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## Risk Analysis: Detailed Versus Summary Schedule

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It is possible to get value from running a risk analysis regardless of the level of detail in the project schedule. There are often questions which strategy is more proper. Both methods have advantages and drawbacks. This paper will address important factors to keep in mind for both summary schedule and detailed schedule risk simulations.

### Key Definitions

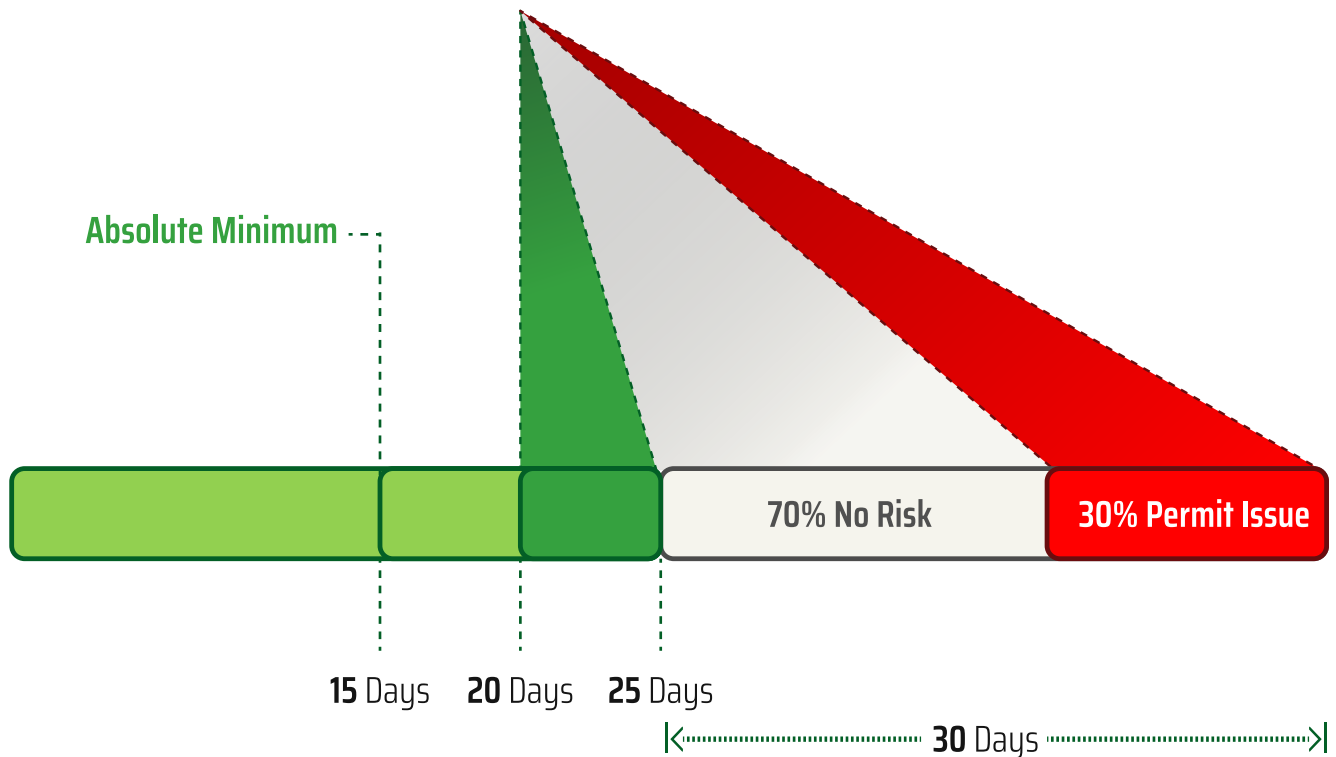
Listed below are key definitions relative to the typical risk process.

#### 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.
- The activity could land anywhere in the range on all iterations.
- Signifies complete uncertainty in the outcome.

#### Risk Event

- 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.
- The activity duration can still have an uncertainty range; however the risk event will fire based on probability.
- The risk event serves as an either/or scenario for events that may or may not occur.



