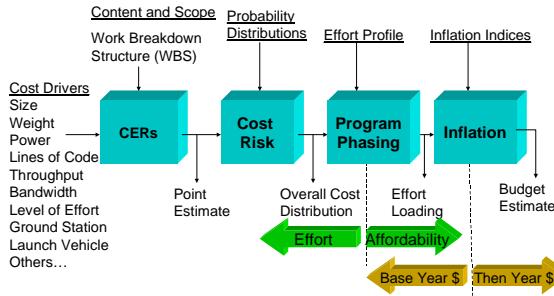


Cost Risk Analysis Quick Reference Card

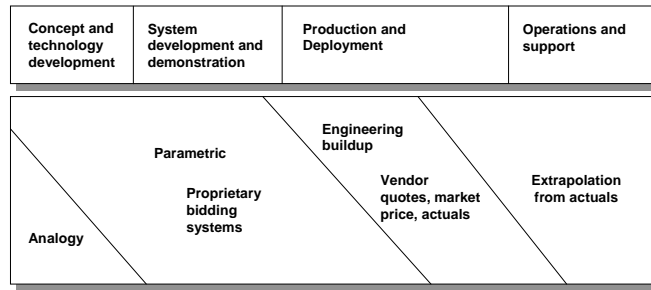
The Cost Estimating Process



Estimating Methods

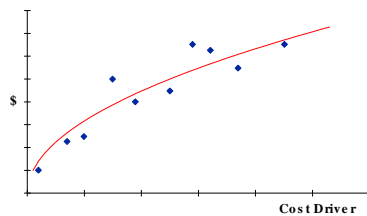
- **Engineering / Expert opinion**
 - Bottoms Up, BOE, BOM
- **Parametric / Commercial cost models**
 - Cost Estimating Relationships
 - Based on many data points
- **Analogy**
 - Direct Analogy, scaled analogy
 - Based on one data point
- **Proprietary bidding systems**
 - Commercial bids, contractor's repository of engineering, analogy and vendor quotes
- **Vendor quotes/ Market price / actuals**
 - Materials costs

Estimating Methods

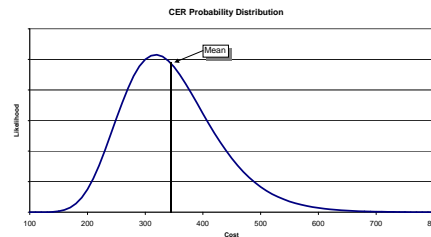


A full estimate is usually a combination of these methods.

Typical Cost Models are Based on Historical Data



And Typical Cost Estimates Have Probability Distributions



Cost Risk Checklist

- ✓ Are all CER inputs modeled as random variables?
- ✓ Are all CER outputs modeled as random variables?
- ✓ Are all CER inputs/outputs correlated with a correlation matrix?
- ✓ Are cost multipliers (e.g., inflation rates, learning curves) modeled as random variables?
- ✓ Is the correlation matrix fully populated or sparse?
- ✓ Have enough Monte Carlo iterations been performed?
- ✓ Is the final cost estimate distribution sufficiently wide?

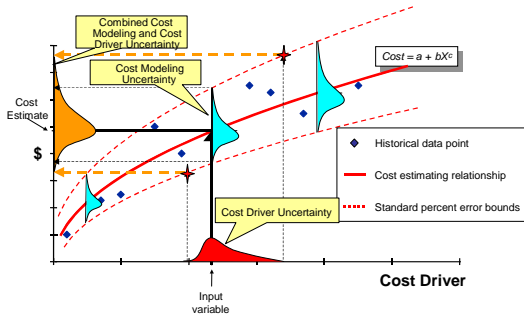
Aerospace Role in Cost Risk Analysis

- Work with customer to evaluate system concepts; determine if objectives can be achieved with acceptable cost and risk.
- Help prepare technical and cost-risk analyses
- Assist in calculation of Most Probable Cost for source selections
- Develop and maintain cost models, analysis tools, databases
- Develop curricula to maintain Aerospace and customer skills
- Provide focal point for cost-risk excellence in space industry

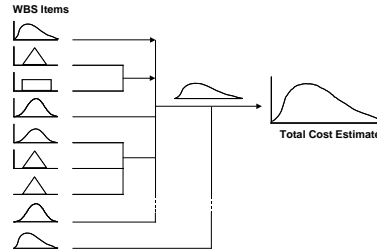


Cost Risk Analysis Quick Reference Card

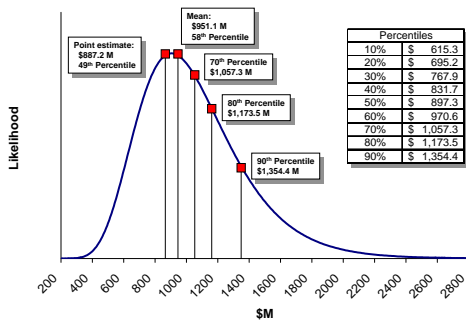
Cost Modeling and Technical Uncertainty



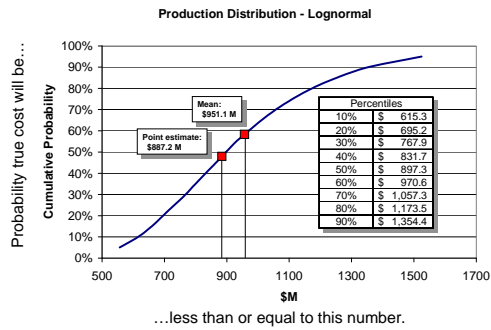
Statistical Roll-Up



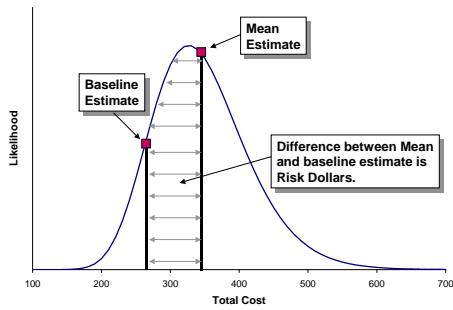
Total Cost Estimate



The "S" Curve



How Many Risk Dollars Are In The Estimate?



How "Risky" Is The Estimate?

