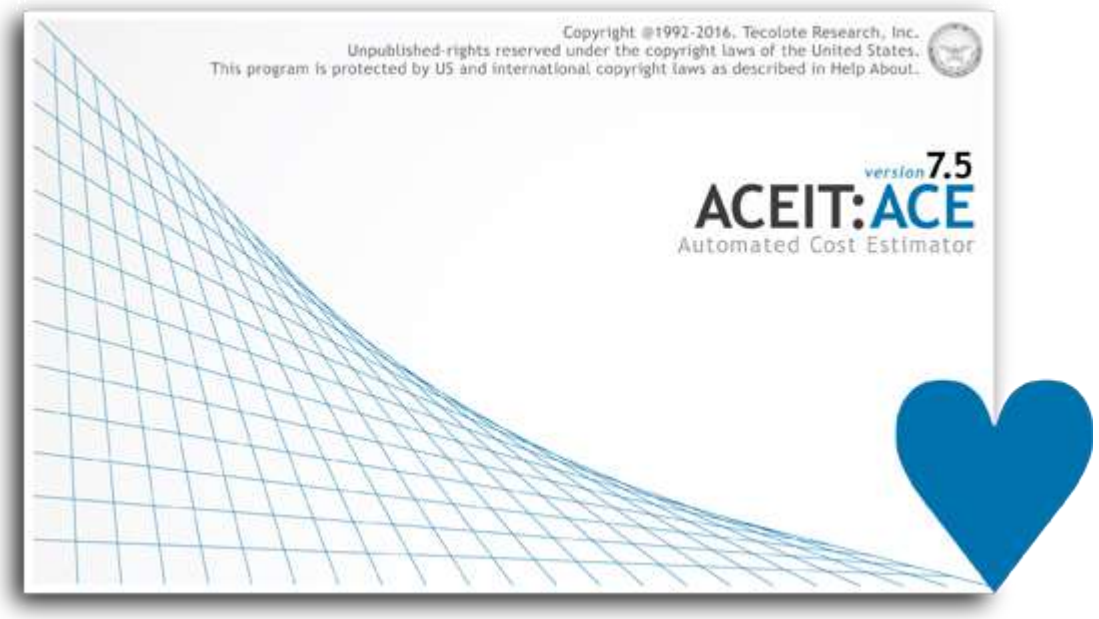
ACEIT Overview

Version 7.5

released August 2016

Tecolote Research, Inc.

Outline

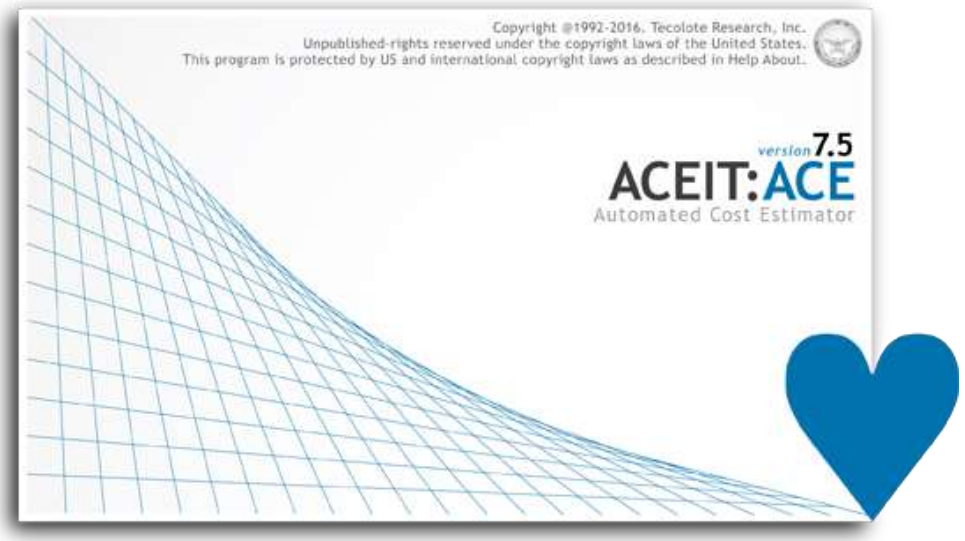


- **ACEIT Overview**
- **ACEIT in Action**
  - ACE Basic
  - Incorporating Uncertainty Analysis
  - Generating Reports and Presentations
  - Analyzing an Estimate
  - CO$TAT
  - JACS

The ACEIT Concept

- **Goals**
  - Bring structure and consistency to the cost analysis process
  - Allow analysts to focus on estimate methodology rather than spreadsheet mechanics
  - Incorporate approved processes to perform repetitive functions: WBS building and summing, inflation, learning curves, phasing, adjustments (fee, G&A, OH), risk, documentation, reports, etc
    - This eliminates many sources of potential errors found in spreadsheets
  - Promotes efficient, systematic cost estimating approach and standardized methodology/auditing/documentation/reporting
- **Team Approach to Develop ACEIT for and by Cost Analysts**
  - Multi-Service funding sources for development (US Army is current lead)
  - Available to governments, support contractors and commercial users

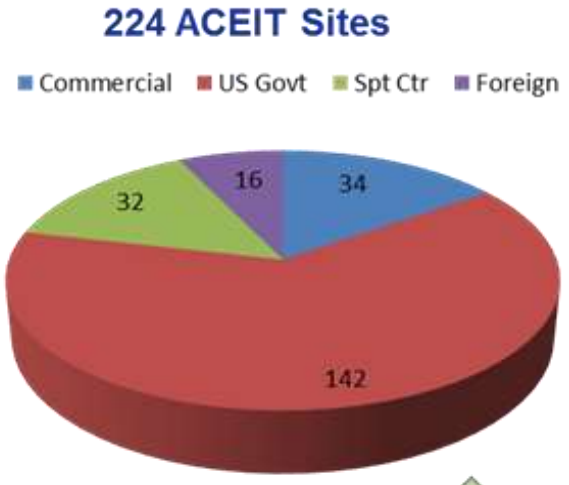
ACEIT is Widely Accepted

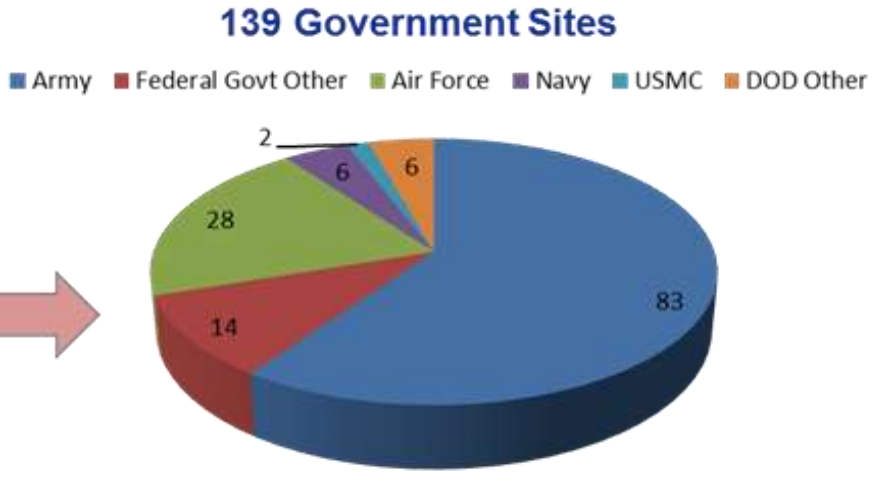


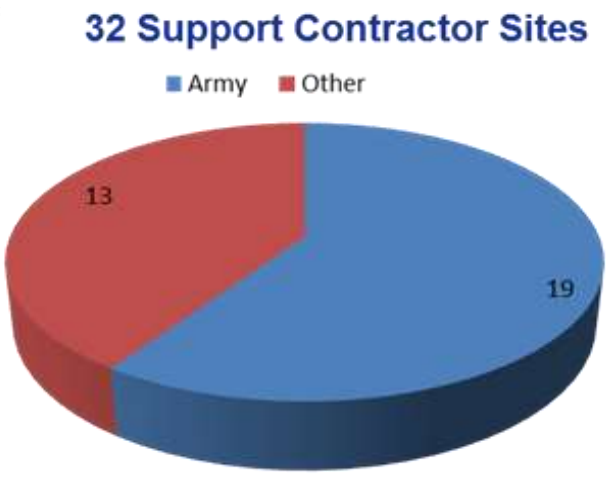
- **Over 30 Years of Ongoing Success**
  - *Continued funding by the Government for enhanced functionality*
  - *Mandated by the US Army for ACAT I and II programs*
  - *Mandated by US Homeland Security National Protection and Programs Directorate*
  - *Endorsed by the Air Force and Marine Corps*
  - *Australia DoD LHD SPO selected ACEIT as standard modeling tool*
  - *NASA selected JACS as 1 of 2 Approved JCL Tools*

- **In use at 250+ sites with over 8000 students trained**
  - *Army, Air Force, Navy, USMC*
  - *NASA, USCG, DHS, Dept of Education, DOE*
  - *Over 40 SETA and FFRDC companies*
  - *Over 50 DoD contractors (Boeing, Lockheed, etc)*
  - *Australian Defence*

Who is Using ACEIT?





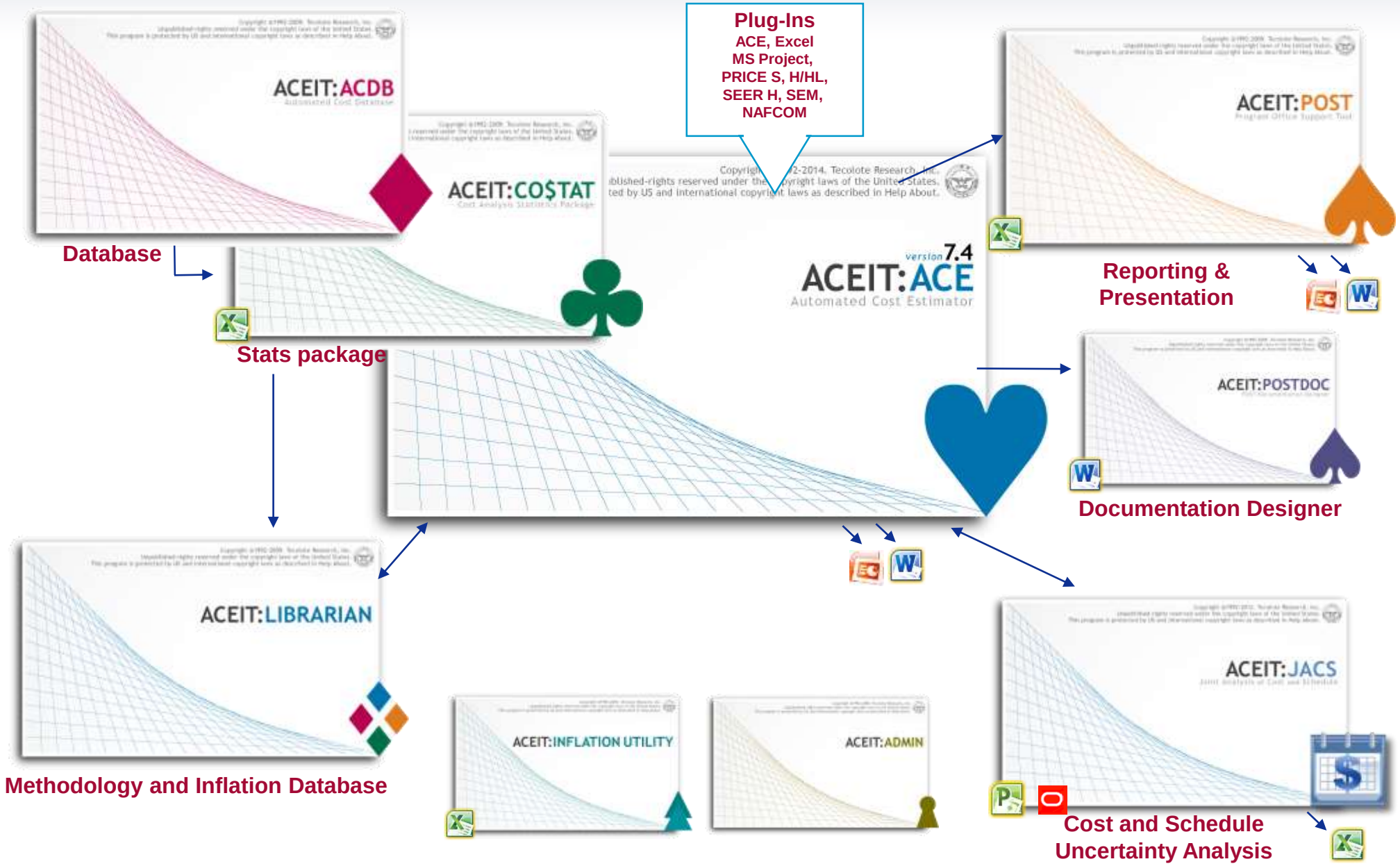


Tecolote Sites are not included in site counts

As of 19 Jan 2017

ACEIT 7.5

Automated Cost Estimating Integrated Tools



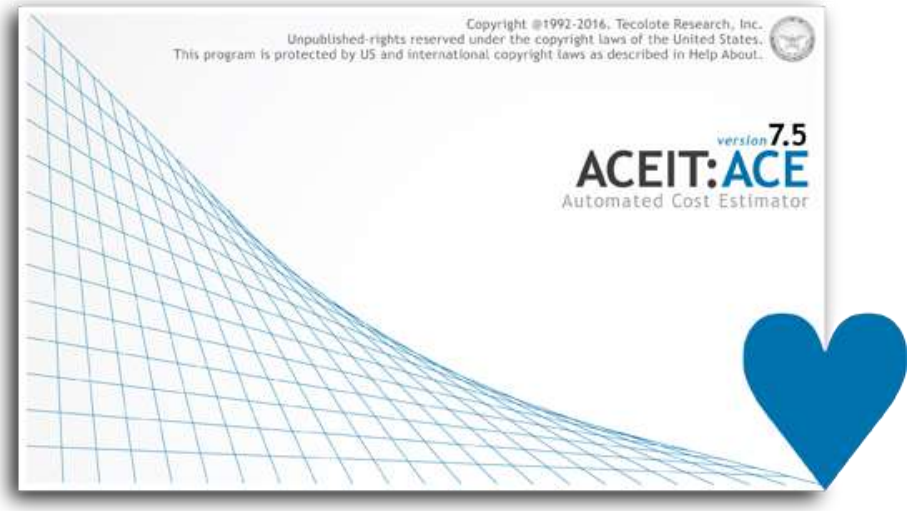
ACEIT Components

- **Nine integrated software tools**
  - ACDB – Warehouses raw and normalized cost/technical data tailored to organization's needs
  - CO$TAT – Tool specifically focused on cost estimating statistics and regression analysis
  - ACE – Automated inflation, learning, phasing, risk, documentation, and other essential cost estimating processes to help you build a robust, accurate, and defendable cost model
  - POST – Program Office Support Tool, automates what-if drills, charts, and tables from Excel and their transfer to PowerPoint and Word
  - POST Doc – Post Documentation Designer, integrates session data and results with any Word document
  - JACS – Joint Analysis of Cost and Schedule utilizing the schedule logic and framework of MS Project, P6, and the powerful ACEIT engine for processing
  - Librarian – Manage and share custom inflation indices and CERs
  - ACEIT Admin – Manages the ACEIT interaction and share data
  - Inflation Utility – Powerful Excel add-in for access to the latest OSD inflation indices

ACEIT and Building Estimates

ACE is an Estimating Platform

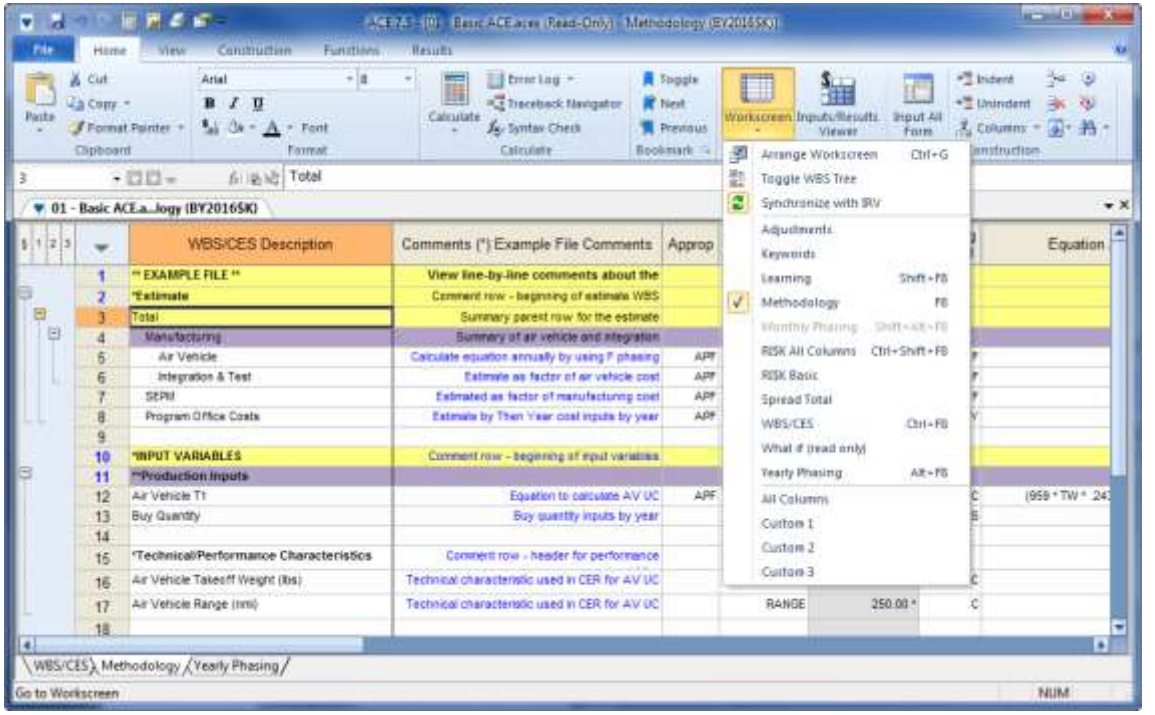
- **What is ACE?**
  - Framework to build models
  - Calculation engine to compute/process information
- **ACE files (sessions) contain user-developed cost estimate**
  - Methodology
  - Documentation
  - Inputs
  - Integrated uncertainty analysis



Create risk adjusted, integrated cost/schedule life cycle estimates for any project!

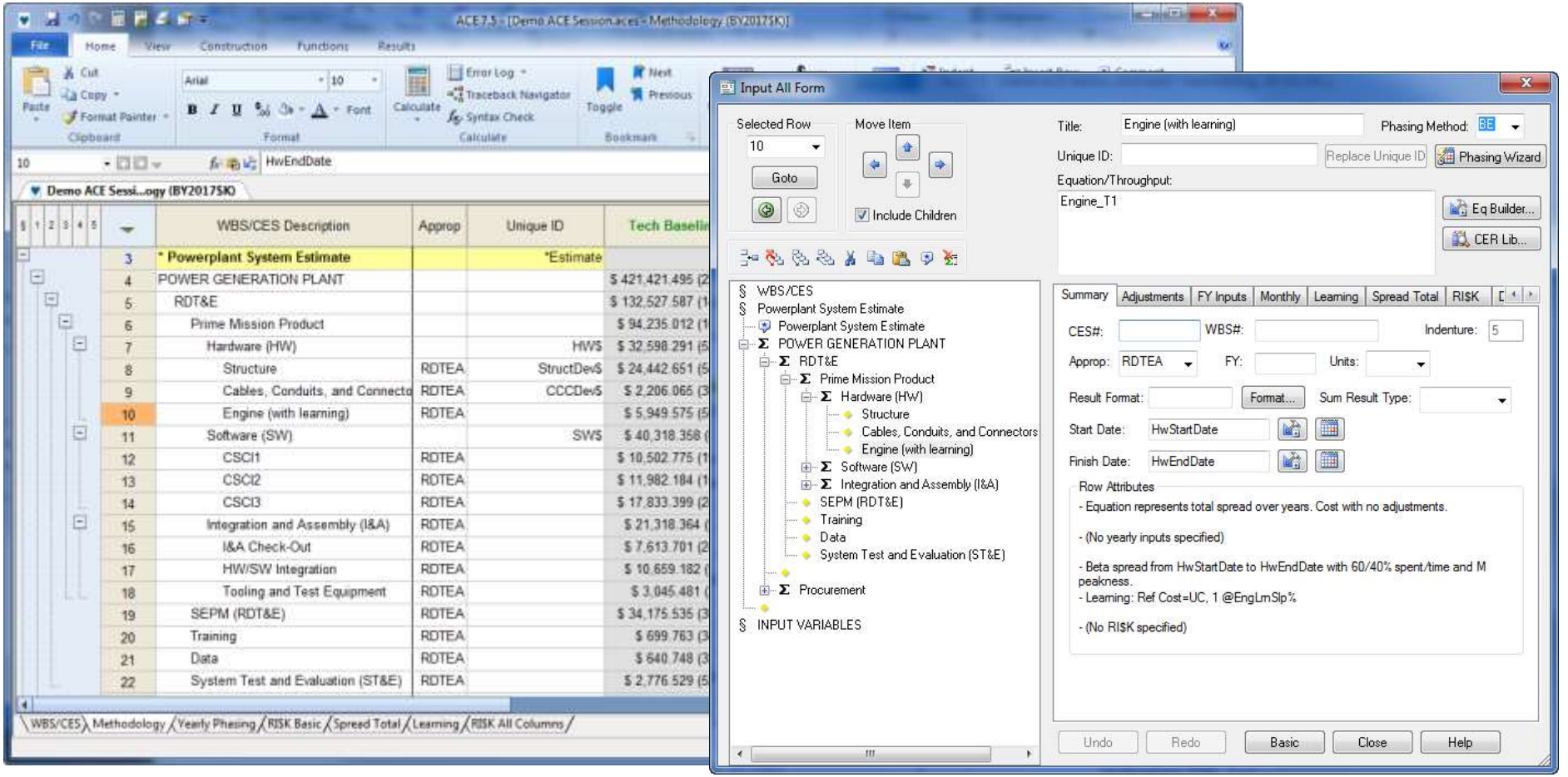
Workscreens Provide a Filtered View of an ACE Session

- **Each workscreen shows only the relevant fields supporting specific functions involved in building a cost estimate**
  - Building a WBS/CES
  - Implementing methodologies
    - Adjusting for FY, dollar units, Fee, Overhead, G&A
    - Applying learning curve theory
    - Time phasing the estimate (Annual and Monthly)
    - Incorporating a risk analysis
  - Viewing What if results
  - Entering documentation



