Presenting Your Estimate Results

For ACEIT User Workshop

19 Sep 2012

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Outline

- What Makes a Successful Management Review Presentation?
- GAO Guidance on Cost Estimate Presentations
- Preparation for Building the Presentation
- Building the Management Presentation
- Conclusions

What is a Management Review?

- **The last of a series of reviews held by various levels of management**
- **Conducted at a high level of analysis** ***(usually does not involve the details of the estimate)***
- **Estimate validation is a key element of the management reviews**
- **Includes analysis of uncertainty in the estimate**
  - Clearly and concisely explains the probabilistic nature of the estimate
  - Explains how recommended contingency and escalation amounts were developed
  - Explains the cost and uncertainty drivers
  - Explains the cost distribution/ranges
  - It is then up to management to determine the level of risk (and contingency) they are willing to accept
- **Many times management will ask questions concerning alternative scopes or designs**
  - Management will always be questioning the overall cost of the project and will probe to determine if there are lower cost options
  - Always come prepared with:
    - Any earlier design/cost alternatives
    - Knowledge of potential process improvements or technical alternatives
    - The decision tree leading to the selected design
- **The effectiveness of an estimate review relies on:**
  - The information that is presented
  - The manner in which it is presented

SUCCESS in the Management Review is:

Getting the Approval *for your* Estimate

Characteristics of An Effective Management Presentation:

- **Targeted at the Decision Maker**
  - Tailored to the PM's decision style and preference for details/data
  - Keeps the interest of the Decision Maker
  - Attempt to have buy-in from all PM influencers prior to briefing
    - Know who the detractors will be and come prepared to defend your position
- **Focused on the Purpose of the Presentation**
  - Focus discussion (debate) on input values and methodologies – not cost results!!!
  - Guide the decision maker to focus on top cost and variance drivers
    - You are the navigator on this trip
- **Clear and Concise Message**
- **Thoroughly covers key elements of estimate**
- **Includes Results of Robust Sensitivity and Uncertainty Analysis**
  - Analyst's knowledge of estimate sensitivity will aid negotiation and identification of areas where requirement changes and alternative approaches can drive cost reductions

Planning is the most important step in creating a successful presentation of any kind

GAO Cost Guide Ch. 17

- **Cost Estimate Briefing to Management should cover the documented LCCE with an explanation of the program's technical and program baseline**
  1. **Title Page**
  2. **Top Level Outline**
  3. **Estimate's Purpose – why it was developed and what approval is needed**
  4. **Brief Program Overview**
     - Physical Characteristics
     - Performance Characteristics
     - Acquisition Strategy
  5. **Ground Rules and Assumptions (GRA&As)**
  6. **Estimate (time phased in constant-year dollars and tracked to previous estimate)**
  7. **Methodology/Estimating Process. For each WBS cost element show:**
     - Estimating Method for cost drivers and high value items
     - Breakout of the total cost elements and their percentage of the total cost estimate to identify key cost drivers
  8. **Sensitivity Analysis**

GAO Cost Guide – Cont'd

9. **Risk and Uncertainty Analysis Discussion**
   - Cost Drivers
   - Magnitude of outside influences
   - Contingencies
   - Confidence Interval surrounding the point estimate and corresponding S-curve
   - Other historic data for reality checks
   - How Uncertainty, Bounds, and Distributions were defined
10. **Comparison to an independent cost estimate (ICE) – explain differences**
11. **Comparison of estimate (in current-year dollars) to funding profile**
    - Include Contingency reserve based on risk analysis
    - Identify budget shortfalls and impacts
12. **Discussion of other concerns or challenges**
13. **Conclusions and recommendations**

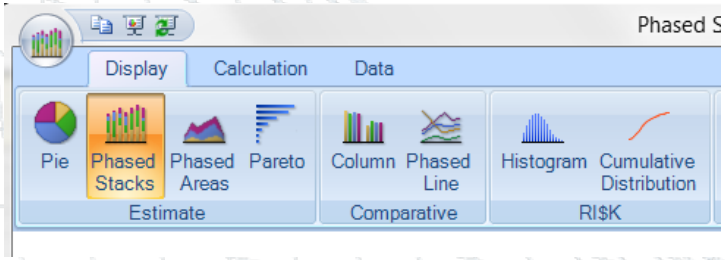
Approval for the estimate (as-is or with modifications) should be sought at Conclusion!

Preparation for Building the Management Presentation

Before Preparing the Presentation

- **Get to know your estimate**
- **Perform analysis prior to building any charts**
  - Develop the plan for how you will focus decision maker on most important elements, inputs, and methodologies in your estimate
  - Build robust POST/Excel file with your data analysis
  - Use all the analytical tools available in ACE and POST

