Conclusion and Next Steps

Correlation is a critical component of cost risk analysis. Overlooking it leads to a significant underestimation of the total amount of uncertainty. However, for a large WBS, assigning correlation values for each individual pair of distinct elements can be daunting. The process can take a long time, as the number of correlations grows as the square of the size of the WBS and you have to be careful to ensure that the correlation values assigned are consistent. The events that have the biggest potential to cause cost to grow are things that will influence all WBS elements, such as schedule delays. Thus there is likely some amount of positive correlation among most, if not all, WBS elements. Taking this into account, a simple way to cut the proverbial Gordian knot of assigning correlation values is to assign a single value. Depending upon how you consider the problem, that single best value is somewhere in the range between 20% and 60%.

The SEER software products are a sophisticated suite of tools that provide a cost risk capability. Until now, however, this has been limited to either no correlation or 100% correlation across all WBS elements. The ability to choose a single value between 0% and 100% is now implemented in SEER-H, SEER-MFG and SEER-SEM, and will soon be in other SEER products. We have described how this works and how it affects the risk outputs from these models. Furthermore, Monte Carlo analysis can be performed on a combined SEER estimate (such as hardware and software) with consideration of correlation.

Some may argue that a single number is too simple. One way to make this more granular is to assign different values at WBS roll-up levels. This would allow, for example, modeling hardware structural, mechanical, and thermal elements with a single correlation value, while assigning a different value between those elements and avionics elements. Also, correlation is only one measure of stochastic dependency. There are others – in particular, tail dependency. Often, extreme risks occur together. Correlation does not capture this phenomenon, but tail dependency does. Both correlation and tail dependency can be modeled together. The use of tail dependency in risk modeling is discussed in an ICEAA paper from 2015 (Smart 2015).

References

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