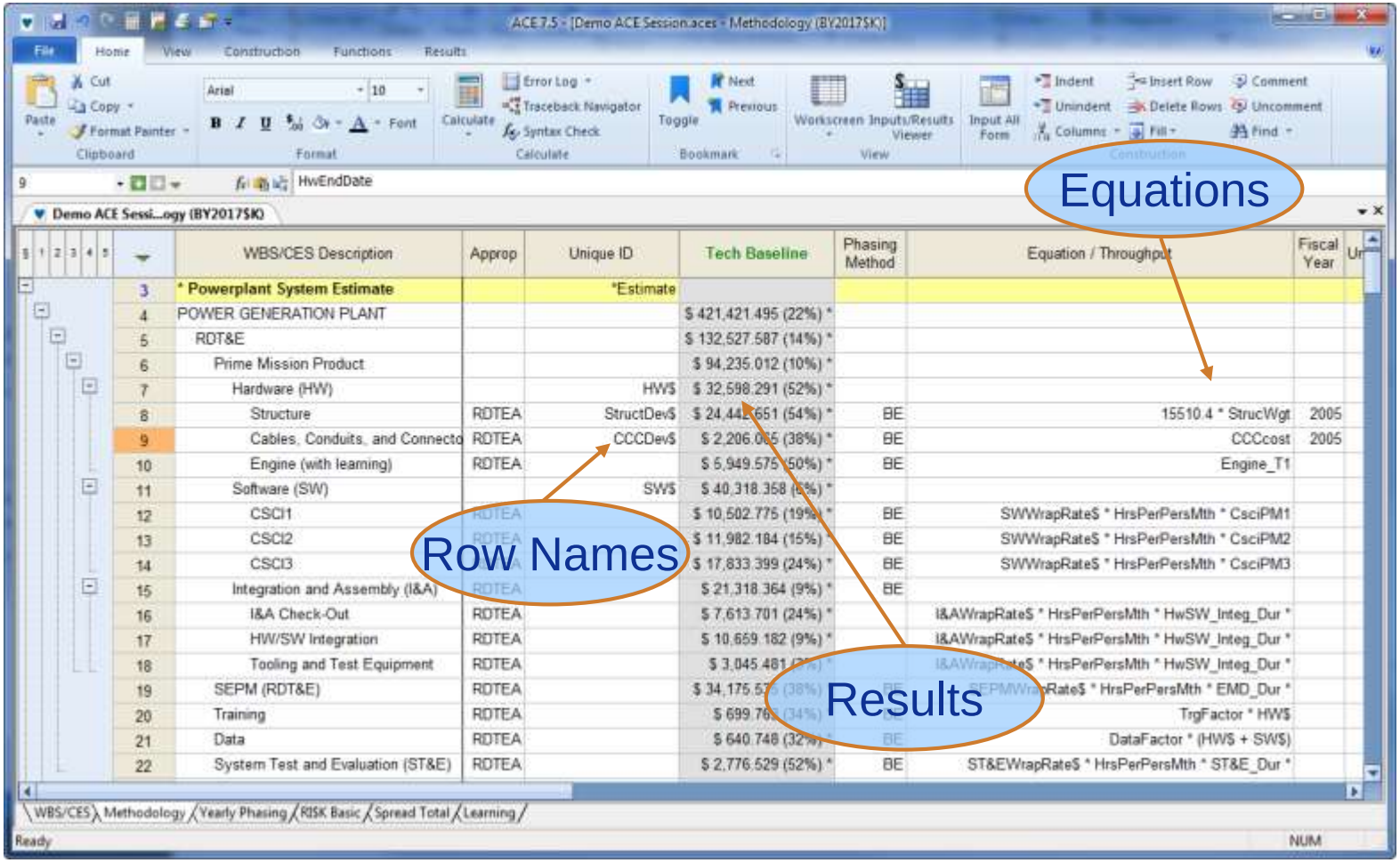
Results are Automatically Summed Based on Element Hierarchy

- **ACE uses an indenture structure to sum elements, thereby ensuring proper calculation**
  - Add/remove elements when the WBS changes without need to redo summing equations
- **Tools available to simplify navigation and data entry**



Equations / Data Entered into Specific Fields

- Specific columns are used to enter equations and annual data
- Data is referenced by naming of rows / columns by Unique IDs
- All data used for the estimate is immediately visible



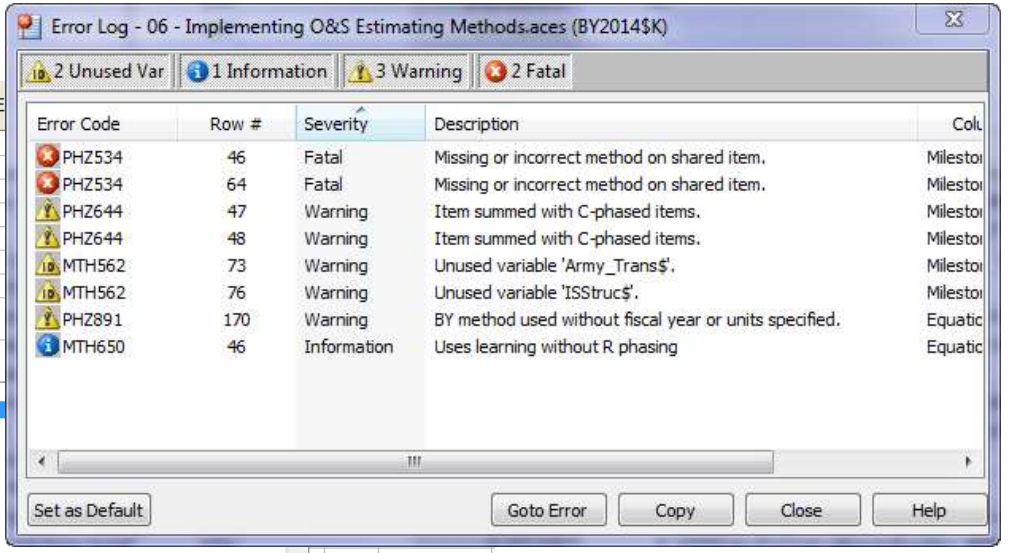
Standard Methods / Techniques to Ensure Reliable Calculations

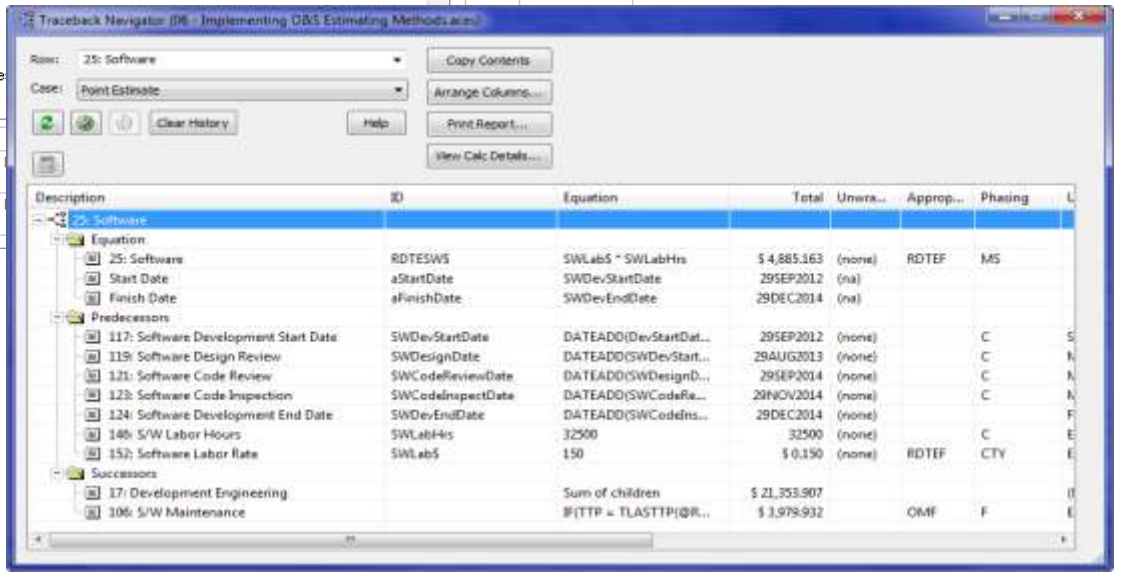
- Integrated inflation indices to correctly normalize results and develop annual outlays

	WBS/CES Description	Approp	Unique ID	Point Estimate	Phasing Method	E
7	*Estimate		*Estimate			
8	Total			$ 890,755.722 *		
9	RDT&E		RDTE$	$ 64,063.575 *		
10	Concept Refinement			$ 1,034.093 *		
11	Contractor A	RDTEF		$ 519.046 *	TY	
12	Contractor B	RDTEA		$ 515.048 *	TY	
13	Technology Development			$ 4,604.018 *		
14	Contractor A	RDTEF		$ 2,302.009 *	TC	
15	Contractor B	RDTEA		$ 2,302.009 *	TS	
16	System Development and Demonstration					
17	Development Engineering					
18	Air Vehicle					
19	Basic Structure					
20	Navigation/Guidance					
21	Propulsion					
22	Ground Station					
23	Procure OTS Parts					
24	Design New Parts					
25	Software					
26	Int & Assy					
27	Prototype Manufacturing			$ 3,206.330 *		
28	Air Vehicle	RDTEF		$ 2,855.320 *		
29	Mobile Ground Station	RDTEA		$ 351.010 *		

RDTEF - AIR FORCE - Rsch, Dev, Test & Eval
RDTEA - ARMY - Rsch, Dev, Test & Eval, Army
APF - AIR FORCE - Aircraft Procurement
APA - ARMY - Aircraft Procurement, Army
OMF - AIR FORCE - O&M - Non-Pay, Non-POL
MPF - AIR FORCE - Military Personnel - Total
MPA - ARMY - Military Personnel (Composite), Army
OMA - ARMY - Operation & Maintenance, Army
MIPF - AIR FORCE - Missile Procurement
OPF - AIR FORCE - Other Procurement
MCONF - AIR FORCE - Military Construction
OMF_P - AIR FORCE - O&M - GS & WB Pay Only
OMF_F - AIR FORCE - O&M - Fuel
MPF_P - AIR FORCE - Military Personnel - Pay Base
MPF_O - AIR FORCE - Military Personnel - Other Expense
MPF_R - AIR FORCE - Military Personnel - Retirement
MCF_R - AIR FORCE - MILCON - AF Reserve

- Logs to show potential estimate errors





- Tools to trace model logic

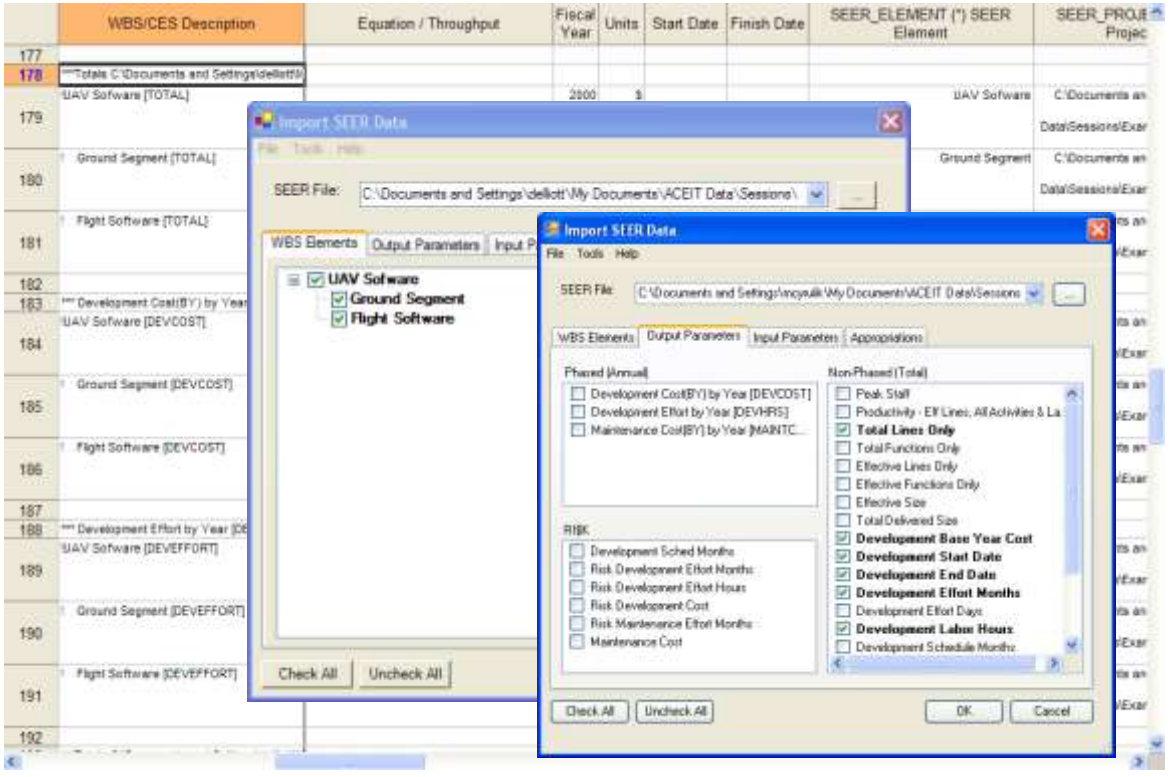
Built-in ACE Functions

- **ACE offers several types of built-in functions to automate relationships between elements in an ACE session:**
  - Mathematical
  - Date
  - Economic Analysis
  - Time Period (operate on specific yearly or monthly inputs or results)
  - ACE Specific
  - Inflation
  - Logic and Mathematical
  - Matrix
  - Operational Life
  - RI$K

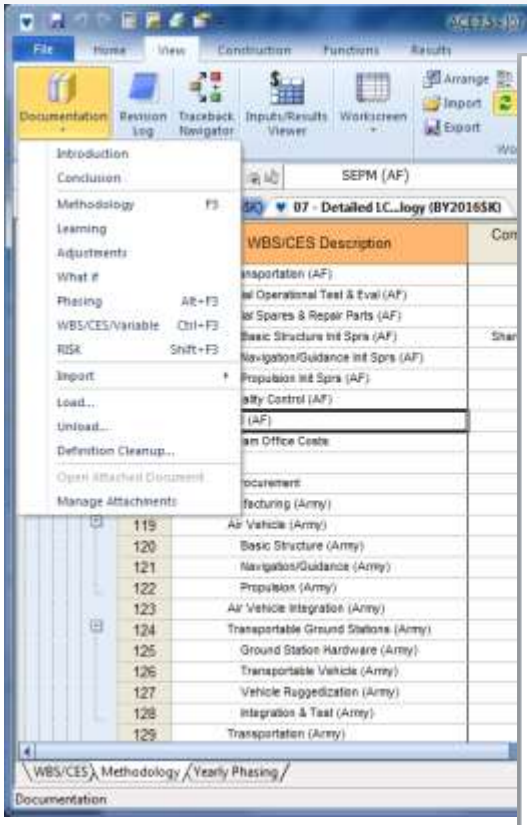
Open Platform Allows Integration with 3rd Party Applications

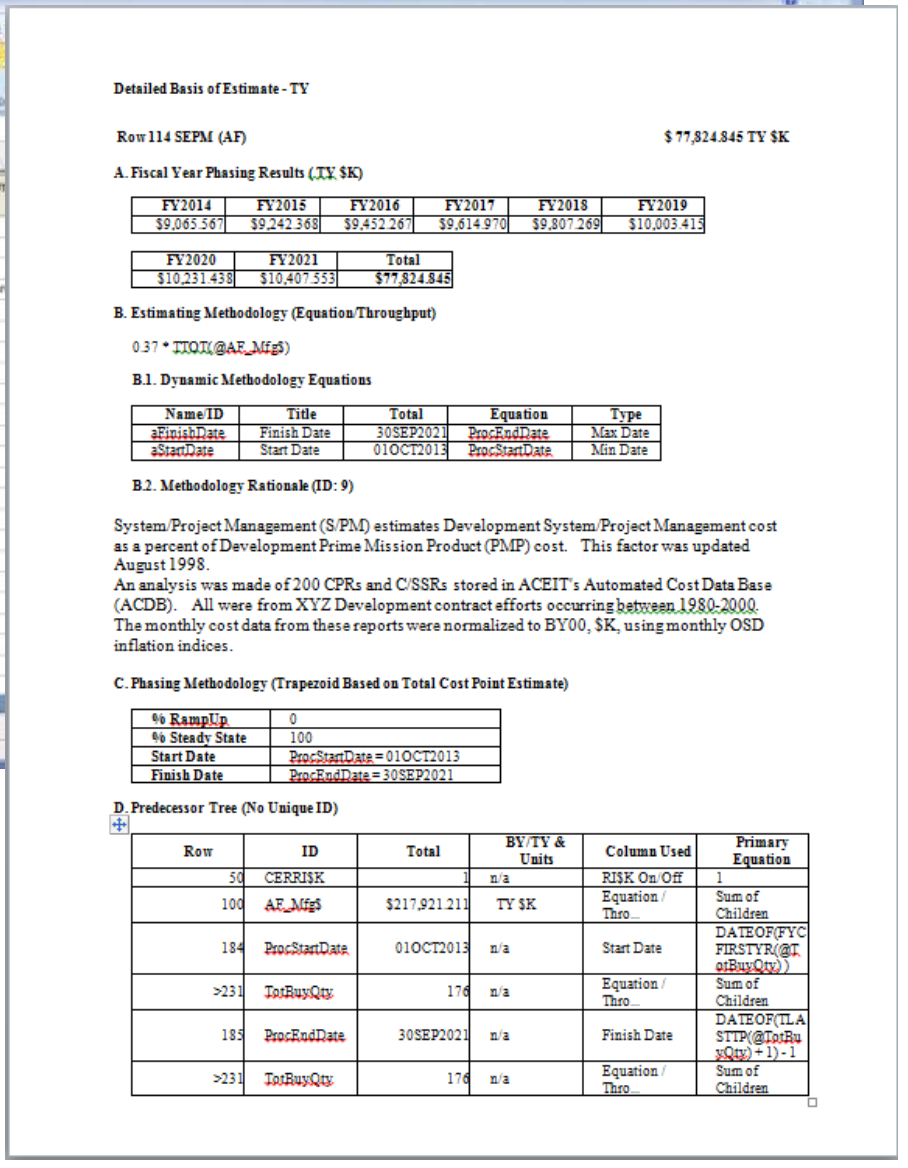
- **Multiple methods for integration with other applications**
  - Direct export to .rtf and.txt file formats
  - ACE results integrate with Excel through POST
  - ACE clipboard allows dynamic data export/import from/to an ACE session
  - ACE API enables
    - Ability to embed ACE sessions into other tools
    - Ability to create plug-ins that allow direct interaction inside ACE
- **Current ACE plug-ins**

  Getting data into ACE
  - ACE-to-ACE
  - Microsoft Excel
  - Microsoft Project
  - SEER



Full Estimate Documentation Capability





Detailed Basis of Estimate - TY

Row 114 SEPM (AF) **$ 77,824.845 TY $K**

A. Fiscal Year Phasing Results (TY $K)

FY2014	FY2015	FY2016	FY2017	FY2018	FY2019
$9,065.567	$9,242.368	$9,452.267	$9,614.970	$9,807.269	$10,003.415

FY2020	FY2021	Total
$10,231.438	$10,407.553	$77,824.845

B. Estimating Methodology (Equation/Throughput)

0.37 * TIQI(@AF_Mfg$)

B.1. Dynamic Methodology Equations

Name/ID	Title	Total	Equation	Type
aFinishDate	Finish Date	30SEP2021	ProcEndDate	Max Date
aStartDate	Start Date	01OCT2013	ProcStartDate	Min Date

B.2. Methodology Rationale (ID: 9)

System/Project Management (S/PM) estimates Development System/Project Management cost as a percent of Development Prime Mission Product (PMP) cost. This factor was updated August 1998.
An analysis was made of 200 CPRs and C/SSRs stored in ACEIT's Automated Cost Data Base (ACDB). All were from XYZ Development contract efforts occurring between 1980-2000. The monthly cost data from these reports were normalized to BY00, $K, using monthly OSD inflation indices.

C. Phasing Methodology (Trapezoid Based on Total Cost Point Estimate)

% RampUp	0
% Steady State	100
Start Date	ProcStartDate = 01OCT2013
Finish Date	ProcEndDate = 30SEP2021

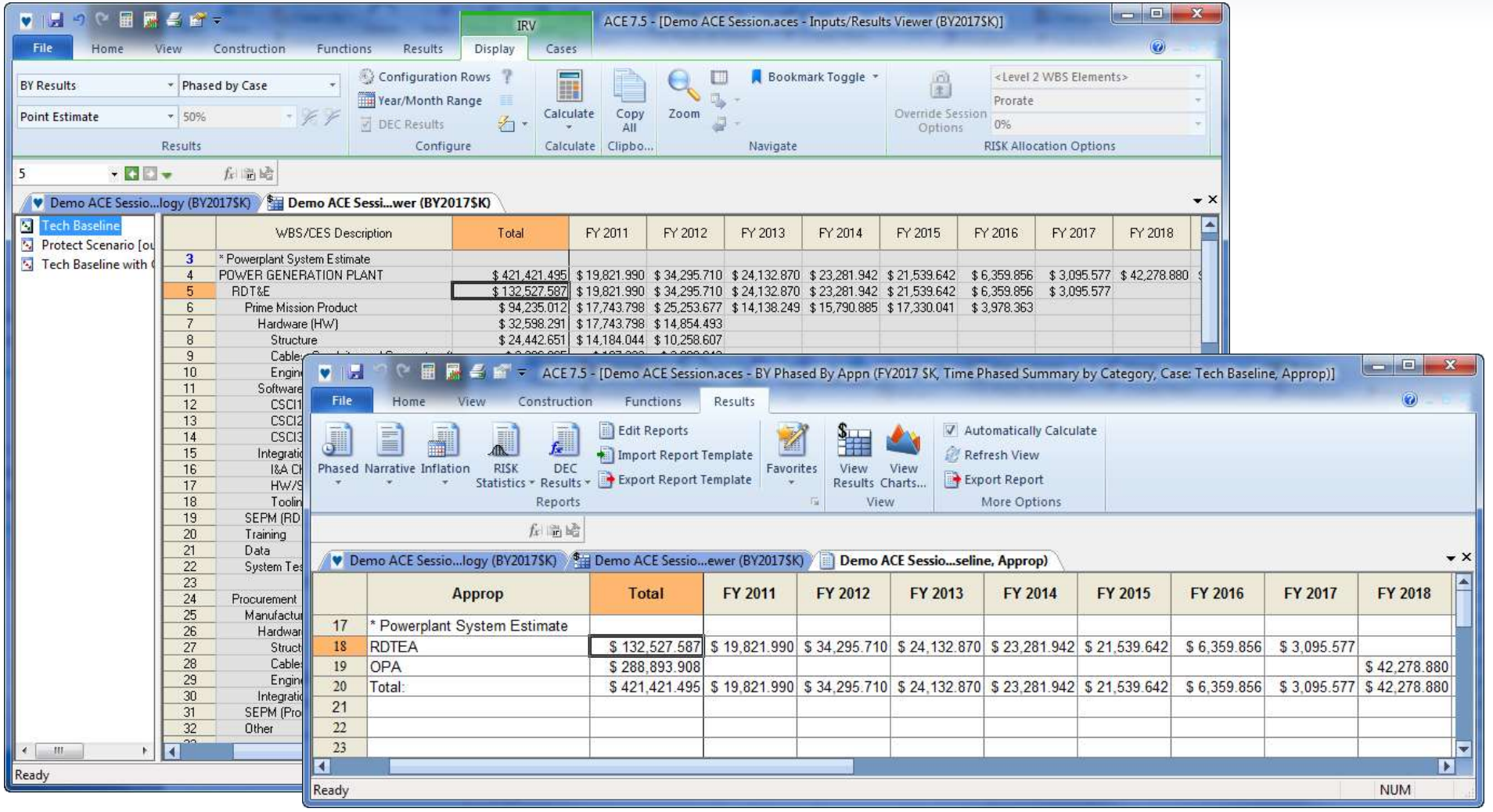
D. Predecessor Tree (No Unique ID)

Row	ID	Total	BY/TY & Units	Column Used	Primary Equation
50	CERRI$K	1	n/a	RI$K On/Off	1
100	AF_Mfg$	$217,921.211	TY $K	Equation / Thro...	Sum of Children
184	ProcStartDate	01OCT2013	n/a	Start Date	DATEOF(FYC FIRSTYR(@T otBuyQty))
>231	TotBuyQty	176	n/a	Equation / Thro...	Sum of Children
185	ProcEndDate	30SEP2021	n/a	Finish Date	DATEOF(TLA STTP(@TotBu yQty) + 1) - 1
>231	TotBuyQty	176	n/a	Equation / Thro...	Sum of Children

- **Analysts can document in real time:**
  - WBS
  - Methodology
  - Phasing
  - Risk
  - Adjustments

- **Documentation can be imported via:**
  - RTF and MS Word files
  - Copy and Paste Commands
- **Documentation Available via:**
  - Input All Form
  - Narrative Report
  - MS-Word Document

