



The Implementation of Risk Analysis in Proposal Evaluations and Cost Models

Travis Winstead

Marcus Oberholzer

SCEA Conference June 2011



Background

- Sole Source vs Competitive Proposals
- Reasons for a sole source procurement
 - C1, C4 exemptions
- Drawbacks of sole source
 - Little incentive for contractors to control costs
- Program offices need additional resources to determine if costs are fair and reasonable

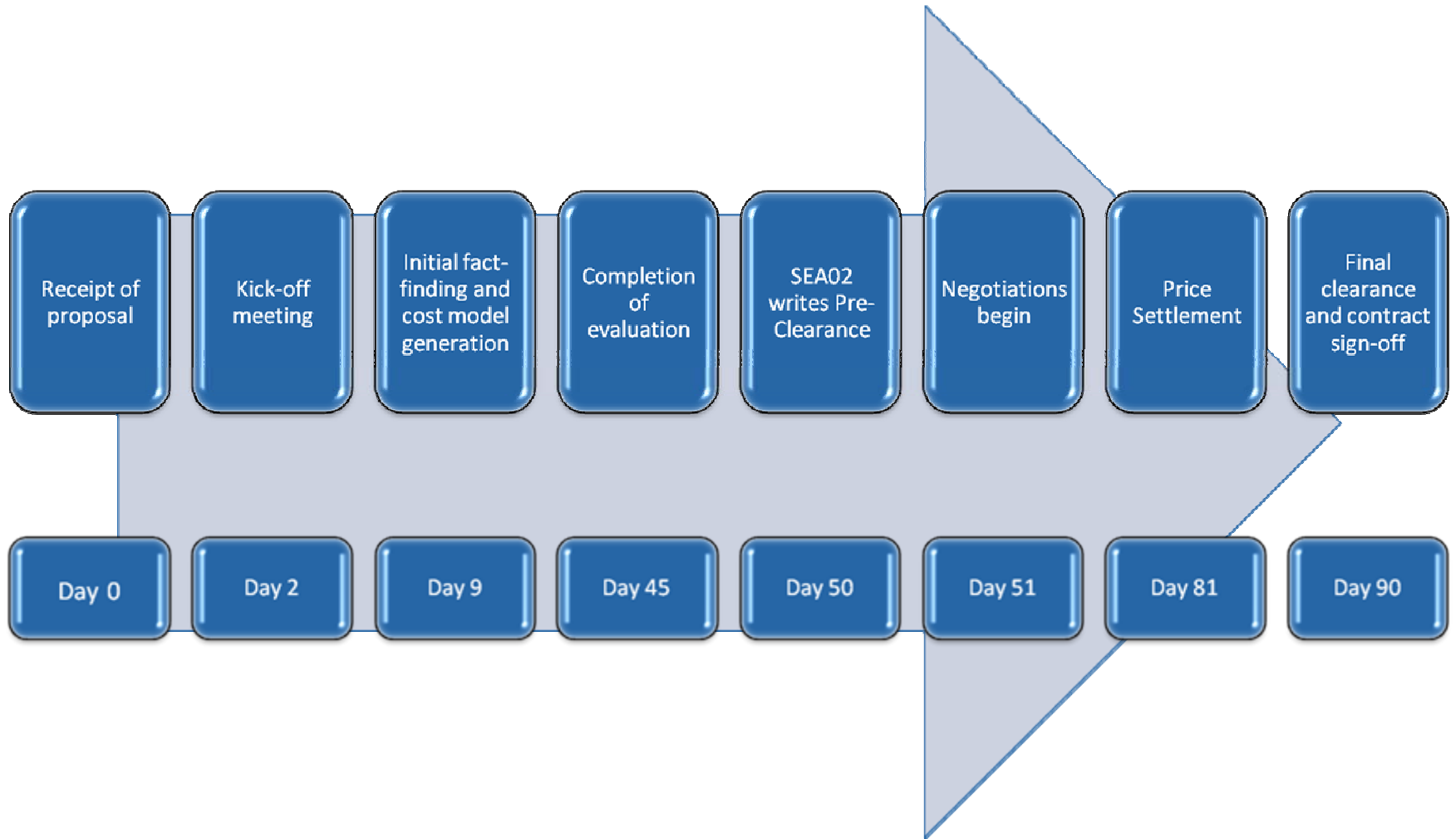


Department of Defense Acquisition

- DoD spends billions of dollars on goods and services per year
- Dr. Ashton Carter's Memo (November 2010)
 - DoD needs more accurate cost estimates to drive better buying power
 - Improve acquisition processes
- How do we achieve this?
 - Utilize a more effective negotiation position and strategy
- Effective risk analysis identifies uncertainties
 - Potential cost outcomes
 - Key cost drivers



