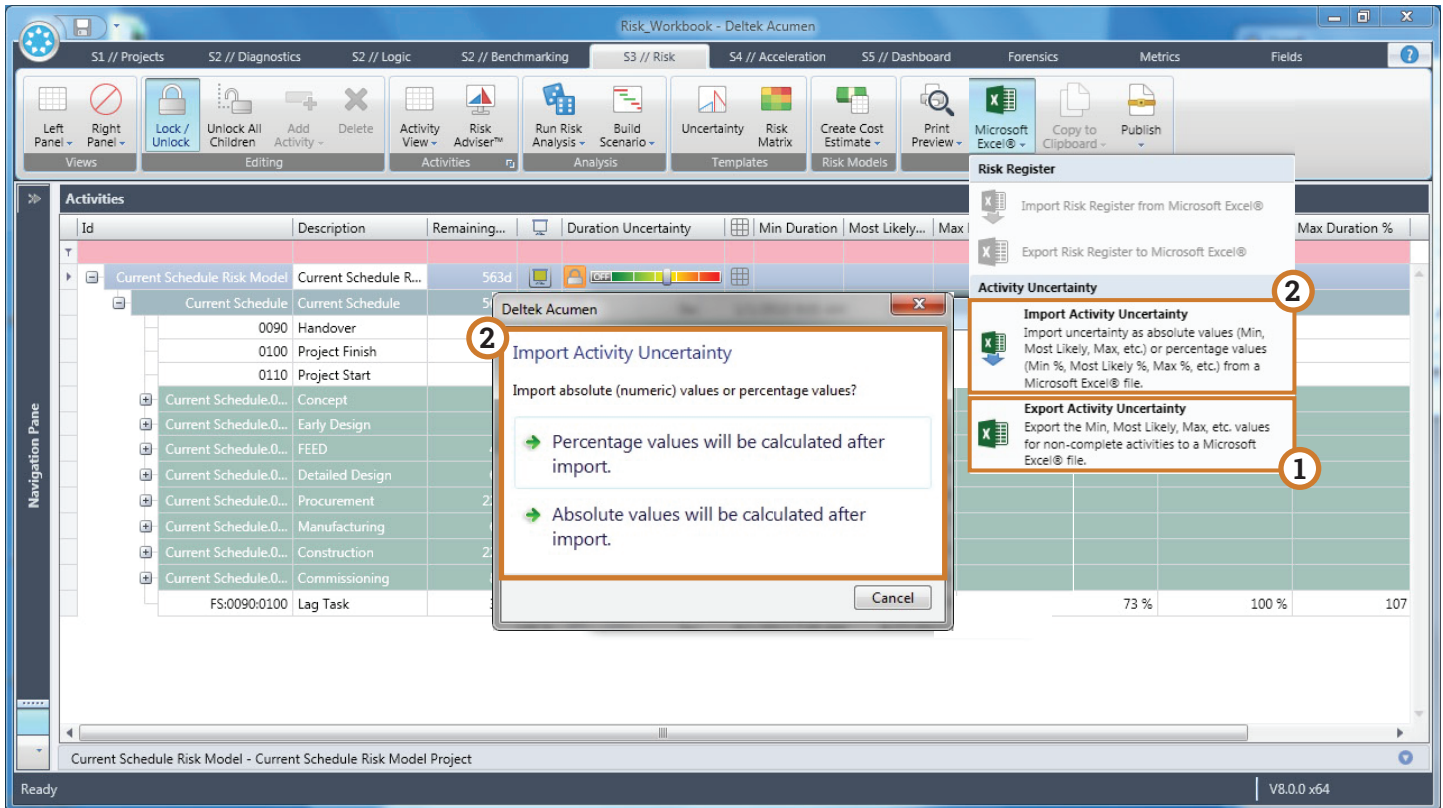
The Uncertainty distribution chart includes only activities that have a status of **not-complete**. So, activities with a remaining duration of zero have **No Risk** assigned and are not shown in the distribution.