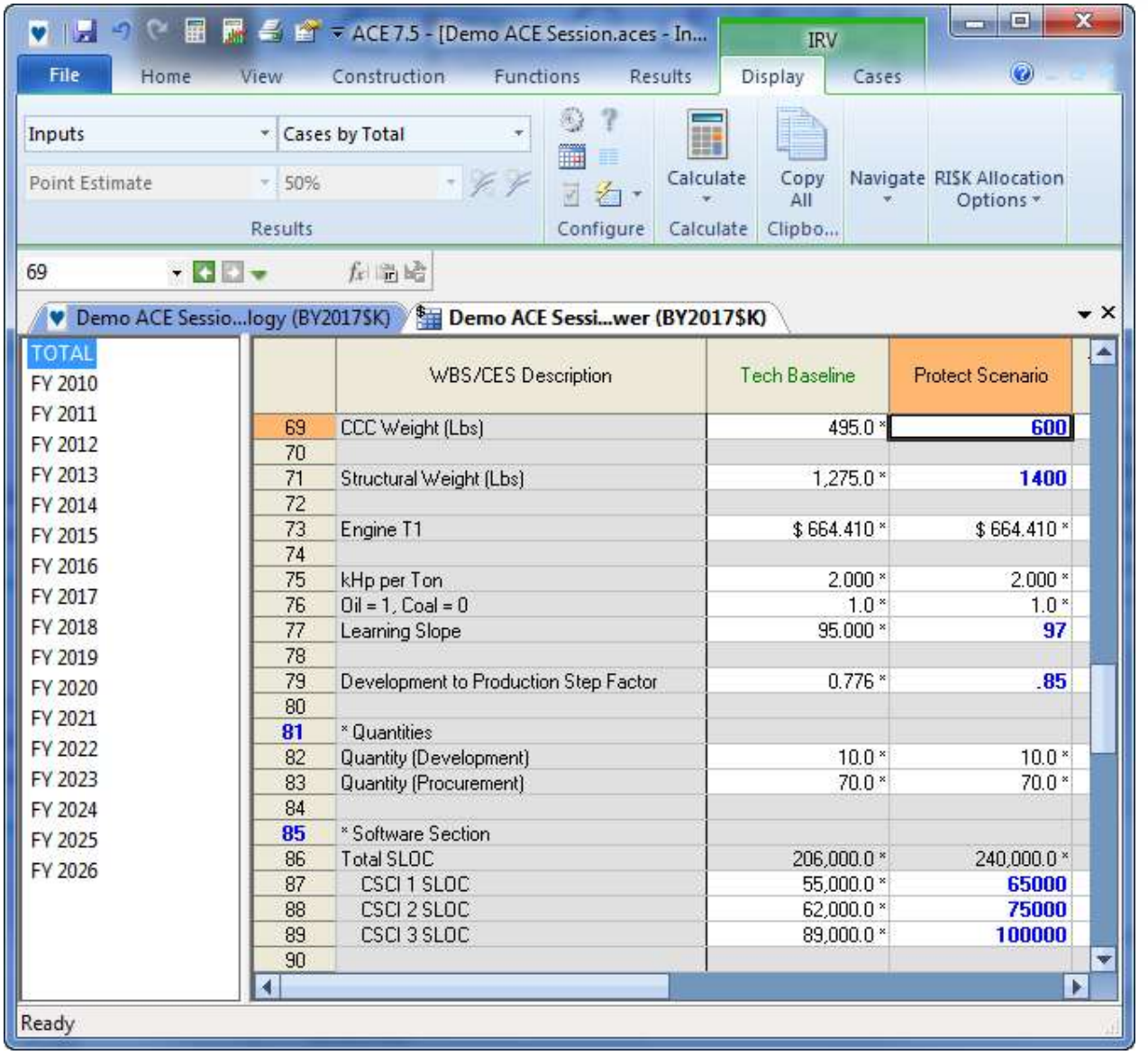
Quick Access to Estimate Results



- **Time-Phased Base Year and Then Year results can be quickly generated**
- **Estimated costs can be "racked and stacked" by various breakouts (Appropriation, Funding Agency, Contract Line Item, Job Order Number, Budget Line Item, etc.)**

Baselines can be Established as Basis for Scenario Evaluation

- Main methodologies are basis for all calculations
- Add an unlimited number of alternative scenarios (what if cases)
- Scenarios are enabled by overriding methodology equations and/or input variables (total or yearly)
- Supporting documentation, reports, time-phased (BY or TY) and risk results can be created for any scenario
- Cost Benefit Analysis calculations can be added to the session and evaluated for each alternative



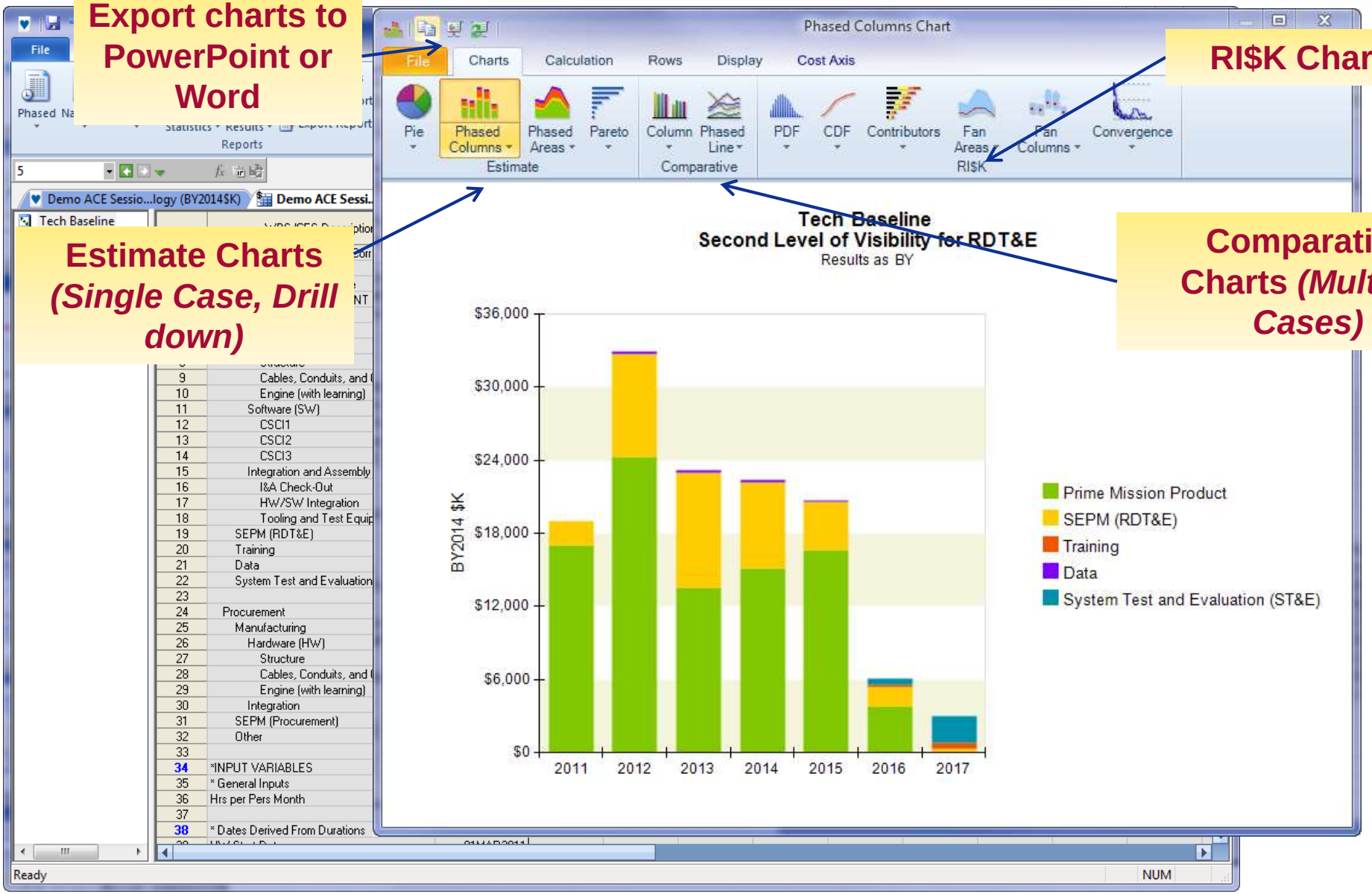
Graphically View Results in ACE

Export charts to PowerPoint or Word

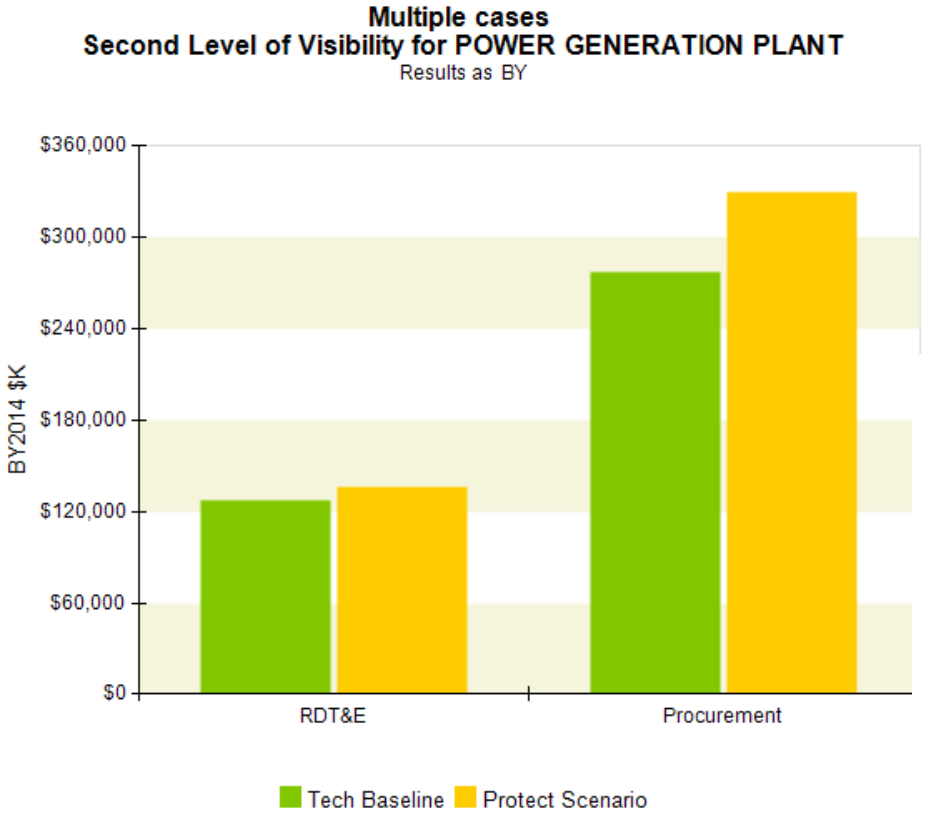
RI$K Charts

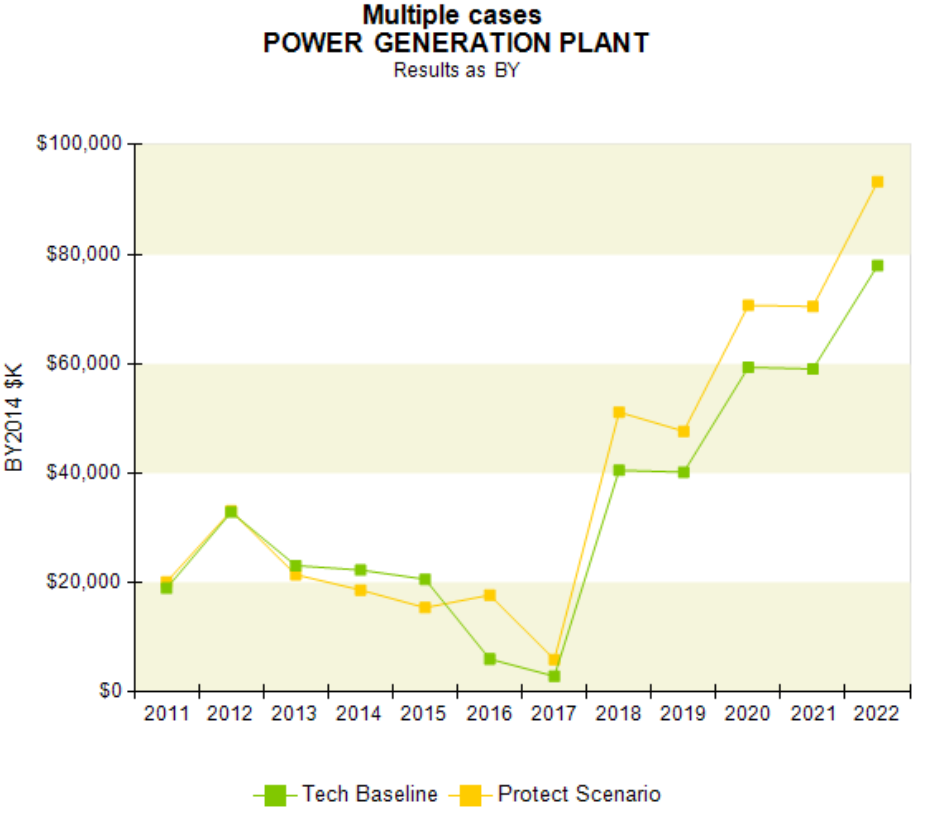
Estimate Charts *(Single Case, Drill down)*

Comparative Charts *(Multiple Cases)*



Graphical Outputs to Compare What-if Cases

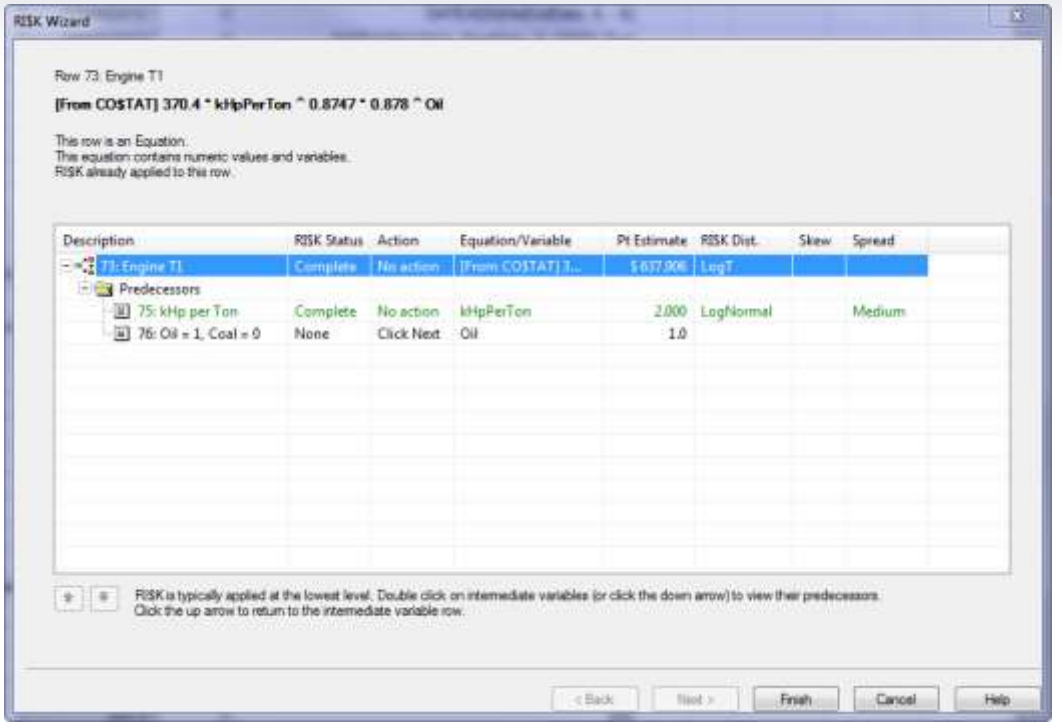




Uncertainty Analysis in ACE

RI$K Wizard

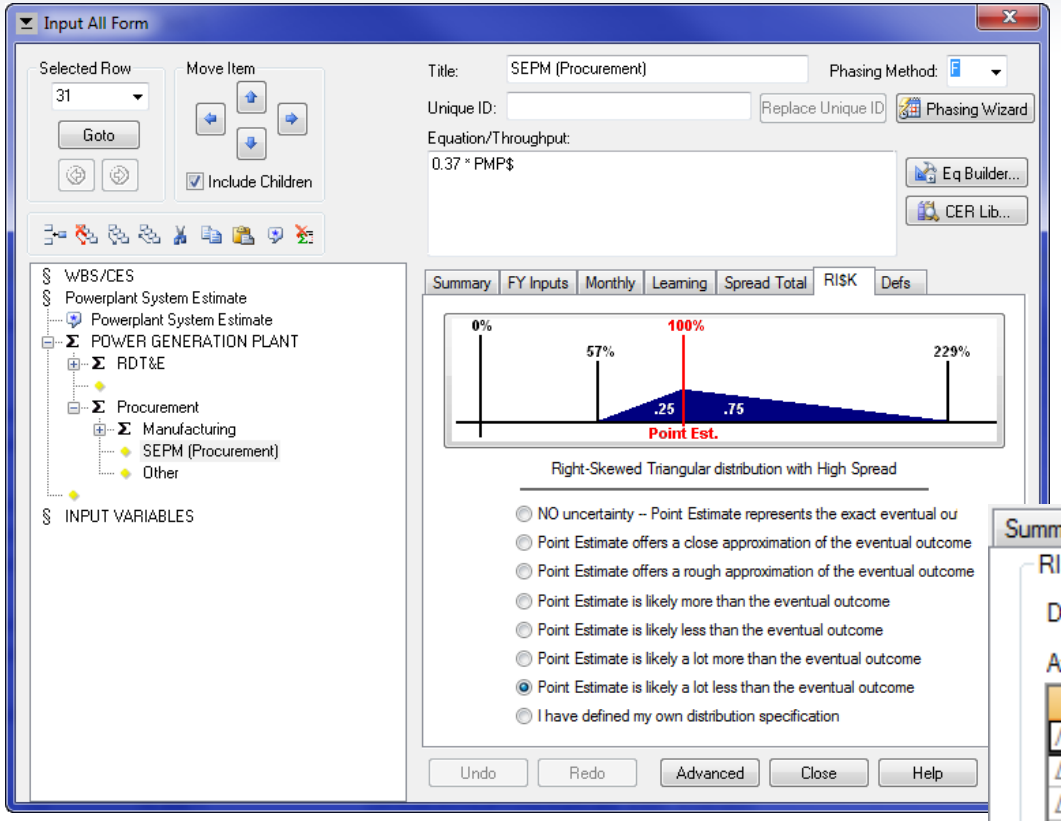
- RI$K Wizard. Designed for new analysts, provides easy-to-follow screens that apply RI$K distributions to the estimate
  - The wizard gives guidance on whether uncertainty should be specified:
    - on the current row
    - and/or on the variables
    - or not recommended for that type of methodology



- Easy-to-understand options help the analyst characterize the uncertainty
- The wizard also displays any rows or variables feeding into the current row and shows if they already have uncertainty specified. The analyst is given the opportunity to specify uncertainty on these rows also.

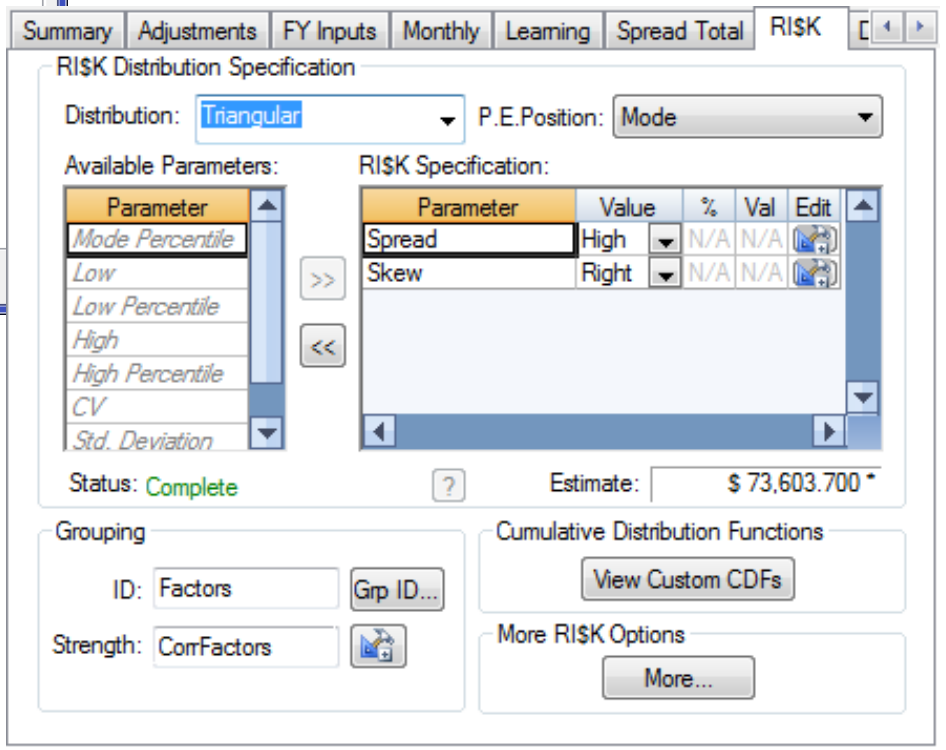
NOTE: Advanced analysts will most likely continue to use the Advanced mode of the Input All form or the RI$K workscreens to enter uncertainty**.**

Input All Form: Basic and Advanced Mode



Basic mode:

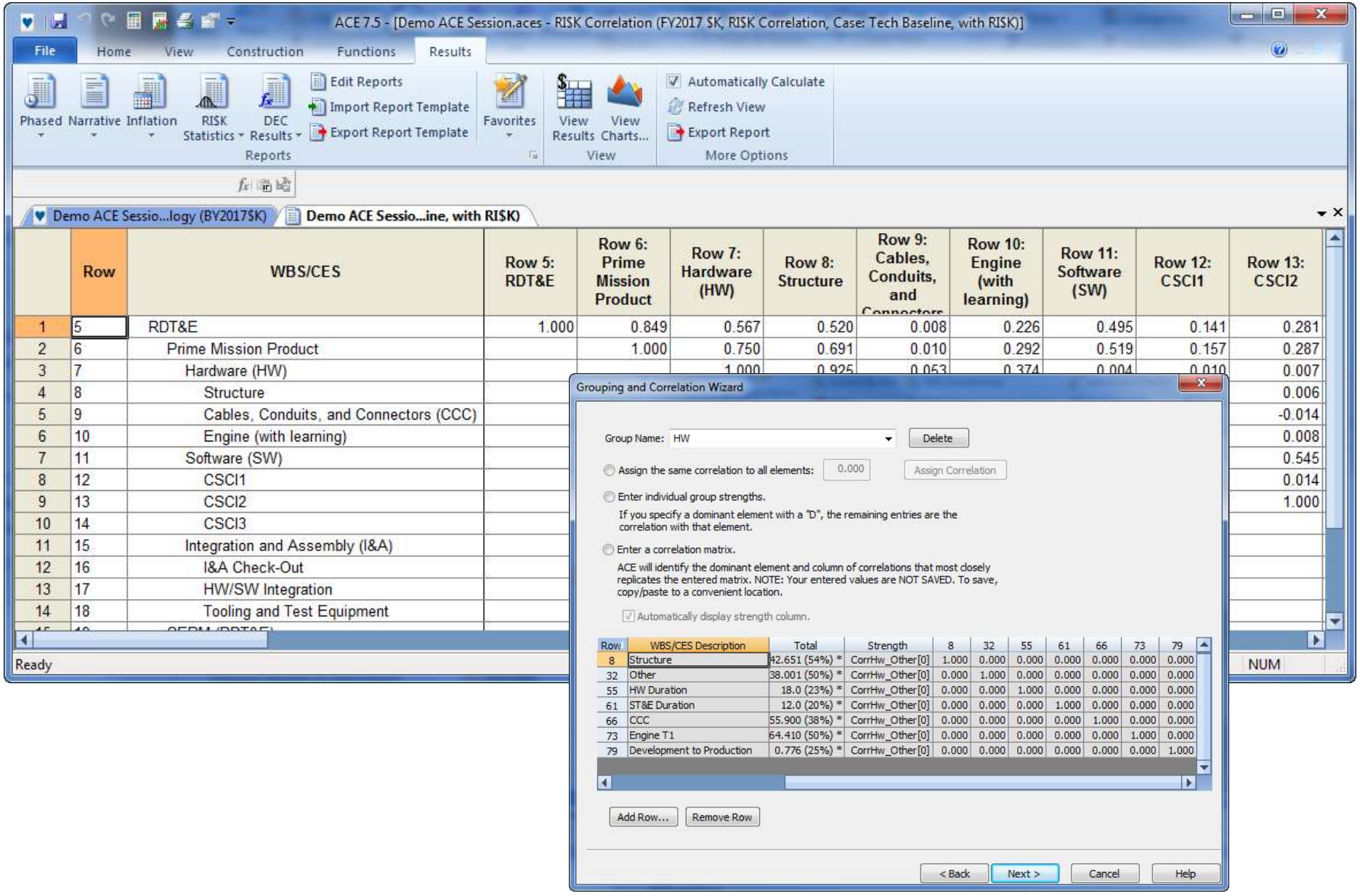
- Provides descriptive choices for specifying uncertainty
- Diagram changes based on selection



Advanced mode:

- Guides you through valid parameter choice
- Status tells you when the specification is Complete

