**Monte Carlo Simulation**

The Monte Carlo simulation is a mathematical technique that allows you to account for risk and help you make data-driven decisions. It is based on historical data that is run through many random simulations to project the probable outcome of future projects under similar circumstances.

In other words, if this risk occurs, how will it affect the schedule or the cost of the project? Monte Carlo gives you a range of possible outcomes and probabilities to allow you to consider the likelihood of different scenarios.

For example, let’s say you don’t know how long your project will take. You have a rough estimate of the duration of each project task. Using this, you develop a best-case scenario (optimistic) and worst-case scenario (pessimistic) duration for each task.

You can then use Monte Carlo to analyze all the potential combinations and give you probabilities of when the project will complete.

The results would look something like this:

* 2% chance of completing the project in 12 months (if every task finished by the optimistic timeline)
* 15% chance of completion within 13 months
* 55% chance of completion within 14 months
* 95% chance of completion within 15 months
* 100% chance of completion within 16 months (If everything takes as long as the pessimistic estimates)

Using this information, you can now better estimate your timeline and plan your project.

**Benefits of Monte Carlo analysis in project management**

The primary benefits of using Monte Carlo analysis on your projects are:

* Provides early inducation of how likely you are to meet project milestones and deadlines
* Can be used to create a more realistic budget and schedule
* Predicts the likelihood of schedule and cost overruns
* Quantifies risks to assess impacts
* Provides objective data for decision making

**Limitations of Monte Carlo analysis in project management**

There are some challenges to using the Monte Carlo analysis. These include:

* You must provide three estimates for every activity or factor being analyzed
* The analysis is only as good as the estimates provided
* The Monte Carlo simulation shows the overall probability for the entire project or a large subset (such as a phase). It can’t be used to analyze individual activities or risks.