Export/Import Values

Save and Re-apply to Next Risk Model

- Schedule Name and Activity IDs **MUST** be the same



1 Export to MS Excel

2 Import from MS Excel

- **Absolute numbers** - Percentages are calculated
- **Percentages** - Numbers are calculated

Acumen Risk 8.2 - Risk Mapping

Risk Event Impacts

Multiple Risk Events to a Single Activity

Risk ID	Description	Probability	Impact
0001	Hurricane	25%	2 10 days
0002	Labor Strike	50%	1 50%

R...	Activity	Min Proba...	Max Proba...	Min Durati...	Max Durat...
✖	1.2.A.103.02: Assemble S...	75 %	100 %	3d	3d
✖	1.2.A.103.06: Install Pipe	75 %	100 %	17d	21d
✖	1.2.A.103.07: Install Equi...	75 %	100 %	7d	8d
✖	1.2.A.103.09: Install Vents	75 %	100 %	7d	8d
✖	1.2.A.103.20: Install Fdns	75 %	100 %	7d	8d

R...	Activity	Min Proba...	Max Proba...	Min Durati...	Max Durat...
✖	1.2.A.103.02: Assemble S...	75 %	100 %	40d	50d
✖	1.2.A.103.06: Install Pipe	75 %	100 %	40d	50d
✖	1.2.A.103.07: Install Equi...	75 %	100 %	40d	50d
✖	1.2.A.103.09: Install Vents	75 %	100 %	40d	50d
✖	1.2.A.103.20: Install Fdns	75 %	100 %	40d	50d

1 Percentages – Each activity receives a % of the remaining duration/cost

2 Pro-Rated Number – Each activity receives its portion of impact depending upon its portion of remaining duration/cost

3 Absolute Number – Each activity receives the full impact

Mapping Risk Events

Risk events **must** be mapped to activities/cost elements in order to be included in the risk model. Mapping can be done **several different ways**. If the risk register is fully populated, then the mapping is a process of assigning the risk events to the correct activity or activities. If the risk register is empty, then a risk event can be **both** entered into the register and assigned simultaneously.

The screenshot shows the Acumen Risk software interface. On the left, the 'Risk Register' tab is active, displaying a list of risk events (R1-R45) with columns for Enabled, Absolute ID, Type, Name, Current Probability, Schedule, and Cost. On the right, the 'Activities' tab is active, showing a Gantt chart of project activities with columns for Mapped, ID, Description, Remaining, and Duration Uncertain. A 'Mappings' tab is also visible at the bottom, showing a table of activity mappings with columns for R..., Activity, Min Proba..., Max Proba..., Min Durati..., Max Durat..., Min Cost, and Max Cd. Three callouts (1, 2, 3) highlight specific features: 1 points to a risk event in the register, 2 points to a mapping entry, and 3 points to the Mappings tab.