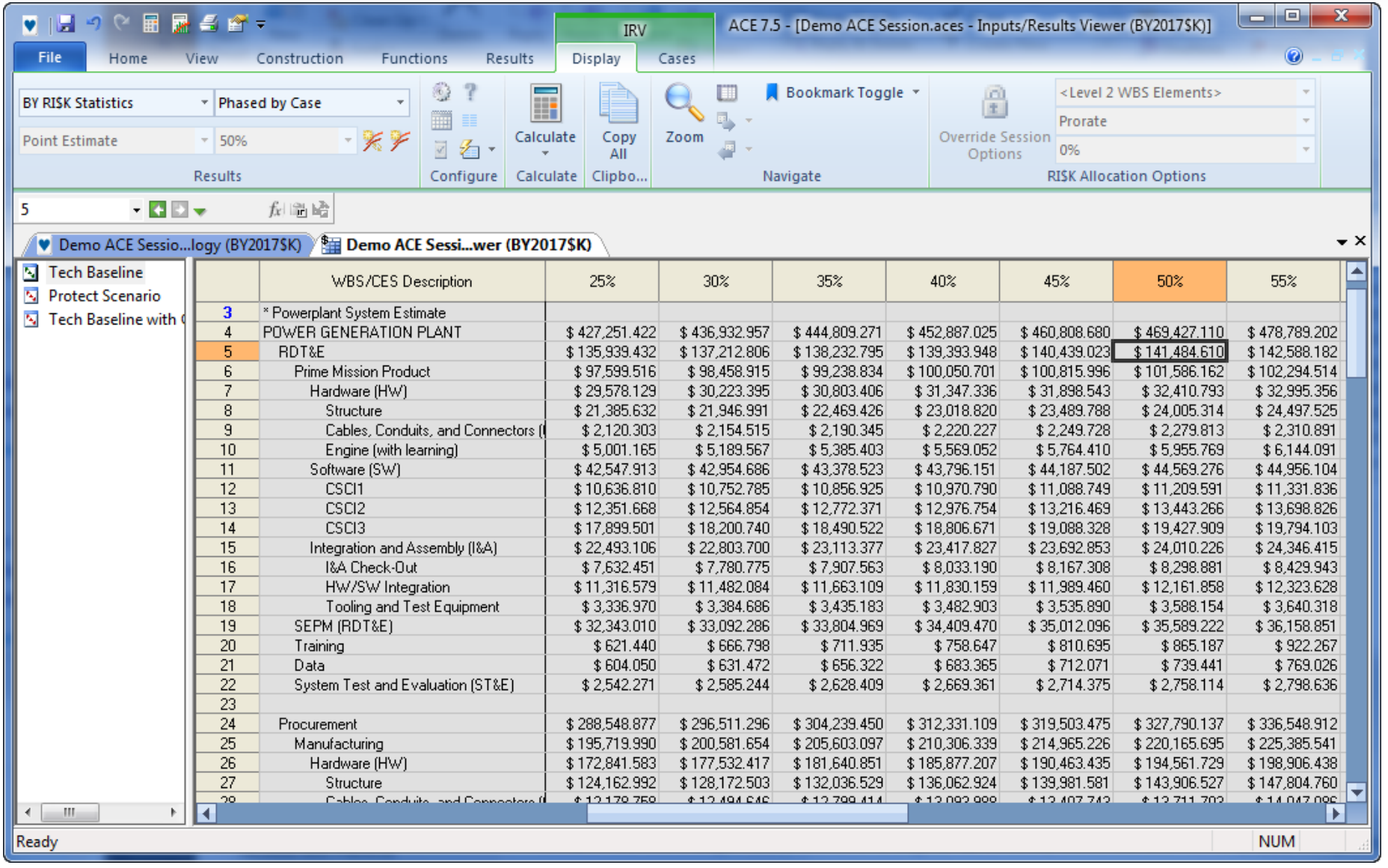
Correlation can be Assessed and Modeled



	Row	WBS/CES	Row 5: RDT&E	Row 6: Prime Mission Product	Row 7: Hardware (HW)	Row 8: Structure	Row 9: Cables, Conduits, and Connectors	Row 10: Engine (with learning)	Row 11: Software (SW)	Row 12: CSCI1	Row 13: CSCI2
1	5	RDT&E	1.000	0.849	0.567	0.520	0.008	0.226	0.495	0.141	0.281
2	6	Prime Mission Product		1.000	0.750	0.691	0.010	0.292	0.519	0.157	0.287
3	7	Hardware (HW)			1.000	0.925	0.053	0.374	0.004	0.010	0.007
4	8	Structure									0.006
5	9	Cables, Conduits, and Connectors (CCC)									-0.014
6	10	Engine (with learning)									0.008
7	11	Software (SW)									0.545
8	12	CSCI1									0.014
9	13	CSCI2									1.000
10	14	CSCI3									
11	15	Integration and Assembly (I&A)									
12	16	I&A Check-Out									
13	17	HW/SW Integration									
14	18	Tooling and Test Equipment									

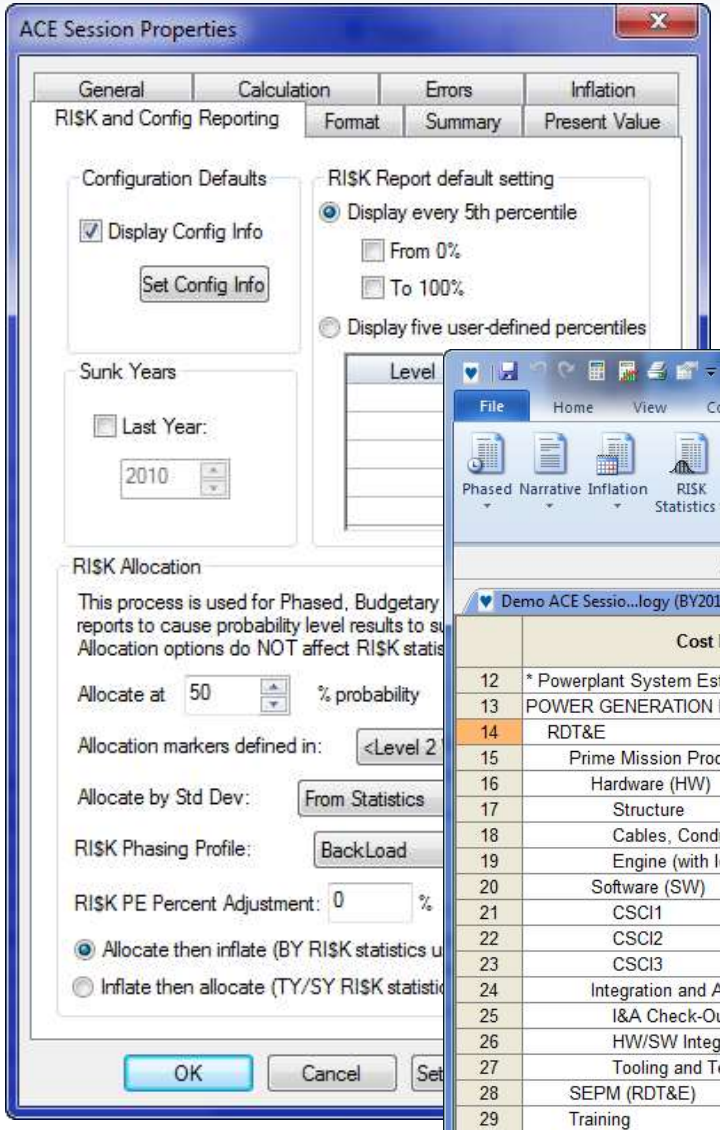
Row	WBS/CES Description	Total	Strength	8	32	55	61	66	73	79
8	Structure	42.651 (54%) *	CorrHw_Other[0]	1.000	0.000	0.000	0.000	0.000	0.000	0.000
32	Other	38.001 (50%) *	CorrHw_Other[0]	0.000	1.000	0.000	0.000	0.000	0.000	0.000
55	HW Duration	18.0 (23%) *	CorrHw_Other[0]	0.000	0.000	1.000	0.000	0.000	0.000	0.000
61	ST&E Duration	12.0 (20%) *	CorrHw_Other[0]	0.000	0.000	0.000	1.000	0.000	0.000	0.000
66	CCC	55.900 (38%) *	CorrHw_Other[0]	0.000	0.000	0.000	0.000	1.000	0.000	0.000
73	Engine T1	64.410 (50%) *	CorrHw_Other[0]	0.000	0.000	0.000	0.000	0.000	1.000	0.000
79	Development to Production	0.776 (25%) *	CorrHw_Other[0]	0.000	0.000	0.000	0.000	0.000	0.000	1.000

Risk Statistics Easily Available

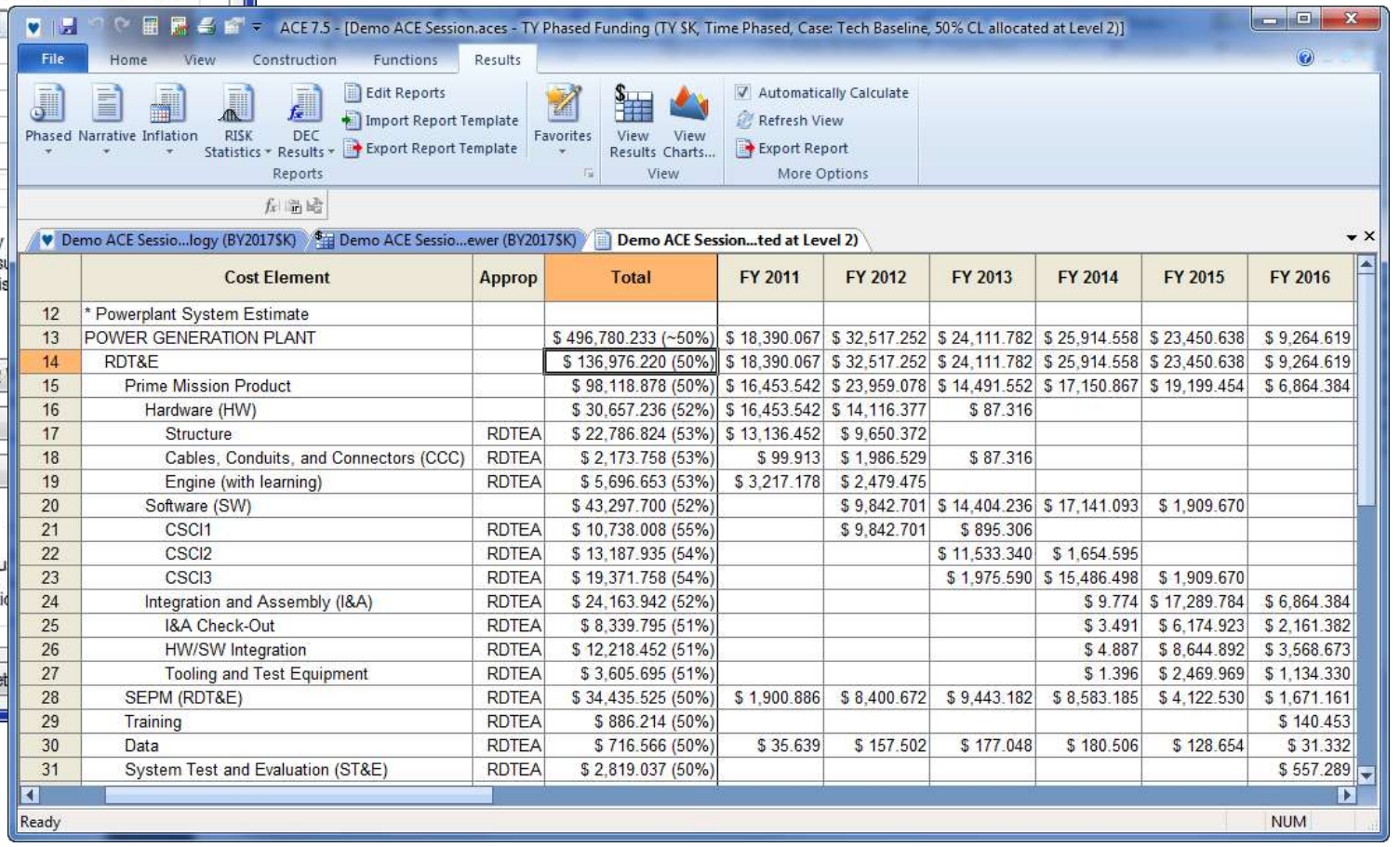


	WBS/CES Description	25%	30%	35%	40%	45%	50%	55%
3	* Powerplant System Estimate							
4	POWER GENERATION PLANT	$ 427,251.422	$ 436,932.957	$ 444,809.271	$ 452,887.025	$ 460,808.680	$ 469,427.110	$ 478,789.202
5	RDT&E	$ 135,939.432	$ 137,212.806	$ 138,232.795	$ 139,393.948	$ 140,439.023	$ 141,484.610	$ 142,588.182
6	Prime Mission Product	$ 97,599.516	$ 98,458.915	$ 99,238.834	$ 100,050.701	$ 100,815.996	$ 101,586.162	$ 102,294.514
7	Hardware (HW)	$ 29,578.129	$ 30,223.395	$ 30,803.406	$ 31,347.336	$ 31,898.543	$ 32,410.793	$ 32,995.356
8	Structure	$ 21,385.632	$ 21,946.991	$ 22,469.426	$ 23,018.820	$ 23,489.788	$ 24,005.314	$ 24,497.525
9	Cables, Conduits, and Connectors (	$ 2,120.303	$ 2,154.515	$ 2,190.345	$ 2,220.227	$ 2,249.728	$ 2,279.813	$ 2,310.891
10	Engine (with learning)	$ 5,001.165	$ 5,189.567	$ 5,385.403	$ 5,569.052	$ 5,764.410	$ 5,955.769	$ 6,144.091
11	Software (SW)	$ 42,547.913	$ 42,954.686	$ 43,378.523	$ 43,796.151	$ 44,187.502	$ 44,569.276	$ 44,956.104
12	CSCI1	$ 10,636.810	$ 10,752.785	$ 10,856.925	$ 10,970.790	$ 11,088.749	$ 11,209.591	$ 11,331.836
13	CSCI2	$ 12,351.668	$ 12,564.854	$ 12,772.371	$ 12,976.754	$ 13,216.469	$ 13,443.266	$ 13,698.826
14	CSCI3	$ 17,899.501	$ 18,200.740	$ 18,490.522	$ 18,806.671	$ 19,088.328	$ 19,427.909	$ 19,794.103
15	Integration and Assembly (I&A)	$ 22,493.106	$ 22,803.700	$ 23,113.377	$ 23,417.827	$ 23,692.853	$ 24,010.226	$ 24,346.415
16	I&A Check-Out	$ 7,632.451	$ 7,780.775	$ 7,907.563	$ 8,033.190	$ 8,167.308	$ 8,298.881	$ 8,429.943
17	HW/SW Integration	$ 11,316.579	$ 11,482.084	$ 11,663.109	$ 11,830.159	$ 11,989.460	$ 12,161.858	$ 12,323.628
18	Tooling and Test Equipment	$ 3,336.970	$ 3,384.686	$ 3,435.183	$ 3,482.903	$ 3,535.890	$ 3,588.154	$ 3,640.318
19	SEPM (RDT&E)	$ 32,343.010	$ 33,092.286	$ 33,804.969	$ 34,409.470	$ 35,012.096	$ 35,589.222	$ 36,158.851
20	Training	$ 621.440	$ 666.798	$ 711.935	$ 758.647	$ 810.695	$ 865.187	$ 922.267
21	Data	$ 604.050	$ 631.472	$ 656.322	$ 683.365	$ 712.071	$ 739.441	$ 769.026
22	System Test and Evaluation (ST&E)	$ 2,542.271	$ 2,585.244	$ 2,628.409	$ 2,669.361	$ 2,714.375	$ 2,758.114	$ 2,798.636
23								
24	Procurement	$ 288,548.877	$ 296,511.296	$ 304,239.450	$ 312,331.109	$ 319,503.475	$ 327,790.137	$ 336,548.912
25	Manufacturing	$ 195,719.990	$ 200,581.654	$ 205,603.097	$ 210,306.339	$ 214,965.226	$ 220,165.695	$ 225,385.541
26	Hardware (HW)	$ 172,841.583	$ 177,532.417	$ 181,640.851	$ 185,877.207	$ 190,463.435	$ 194,561.729	$ 198,906.438
27	Structure	$ 124,162.992	$ 128,172.503	$ 132,036.529	$ 136,062.924	$ 139,981.581	$ 143,906.527	$ 147,804.760

Estimates can be Adjusted to Desired Confidence Levels

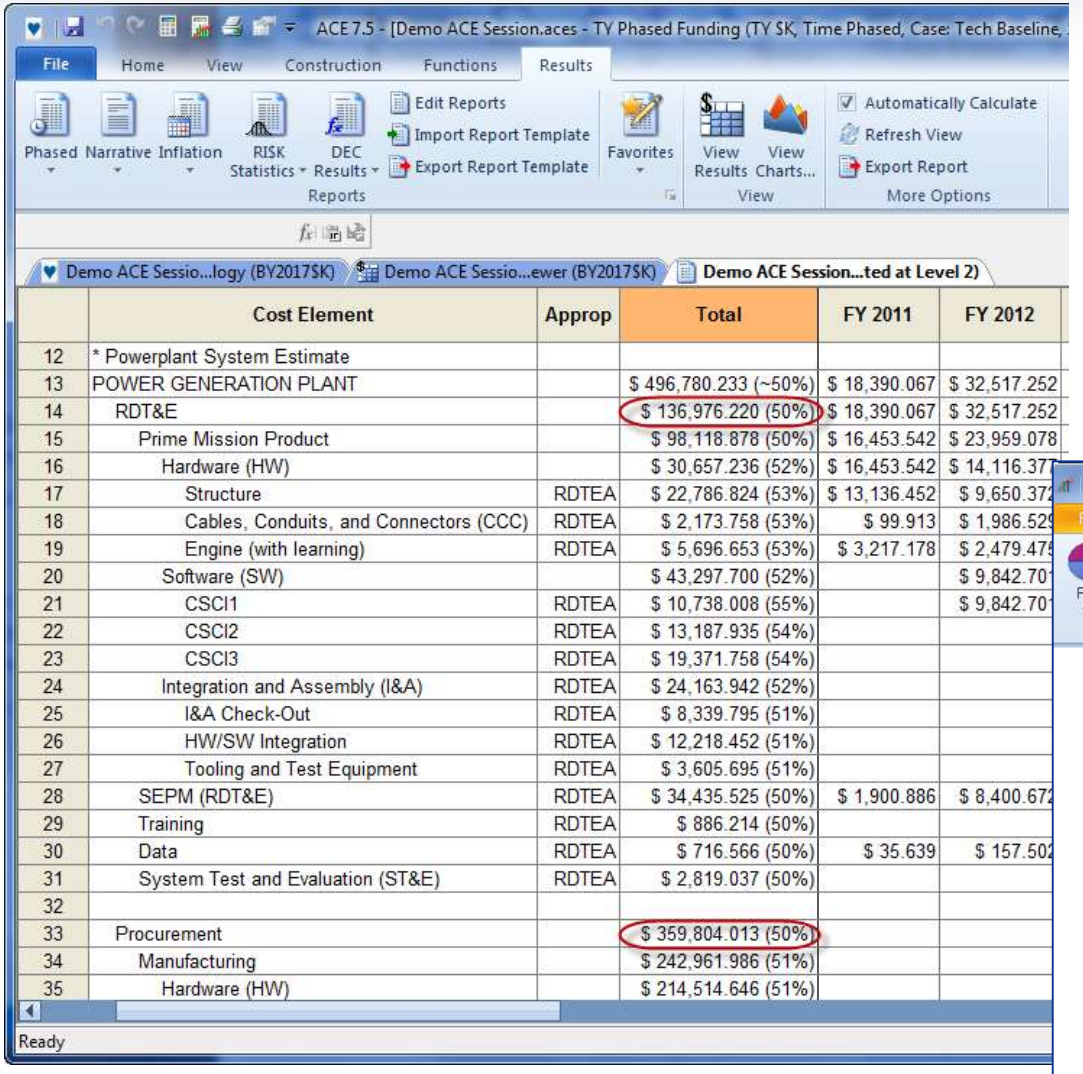


In constant or then year dollars



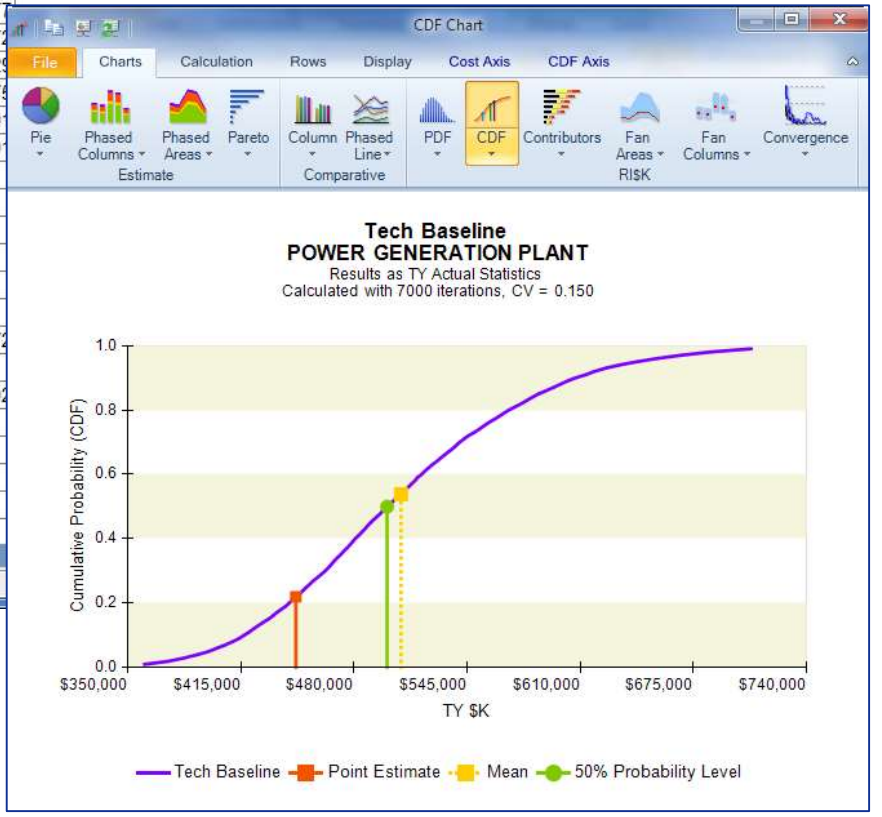
	Cost Element	Approp	Total	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016
12	* Powerplant System Estimate								
13	POWER GENERATION PLANT		$ 496,780.233 (~50%)	$ 18,390.067	$ 32,517.252	$ 24,111.782	$ 25,914.558	$ 23,450.638	$ 9,264.619
14	RDT&E		$ 136,976.220 (50%)	$ 18,390.067	$ 32,517.252	$ 24,111.782	$ 25,914.558	$ 23,450.638	$ 9,264.619
15	Prime Mission Product		$ 98,118.878 (50%)	$ 16,453.542	$ 23,959.078	$ 14,491.552	$ 17,150.867	$ 19,199.454	$ 6,864.384
16	Hardware (HW)		$ 30,657.236 (52%)	$ 16,453.542	$ 14,116.377	$ 87.316			
17	Structure	RDTEA	$ 22,786.824 (53%)	$ 13,136.452	$ 9,650.372				
18	Cables, Conduits, and Connectors (CCC)	RDTEA	$ 2,173.758 (53%)	$ 99.913	$ 1,986.529	$ 87.316			
19	Engine (with learning)	RDTEA	$ 5,696.653 (53%)	$ 3,217.178	$ 2,479.475				
20	Software (SW)		$ 43,297.700 (52%)		$ 9,842.701	$ 14,404.236	$ 17,141.093	$ 1,909.670	
21	CSCI1	RDTEA	$ 10,738.008 (55%)		$ 9,842.701	$ 895.306			
22	CSCI2	RDTEA	$ 13,187.935 (54%)			$ 11,533.340	$ 1,654.595		
23	CSCI3	RDTEA	$ 19,371.758 (54%)			$ 1,975.590	$ 15,486.498	$ 1,909.670	
24	Integration and Assembly (I&A)	RDTEA	$ 24,163.942 (52%)				$ 9.774	$ 17,289.784	$ 6,864.384
25	I&A Check-Out	RDTEA	$ 8,339.795 (51%)				$ 3.491	$ 6,174.923	$ 2,161.382
26	HW/SW Integration	RDTEA	$ 12,218.452 (51%)				$ 4.887	$ 8,644.892	$ 3,568.673
27	Tooling and Test Equipment	RDTEA	$ 3,605.695 (51%)				$ 1.396	$ 2,469.969	$ 1,134.330
28	SEPM (RDT&E)	RDTEA	$ 34,435.525 (50%)	$ 1,900.886	$ 8,400.672	$ 9,443.182	$ 8,583.185	$ 4,122.530	$ 1,671.161
29	Training	RDTEA	$ 886.214 (50%)						$ 140.453
30	Data	RDTEA	$ 716.566 (50%)	$ 35.639	$ 157.502	$ 177.048	$ 180.506	$ 128.654	$ 31.332
31	System Test and Evaluation (ST&E)	RDTEA	$ 2,819.037 (50%)						$ 557.289