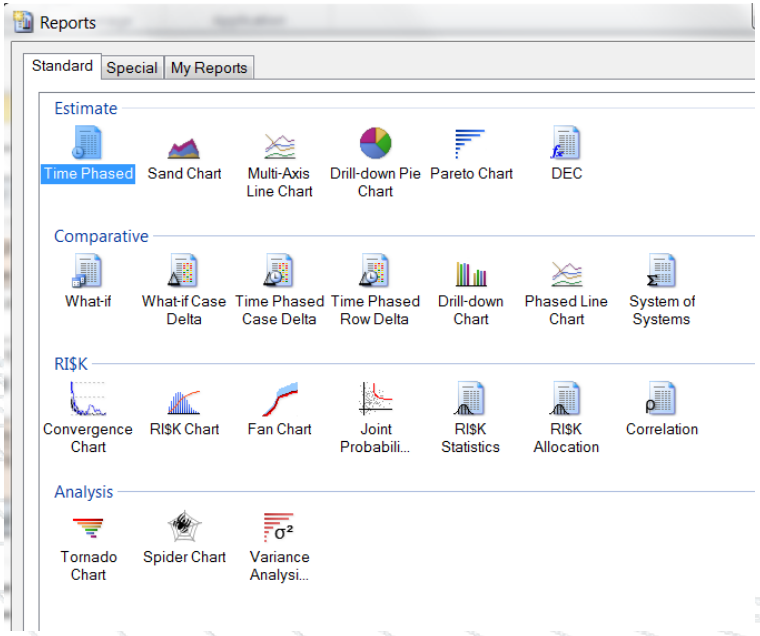
ACE Charts



ACE IRV

ACE Reports

POST Charts



Example File: 07 - Detailed LCC Estimate

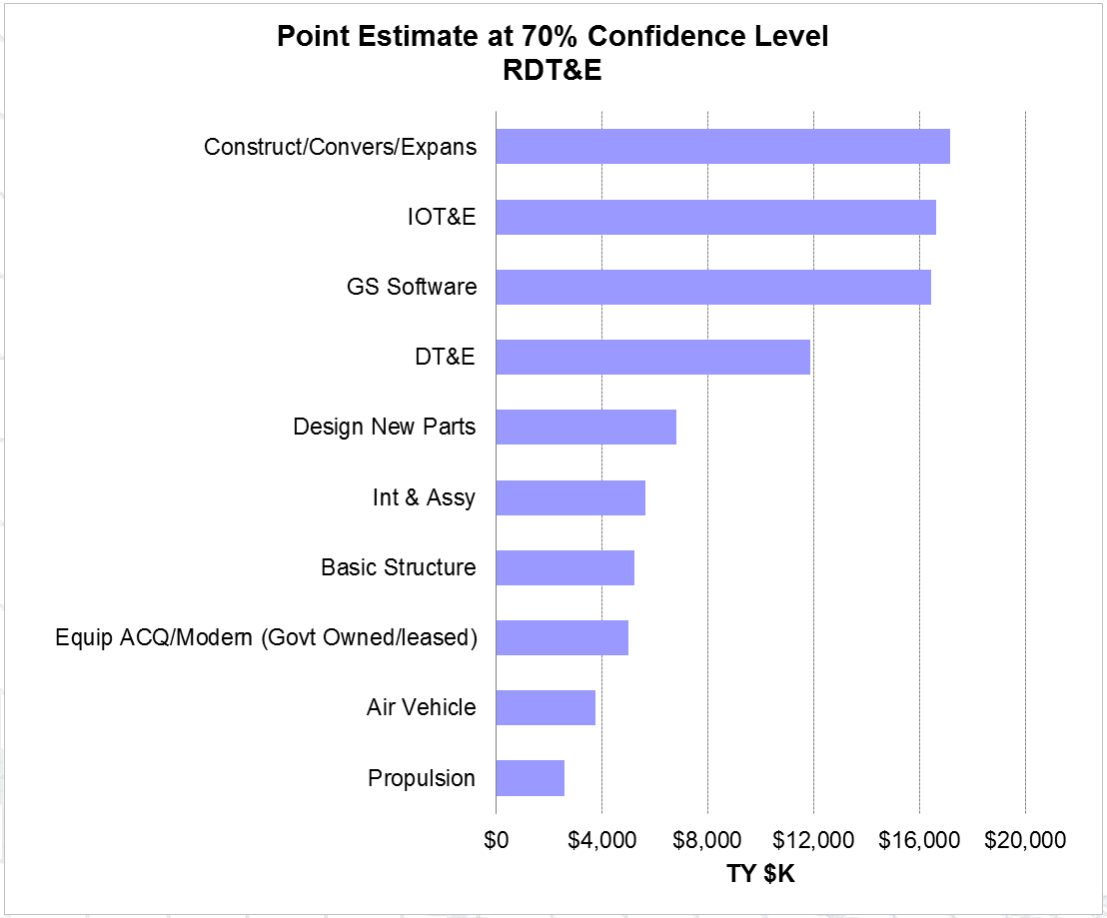
ACE Session Review

- LCC Estimate for an Unmanned Air Vehicle
  - 361 row ACE estimate
    - 90 WBS elements
    - 110 input variables
  - LCC covers FY2008 – FY2030
  - 4 ACE Cases and 4 POST Cases

Case	Sensitive Inputs	Input Range	Delta to Pt Estimate
Point Estimate	Baseline: reflects technical baseline		
Lower Propulsion Cost Scenario	Propulsion Unit Cost	Reduced from 495 2003$K to 450 2005$K	($31,297.9)
New 3010 Budget and AF Buy Quantities	Budget start AF Buy Quantity LRIP and FRP starts	Moved from 2012 to 2014 and decreased by $30K Moved to 2017 start	$7,742.5
Ground Station Mods	Ground Station Software Labor Hours	Reduced from 15,000 to 10,000	($9,323.8)
New OM Plan (POST)	Op Life, operational parameters, and continuing system improvement	Increased from 10 to 11 years, varaiables increased	$29,751.4
Closer to Budget (POST)	Learning curve slope	Reduced from 90% to 85%	($89,129.3)
Staffing Cut (POST)	Contractor Staff and Government Staff	Reduced Contractor Staff from 30 to 15 and Government Staff from 30 to 20	($14,355.8)
70% Probability Estimate (POST)	Risk Adjusted: 70% Probability Estimate Allocated at WBS Lvl 2		$110,233.6

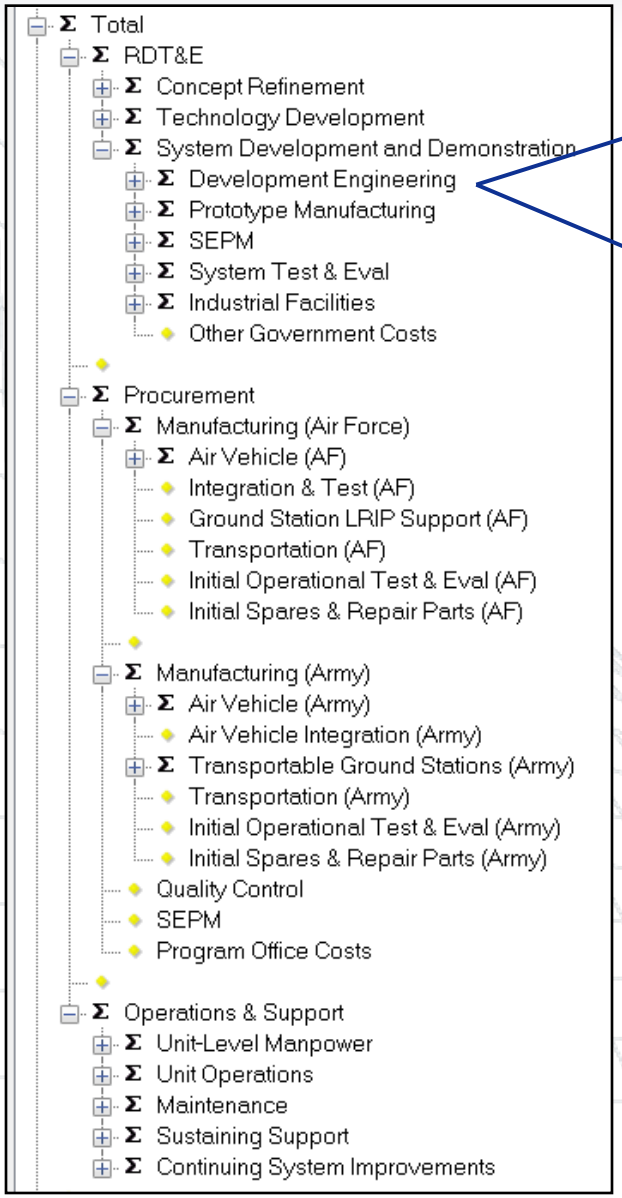
  - Summaries by Phase/Appn/Service
  - Budgets loaded in Session
  - Cost Metrics (risk adjusted and no adjustment)

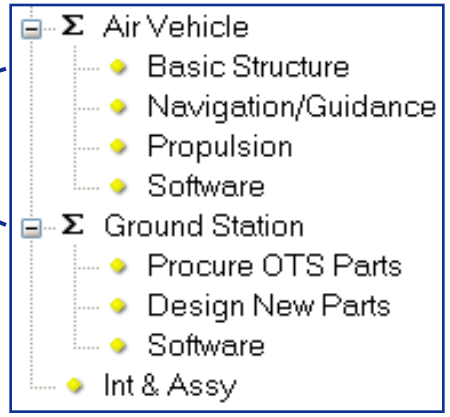
Pareto Chart



- **Pareto Chart:** identifies WBS elements that contribute the most to the target row *total*
- **Rank orders children of the selected WBS row from largest to smallest**
- **Best Practices**
  - TY$
  - Review Baseline and Allocated Risk Case
- **Use to prioritize methodology and GR&A focus**

Key Tools for Analyzing Sensitivity and Uncertainty Impacts





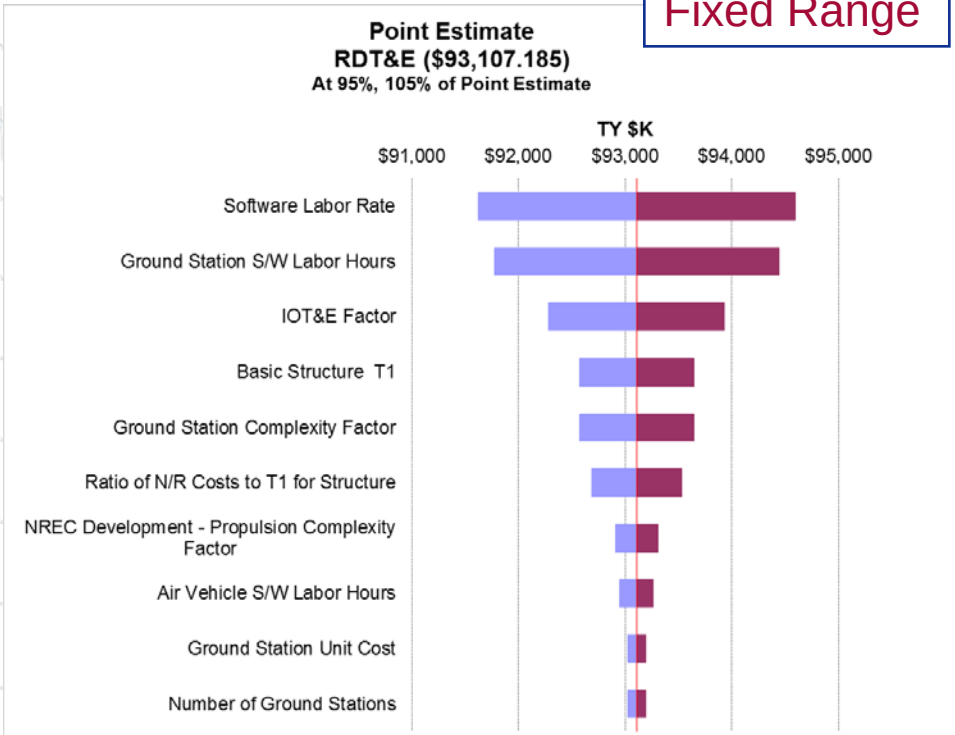
- **Tornado/Spider Chart:** identifies the input variables that most influence the target row *total*
- **Variance Analysis Chart (rollup & driver):** identifies the defined distributions that contribute the most to the target row *uncertainty*

