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**PMEducation**

SIMULATION

**WHAT IT IS**

Project Simulation is used in Quantifying the Risks, which is an optional process. As such, Simulation is not frequently used in Project Management. Simulation uses a model that translates specified project Risks into potential impact on total project goals. It permits representation of the impact of many Risks simultaneously. Software is required as the calculations are complex. Inputs are project values (such as Time or Cost). The system is simulated many times, each time randomly choosing a value from the probability distributions of the input values.

One very well-known technique is called Monte Carlo. Initial research dates back to 1949 and it was named after the casinos in Monte Carlo. Typical outputs include a histogram or curve of the probability for each input value.

**HOW IT WORKS**

The general steps to follow are:

1. Determine the range of input values. Suppose we say the accuracy of our project Time estimate is 20%. We mean the duration on 100 days could be anywhere from 80 days to 120 days.
2. Determine the probability distribution of the inputs. For example, what is the distribution curve for the duration?
3. Generate the inputs randomly. Computerized random number generators can do this.
4. Perform calculations many times, using the random inputs.
5. Collect the results from the calculations. With sufficient simulation runs, the results should focus around the most probable outcome.

**KEY ELEMENTS**

For this method to be effective, the following key elements must be used:

* Good project model, typically Cost Estimate or Schedule
* Random sampling and many repeat calculations
* A range of inputs
* Appropriate software

ADVANTAGES and DISADVANTAGES

Of SIMULATION

ADVANTAGES

* Minimizes biases of Stakeholders
* Provides focus around most likely outcome
* Allows all specified Risks to vary simultaneously
* Allows answering questions like, “What is the outcome at 90% certainty? How much contingency is enough?”

DISADVANTAGES

* Needs a probability distribution, not always available
* May require special expertise
* Requires specialized computer software
* Inputs must be randomly selected
* Takes many runs to find an output

FINAL NOTE: This tool is highly sophisticated, used in Quantifying the Risks, and often not required for Professional Project Management.