TY RI$K Results



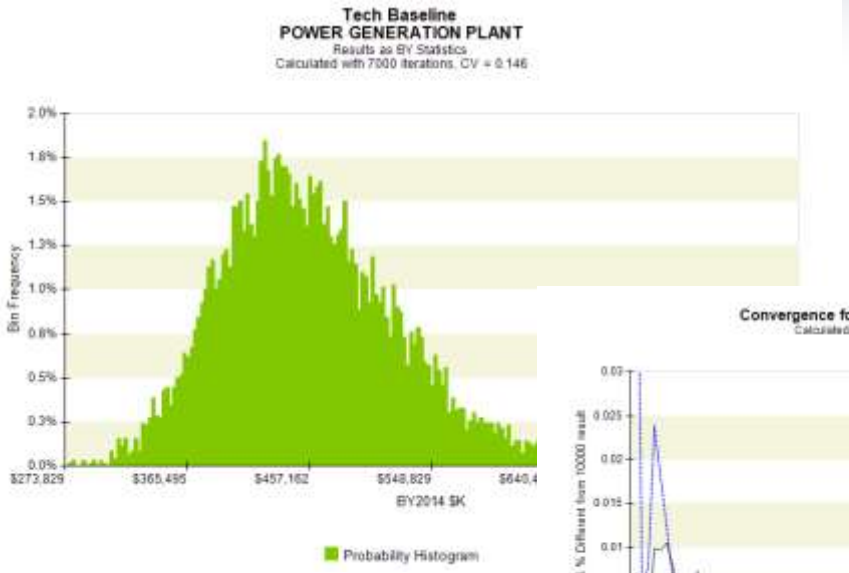
	Cost Element	Approp	Total	FY 2011	FY 2012
12	* Powerplant System Estimate				
13	POWER GENERATION PLANT		$ 496,780.233 (~50%)	$ 18,390.067	$ 32,517.252
14	RDT&E		$ 136,976.220 (50%)	$ 18,390.067	$ 32,517.252
15	Prime Mission Product		$ 98,118.878 (50%)	$ 16,453.542	$ 23,959.078
16	Hardware (HW)		$ 30,657.236 (52%)	$ 16,453.542	$ 14,116.377
17	Structure	RDTEA	$ 22,786.824 (53%)	$ 13,136.452	$ 9,650.372
18	Cables, Conduits, and Connectors (CCC)	RDTEA	$ 2,173.758 (53%)	$ 99.913	$ 1,986.529
19	Engine (with learning)	RDTEA	$ 5,696.653 (53%)	$ 3,217.178	$ 2,479.475
20	Software (SW)		$ 43,297.700 (52%)		$ 9,842.701
21	CSCI1	RDTEA	$ 10,738.008 (55%)		$ 9,842.701
22	CSCI2	RDTEA	$ 13,187.935 (54%)		
23	CSCI3	RDTEA	$ 19,371.758 (54%)		
24	Integration and Assembly (I&A)	RDTEA	$ 24,163.942 (52%)		
25	I&A Check-Out	RDTEA	$ 8,339.795 (51%)		
26	HW/SW Integration	RDTEA	$ 12,218.452 (51%)		
27	Tooling and Test Equipment	RDTEA	$ 3,605.695 (51%)		
28	SEPM (RDT&E)	RDTEA	$ 34,435.525 (50%)	$ 1,900.886	$ 8,400.672
29	Training	RDTEA	$ 886.214 (50%)		
30	Data	RDTEA	$ 716.566 (50%)	$ 35.639	$ 157.502
31	System Test and Evaluation (ST&E)	RDTEA	$ 2,819.037 (50%)		
32					
33	Procurement		$ 359,804.013 (50%)		
34	Manufacturing		$ 242,961.986 (51%)		
35	Hardware (HW)		$ 214,514.646 (51%)		

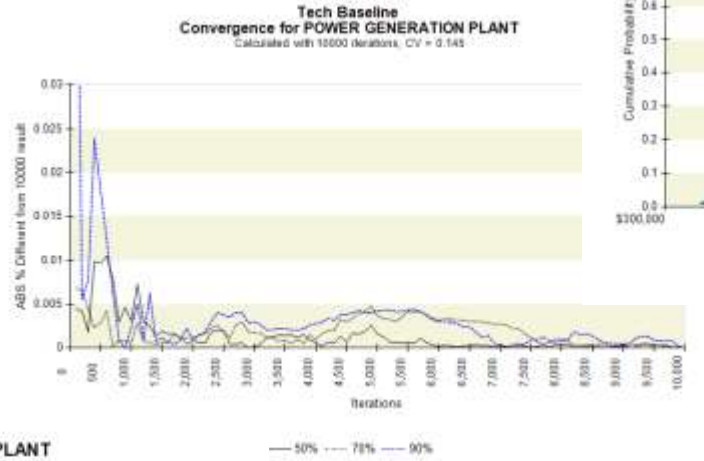
- TY time phased RI$K results allocated at specified confidence level from a specified level in the WBS
- In this case, 50% from 2nd level, meaning RDT&E and Procurement are the 50% statistical results, remaining levels adjusted to sum

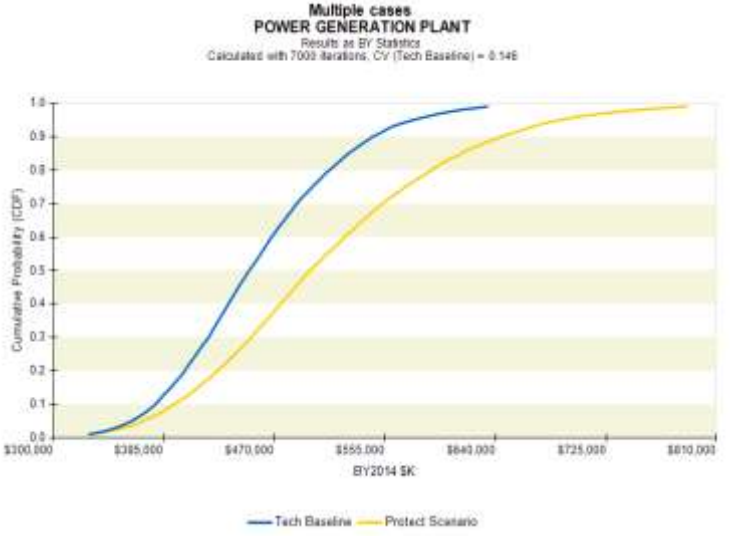


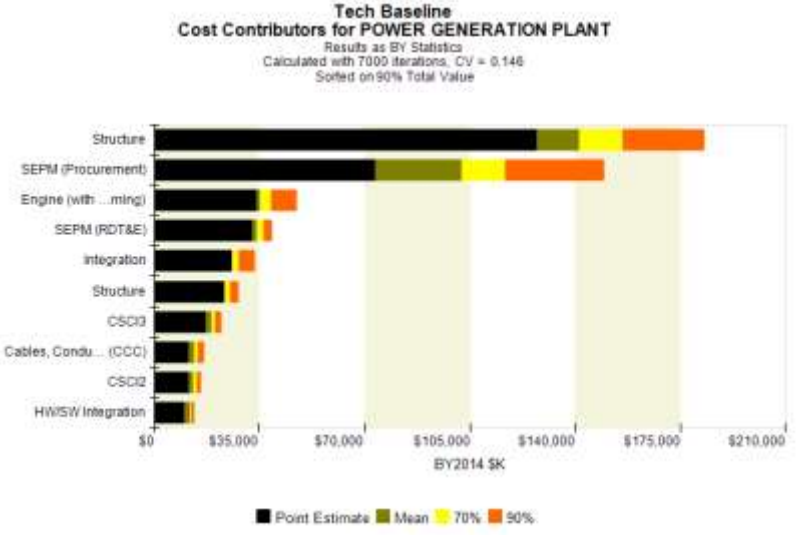
- TY RI$K cumulative distribution curve

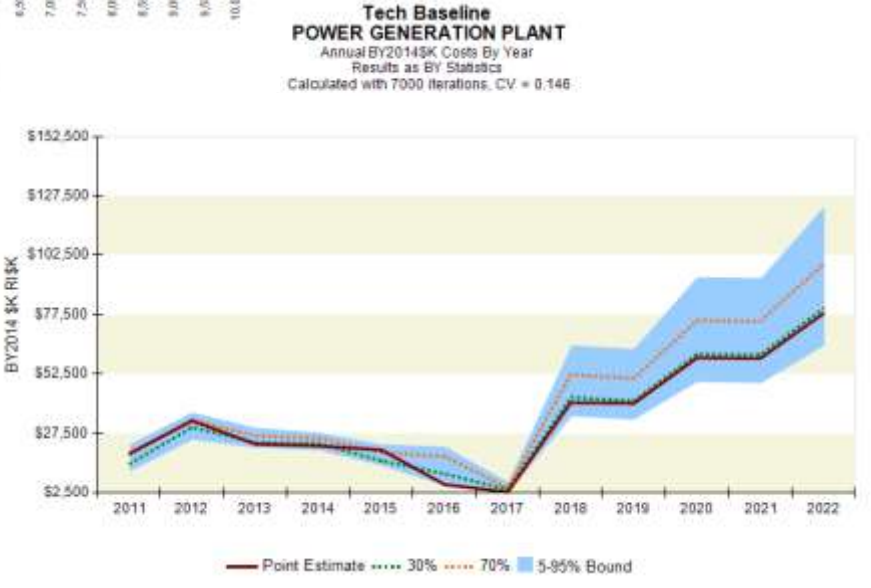
Graphical Outputs to Present Uncertainty Results

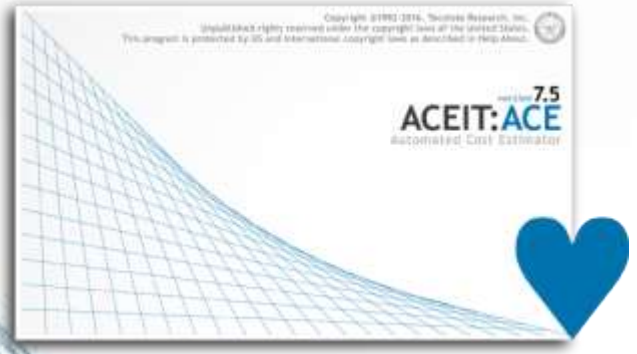












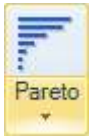
Excursions and Reports

Charts in ACE

- **Estimate Reports**
  - 

    Pie
  - 

    Phased Column
  - 

    Phased Areas
  - 

    Pareto
- **Comparison Reports**
  - 

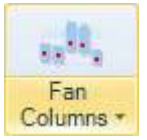
    Column
  - 

    Phased Line
- **RI$K Reports**
  - 

    Histogram
  - 

    Cumulative Distribution
  - 

    Contributors
  - 

    Fan Area
  - 

    Fan Columns
  - 

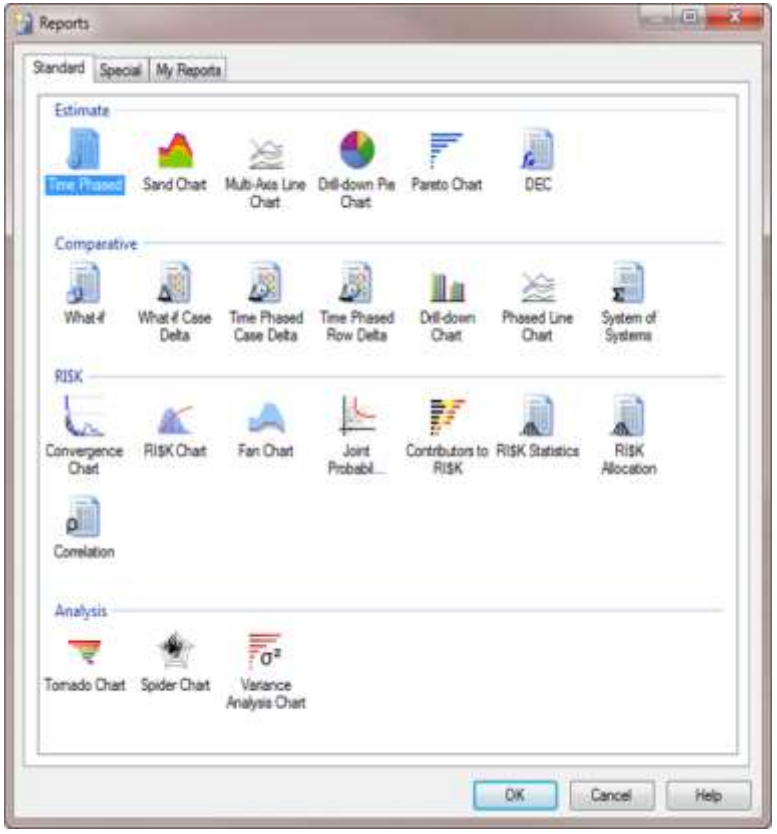
    Convergence

Program Office Support Tool (POST) Overview

POST is an Excel Add-in to:

- **Conduct an unlimited number of alternative scenario estimates for one or more ACE sessions**
- **Graphically drill-down through estimates to identify cost drivers**
- **Compare deltas between cost estimate scenarios**
- **Generate sensitivity reports to identify cost and uncertainty drivers**
- **Generate charts and tables for comprehensive reporting of the estimate**
- **Populate PowerPoint presentations and Word Documents**

POST Reports and Charts



Graphical Charts

- **Estimate:**
  - Sand
  - Multi-Axis Line
  - Drill-Down Pie
  - Pareto
- **Comparative:**
  - Drill-Down
  - Phased Line
- **RI$K:**
  - RI$K chart (Histogram/CDF)
  - Fan
  - Joint Probability
  - Convergence
  - Contributors
- **Analysis:**
  - Tornado
  - Spider
  - Variance Analysis

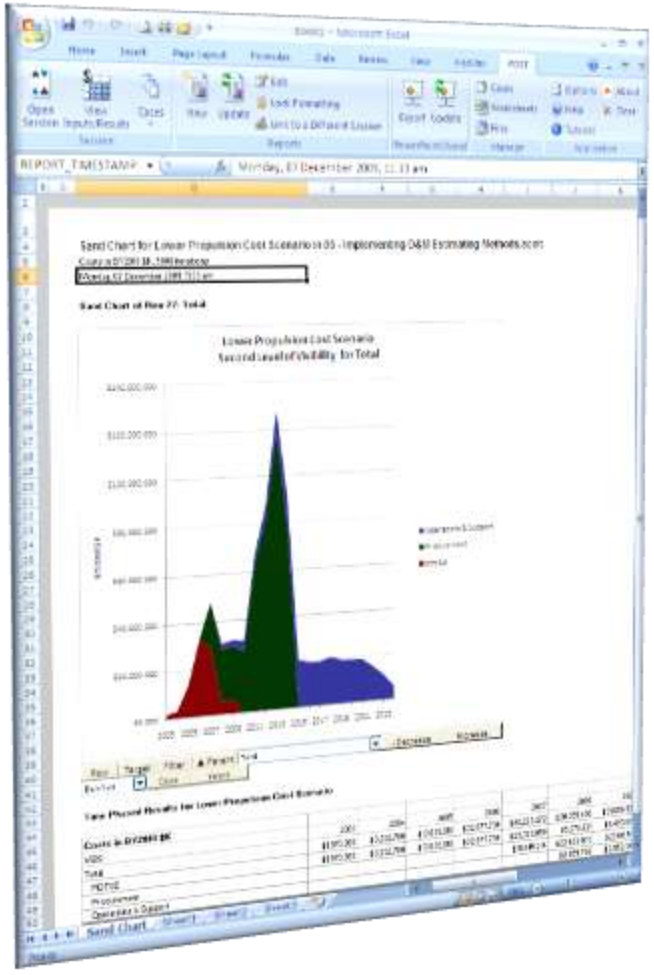
Tabular Reports

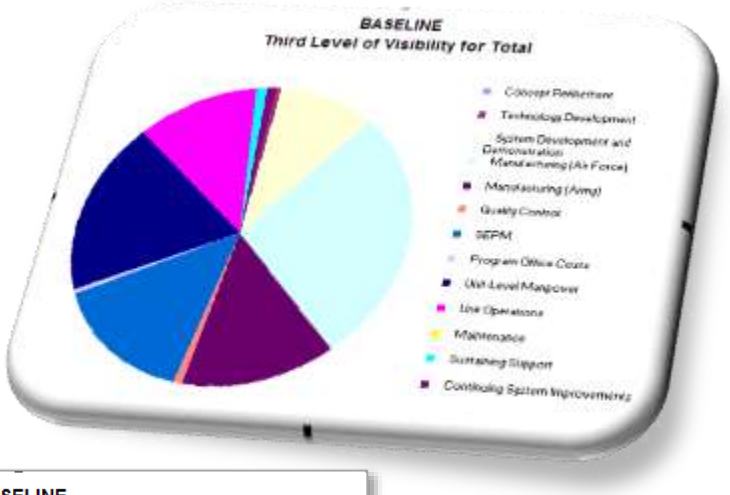
- **Estimate:**
  - Time Phased
  - DEC
- **Comparative:**
  - What If
  - What If Case Delta
  - Time Phased Case Delta
  - Time Phased Row Delta
  - System of Systems
- **RI$K:**
  - Statistics
  - Allocation
  - Correlation

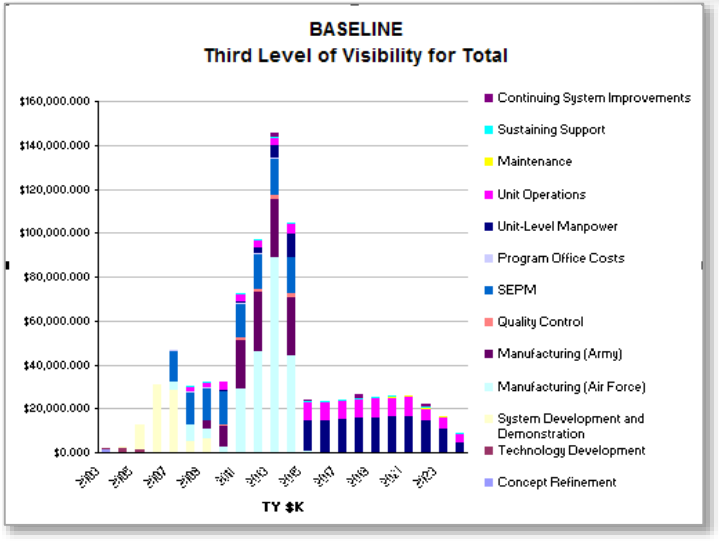
View Cost Estimates Graphically in ACE or POST

ACE charts provide on the fly graphics

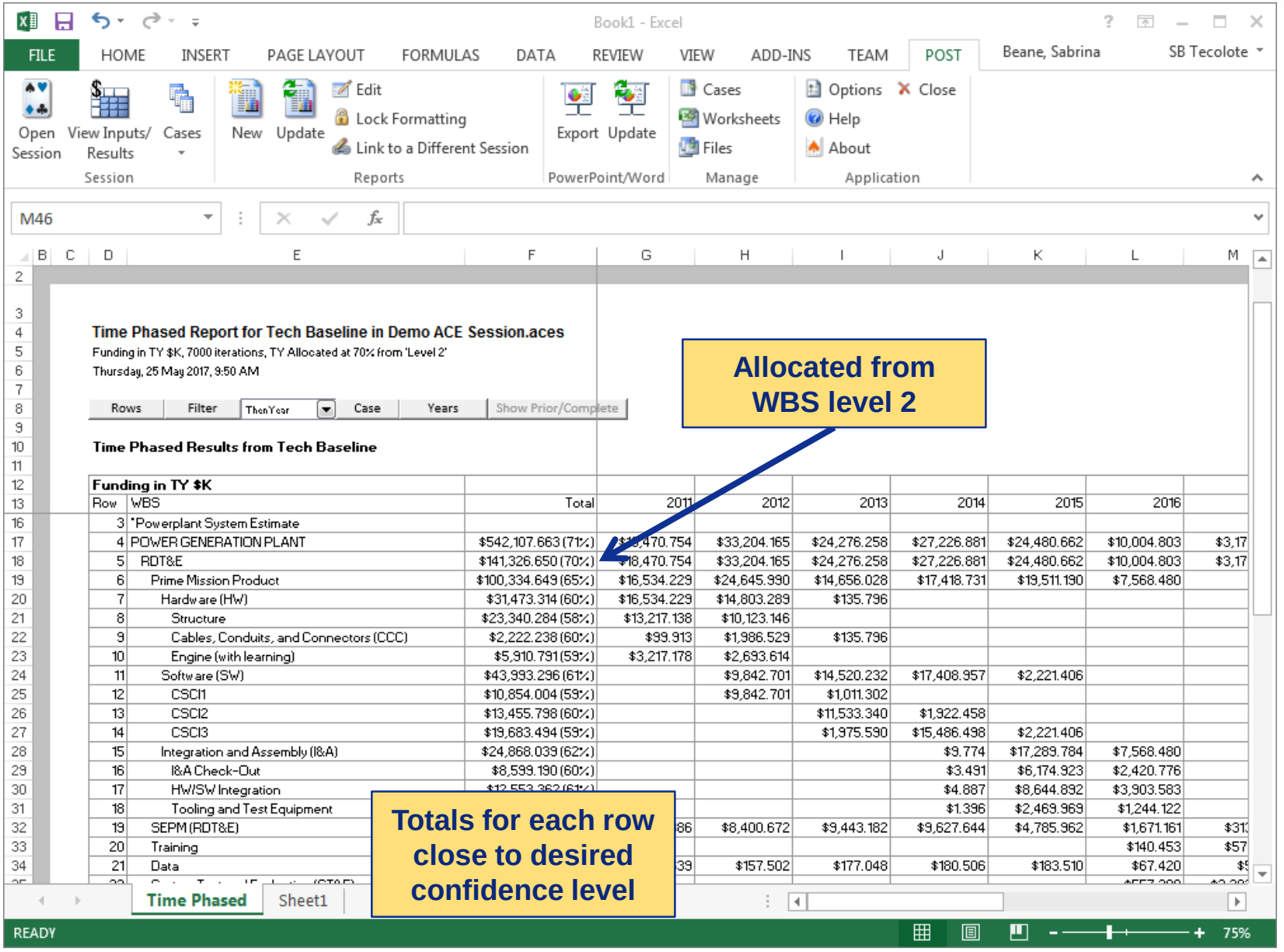
POST Reports and Charts are interactive, providing useful macros to update charts and full Excel charting controls







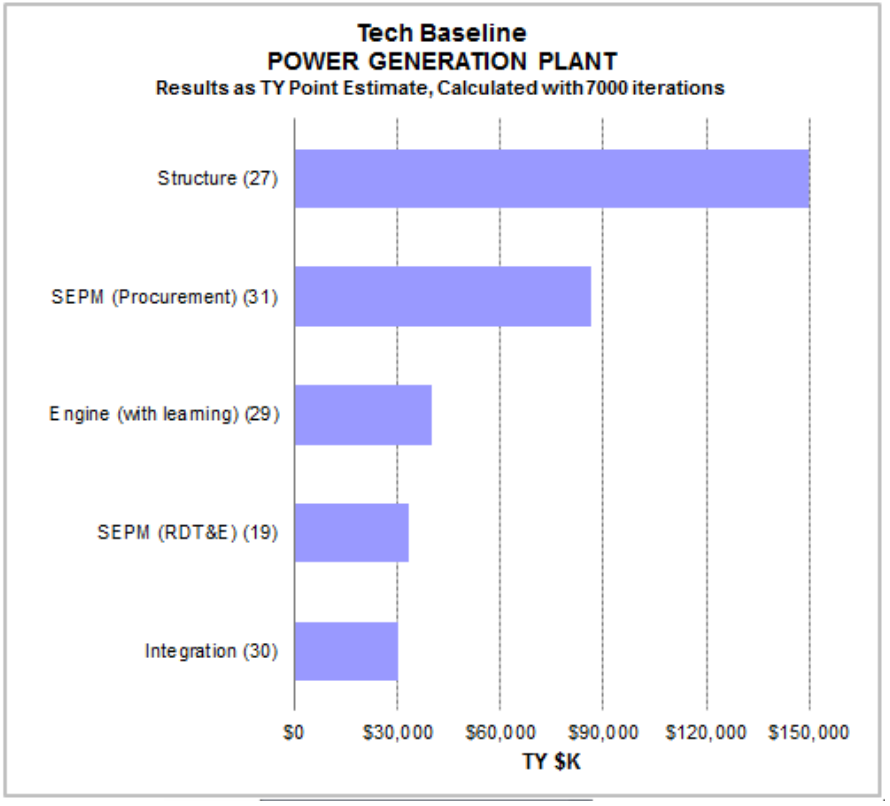
POST - Time Phased Report
Allocated at 70% Confidence