LCC example file has
- 90 WBS elements
- 110 input variables

Want to focus review on most impactful WBS elements and input variables

Tornado Chart

Fixed Range

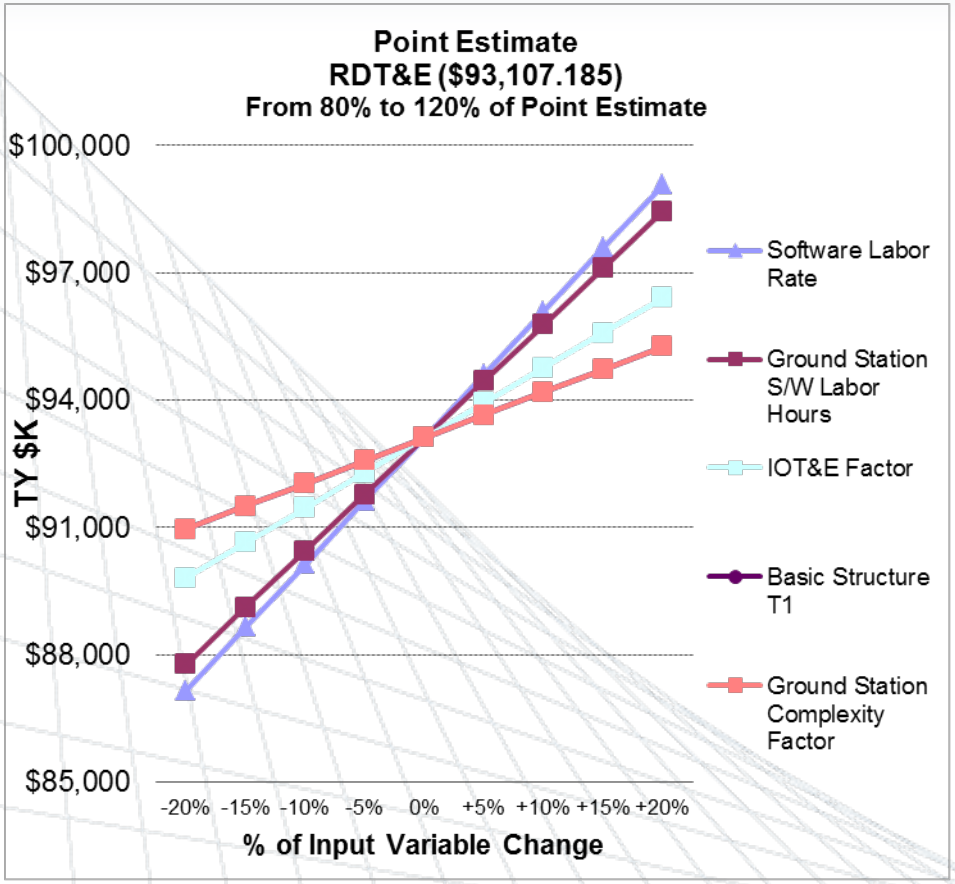


- Displays the impact of changing selected variables that drive the total result of a selected row
- Longer bars mean larger impact
- Drivers can be a mix of Rollup and Input rows *(Restrict to Input Variables when analyzing GR&As)*
- Use fixed range for initial sensitivity analysis on technical baseline
  - **Fixed Range Tornado only show results of varying inputs by a fixed range. This is unlikely to be a valid assumption. Adjust your analysis accordingly!!!**
- Use risk range to evaluate uncertainty parameters
- Exclude drivers that are will not vary by selected levels (+/- 5%). Test other ranges or use spider chart to view impacts at different ranges

		Target Row Results			Fixed Range Inputs		
Drivers (exlcuding Rollup)	**Row**	**Delta**	**-5%**	**+5%**	**Point Estimat**	**-5%**	**+5%**
Software Labor Rate	239	$2,980.478	$91,616.946	$94,597.424	$1.109	$1.053	$1.
Ground Station S/W Labor Hours	238	$2,666.211	$91,774.080	$94,440.291	15000	14250	15750
IOT&E Factor	247	$1,648.008	$92,283.181	$93,931.189	0.45	0.43	0.47
Basic Structure T1	228	$1,074.243	$92,570.064	$93,644.307	$1,512.204	$1,436.593	$1,587.814
Ground Station Complexity Factor	241	$1,073.804	$92,570.283	$93,644.087	1.25	1.19	1.31
Ratio of N/R Costs to T1 for Structure	248	$845.622	$92,684.375	$93,529.996	3.500	3.325	3.675
NREC Development - Propulsion Complexity Factor	249	$397.686	$92,908.342	$93,306.028	0.35	0.33	0.37
Air Vehicle S/W Labor Hours	232	$314.267	$92,950.052	$93,264.319	17500	16625	18375
Ground Station Unit Cost	240	$170.418	$93,021.976	$93,192.394	$533.379	$506.710	$560.048
Number of Ground Stations	242	$170.418	$93,021.976	$93,192.394	2	2	2

For example, vary each variable by +/- 5% and measure the effect on the target row

POST Spider Chart



- Similar to the Tornado chart, plots the impact of changing selected variables that drive the total result of the target row
- Plots results at user specified intervals, between the end points, to plot the driver sensitivity trend
- Useful to identify linear, non-linear, step and trend reversals (if there are any)

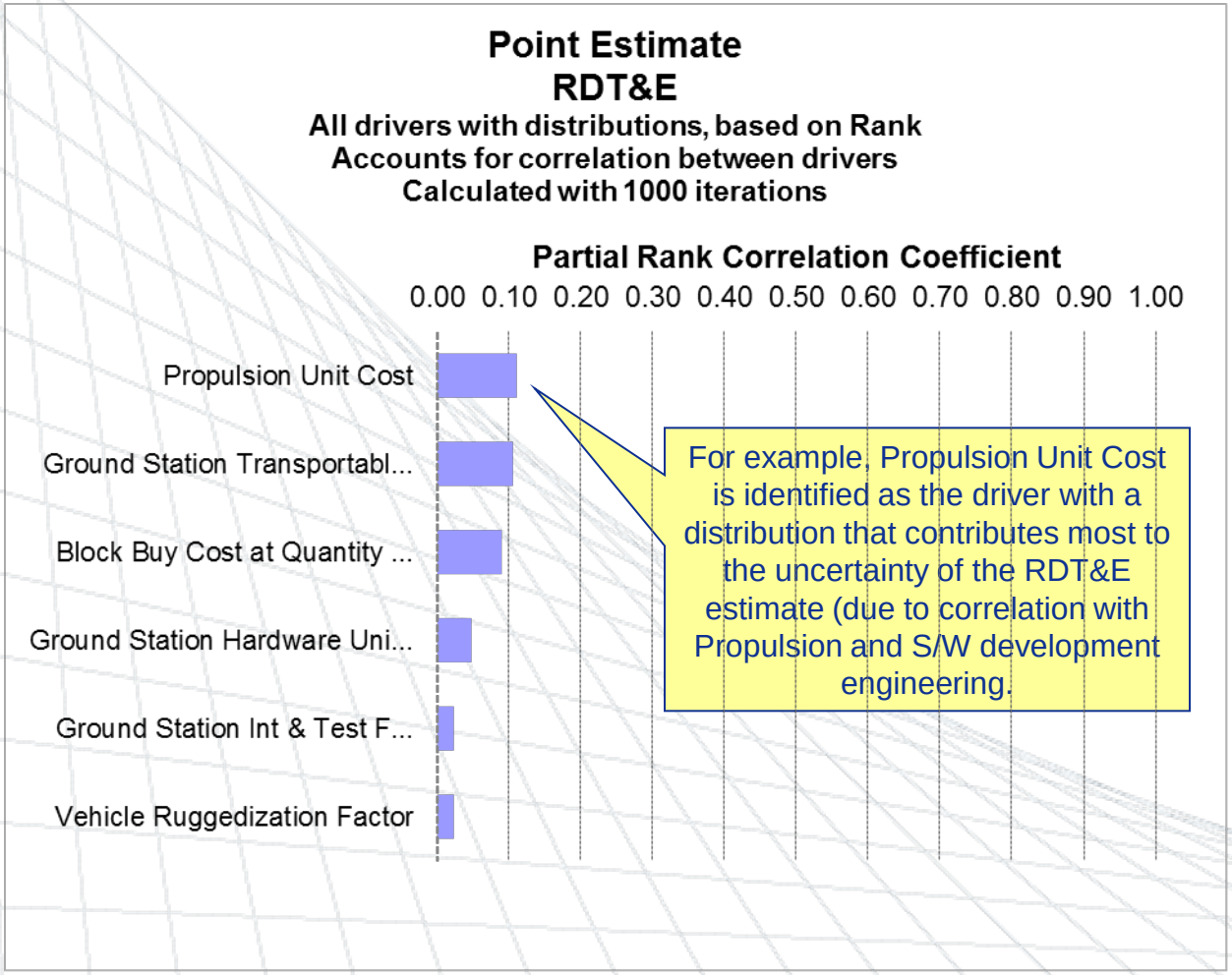
		Target Row Results						Fixed Range Inputs					
Drivers (exlcuding Rollup)	Row	Delta	-20%	-10%	0%	+10%	+20%	Point Estimate	-20%	-10%	0%	+10%	+20%
Software Labor Rate	236	$11,921.912	$87,146.229	$90,126.707	$93,107.185	$96,087.663	$99,068.141	$1.109	$0.887	$0.998	$1.109	$1.219	$1.330
Ground Station S/W Labor Hours	235	$10,664.845	$87,774.763	$90,440.974	$93,107.185	$95,773.396	$98,439.608	15000	12000	13500	15000	16500	18000
IOT&E Factor	244	$6,592.031	$89,811.170	$91,459.178	$93,107.185	$94,755.193	$96,403.201	0.45	0.36	0.41	0.45	0.50	0.54
Basic Structure T1	225	$4,296.974	$90,958.698	$92,032.942	$93,107.185	$94,181.429	$95,255.672	$1,512.204	$1,209.763	$1,360.983	$1,512.204	$1,663.424	$1,814.644
Ground Station Complexity Factor	238	$4,295.216	$90,959.577	$92,033.381	$93,107.185	$94,180.989	$95,254.793	1.25	1.00	1.13	1.25	1.38	1.50