## Advantages of Simulating a Summary Schedule

Summary schedules are often seen as easier to manage. The user does not have to worry about auditing and cleaning the detailed schedule. The data will load faster due to the number of activities.

Larger schedules generally require a grouping strategy to reduce the total number of risk inputs. A summary schedule is generally small enough to manually load risk values on each activity. The reduced number of activities also limits the impact of statistical anomalies based on the interaction between large numbers of activities.

## Disadvantages of Simulating a Summary Schedule

Running a summary requires two schedules to be created, updated, and managed in parallel. Summarized logic often creates an issue that the time of the project is represented correctly; however there are not enough activities to create legitimate logic to simulate the ripple effect of risk events.

Risk events from the risk register may not have a proper connection points due to the lack of logical tie-in points. Large lags and excessive start-to-start or finish-to-finish logic is often used in summary schedules. Large lags are hard-coded absences of logic that should often be converted to activities due to their uncertainty. The start-to-start and finish-to-finish logic often causes issues where uncertainty or risk events can be added to an activity yet not create the expected ripple effect.

## Advantages of Simulating a Detailed Schedule

Using a detailed schedule forces the continuous improvement of working schedule. Over time the amount of schedule cleanup will be greatly minimized. When using a summary schedule, the detailed schedule is



usually not given as much attention and will not be cleaned to an appropriate level. This may cause an issue where the schedule quality decreases over time and becomes incredibly time consuming to clean at a later date.

The detailed schedule logic will also contain appropriate tie-in points for risk register items. Uncertainty templates can be created to load risk from a summary level so that the team does not have to individually manage each activity. The templates allow users to create a hybrid analysis approach where uncertainty and risk events are still analyzed from a high level, yet the detailed schedule is utilized. Risk tools have features that will help the user overcome statistical anomalies that can arise due to the number of activities.

## Disadvantages of Simulating a Detailed Schedule

Analyzing the detailed schedule is often too time consuming to clean and not worth any additional value based on the required outputs of the risk analysis. Due to the increased complexity of the schedule, any questions about the outputs can be harder to trace or explain. While many of the statistical anomalies can be overcome, many users will still find the level of detail in the summary schedule to be intimidating. If the user is not an experienced scheduler, then this may not be a viable option.

Technology can also be a concern for analyzing a detailed schedule. Current risk analysis tools and computer specifications allow very large schedules to be analyzed, however at a certain point running an analysis on a detailed schedule makes very little sense due to the amount of time needed to process the calculations and the inability of a team to create a perfect logic network.

## Items to consider

1. If you are using a summary schedule, then consider breaking up an activity if tie-in points for risk events do not exist or tornado charts are showing incorrect data due to the size of the activities.
2. Consider using the detailed schedule up to the point where the technology makes it impossible to simulate. Statistical issues can be overcome and this will force the team into improving the detailed schedule logic. The time spent creating a summary schedule can often be used to successfully clean up the base logic.
3. Correlation is important on detailed schedules. The larger a schedule becomes, the more correlation becomes critical. Statistical issues such as impact due to the Central Limit Theorem and merge bias may create inaccurate answers.
4. The schedule check items should be considered flags and not wrong answers. Removing valid constraints to clear a schedule check report is not advisable. Using improper logic to avoid negative lags often creates more issues than the negative lag. If small negative lags are not acceptable, then consider breaking the activity if the finish of an activity is the true predecessor.
5. Lags and constraints must be used correctly. Lags and constraints are often used incorrectly in summary and detailed schedules. Constraints should be used to hold float in certain areas, however they must be used correctly. It is common for lags and constraints to be interchanged when the schedule does not require a Monte Carlo analysis.



6. Larger lags are more problematic as they represent larger gaps in logic. This is usually a larger issue on summary schedule; however this is also a very common issue on a detailed schedule. Users should consider converting larger lags to activities, especially when the lagged duration might need an uncertainty value.
7. Use histograms to validate schedule movement. If the answer doesn't make sense relative to the inputs, then this is an indicator that the logic is not correct.
8. Use tornado charts to validate schedule logic. This should be done on summary and detailed schedules. If the tornado chart does not make sense, then the schedule is probably not linked correctly.