Proposal Process





Technical Advisory Report (TAR)

- The TAR is the evaluation to determine if the proposed costs are fair and reasonable.
 - Accompanied by working Excel cost model
- Review includes:
 - Bases of Estimates (BOEs)
 - Direct Material
 - Other Direct Costs (ODC)
 - Labor and burden rates
- Typically results in point estimate
 - Recommended position to start negotiations



Point Estimate vs Range Pricing

- Point estimate provides an educated guess for an unknown cost
 - In what context is the point estimate (mean, mode, percentile)?
 - Limited insight into risks (accuracy) and uncertainty (precision) associated with contract
- Range pricing allows for uncertainty to be incorporated in the cost estimate
 - Also depicts fluctuation of total price based on the inputs supplied



Risk Implementation

- Any cost element in a proposal is subject to some form of risk or uncertainty, including:
 - Labor hours
 - Learning curve slopes
 - Inflation indices
 - Material quotes/pricing
 - Engineering estimates
- To incorporate this risk and uncertainty, each element is assigned a statistical distribution:
 - Distribution chosen based on relevant information for that cost element

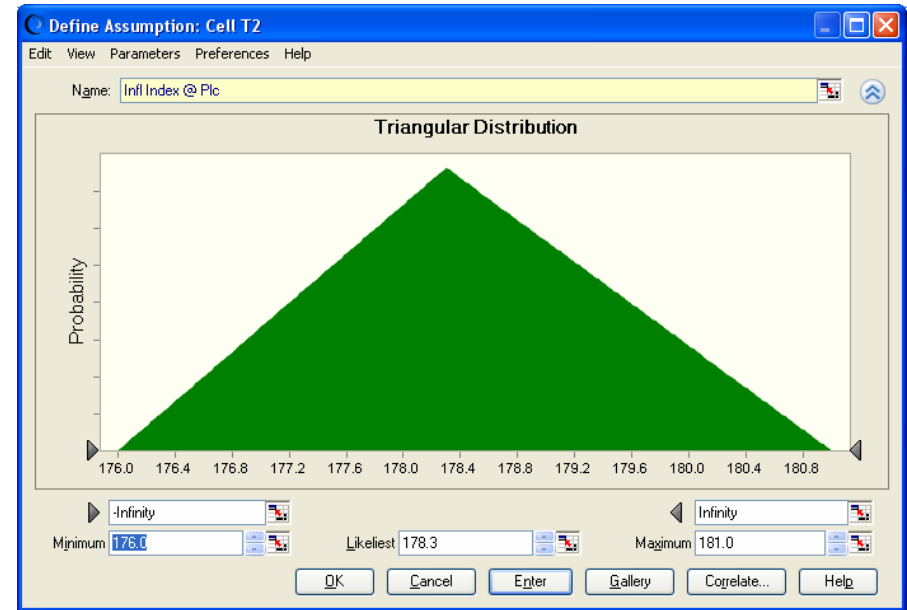


Determining a Distribution

- If historical data for a particular cost element is available, an appropriate distribution can be applied based on that data
 - Rule out all non-significant distributions (F test)
 - Eliminate non-significant variables (t test statistics) within distribution
 - Depending on type of comparison, use either R^2 value or Sum of Squared Errors (SSE)
 - R^2 value for same types of models (linear vs linear, etc)
 - SSE for different types of models (log vs power, etc)
- Data for analogous cost elements is also appropriate
- In the absence of data, Subject Matter Experts (SMEs) can offer valuable information