Finding Key Contributors to Total Uncertainty

- **Uncertainty distributions are assigned to**
  - Cost method
  - Cost method inputs
- **The objective of a "Variance Analysis" is to find the most important contributors to the Total uncertainty**
- **POST allows you to quickly examine different types:**
  - **WBS Rollup**: Find WBS elements that contribute the most to total uncertainty (cost contributors)
  - **All Drivers**: Find distributions anywhere in the model (methods or inputs) that contribute the most to total uncertainty
  - **Some Drivers**: Consider a specific subset of distributions in the model
    - For instance, examine only those distributions assigned to input variables (cost drivers)
    - Similar to a Tornado analysis targeting input variables (this can be a source of further confusion)

Variance Analysis Chart

- **Identifies top contributors to the uncertainty of a selected target row**



- Review session closely to see how uncertainty was modeled
- I only included input variables in the Variance Analysis Drivers.
  - Production and O&S input variables show up in the report due to correlation with the uncertainty on the RDT&E WBS element.
  - Problem - Outputs based uncertainty specification for RDT&E
  - None of the RDT&E input variables have uncertainty definitions

Building the Management Presentation for Example File 07 – RDT&E Phase

Management Presentation Agenda

1. Purpose & Scope of Estimate/Program Review
2. Team Composition
3. Estimate Schedule
4. System Description
5. Analogous Systems & Crosschecks
6. Ground Rules & Assumptions
7. Estimating Methodologies
8. Uncertainty Analysis
9. Estimate Results and Comparison to Budget
10. Sensitivity Analysis
11. Issues (Concerns or Challenges)
12. Request for Approval

Source: ACEIT

Example Estimate Review

1. Purpose & Scope of Estimate/Program Review
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GAO Guide Ch 9. Ground Rules & Assumptions

Ground Rules

Ground rules represent a common set of agreed on estimating standards that provide guidance and minimize conflicts in definitions. When conditions are directed, they become the ground rules by which the team will conduct the estimate. The technical baseline requirements represent cost estimate ground rules.

Assumptions

Without firm ground rules, the analyst is responsible for making assumptions that allow the estimate to proceed. In other words, assumptions are required only where no ground rules have been provided. Assumptions represent a set of judgments about past, present, or future conditions postulated as true in the absence of positive proof. The analyst must ensure that assumptions are not arbitrary, that they are founded on expert judgments rendered by experienced program and technical personnel.

Impacts of Changing Ground Rules and Assumptions

Once the risk uncertainty and sensitivity analyses are complete, the cost estimator should formally convey the results of changing assumptions to management as early and as far up the line as possible. The estimator should also document all assumptions to help management understand the conditions the estimate was based on. When possible, the analyst should request an updated technical baseline in which the new assumptions have been incorporated as ground rules.

Source: GAO Cost Estimating and Assessment Guide (Ch 9), March 2009

Ground Rules and Assumptions

- **Where to find GR&A's in your ACE session**
  - Inputs
    - Schedule/Milestone Dates
    - Technical Inputs
    - Factors
    - Analogous Costs or Technical Parameters
  - File Properties
    - Inflation Indices
    - Base Year
  - Work Breakdown Structure
- **Focus Review on the GR&As with biggest impact on Estimate**
  - Use POST to Perform Sensitivity and Uncertainty Analysis to identify top cost and uncertainty drivers (do not add these charts into presentation – use as backup for discussion)
- **Technical Inputs**
  - Organize by Program Phase
  - Focus on inputs that have the biggest impacts in sensitivity analyses or have defined distributions that contribute most to target row uncertainty

GR&As should lay the foundation for where you want to focus the PM's attention during Review!

Example: Ground Rules and Assumptions

- **RDTE Ground Rules and Assumptions**
  - Software Labor Rates: TY$ hourly rates (based on forward pricing rates for Contractor X on Program D)

	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016
Software Labor Rate	$95	$100	$105	$112	$120	$130	$142	$155	$170

  - Software Labor Hrs: Air Vehicle = 17,500 and Ground Station = 15,000 (from CARD)
  - IOT&E Factor: .45 factor (applied to air vehicle and ground station development cost) (Analyst judgment)
  - Basic Structure T1$ = $1,512K (Program D Structure T1$)
  - Ground Station Complexity Factor = 1.25. Factor applied to analogous cost of Designing New Parts on Program Z (Engineering Judgment)

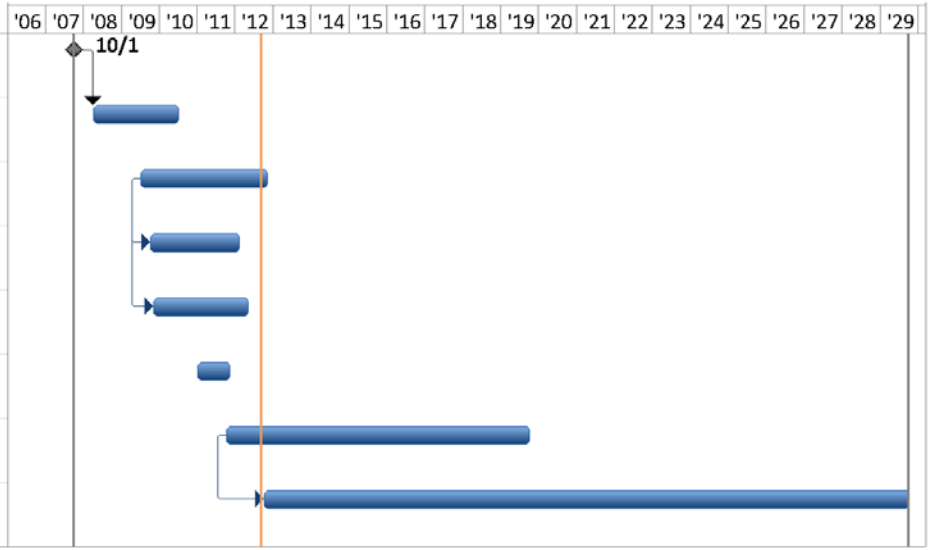
Example (page2)
Ground Rules and Assumptions

- **US Government Inflation Indices 2012**
  - Appropriations:
    - AF – 3010, 3080, 3400, 3500, 3600
    - Army – 2010, 2020, 2031, 2040
  - Base Year – 2012

Schedule

- Did you use the MS Project Plug-in? Is estimate linked to schedule?
- Has a schedule risk assessment been performed?
- Can you explain which elements in your estimate are duration sensitive?

