Practical Project Risk Management[1]

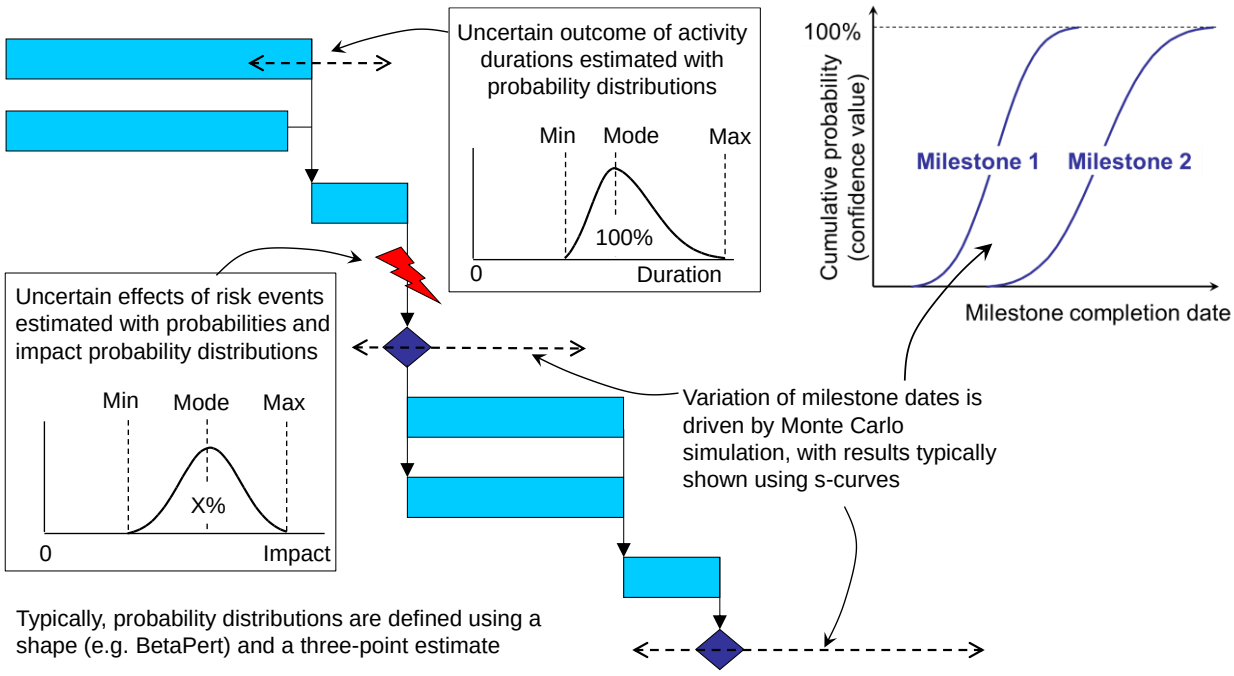
Schedule Risk Analysis: A brief guide [2]

Purposes

1. Forecast the effects of risk on the date of project completion and key milestone dates.
2. Identify the activities and risks likely to cause the most variance to schedule performance.
3. Quantify and plan appropriate provisions for schedule contingency.
4. Contribute to the quantification of cost risks that are influenced by schedule performance.

Illustration of a Monte Carlo Schedule Risk Model

A Monte Carlo schedule risk model comprises a network of activities (of uncertain duration) and risk events (with probability and impact estimates) that can be used to simulate variations of schedule duration. The main analysis outputs focus on final and interim milestones.



[1] This series of articles is by Martin Hopkinson, author of the books "*The Project Risk Maturity Model*" and *"Net Present Value and Risk Modelling for Projects"* and contributing author for Association for Project Management (APM) guides such as *Directing Change* and *Sponsoring Change.* These articles are based on a set of short risk management guides previously available on his company website, now retired. See Martin's author profile at the end of this article.

[2] How to cite this paper: Hopkinson, M. (2023). Schedule Risk Analysis: A brief guide, Practical Project Risk Management series, *PM World Journal*, Vol. XII, Issue V, May.

Other Potential Inputs and Outputs

In addition to the inputs illustrated in the figure, schedule risk models may include:

1. Start-no-earlier constraint dates (but only where there is a genuine justification for them).
2. Correlation between the inputs for activity duration (particularly for larger models).
3. Probabilistic or conditional dependencies.
4. Probabilistic calendars e.g. to simulate the effects of date-dependent weather risks.
5. Resource constraints and/or probabilistic variance in resource availability.

In addition to the simulated variation of milestone completion dates, statistical outputs from a schedule model can be used to identify the activities and risks that drive schedule risk.

A Schedule Risk Model Quality Checklist

1. Have the purposes of the model been identified and agreed?
2. Does the network include all potential critical paths and key sources of schedule risk?
3. Have the correct working time assumptions and project calendar(s) been used?
4. Is the model free of constraint dates that would prevent the simulation running correctly?
5. Are any dependencies not of the simple Finish-Start type legitimate for risk modelling?
6. Does the deterministic version of the activity network align with the project plan?
7. Have non schedule-driving activities e.g. project management been excluded?
8. Have the risk estimates been reviewed and are they realistic in the context of the model?
9. Are the key overarching assumptions disclosed with the modelling results?
10. Are all dependencies and activities in the model likely to be valid through the life of the project? (Detailed models often rely on unrealistic levels of planning certainty).
11. Are there sufficiently few activities in the model to allow the time that is required to develop duration uncertainty estimates of good quality?

Questions 10 and 11 in the above list can normally only be satisfied if the model has an appropriately low number of activities. It is recommended that most project schedule risk models should include in the region of 10-200 activities, with the higher number applying only to very large and complex projects with relatively mature and stable plans.

Common Faults

1. Copying the project's detailed schedule plan to create the schedule risk model (this can cause a model to fail on many of the points in the above quality list).
2. Failure to make realistic estimates for activity duration uncertainty e.g. by using automatically generated estimates such as planned value +/- 10%.
3. Failure to differentiate sufficiently between activity duration uncertainty and risk events.
4. Including ill-defined activities and risks in the model that cause ambiguity in the estimates.
5. Failure to identify, record and disclose key overarching assumptions.

About the Author

Martin Hopkinson

United Kingdom

Martin Hopkinson, recently retired as the Director of Risk Management Capability Limited in the UK, and has 30 years' experience as a project manager and project risk management consultant. His experience has been gained across a wide variety of industries and engineering disciplines and includes multibillion-pound projects and programmes. He was the lead author on Tools and Techniques for the Association for Project Management's (APM) guide to risk management (*The PRAM Guide*) and led the group that produced the APM guide *Prioritising Project Risks.*

Martin's first book, *The Project Risk Maturity Model*, concerns the risk management process. His contributions to Association for Project Management (APM) guides such as *Directing Change* and *Sponsoring Change* reflect his belief in the importance of project governance and business case development.

In his second book *Net Present Value and Risk Modelling for Projects* he brought these subjects together by showing how NPV and risk modelling techniques can be used to optimise projects and support project approval decisions. (To learn more about the book, click here.)