

- Purposes**
1. Produce a realistic risk-based forecast for the cost of project delivery or project ownership.
 2. Assess appropriate financial provisions for cost risk.
 3. Estimate the value of changes to contractual requirements that affect risk exposure or ownership.

Issues involved The need for cost risk forecasts is probably the most common reason for using quantitative risk analysis techniques such as Monte Carlo simulation. However, cost risk models have to be developed with care:

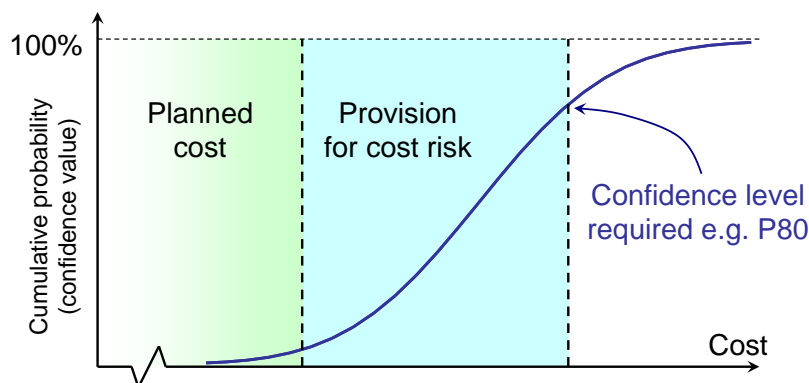
You need a complete and rational risk model. A risk model is required that is rational in that it takes into account all significant sources of uncertainty and the relationships between them whilst avoiding the duplication of risk effects. Developing a rational model usually involves undertaking more than one cycle of a top-down multi-pass process. Summing the effects of a list of low level risks is often irrational.

You need realistic and unbiased risk estimates to run the model. Risk estimates need to be produced by people with appropriate experience who are willing and able to take into account the implications of all significant sources of uncertainty. Being able to do so requires the input from someone with appropriate risk management expertise.

You need a clear understanding of the commercial ownership of risks. A cost risk model must reflect the contractual obligations of the party for which risk is being analysed but not include risks wholly owned by another risk-bearing organisation. (See separate Risk Ownership capability guidance sheet)

You should account for the effects of schedule risk on cost risk. The cost model should be structured to differentiate between costs that are driven by schedule performance and other costs that are not.

Cost risk analysis output



The provision for cost risk may be referred to using terms such as risk fund, risk reserve, or risk contingency. This should be differentiated from any contingency provisioned for the effects of unidentified risk (or unknown unknowns), often referred to as Management Contingency.

Note: unknown unknowns cannot be estimated by this form of risk analysis.

Typical cost risk model structure There is no simple recipe for structuring cost risk models – the best approach to simulating the implications of interdependencies between risks needs to be identified on a case by case basis. However, the structure illustrated below may be appropriate for many projects.

Cost model line item type	Inputs	Outputs
1. Fixed Costs	Fixed values (e.g. fixed price quotations)	Single values
2. Cost line items with uncertain costs	Probability distribution for each line item	Risk-based forecasts
3. Cost line items driven by schedule	Probability distribution for each line item	Risk-based forecasts
4. Risk Events	Estimates for risk probabilities and impacts	Risk-based forecasts
5. Other risk factors	Probability distributions for risks that affect other line items, e.g. simulating exchange rates variance.	Adjusted variance to relevant outputs
	Overall Cost:	<u>Risk-based forecast</u>

Other things to consider Look out for risks with compound effects. For example if the cost per item and the number of items required are both uncertain, the overall risk is calculated as a product, not a sum. Exchange risk is a common example of a risk factor that can have a multiplicative effect on one or more line items in the cost model.

In practice, there will be degrees of co-variance between different elements of the cost model. The implications of this can be simulated with correlation inputs. Failure to include correlation inputs will usually cause the range of overall cost risk to be underestimated; often seriously so.