ID	Task Name	Start	Finish
1	Concept Exploration Start	Mon 10/1/07	Mon 10/1/07
2	Technology Development	Sun 3/30/08	Thu 7/1/10
3	Development	Wed 7/1/09	Thu 11/1/12
4	Air Vehicle SW Development	Mon 9/28/09	Wed 2/1/12
5	Ground Development	Thu 10/29/09	Sun 4/29/12
6	Prototype Manufacturing	Sat 1/1/11	Tue 11/1/11
7	Procurement	Sat 10/1/11	Mon 9/30/19
8	O&S	Mon 10/1/12	Sun 9/30/29



Example 1: Work Breakdown Structure*

- Total
  - RDT&E
    - Concept Refinement
    - Technology Development
    - System Development and Dem
      - Development Engineering
      - Prototype Manufacturing
      - SEPM
      - System Test & Eval
      - Industrial Facilities
      - Other Government Costs
  - Procurement
    - Manufacturing (Air Force)
      - Air Vehicle (AF)
      - Integration & Test (AF)
      - Ground Station LRIP Suppor
      - Transportation (AF)
      - Initial Operational Test & Ev
      - Initial Spares & Repair Parts
    - Manufacturing (Army)
      - Air Vehicle (Army)
      - Air Vehicle Integration (Army
      - Transportable Ground Static
      - Transportation (Army)
      - Initial Operational Test & Ev
      - Initial Spares & Repair Parts
    - Quality Control
    - SEPM
    - Program Office Costs
  - Operations & Support
    - Unit-Level Manpower
    - Unit Operations
    - Maintenance
    - Sustaining Support
    - Continuing System Improvemer

RDT&E Review Focus

- Total
  - RDT&E
    - Concept Refinement
      - Contractor A
      - Contractor B
    - Technology Development
      - Contractor A
      - Contractor B
    - System Development and Demonstration
      - Development Engineering
        - Air Vehicle
          - Basic Structure
          - Navigation/Guidance
          - Propulsion
          - AV Software
        - Ground Station
          - Procure OTS Parts
          - Design New Parts
          - GS Software
        - Int & Assy
      - Prototype Manufacturing
        - Air Vehicle
        - Mobile Ground Station
      - SEPM
        - Contactor SEPM
        - Government SEPM
      - System Test & Eval
        - DT&E
        - IOT&E
        - Test Facilities
      - Industrial Facilities
        - Construct/Convers/Expans
        - Equip ACQ/Modern (Govt Owned/leased)
      - Other Government Costs

* Source: Input All Form WBS hierarchy

Example 2: Work Breakdown Structure*

* Source: WBS workscreen report

Total
1.0 RDT&E
1.1 Concept Refinement
1.1.1 Contractor A
1.1.2 Contractor B
1.2 Technology Development
1.2.1 Contractor A
1.2.2 Contractor B
1.3 System Development and Demonstration
1.3.1 Development Engineering
1.3.1.1 Air Vehicle
1.3.1.1.1 Basic Structure
1.3.1.1.2 Navigation/Guidance
1.3.1.1.3 Propulsion
1.3.1.1.4 Software
1.3.1.2 Ground Station
1.3.1.2.1 Procure OTS Parts
1.3.1.2.2 Design New Parts
1.3.1.2.3 Software
1.3.1.3 Int & Assy
1.3.2 Prototype Manufacturing
1.3.2.1 Air Vehicle
1.3.2.2 Mobile Ground Station
1.3.3 SEPM
1.3.3.1 Contactor SEPM
1.3.3.2 Government SEPM
1.3.4 System Test & Eval
1.3.4.1 DT&E
1.3.4.2 IOT&E
1.3.4.3 Test Facilities
1.3.5 Industrial Facilities
1.3.5.1 Construct/Convers/Expans
1.3.5.2 Equip ACQ/Modern
1.3.6 Other Government Costs

2.0 Procurement
2.1 Manufacturing (Air Force)
2.1.1 Air Vehicle (AF)
2.1.1.1 Basic Structure (AF)
2.1.1.2 Navigation/Guidance (AF)
2.1.1.3 Propulsion (AF)
2.1.2 Integration & Test (AF)
2.1.3 Ground Station LRIP Support (AF)
2.1.4 Transportation (AF)
2.1.5 Initial Operational Test & Eval (AF)
2.1.6 Initial Spares & Repair Parts (AF)
2.2 Manufacturing (Army)
2.2.1 Air Vehicle (Army)
2.2.1.1 Basic Structure (Army)
2.2.1.2 Navigation/Guidance (Army)
2.2.1.3 Propulsion (Army)
2.2.2 Air Vehicle Integration (Army)
2.2.3 Transportable Ground Stations (Army)
2.2.3.1 Ground Station Hardware (Army)
2.2.3.2 Transportable Vehicle (Army)
2.2.3.3 Vehicle Ruggedization (Army)
2.2.3.4 Integration & Test (Army)
2.2.4 Transportation (Army)
2.2.5 Initial Operational Test & Eval (Army)
2.2.6 Initial Spares & Repair Parts (Army)
2.3 Quality Control
2.4 SEPM
2.5 Program Office Costs

3.0 Operations & Support
3.1 Unit-Level Manpower
3.1.1 Operations
3.1.1.1 Airforce Ops
3.1.1.1.1 Officers
3.1.1.1.2 Enlisted
3.1.1.1.3 Civilians
3.1.1.2 Army Ops
3.2 Unit Operations
3.2.1 Operating Material (AF)
3.2.1.1 Basic Structure (AF)
3.2.1.2 Navigation/Guidance
3.2.1.3 Propulsion
3.2.2 Operating Material (Army)
3.2.2.1 Basic Structure (Army)
3.2.2.2 Navigation/Guidance
3.2.2.3 Propulsion
3.2.3 Support Services
3.3 Maintenance
3.3.1 Organizational Maintenance
3.3.2 Intermediate Maintenance
3.3.3 Depot Maintenance
3.4 Sustaining Support
3.4.1 H/W Maintenance
3.4.2 S/W Maintenance
3.4.3 SEPM
3.5 Continuing System Improvements
3.5.1 Hardware Modifications/Modernization
3.5.2 Software Maintenance & Modifications

Example Estimate Review

1. Purpose & Scope of Estimate/Program Review
2. Team Composition
3. Estimate Schedule
4. System Description
5. Analogous Systems & Crosschecks
6. Ground Rules & Assumptions
7. **Estimating Methodologies**
8. Uncertainty Analysis
9. Estimate Results and Comparison to Budget
10. Sensitivity Analysis
11. Issues (Concerns or Challenges)
12. Request for Approval

Estimating Methodologies and Results

- **Determine whether your decision maker is detail oriented or more of a big picture style decision maker**
- **Need to balance decision makers preferred style with time available for presentation and review**
- **3 Approaches**
  - Detailed: Show methodologies, inputs, uncertainty, and results for each element in detail
    - This approach combines Methodology and Uncertainty Reviews
  - Summary of Methodologies: Provide methodology qualitative description only and draw attention to larger cost passengers
    - Do not review $ results until after you have presented the Uncertainty Analysis Section
  - Hybrid Approach: Combination of Detailed and Summary Approach
    - Cover methodologies and inputs for all elements of the estimate

Example 1: Detailed Methodologies

1.3.1.1.2 RDT&E Air Vehicle Development Engineering Navigation Guidance

70% CL estimate (allocated) = $1,476.9 TY$K Point Estimate = $1,431.4 TY$K

Methodology: Parametric: 425.555 + 25.555 * Navigation Guidance Weight (1994 $K)

Inputs: Navigation Guidance Weight (lbs)= 25

Source: CER developed in 1994 based on 10 Military, NASA and commercial unmanned satellite programs.