1 Individual Activity or Summary Activity - Children get **Absolute** or **Pro-Rated Amount of Risk**

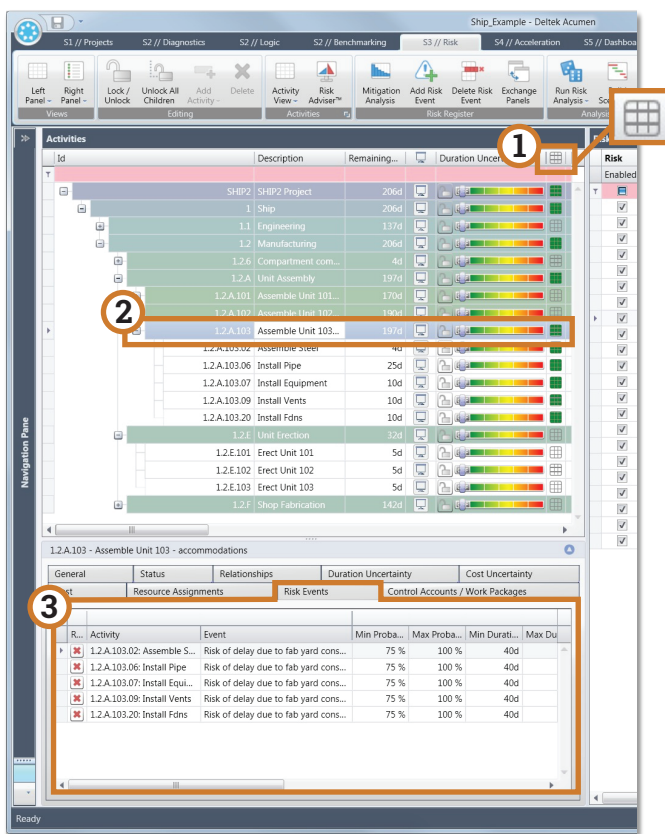
2 Manual Mapping – Map from Risk Events to Activity(s)

3 View Mappings – Mappings Tab

Acumen Risk 8.2 - Risk Mapping



Automatic Mapping

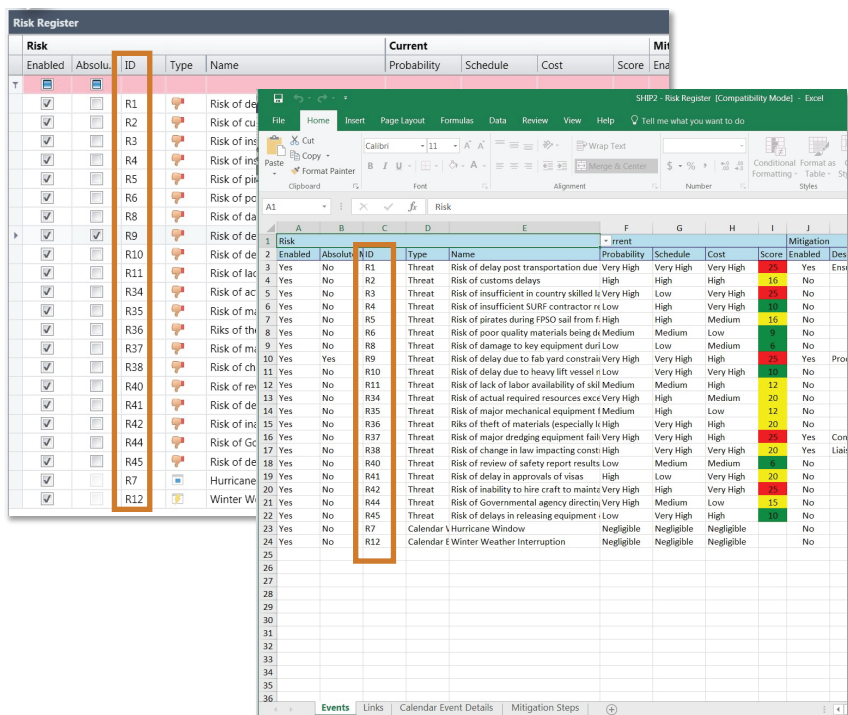


- 1 **Waffle/Grid Icon** – Adds a Risk Event and Maps
- 2 **Individual Activity or Summary Activity** - Children get Absolute or Pro-Rated Amount of Risk
 - Automatic Mapping – Map from Activity(s) to Risk Events
- 3 **View Mappings – Risk Event Tab**
 - Good view for project team

Import/Export

Risks can be **edited/added/removed** in the MS Excel file, independent of Deltek Acumen Risk®. Then can be imported back into the Deltek Acumen Risk® Risk Register by selecting Import Risk Register from the same pull-down menu as the Export.