Distribution Example -Triangle

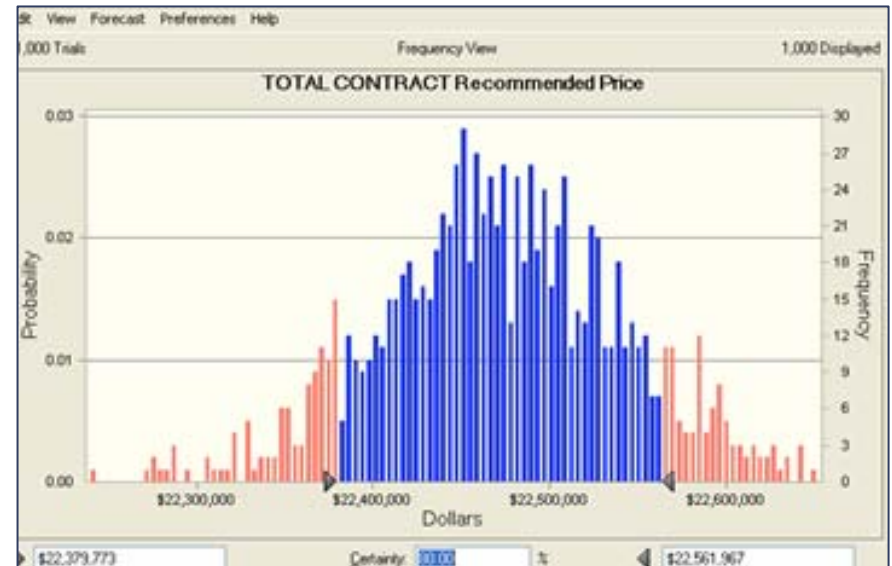
- Triangle distribution parameters:
 - Minimum
 - Maximum
 - Most likely
- Used when little is known about the true distribution
 - SME inputs can serve as parameters
- With this element of risk incorporated into the cost element, the Procuring Contracting Officer (PCO) will have an idea of how these estimates may vary
 - Results in better budget decisions
 - overruns





Monte Carlo Simulation

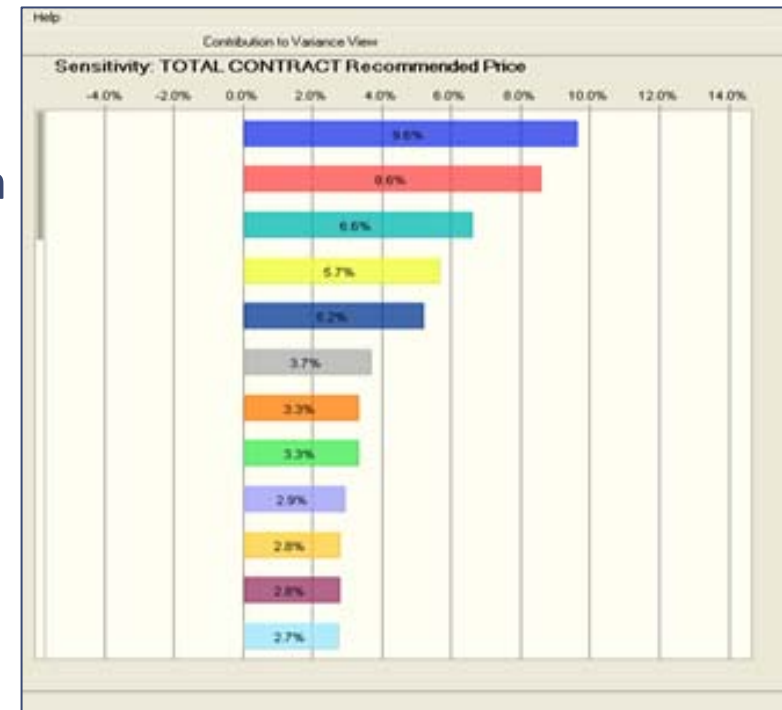
- Crystal Ball used to implement Monte Carlo simulation
 - Probability density function is generated for the total expected cost
 - Confidence interval can be changed to narrow/widen range
- Probability of contract being under budget can be assessed
- Helps develop an understanding of true price of the contract
 - Point estimate will be wrong every time





Cost Element Prioritization

- Tornado chart measures each cost element's impact to final price
 - Single-factor sensitivity analysis
 - Given as a percentage of contribution to variance
- Prioritization allows for focus on most significant cost elements during negotiations
 - Reduces Total Ownership Costs
 - Helpful when schedules are tight





Summary

- Range estimates provide insight into true nature of a contract
 - Point estimates will always be wrong
- Applying distributions to cost elements enhances value of proposal evaluation and reduces uncertainty of estimate
- Tornado chart primary value added cost drivers to focus on during negotiations
- Allows for a more comprehensive assessment of budget vs true cost