Navigation Guidance Weight is a ground rule documented in the CARD

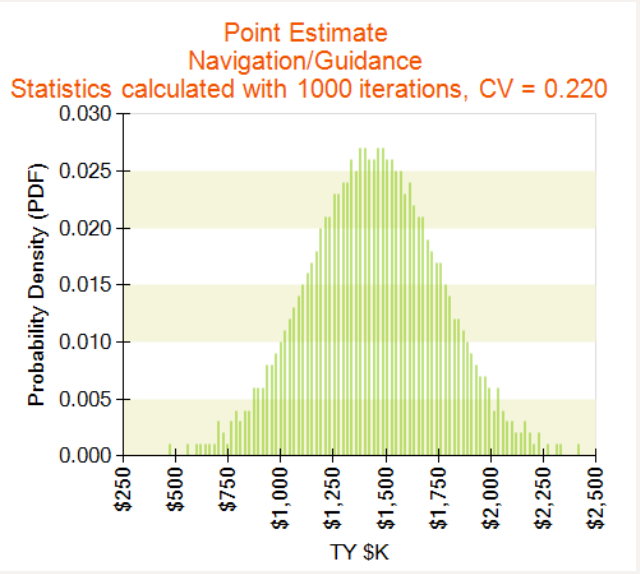
Time Phasing: 60/40 beta curve covering duration of Development (2009-2013)

70%CL TY$K (allocated)

WBS	Total	2008	2009	2010	2011	2012	2013
Navigation/Guidance	$ 1,476.9		$ 60.5	$ 752.5	$ 540.0	$ 123.4	$ 0.5

Cost Risk Methodology: CER Uncertainty – Normal Distribution CV=.22

Based on CER objective Data



Notice: I reported the allocated 70%CL estimate, but my PDF is for the statistical results. Be prepared to discuss what the difference is between those two.

Why do you think I am using the allocated results?

Example 2: Methodology Summary

- Concept Refinement – Budget constrained TY throughput
- Technology Development – Analogy to Program X
- **Development Engineering**
  - Air Vehicle
    - **Basic Structure is analogy to Program D**
    - Navigation/Guidance is weight based CER
    - Propulsion is analogy to Program Y with a complexity adjustment
    - Software is buildup based on hour estimate from Engineer Q
  - Ground Station
    - Off the Shelf Parts is analogy to Program Z
    - **New Parts are analogy to Program Z with complexity adjustment (Engineering Judgment)**
    - **Software: Buildup based on projected SW Labor Rates (Hourly) from Contractor X forward pricing rates and total hour estimate from Engineer Q**
  - Integration & Assembly – Factor based on analogy to Program C applied to Air Vehicle and Ground Station Development cost
- Prototype Manufacturing – Factors for Air Vehicle and Mobile ground Station (from command level handbook) applied to T1$
- Systems Engineering/Program Management – Buildup: Contractor and Government Average rates time average staff projection (Engineering Judgment)
- System Test & Evaluation
  - **DT&E is Analogy to Program Z**
  - **IOT&E – Factor** (Analyst judgment) applied to air vehicle and ground station development cost
  - Test Facilities is Analogy to Program Z
- **Industrial Facilities**
  - **Construction/Convers/Expans is Analogy to Program Z**
  - Equip ACQ/Modern – Factor (analyst judgment) applied to Construction Cost
- Other Government Costs – TY Throughput based on available budget

- Animations, font sizes and colors used to draw attention to larger cost elements
- Purpose of this slide is to get buy in to general methodology approach
- No Numbers on this slide
- Analogous Programs should be reviewed prior to this slide

Example 3: Hybrid Methodology Review

RDT&E TY$	WBS#	Element	Meth. Type	Description	Source Data
16.5%	1.3.5.1	Construct/Conver/Expan	Analogy	Program Z	Program Z Industrial facilities costs reported in SAR (dtd Dec06)
16.0%	1.3.4.2	IOT&E	Factor	Factor x (Air vehicle development cost + Ground	Factor is based on analyst judgment
15.8%	1.3.1.2.3	GS Software	Buildup	Hours x Rate	Hour Estimate from Engineer Q and rates fromForward Pricing Rates for Contractor X on Program D
11.4%	1.3.4.1	DT&E	Analogy	Program Z	Program Z DT&E costs reported in SAR (dtd Dec06)
6.5%	1.3.1.2.2	Design New Parts	Analogy	Program Z with complexity adjustment	Nonrecurring Program Z Design Cost from CCDR (dtd 2Apr04) and Complexity Factor from Engineer A
5.4%	1.3.1.3	Int & Assy	Factor	Factor x (Air vehicle development cost + Ground station development cost)	Factor Developed from Analysis of Program C CPR (dtd Oct2007)
5.0%	1.3.1.1.1	Basic Structure	Analogy	Structure T1 cost from Program D times Ratio of N/R Costs to T1 for Structure	Program D CCDR for Structure T1$ (dtd 05Feb03), Ratio of N/R Costs to Structure T1 from ABC Factors List
4.8%	1.3.5.2	Equip ACQ/Modern	Factor	Factor x Contruct/Convers/Expans Cost	Factor is based on analyst judgment
4.2%	1.2	Technology Development	Analogy	Assume Technology development equivalent tp that of Program B	Verbal provided by Program B Financial Manager (12Nov11)
4.1%	1.3.2	Prototype Manufacturing	Factor	Factor x (Air vehicle development cost + Ground station development cost)	Factors from Command Level Handbook

- Prioritized based on pareto chart
- Purpose of this slide is to get buy in to general methodology approach
- Clearly identifies importance, methodology and source data

Example Estimate Review

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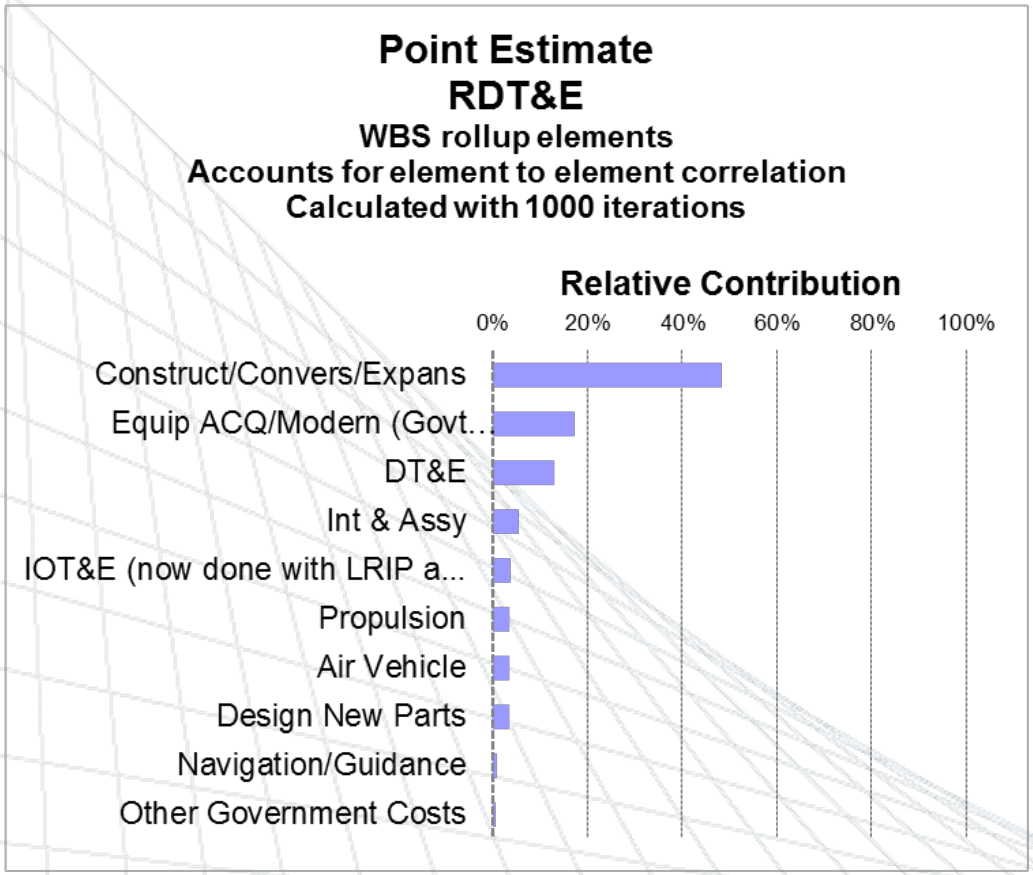
12. Request for Approval

Uncertainty Analysis

- **Make Sure the Reviewer Understands what Uncertainty is**
  - Sources of Uncertainty
    - Estimating methodologies
    - Input Variables (technical, cost, schedule, factors, etc.)
    - Correlation
    - Discrete Risks
  - Where and How Uncertainty is Defined in your Model
    - Variance Analysis Chart Can Help you Identify Locations and Impacts of Uncertainty
  - Uncertainty Analysis Results
    - CDF – S Curves (with CV specified)
- **Risk Charts to Include in Briefing**
  - Risk Approach
  - Risk Review
  - Risk Results

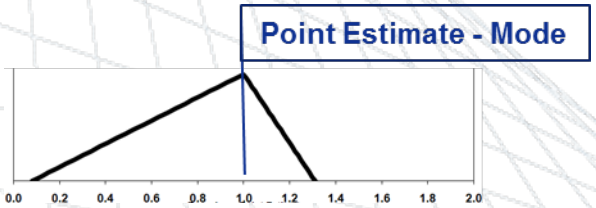
Analyst review of Variance Analysis Chart