- Each schedule has its own **Risk Register**
- Export to MS Excel
- Import from MS Excel
- Risk Events** automatically map if the activity ID and Risk ID are the same



Acumen Risk 8.2 - Risk Analysis Exposure

Risk Analysis Exposure Options

1 **Simulation**
Number of Iterations: 1000
Complete Automatically
Perform risk analysis until results converge to given accuracy.
Automatic Accuracy: 1 %
Convergence Iterations: 100

2 **Scenarios**
 Uncertainty Only (No Risk Events)
Perform the risk analysis including only duration uncertainty.
 Uncertainty and Risk Events (No Mitigation)
Perform the risk analysis including both uncertainty and pre-mitigated risk events.
 Uncertainty and Risk Events (Mitigated, Excluding Overhead)
Perform the risk analysis including both uncertainty and pre-mitigated risk events, but without the cost/schedule effort required for mitigation.
 Uncertainty and Risk Events (Mitigated, Including Overhead)
Perform the risk analysis including both uncertainty and pre-mitigated risk events, and including the cost/schedule effort required for mitigation.

3 **Interaction**
 Automatic
Automatically run all of the risk analysis iterations using multiple CPU cores. (Fastest)
 Interactive
Automatically run risk analysis iterations and view the values changing during the execution. (Fast)
 Diagnose
Manually run each risk analysis iteration and view the values changing during execution. (Slow)

4 **Repeatability**
 Use Fixed Seed
Seed Value: 1

5 **Activity Correlation**
 Use correlation to link activities

6 **Hierarchical Risk Models**
 Use Correlation to Overcome the Central Limit Theorem.
Correlation Coefficient: 50 %

7 **Cost/Schedule Integration**
Account for cost of schedule risk impact

1 Simulation

- Accounts for all reasonable combinations
- Follows the CPM Schedule Logic
- Run iteration until results don't vary significantly
- Sets number of iterations

2 Scenarios

- Combination of Uncertainty, Risk Events, Mitigation, Overhead

3 Interaction

- Accuracy, Interactive, Diagnose

4 Repeatability

5 Activity Correlation

6 Hierarchical Risk Models

- Overall Correlation
- Less than 3 levels below uncertainty assignment

7 Cost/Schedule Integration

Risk Mentor

1 Deltek Acumen

Deltek Mentor Suggestions

Looks like your project is not of sufficient schedule quality to generate reliable risk analysis results based on the current Deltek Acumen Mentor settings.

Your Schedule Quality score (0) is below the set threshold of 75. Use the S2//Diagnostics tab and FUSE Schedule Quality metrics to guide you on improving the schedule quality before performing risk analysis.

You will get better risk analysis results if you review and improve these areas:

2

- Missing Logic (49)
- Logic Density™ (0)

OK Ignore View Schedule Quality

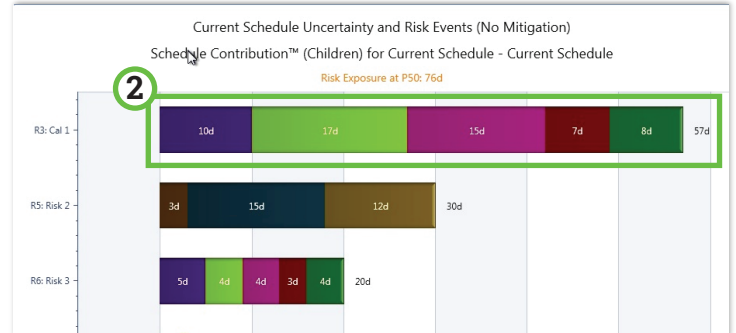
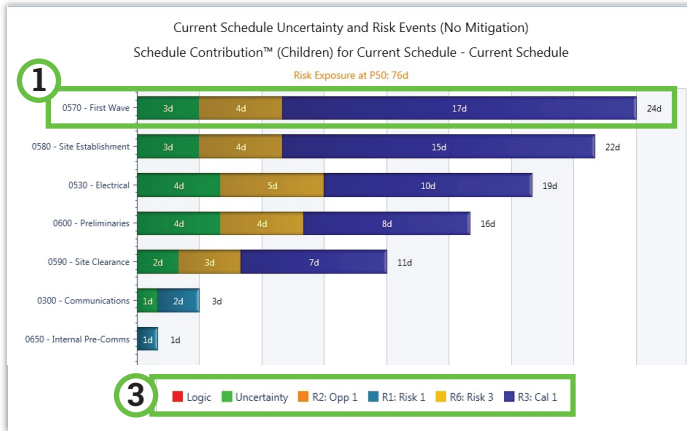
1 Checks schedule quality score

