Cost Estimates and Uncertainties: We will quote the 50% point for each cost estimate.

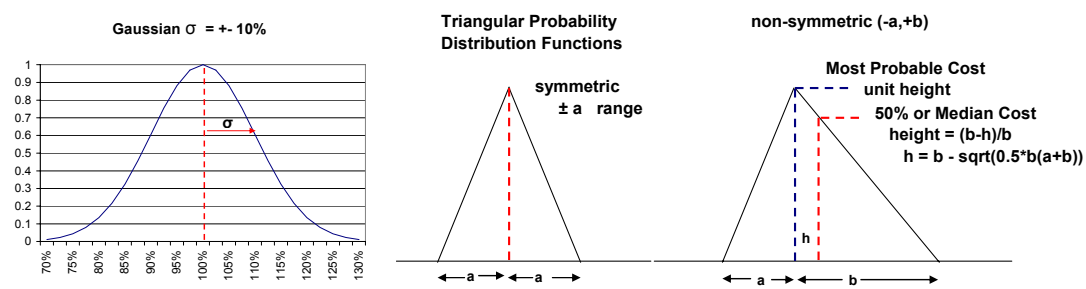
By this we mean that if the procurement or bidding process is repeated many times, there would be a probability distribution for the accepted bid (lowest reasonable cost for required quality). Please note that this is NOT the distribution obtained by going out once for quotation and getting 20 bids back. Some of these may be unacceptably high, and only the lowest acceptable bid would be put into the probability distribution. The 50% point or median estimate is that estimate where 50% of the accepted bids are below that point and 50% are above.

Although this single point is adequate for the first estimate at Vancouver, to complete the RDR we will need an estimate of the uncertainty in the 50% cost estimate for each item, or the spread in the probability distribution function for the cost estimate. Please keep this later requirement in mind while developing the initial cost estimates for Vancouver. If you can get an indication of the spread of the probability distribution for the cost estimate from an industrial source or a consultant or your own experience, please provide that spread. Otherwise, you can fill out the Basis of Estimate checklist

http://www-ilcdcb.fnal.gov/RDR/Basis_of_Estimate.pdf

to describe the maturity of the development of that estimate. DCB will then assign a spread for the probability distribution for that cost estimate, based on the information in its Basis of Estimate.

For simplicity, we will consider only the following examples of probability distributions for cost estimates: Gaussian with r.m.s. or ±σ (symmetric), triangular with maximum spread ±a (symmetric), or triangular with maximum spreads (-a,+b) (non-symmetric with longer tail on high cost side). The symmetric distributions have the most probable cost estimate equal to the 50% estimate or median, while the example below gives the relationship between the offset between the most probable and 50% estimates for the non-symmetric triangular distribution.



Once we have the probability distribution function for each element of the cost estimate, we can then do a probabilistic cost estimate (summed by monte carlo methods) to determine the expected cost probability distribution for the entire ILC construction project, including the statistical uncertainties (some higher costs will balance lower cost) and be able to quote the overall 50% or 90% or 95% points for the estimate.

Notice that we still need correlations between labor, steel, copper, energy, etc.

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