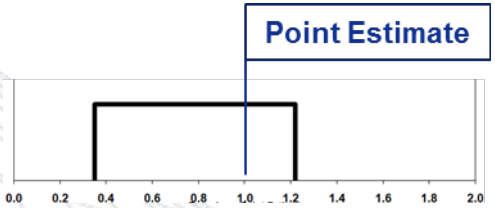
- **WBS Rollup and relative contribution to RDT&E total uncertainty**
  - RDT&E Input Variables did have uncertainty on them
- **I would not include this chart in the briefing**
  - Use it to determine where to focus the decision maker's attention on uncertainty

Example: Risk Approach

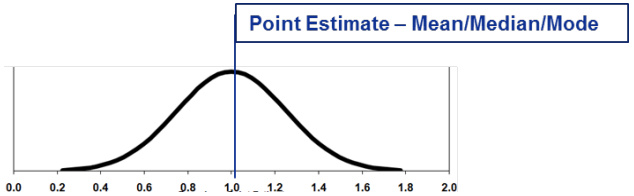
- RDT&E Uncertainty
  - Objective uncertainty on cost estimating relationships
  - Subjective assessment on analogy and factor uncertainty
  - Cost inputs consistent with most likely
- 3 Distribution Shapes in RDT&E Uncertainty



Triangular



Uniform

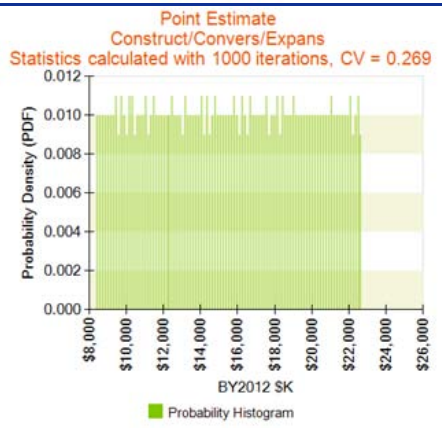


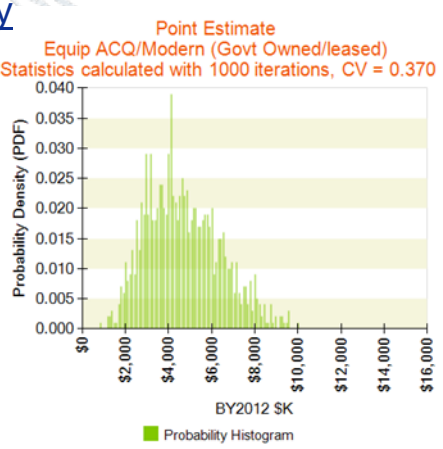
Normal

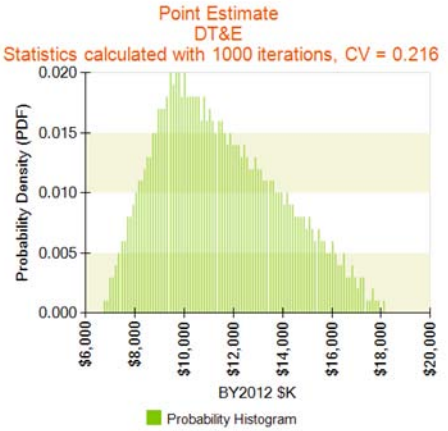
Example: Risk Review

WBS/CES Description	Point Estimate	70% Estimate	Equation / Throughput	RI$K Specification
RDT&E	$93,316.131	$104,059.552		
System Development and Demonstration	$87,790.847	$98,732.923		
Development Engineering	$40,895.551	$41,092.729		
Air Vehicle	$11,198.275	$11,183.692		
Navigation/Guidance	$1,456.794	$1,476.940	425.555 + 25.555 * PCDWT	Normal, PE=Mean, CV=0.22
Propulsion	$2,489.100	$2,568.911	6000 * NREC_Prop_Cplx%	Normal, PE=Mean, High*=135, High%=85
Ground Station	$24,363.074	$24,280.378		
Design New Parts	$6,667.233	$6,799.049	4500 * Complex	Normal, PE=Mode, Spread=Low
Int & Assy	$5,334.202	$5,628.658	.15 * (AV$.FYTOT + GS$.FYTOT)	Normal, PE=Mode, Spread=Medium
Prototype Manufacturing	$3,829.371	$4,311.742		
Air Vehicle	$3,432.671	$3,752.183	1.5 * AV_T1$	Normal, PE=Mean, CV=0.25
Mobile Ground Station	$396.700	$559.559	1.75 * TGS_T1$	Normal, PE=Mean, CV=0.3
System Test & Eval	$25,840.480	$28,849.661		
DT&E	$9,482.287	$11,860.164	8000	Triangular, PE=Mode, Spread=Medium, Skew=Right
IOT&E	$16,002.607	$16,619.388	TestFact * (AV$.FYTOT + GS$.FYTOT)	
Test Facilities	$355.586	$370.110	[Cost Throughput]	Normal, PE=Mean, CV=0.15
Industrial Facilities	$15,408.716	$22,134.602		
Construct/Convers/Expans	$11,852.859	$17,136.028	10000	Uniform, PE=Mode, Spread=High, Skew=Right
Equip ACQ/Modern	$3,555.858	$4,998.574	.3 * Const$	Normal, PE=Mode, Spread=Medium

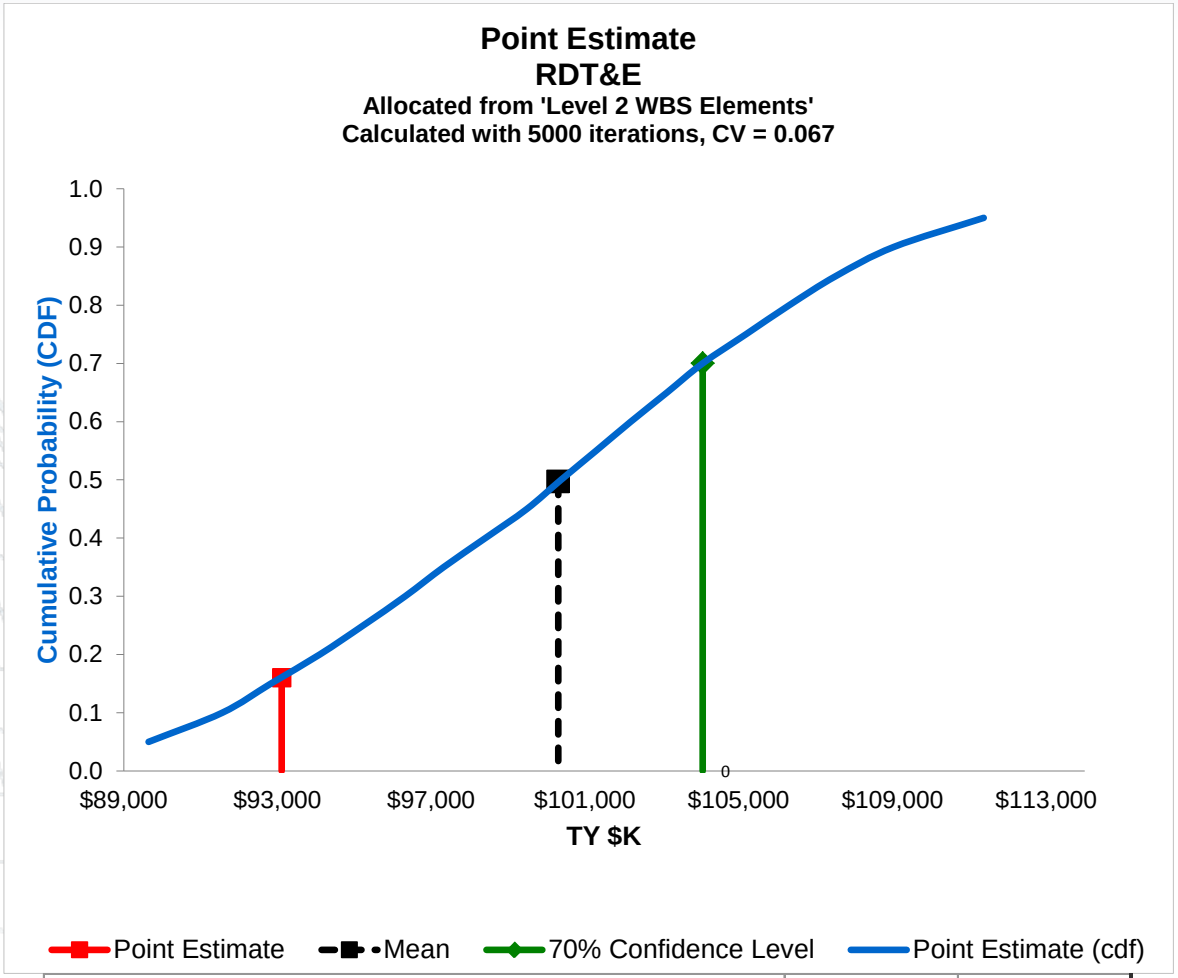
Top Contributors to RDT&E Uncertainty







Example: Risk Results



Markers	Costs	Confidence
Point Estimate	$93,107.185	16.0%
Mean	$100,305.112	49.7%
70% Confidence Level	$104,059.552	70.0%