2 If below 75, gives message and what metric is the issue

Acumen Risk 8.2 - Risk Analysis Exposure



Risk Drivers



Types

- ① Most Vulnerable Activities
- ② Top Risk Event Drivers

Traditional Reporting

- Criticality
- Correlation Statistic
- Both can be misleading

Risk Contribution

- Select P-Value
- Schedule or Cost Contribution
- ③ Differentiates sources - Logic, Uncertainty, Risk Events

Comparison and Chart Customization

The Risk Comparison chart can be customized for the **data curves (colors, labels, date unit) and variances**. If there are only two curves on the chart then the variance is automatically added. If there are more than two curves on the chart, then two must be selected for the variance to be shown.

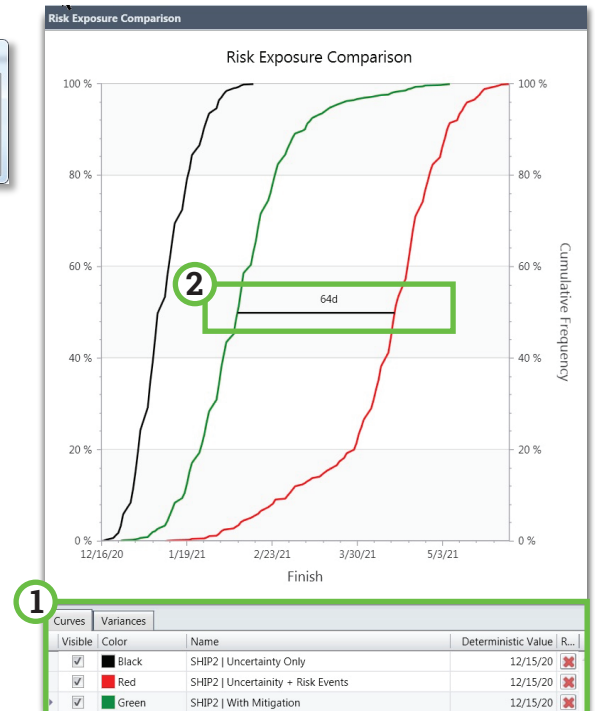
③ Add Finish Variance

Add Finish Variance at P55 From To

OK Cancel

- 1 For Each Curve**
 - Visible
 - Colors
 - Labels
- 2 Variances**

Automatically set if only 2 curves
- 3 Select desired curves if > 2 curves**



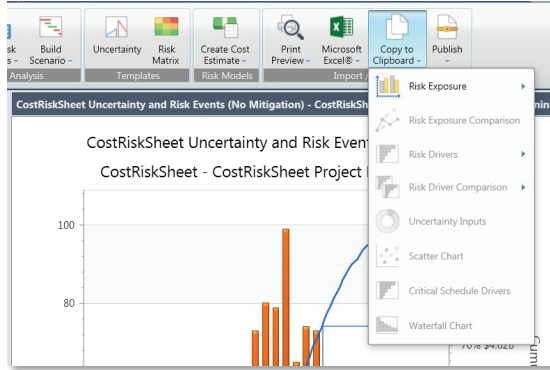
Acumen Risk 8.2 - Risk Analysis Reports



Schedule or Cost Analysis

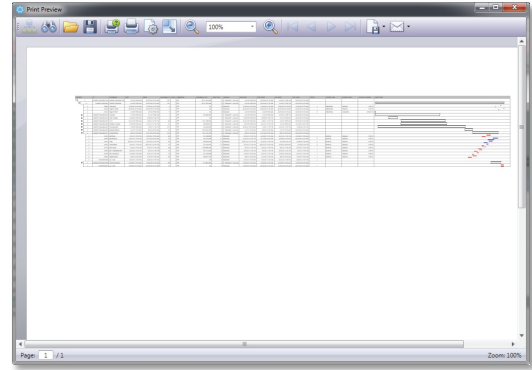
Risk Sensitivity chart shows the relationship and joint confidence level (JCL) between activities and/or costs in a scatter chart format. The Risk Sensitivity chart is viewed by selecting it from the right panel pull-down.

Images



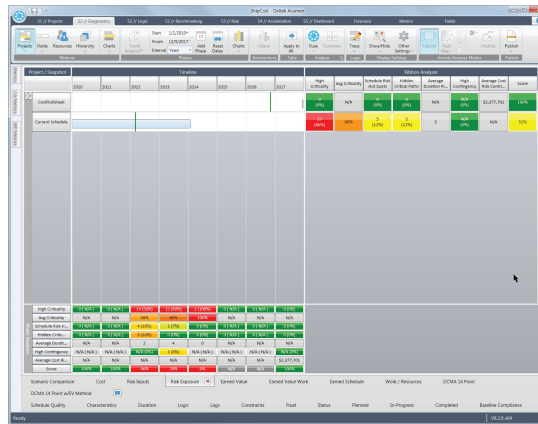
- All analysis images can be copy/pasted to the clipboard

Activities/Gantt Chart



- Print Preview
- Export

S2//Diagnostics



- Risk Inputs
- Risk Exposure