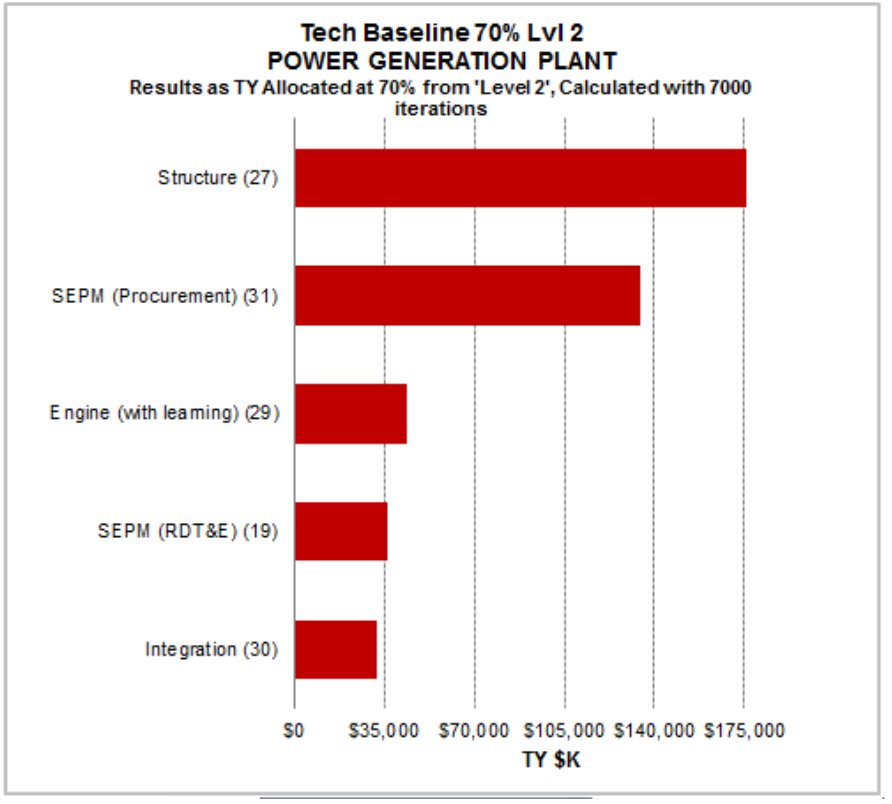


Funding in TY $K									
Row	WBS	Total	2011	2012	2013	2014	2015	2016	
3	*Powerplant System Estimate								
4	POWER GENERATION PLANT	$542,107.663 (71%)	$18,470.754	$33,204.165	$24,276.258	$27,226.881	$24,480.662	$10,004.803	$3,17
5	RDT&E	$141,326.650 (70%)	$18,470.754	$33,204.165	$24,276.258	$27,226.881	$24,480.662	$10,004.803	$3,17
6	Prime Mission Product	$100,334.649 (65%)	$16,534.229	$24,645.990	$14,656.028	$17,418.731	$19,511.190	$7,568.480	
7	Hardware (HW)	$31,473.314 (60%)	$16,534.229	$14,803.289	$135.796				
8	Structure	$23,340.284 (58%)	$13,217.138	$10,123.146					
9	Cables, Conduits, and Connectors (CCC)	$2,222.238 (60%)	$99.913	$1,986.529	$135.796				
10	Engine (with learning)	$5,910.791 (59%)	$3,217.178	$2,693.614					
11	Software (SW)	$43,993.296 (61%)		$9,842.701	$14,520.232	$17,408.957	$2,221.406		
12	CSCI1	$10,854.004 (59%)		$9,842.701	$1,011.302				
13	CSCI2	$13,455.798 (60%)			$11,533.340	$1,922.458			
14	CSCI3	$19,683.494 (59%)			$1,975.590	$15,486.498	$2,221.406		
15	Integration and Assembly (I&A)	$24,868.039 (62%)				$9.774	$17,289.784	$7,568.480	
16	I&A Check-Out	$8,599.190 (60%)				$3.491	$6,174.923	$2,420.776	
17	HW/SW Integration	$12,553.362 (61%)				$4.887	$8,644.892	$3,903.583	
18	Tooling and Test Equipment					$1.396	$2,469.969	$1,244.122	
19	SEPM (RDT&E)		86	$8,400.672	$9,443.182	$9,627.644	$4,785.962	$1,671.161	$31
20	Training							$140.453	$57
21	Data		39	$157.502	$177.048	$180.506	$183.510	$67.420	$

Pareto Chart

- Identifies the top contributors to the target parent level WBS
- Two SEPMs are identified, and two "Structure" elements
  - (xx) identifies session row numbers…. useful when names are not unique
- Evaluate point estimate and allocated case





Contributors Chart

- Identifies top contributors and impacts of uncertainty

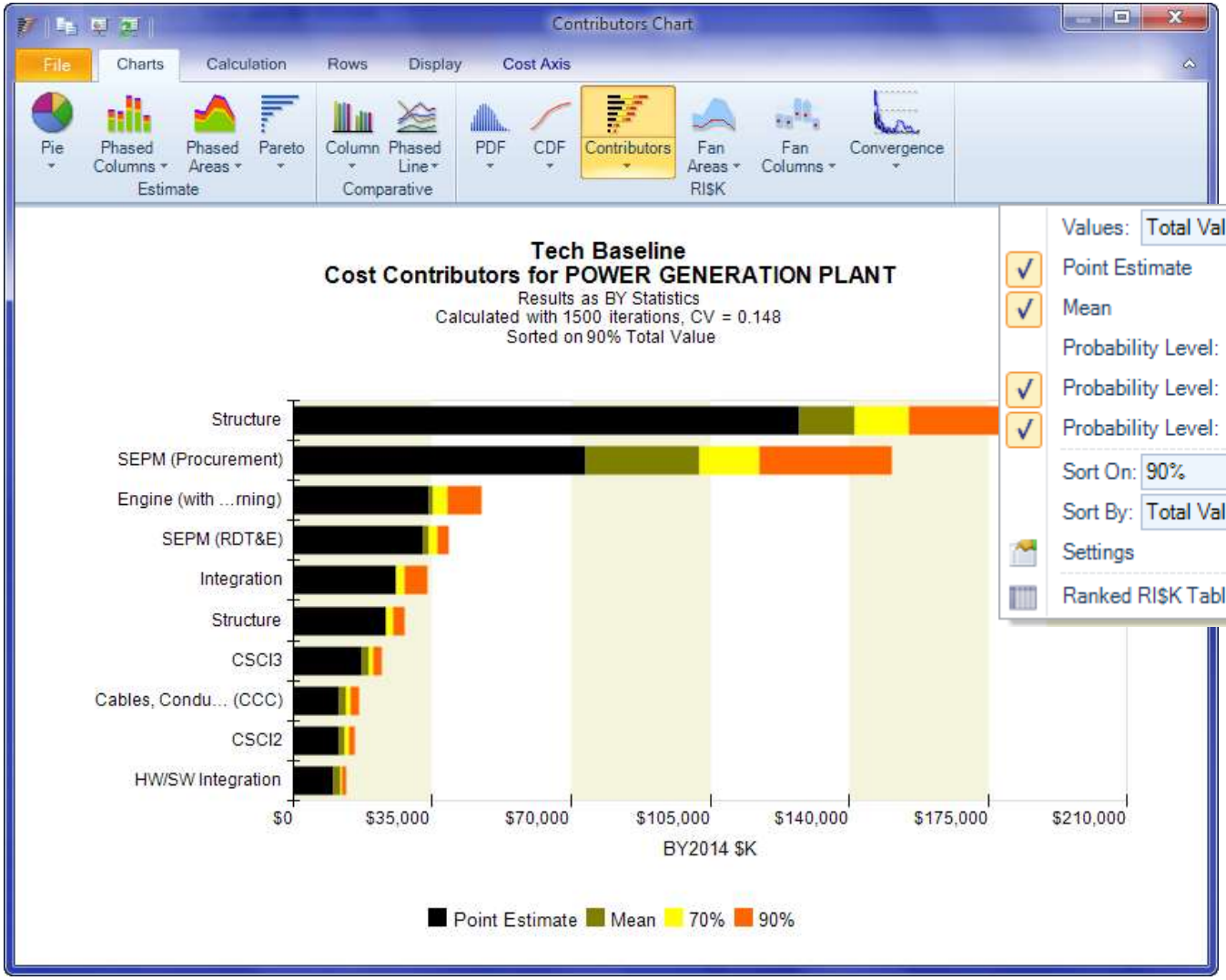
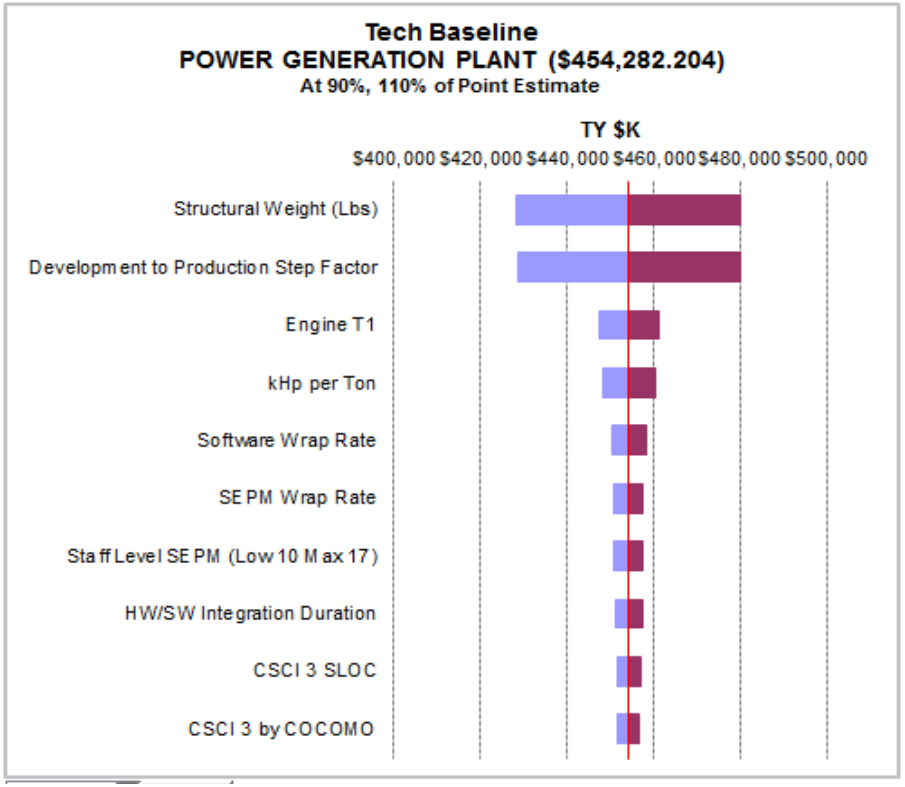
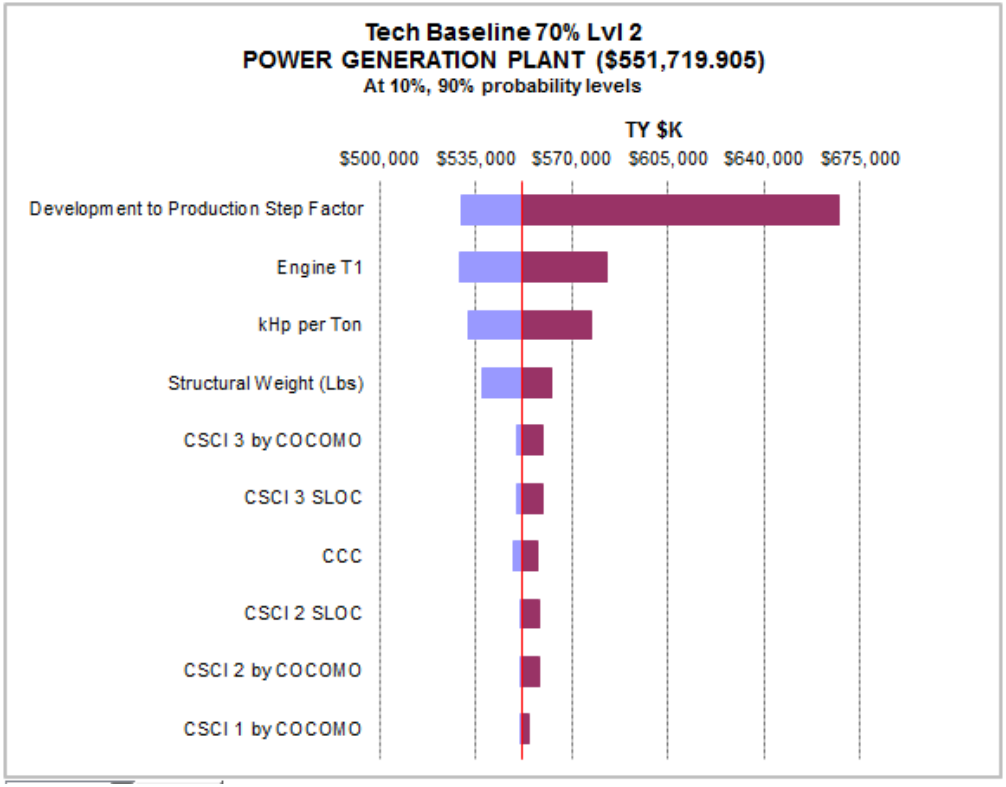


Chart drop-down provides access to user specified values to plot, probability levels, and sort options

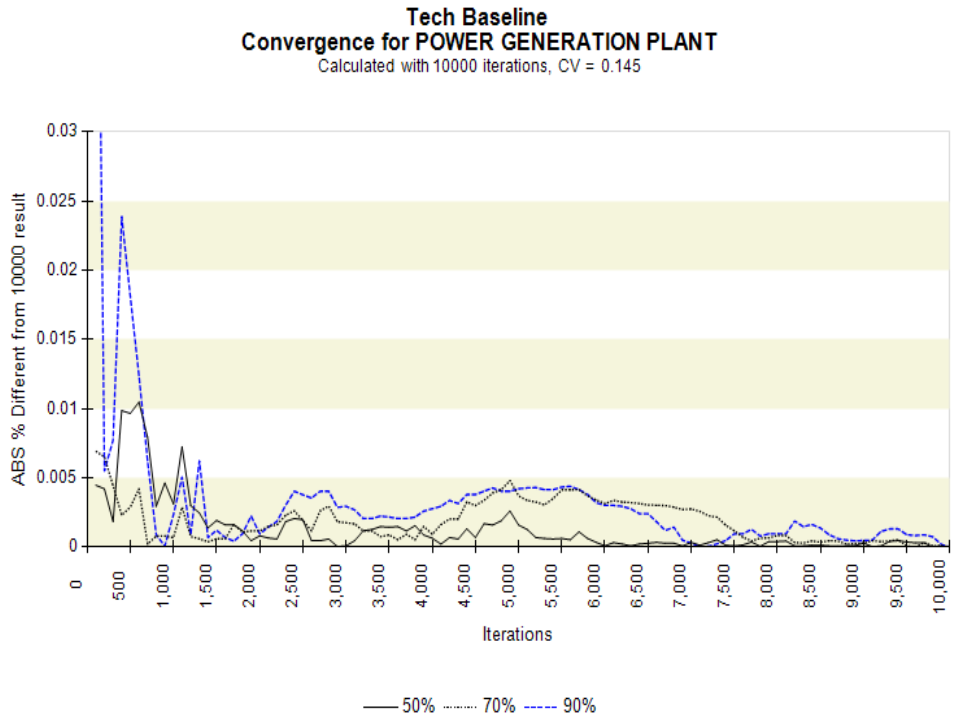
Tornado Chart

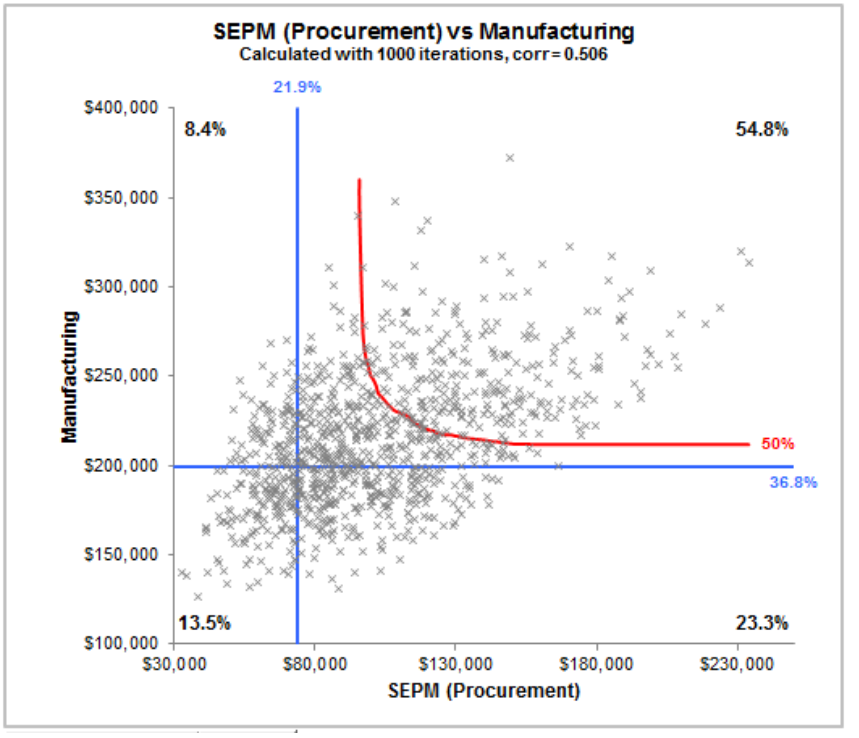
- **Rank orders the impact of input variations on a specific cost result**
  - Variations based on arbitrary Fixed Range or the model's RI$K Range
  - RI$K range captures the bounds assigned by the analyst which should make it a more realistic assessment





Other ACE/POST RI$K Reports

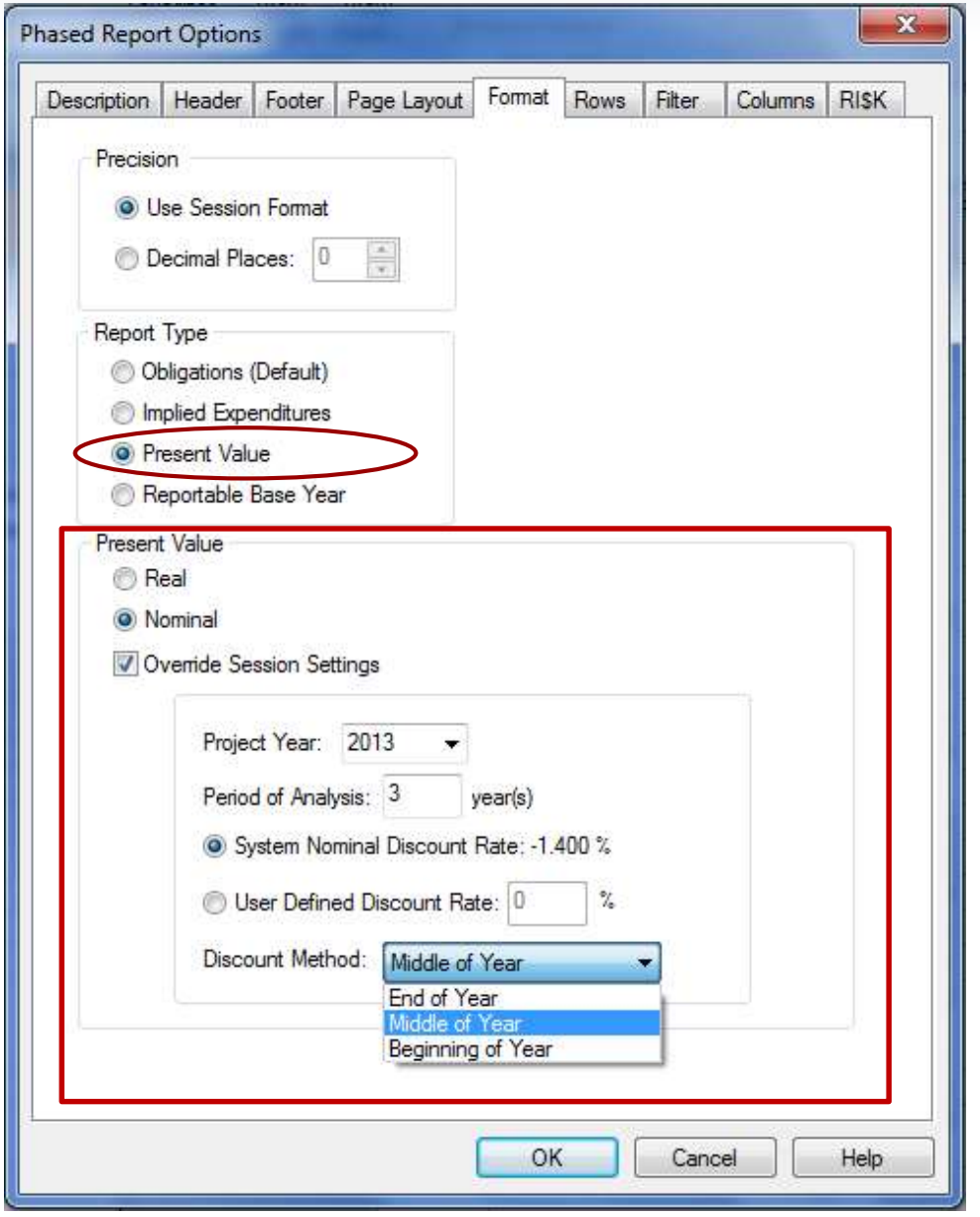




- ACE/POST Convergence chart provides guidance on the number of iterations to use
- POST Joint Probability chart illustrates the joint probability of hitting two targets