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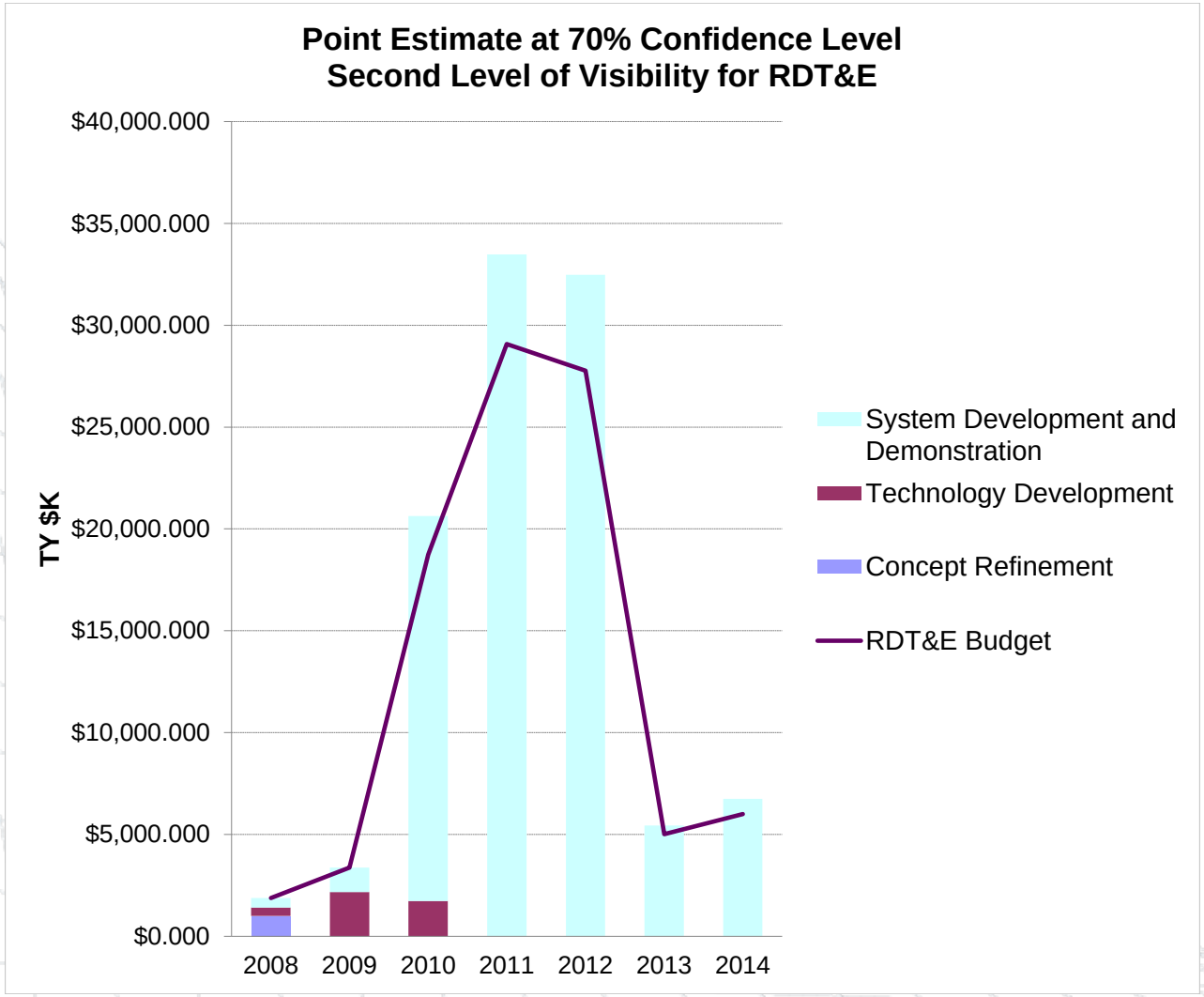
Example: Detailed Estimate

Funding in TY $K	Point Estimate	70% Estimate	RISK $
RDT&E	$93,107.185	$104,059.552	$10,952.367
Concept Refinement	$1,000.000	$1,000.000	
Contractor A	$500.000	$500.000	
Contractor B	$500.000	$500.000	
Technology Development	$4,326.630	$4,326.630	
Contractor A	$2,158.348	$2,158.348	
Contractor B	$2,168.281	$2,168.281	
System Development and Demonstration	$87,780.556	$98,732.923	$10,952.367
Development Engineering	$40,527.525	$41,092.729	$565.205
Air Vehicle	$11,015.058	$11,183.692	$168.635
Basic Structure	$5,200.593	$5,200.593	
Navigation/Guidance	$1,431.439	$1,476.940	$45.501
Propulsion	$2,445.778	$2,568.911	$123.133
Software	$1,937.248	$1,937.248	$0.000
Ground Station	$24,118.260	$24,280.378	$162.118
Procure OTS Parts	$1,047.999	$1,047.999	
Design New Parts	$6,636.931	$6,799.049	$162.118
Software	$16,433.330	$16,433.330	
Int & Assy	$5,394.207	$5,628.658	$234.452
Prototype Manufacturing	$3,862.430	$4,311.742	$449.312
Air Vehicle	$3,459.781	$3,752.183	$292.401
Mobile Ground Station	$402.649	$559.559	$156.910
SEPM	$24.394	$24.394	
Contactor SEPM	$11.400	$11.400	
Government SEPM	$12.993	$12.993	
System Test & Eval	$26,300.612	$28,849.661	$2,549.049
DT&E	$9,461.264	$11,860.164	$2,398.899
IOT&E (now done with LRIP articles per DoDI 5000.2.	$16,480.077	$16,619.388	$139.310
Test Facilities	$359.271	$370.110	$10.840
Industrial Facilities	$15,315.595	$22,134.602	$6,819.007
Construct/Convers/Expans	$11,781.227	$17,136.028	$5,354.801
Equip ACQ/Modern (Govt Owned/leased)	$3,534.368	$4,998.574	$1,464.206
Other Government Costs	$1,750.000	$2,319.795	$569.795

Example: RDT&E 70% Estimate vs. Budget



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Sensitivity Analysis

- **If the presentation is planned properly, sensitivity will be addressed during the GR&A's, methodologies, and uncertainties**
- **Present sensitivity as a standalone only if you think you will be unable to convey the results of sensitivity analysis while covering other areas**
  - Prepare charts and have them available in backup to support discussion
    - Tornado
    - Spider
    - Analysis of Variance
    - Pareto
  - These charts were introduced in slides 12-18

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Request for Approval

- This is the most important step
- Focus “negotiation” on adjusting technical parameters and not results
- Try to avoid decision maker directives like “Make changes and then come back and show me the results”

Conclusion

- **There is no magic formula to the management review presentation. Prepare the following and you will increase your chance of success:**
  - Presentation Targeted to the Decision Maker
  - Presentation Focused on Driving Your Key Points
  - Clear and Concise Message
  - Thoroughly cover the key elements of estimate
  - Utilize Results of Robust Sensitivity and Uncertainty Analysis to Prepare and Negotiate your Estimate
- **Key ACEIT Features that can be leveraged**
  - Case Management for Sensitivity Analysis
  - Input All Form WBS Hierarchy
  - ACE Reports: Workscreen Reports
  - Time Phased Reports, Sand Charts, Pareto, Comparative
  - Risk and Analytic Charts
    - Analysis Charts: Tornado, Spider. Variance Analysis

Planning is the most important step in creating and delivering a successful Management Review.

QUESTIONS ???