Images

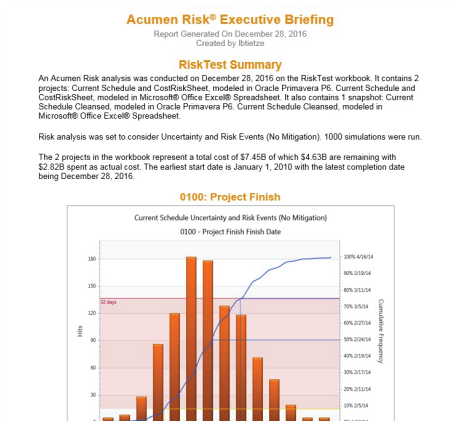
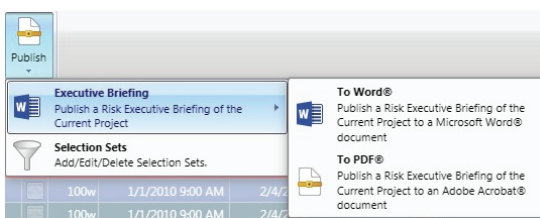
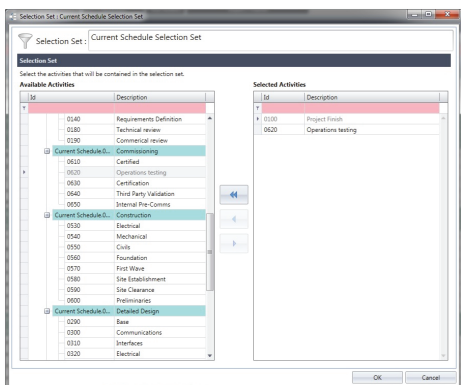
ID	Description	Activity Type	Remaining Duration	WBS Code	WBS Name	Current Schedule	Current Schedule Cleared
1	0090 Handover	Milestone	0	Current Schedule	Current Schedule	12/26/2013 3:30:00 PM	83 3/28/2014 11:30:00 AM
2	0100 Project Finish	Milestone	0	Current Schedule	Current Schedule	2/4/2014 3:30:00 PM	83 4/29/2014 11:30:00 AM
3	0300 Communications	Normal	5	Current Schedule.0040	Detailed Design	3/7/2012 2:30:00 PM	74 5/21/2012 7:30:00 AM
4	0350 Bid reviews	Normal	30	Current Schedule.0050	Procurement	10/4/2012 11:30:00 AM	74 12/17/2012 1:30:00 PM
5	0360 Initial Long Lead Items	Normal	90	Current Schedule.0050	Procurement	7/5/2012 10:30:00 AM	74 9/17/2012 12:30:00 PM
6	0370 Vendor B	Normal	15	Current Schedule.0050	Procurement	8/1/2012 7:30:00 AM	72 10/12/2012 8:30:00 AM
7	0380 Vendor A	Normal	25	Current Schedule.0050	Procurement	4/3/2012 11:30:00 AM	204 10/25/2012 10:30:00 AM
8	0390 Outsourced PMO	Normal	95	Current Schedule.0050	Procurement	7/3/2012 12:30:00 PM	52 8/24/2012 1:30:00 PM
9	0400 Secondary Long Leads	Normal	60	Current Schedule.0050	Procurement	5/31/2012 9:30:00 AM	74 8/13/2012 11:30:00 AM
10	0410 Phase 5	Normal	20	Current Schedule.0060.0450	Offshore	12/19/2012 11:30:00 AM	99 3/28/2013 12:30:00 PM
11	0420 Phase 2	Normal	10	Current Schedule.0060.0440	Domestic	11/5/2012 7:30:00 AM	84 1/28/2013 7:30:00 AM
12	0430 Phase 1	Normal	4	Current Schedule.0060.0440	Domestic	10/15/2012 4:30:00 PM	84 1/7/2013 4:30:00 PM