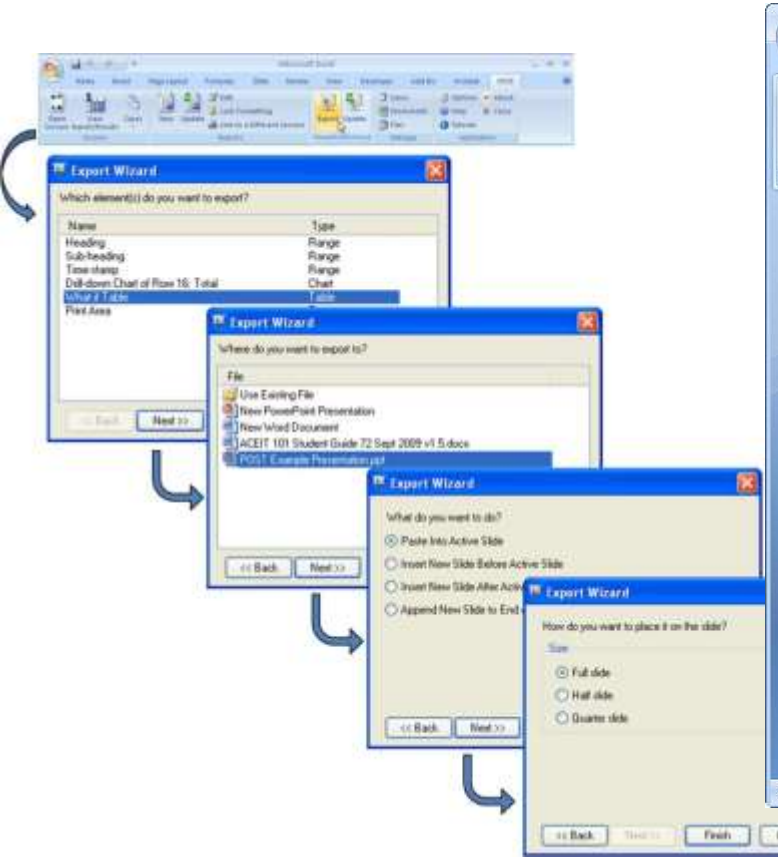
Present Value Report

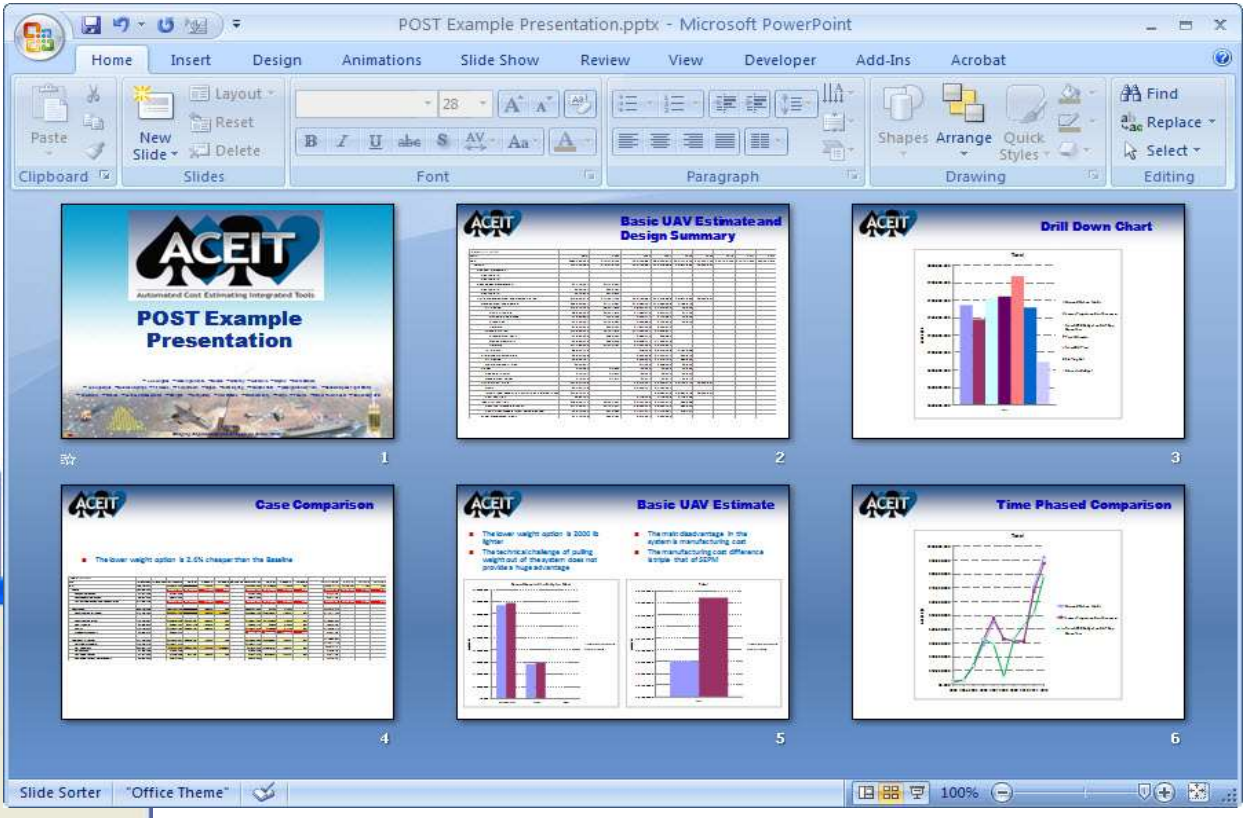
- **Present Value** report options for Phased Reports
- Available for Base Year and Then Year
  - Base Year --> Real Discount Rate
  - Then Year –> Nominal Discount Rate
- OMB Discount Rates stored and updated annually as part of the ACEIT inflation updates



Presentations Can be Auto-Generated by ACE and POST

- **Reports can be exported to PowerPoint**
  - Built-in POST feature
  - Minimizes links and PPT file size
- **Reports can be updated with a single button**





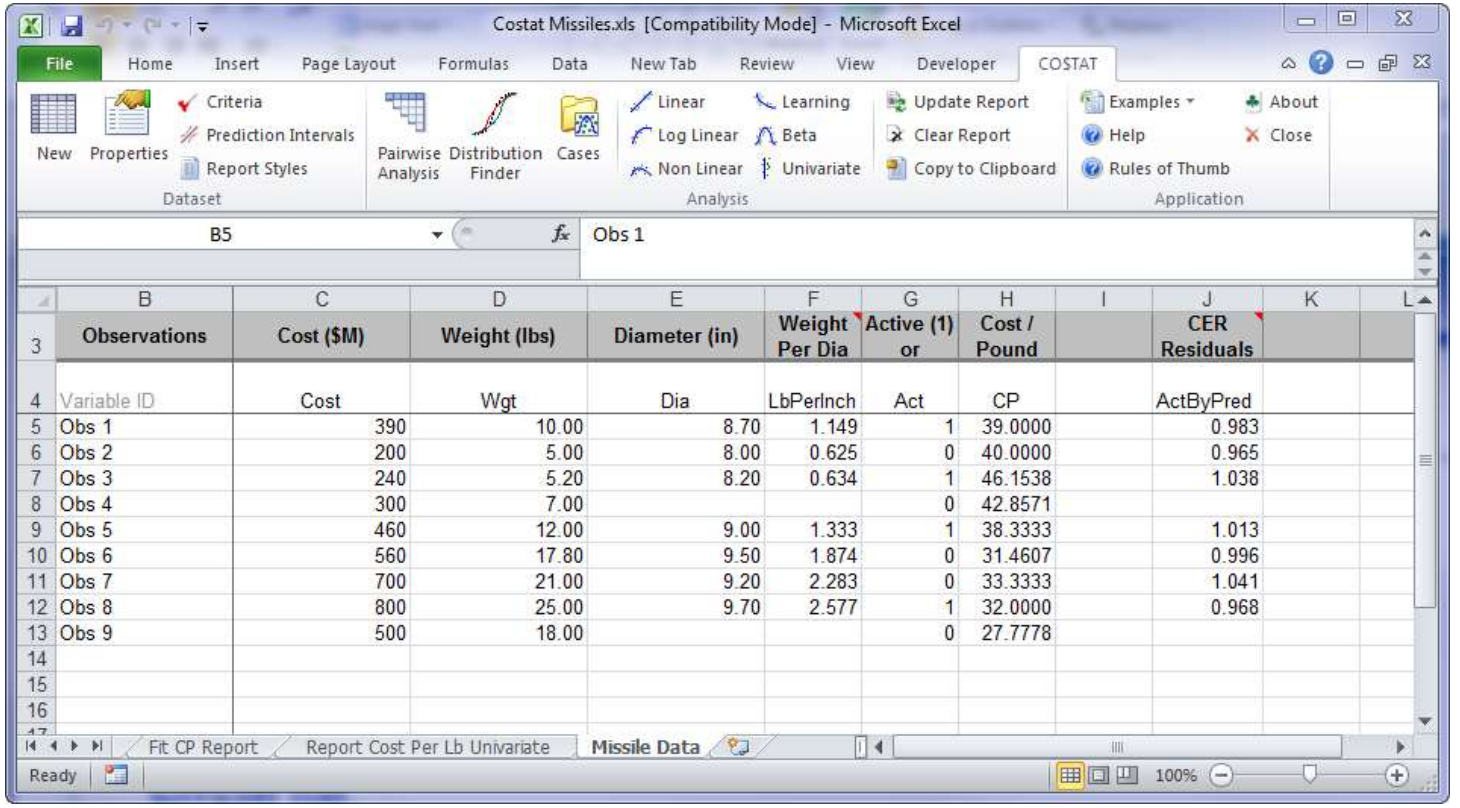
Data Analysis – CO$TAT

CO$TAT

- CO$TAT is the statistics package of the ACEIT platform
- Statistical analysis tool designed specifically for the cost analyst
- Use it to conduct univariate, multivariate, linear, log-linear, non-linear, beta curve, data sampling, and learning curve analysis
- Easily exports analogies or CO$TAT analyses to ACE or Librarian

CO$TAT - Excel Based Add-in

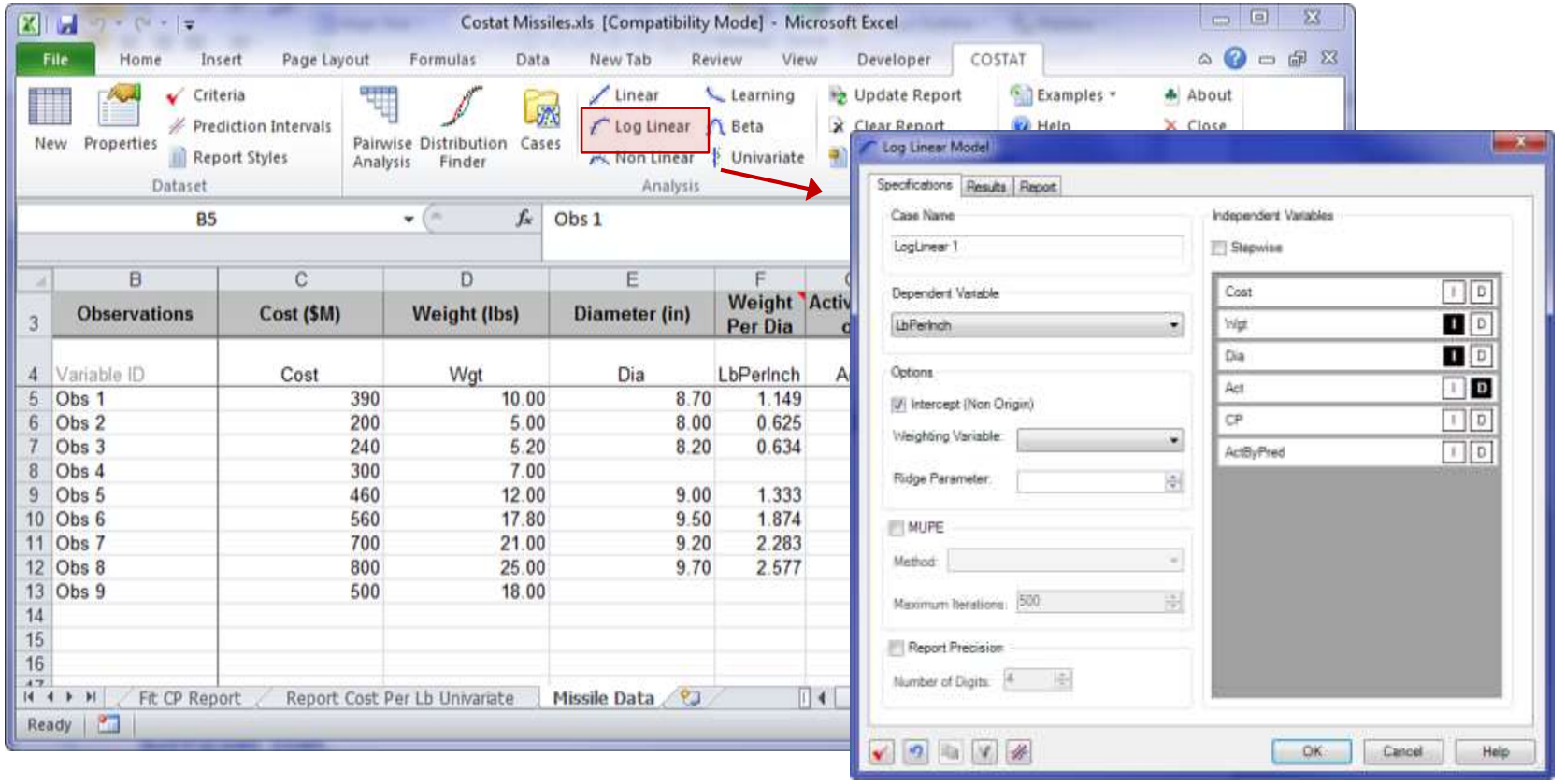
- Datasets easily created, updated, and managed in Excel workbooks
- CO$TAT readable datasets can easily be created from any source
- Allows for entire analysis and data to be self-contained in a simple file.
- Data manipulation is simple and intuitive
- Users are in familiar application (Excel)



	B	C	D	E	F	G	H	I	J	K	L
3	Observations	Cost ($M)	Weight (lbs)	Diameter (in)	Weight Per Dia	Active (1) or	Cost / Pound		CER Residuals		
4	Variable ID	Cost	Wgt	Dia	LbPerInch	Act	CP		ActByPred		
5	Obs 1	390	10.00	8.70	1.149	1	39.0000		0.983		
6	Obs 2	200	5.00	8.00	0.625	0	40.0000		0.965		
7	Obs 3	240	5.20	8.20	0.634	1	46.1538		1.038		
8	Obs 4	300	7.00			0	42.8571				
9	Obs 5	460	12.00	9.00	1.333	1	38.3333		1.013		
10	Obs 6	560	17.80	9.50	1.874	0	31.4607		0.996		
11	Obs 7	700	21.00	9.20	2.283	0	33.3333		1.041		
12	Obs 8	800	25.00	9.70	2.577	1	32.0000		0.968		
13	Obs 9	500	18.00			0	27.7778				
14											
15											
16											

Intuitive Interface

- Access all functionality from the Excel menu
- Model specification form (Dependent / Independent variables) is straight-forward
- Develop methodologies specific to system types/ technologies based on available historical data for use as primary estimate or to cross-check relationships
- Prediction intervals and results can be quickly displayed



Comprehensive Statistics

- Statistical results can be viewed quickly and a detailed report can be created in an Excel workbook
- Graphical charts are generated
- Entire detailed statistics report can be exported into ACE CER libraries an ACE estimate documentation

LogLinear 1

Wednesday, 09 April 2014, 1:59 PM

I. Model Form and Equation Table

Model Form:	Unweighted Log-Linear model
Number of Observations Used:	7
Equation in Unit Space:	LbPerInch = 0.9975 * Wgt^1 * Dia^(-0.9987) * 0.9996^Act

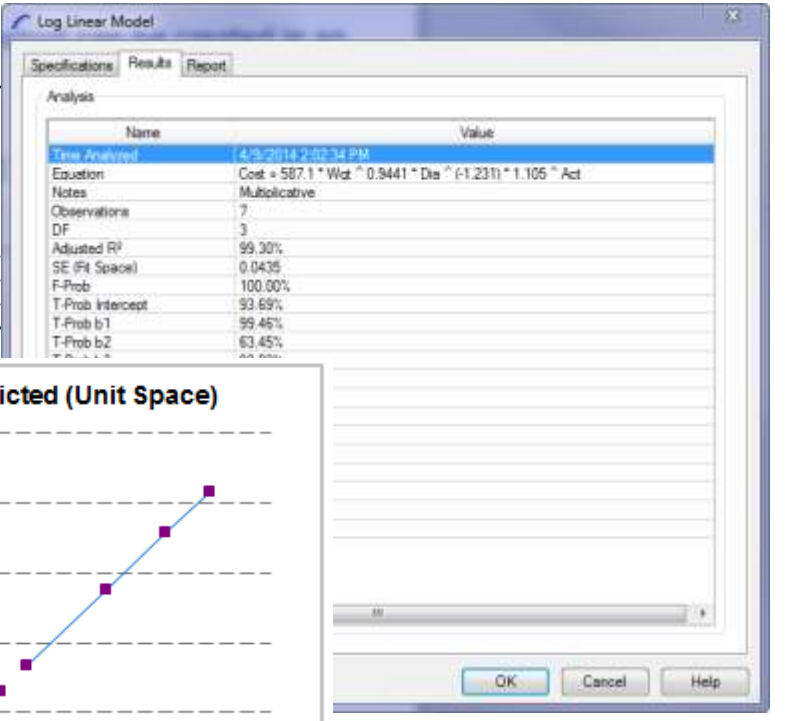
II. Fit Measures (in Fit Space)

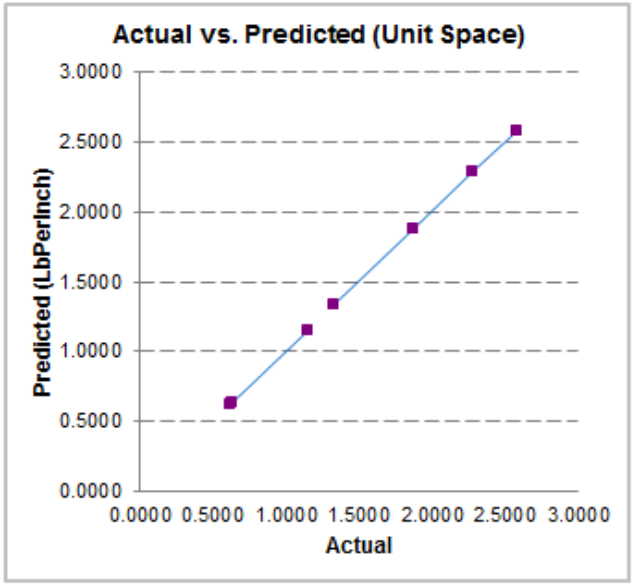
Coefficient Statistics Summary

Variable	Coefficient	Std Dev of Coef	Beta Value	T-Statistic (Coef/SD)	P-Value
Intercept	-0.0025	0.0043		-0.5879	0.59
Wgt	1.0000	0.0003	1.1219	3935.9014	0.00
Dia	-0.9987	0.0023	-0.1257	-442.2979	0.00
EXP_Act	-0.0004	0.0000	-0.0003	-5.1540	0.01

Goodness-of-Fit Statistics

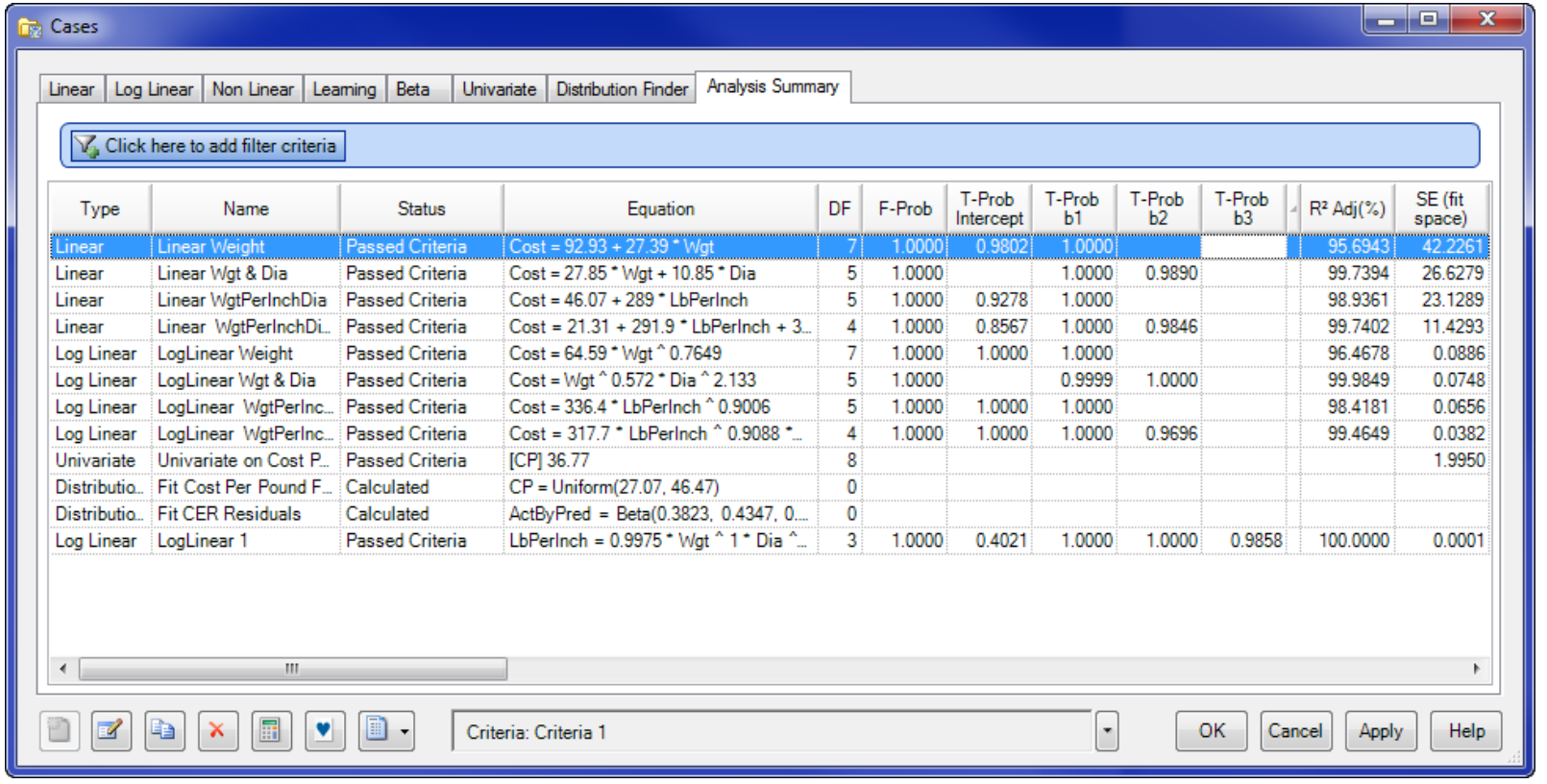
Std Error (SE)	R-Squared	R-Squared (Adj)	Pearson's Corr Coef
0.0000	100.00%	100.00%	1.0000





Easily Compare Metrics

- Compare and view all solutions from a simple interface
- Assess which model forms meet statistics criteria
- Export desired methods with documentation for use in ACE

