

## Uncertainty

- How to estimate the cost of a project, never been built before?
- What are the associated risks?
- How to take advantage of historical bidding data?
- How to incorporate uncertainty and risks into the final estimate?



## Dypes of Distributions Uniform: Uniform probability across all ranges Dianded by optimistic, pessimistic and mean values Normal Distribution of the sum of a large number of variables is normal A family of distributions defined by location and scale parameters: the mean ("average") and standard deviation ("variability"). Log-normal A variable modeled as log-normal if it can be thought of as the multiplicative product of many small independent factors. Example: Long-term trun rate on a stock investment: it can be

 Example: Long-term return rate on a stock investment: it can be considered as the product of the daily return rates.