- Remaining duration between initial schedule and risk adjusted schedule

Acumen Risk 8.2 - Risk Analysis Reports



Risk Executive Briefing



Selection Sets

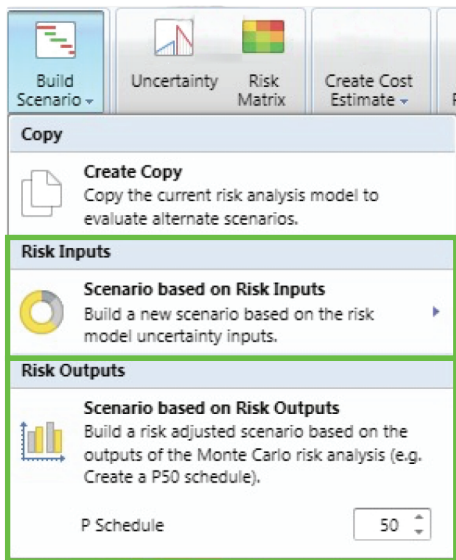
- Set of Specific Activities

Executive Briefing

- Summary Text
- Risk Exposure Image
- Risk Contribution Image

Risk Adjusted Schedule

Once the schedule has been analyzed for risk, a new scenario can be created based on the **risk inputs** or **risk outputs**. This is very useful when a schedule needs to be re-calibrated based on the project team's uncertainty rankings or a deterministic schedule (that includes all of the risk impact) needs to be created for a customer. Deltek Acumen Risk® can automatically create the risk-adjusted schedule using either the **risk inputs** or **risk outputs**.



Based on Uncertainty Inputs

- PERT Method = $[Max+(MostLikely*4)+Min]/6$
- Median Method = Value that Separates the Min from the Max

Based on Risk Analysis Outputs

- Select P-Value
- Assembles CPM Based on P-Value Durations

Exportable to:

- P6 – XER
- MS – MPP or XML
- Deltek – OpenPlan (publish updates)
- UN/CEFACT – schedule schema