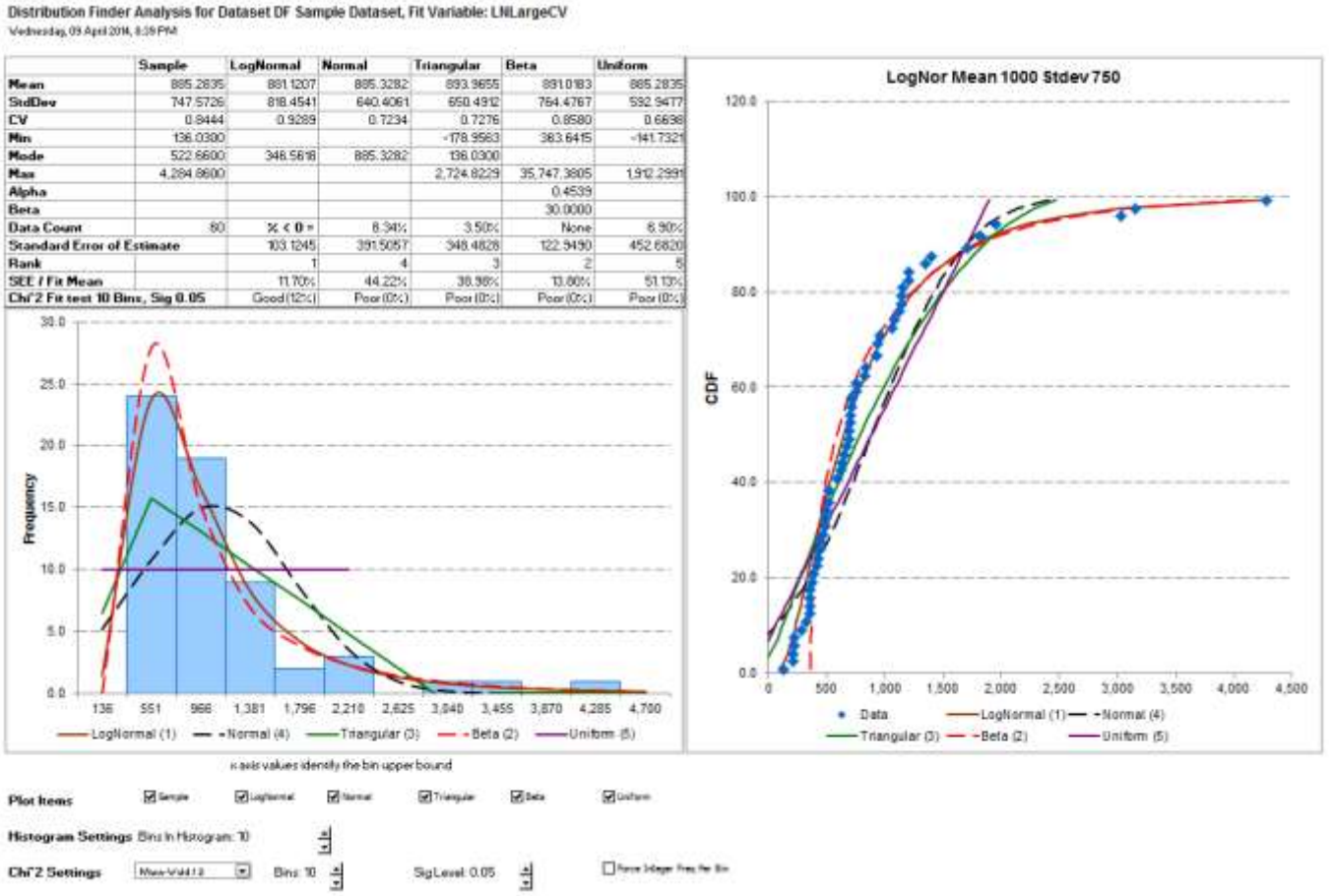


Type	Name	Status	Equation	DF	F-Prob	T-Prob Intercept	T-Prob b1	T-Prob b2	T-Prob b3	R² Adj(%)	SE (fit space)
Linear	Linear Weight	Passed Criteria	Cost = 92.93 + 27.39 * Wgt	7	1.0000	0.9802	1.0000			95.6943	42.2261
Linear	Linear Wgt & Dia	Passed Criteria	Cost = 27.85 * Wgt + 10.85 * Dia	5	1.0000		1.0000	0.9890		99.7394	26.6279
Linear	Linear WgtPerInchDia	Passed Criteria	Cost = 46.07 + 289 * LbPerInch	5	1.0000	0.9278	1.0000			98.9361	23.1289
Linear	Linear WgtPerInchDi...	Passed Criteria	Cost = 21.31 + 291.9 * LbPerInch + 3...	4	1.0000	0.8567	1.0000	0.9846		99.7402	11.4293
Log Linear	LogLinear Weight	Passed Criteria	Cost = 64.59 * Wgt ^ 0.7649	7	1.0000	1.0000	1.0000			96.4678	0.0886
Log Linear	LogLinear Wgt & Dia	Passed Criteria	Cost = Wgt ^ 0.572 * Dia ^ 2.133	5	1.0000		0.9999	1.0000		99.9849	0.0748
Log Linear	LogLinear WgtPerInc...	Passed Criteria	Cost = 336.4 * LbPerInch ^ 0.9006	5	1.0000	1.0000	1.0000			98.4181	0.0656
Log Linear	LogLinear WgtPerInc...	Passed Criteria	Cost = 317.7 * LbPerInch ^ 0.9088 *...	4	1.0000	1.0000	1.0000	0.9696		99.4649	0.0382
Univariate	Univariate on Cost P...	Passed Criteria	[CP] 36.77	8							1.9950
Distributio...	Fit Cost Per Pound F...	Calculated	CP = Uniform(27.07, 46.47)	0							
Distributio...	Fit CER Residuals	Calculated	ActByPred = Beta(0.3823, 0.4347, 0....	0							
Log Linear	LogLinear 1	Passed Criteria	LbPerInch = 0.9975 * Wgt ^ 1 * Dia ^...	3	1.0000	0.4021	1.0000	1.0000	0.9858	100.0000	0.0001

Distribution Finder

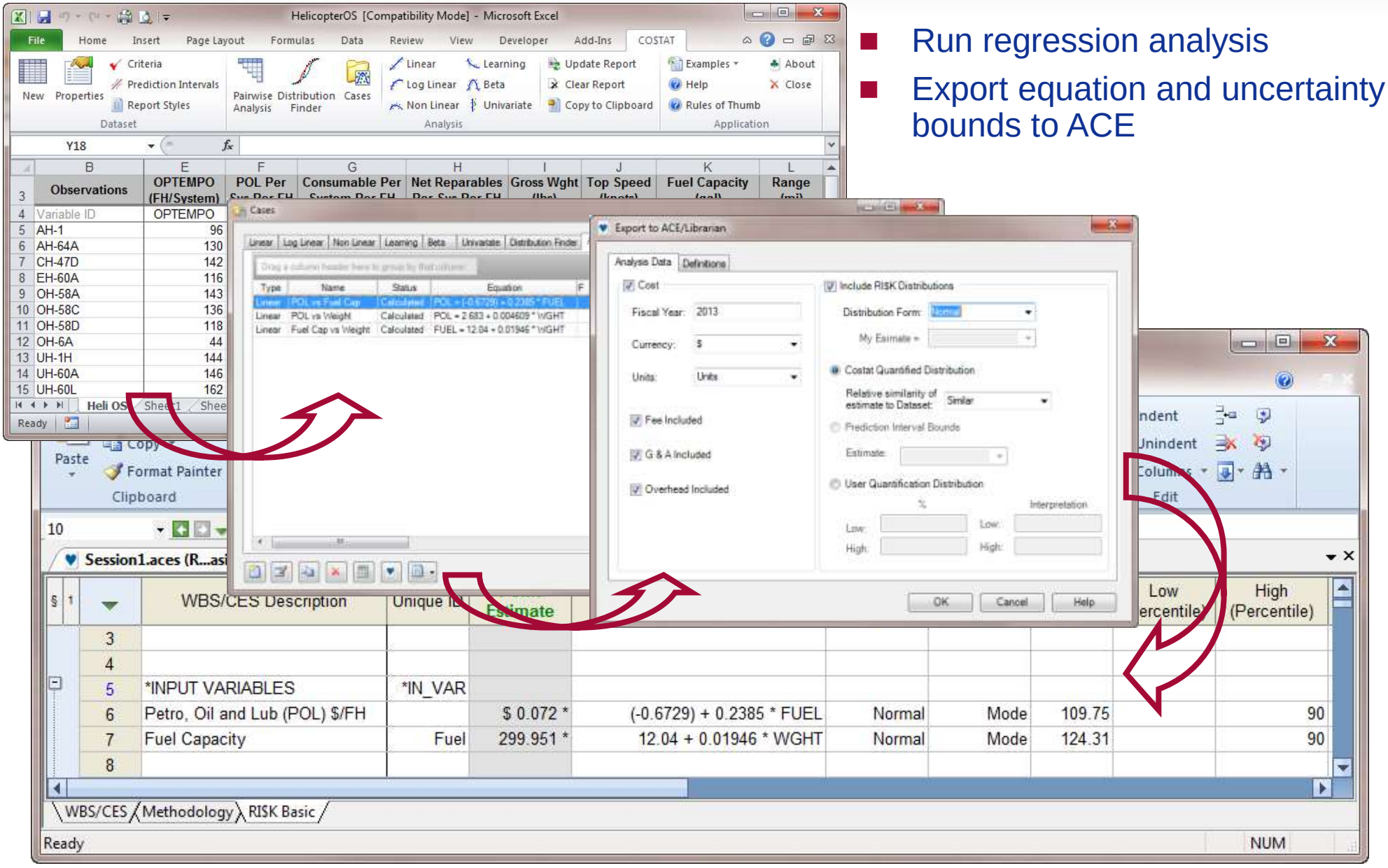
	B	C
3	Observations	LogNor Mean 1000 Stdev 750
4	Variable ID	LNLargeCV
5	Project 1	353.82
6	Project 2	438.44
7	Project 3	424.04
8	Project 4	934.55
9	Project 5	754.40
10	Project 6	415.07
11	Project 7	473.28
12	Project 8	225.47
13	Project 9	1,129.11
14	Project 10	3,154.59
15	Project 11	1,821.75
16	Project 12	1,959.22
17	Project 13	1,148.85
18	Project 14	
19	Project 15	4,284.86
20	Project 16	492.64
21	Project 17	758.22
22	Project 18	708.66
23	Project 19	714.72
24	Project 20	1,081.27
25	Project 21	210.94
26	Project 22	1,059.59
27	Project 23	1,160.09
28	Project 24	1,714.10
29	Project 25	289.40
30	Project 26	499.08
31	Project 27	936.16
32	Project 28	387.57
33	Project 29	489.42
34	Project 30	
35	Project 31	957.43
36	Project 32	824.49
37	Project 33	1,151.08
38	Project 34	1,400.34
39	Project 35	1,346.14
40	Project 36	720.80
41	Project 37	136.03
42	Project 38	674.27
43	Project 39	
44	Project 40	1,204.72
45	Project 41	596.29
46	Project 42	626.27

- Distribution Finder is used to find the distribution shape that most closely fits a set of data
- It can also be used to manually calculate the prediction interval for a CER by fitting a distribution to the residuals in the form of multipliers (Actual/Predicted)



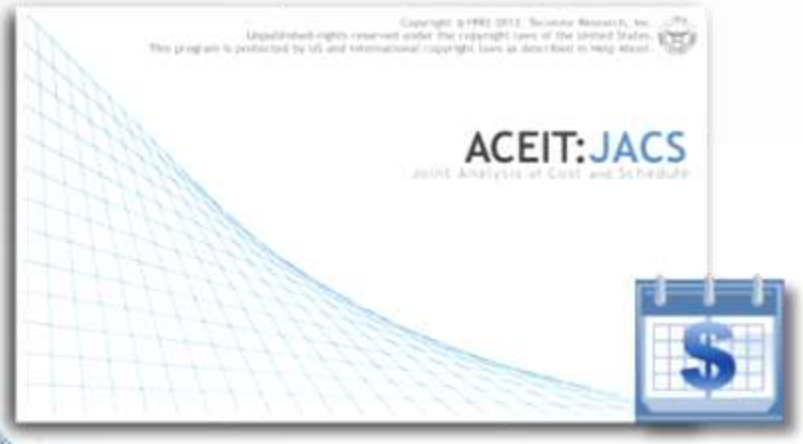
CO$TAT Statistical Analysis

- Run regression analysis
- Export equation and uncertainty bounds to ACE



CO$TAT Key Features

- **Simple dataset creation in Excel**
- **Access to Statistical Analysis Methods**
  - Distribution fit analysis
  - Pairwise correlation analysis
  - Univariate and multivariate analysis
  - Stepwise analysis
  - Multicollinearity analysis
  - Linear, log-linear, non-linear regression analysis
  - Least-squared analysis
  - Iterative method for non-linear regression
  - Identification of outliers, leverage points and data with undue influence
  - Use of dummy and weighting variables allowed
  - Cumulative average and unit theory learning curve analysis
  - Rate adjusted and broken learning
  - Spend profile analysis to determine beta curves
  - Ridge regression
  - MUPE analysis
  - Prediction interval calculations
- **Comprehensive Descriptive Statistics**
  - Coefficient Statistics
  - Goodness of Fit
  - Analysis of Variance
  - Standard deviation
  - Mean, median, quartiles
  - Predictive Measures
  - Ridge statistics
- **Integrated Documentation**
  - Statistical reports
  - Pairwise correlation matrices
  - Interactive scatter plots, standardized residuals, actuals vs predicted, equation vs variable
  - Created as Excel worksheets
- **Compare methodologies**
  - Summary statistical report interface
  - Ability to set selection criteria
- **Export to Libraries and ACE Estimates**
  - Include dataset
  - Include statistical reports and graphics
  - Include prediction intervals and/or risk bounds



Analyzing Cost and Schedule JACS

What is JACS?

JACS is a robust risk analysis tool compatible with MS Project and Primavera P6.

- Conduct schedule risk analysis
- Integrate cost & schedule
- Perform joint confidence level analysis

What Sets JACS Apart

Directly integrates with schedule, no Separate File required

- Data stored directly in working files, allowing continual update and input review
- Currently JACS for Project add-in for MS Project and JACS for P6 standalone tool that interfaces with P6 database

Proven customer focused support

- Tecolote Research has over 30 years of product development, maintenance, and customer support experience
- Direction controlled by the primary customer base (NASA and US Federal Agencies)
- Developed by authors of risk analysis handbooks, noted researchers in the field of cost and schedule risk analysis, and practitioners

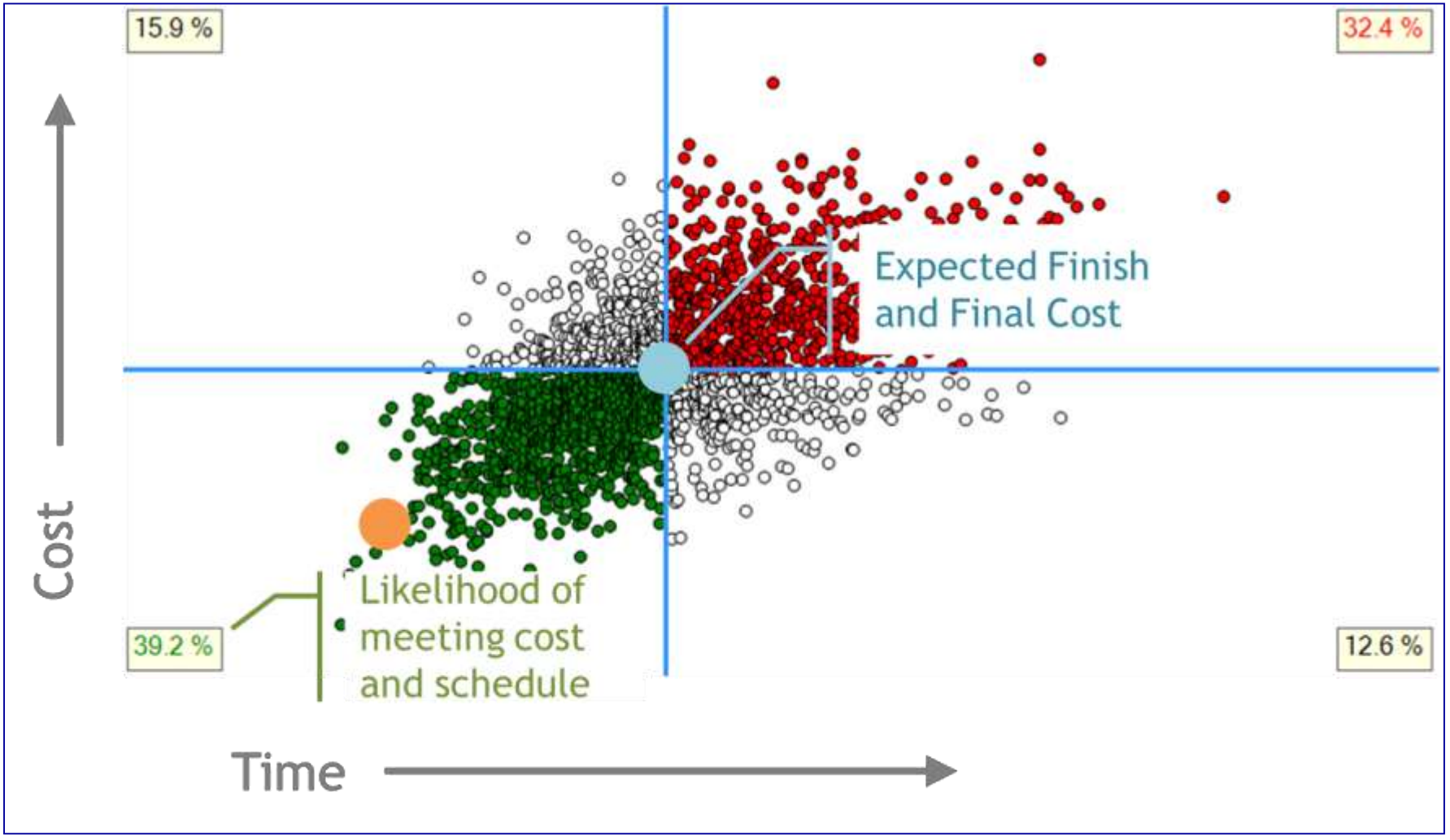
Open architecture

- Only application to provide all calculation data to allow advanced analytics
- Fully enables the analyst to assess, understand, and communicate results

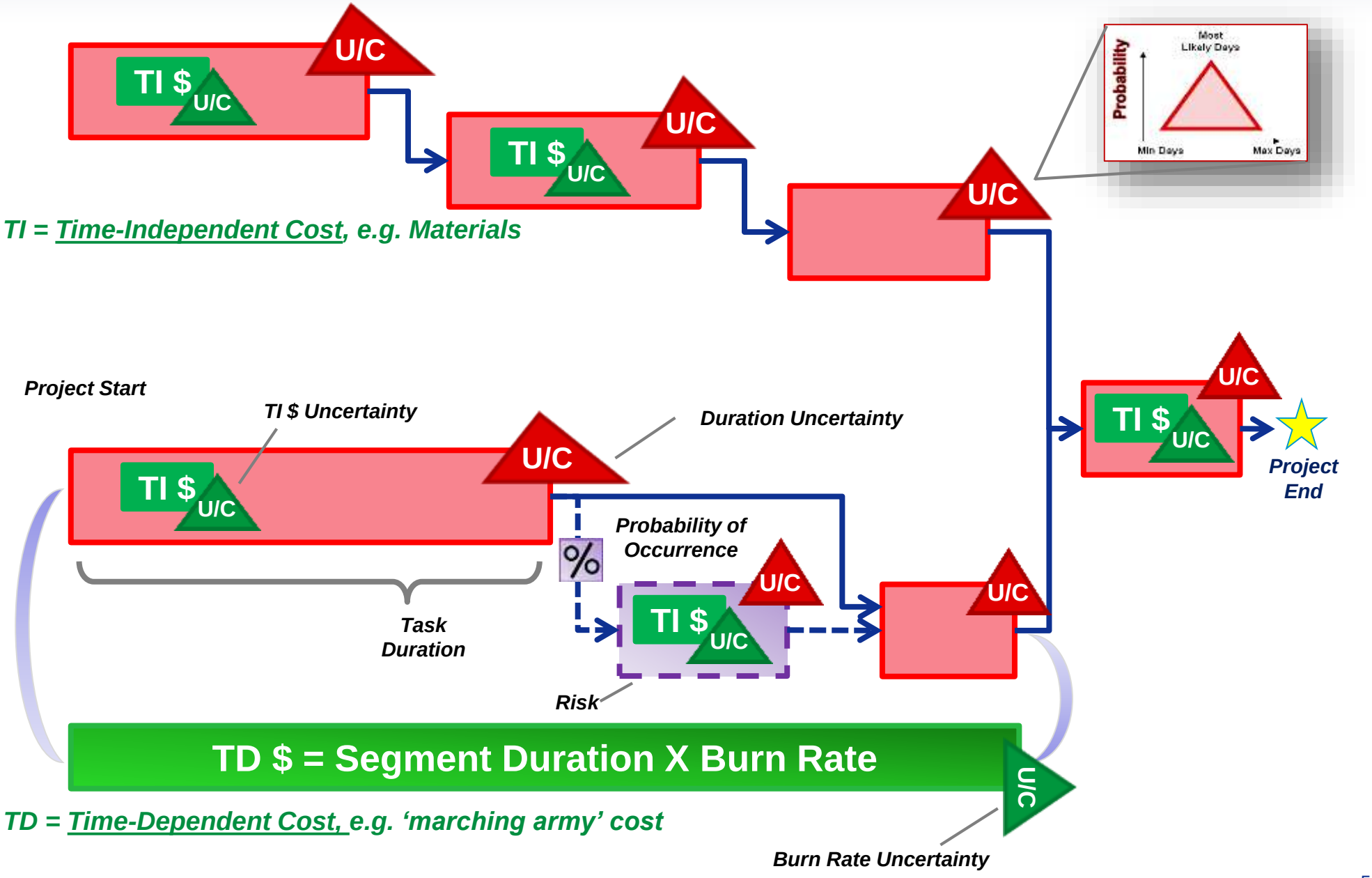
Low cost

- Included in ACEIT software suite

Identify Cost and Schedule Range

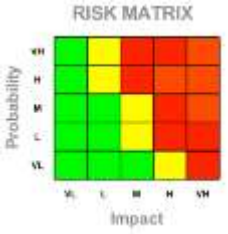


Integrated Risk & Uncertainty Landscape – the JACS Paradigm



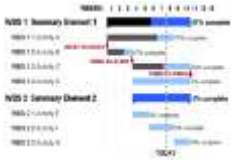
Fully Integrated Cost and Schedule Method (FICSM)

Risk



Collect Risk Data → Assign Likelihood, Estimate Impact → Map to Schedule Activities → Assign Event Impact Uncertainty

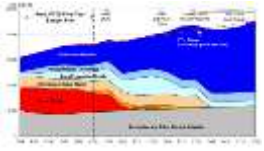
Sched



Validate File

Collect Schedule Data → Create Analysis Schedule → Update Analysis Schedule → Assign Duration Uncertainty

Cost



Collect Cost Data → Identify as TD or TI → Map to Schedule Activities → Assign Cost Uncertainty

Apply Correlation → Validate File → Run Analysis

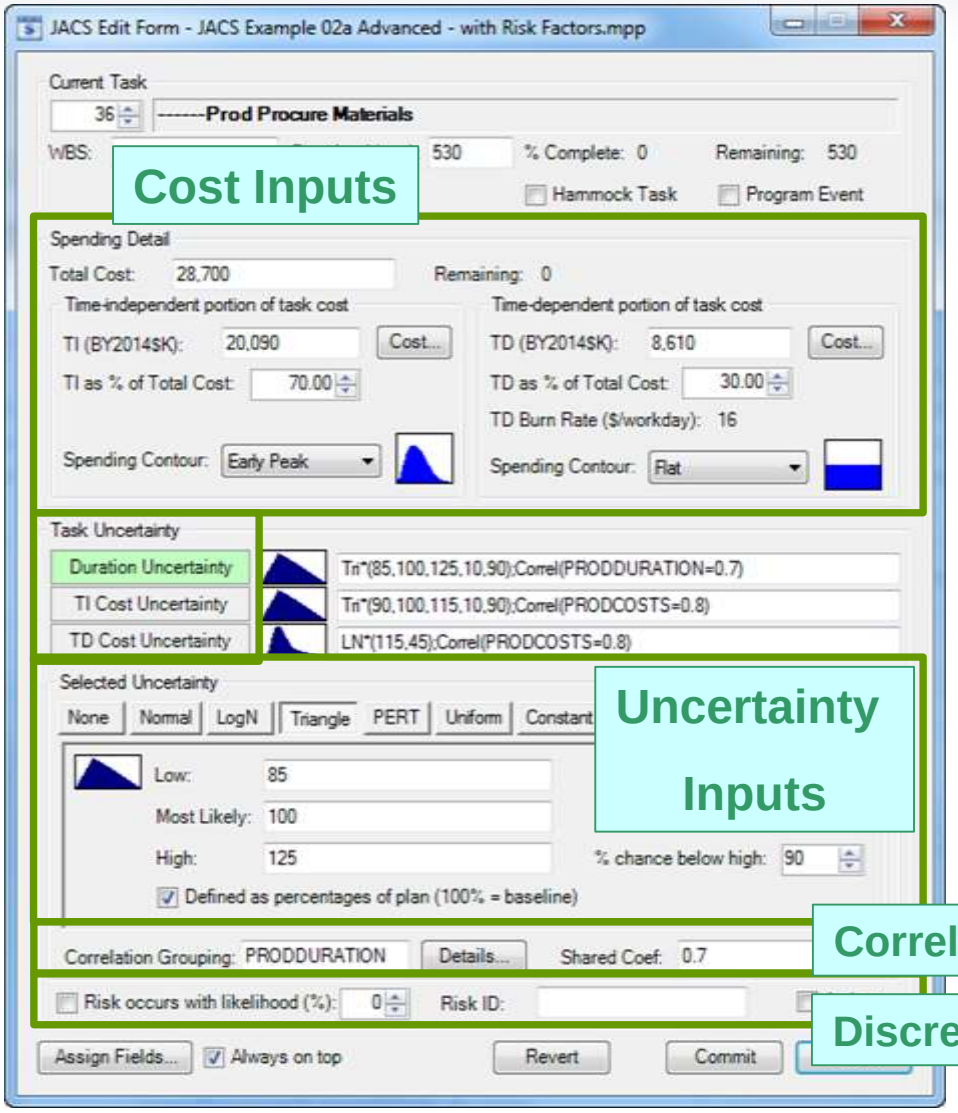
JACS Functionality and Purpose

- **JACS supports Program Management in cost and scheduling analysis**
- **Empowers the analysts to answer Key Program/Project Management questions**
  - Does the program have enough funds to complete the effort scope by the target date?
  - What is the likelihood of completing the effort scope by the target date?
  - What can be done to increase the likelihood of on-time completion?
  - If the program slips beyond target end date, what is the potential cost overrun and schedule slip?
  - What adjustments are needed?

JACS Inputs

- **Schedule**
  - Work effort (activities) with durations to meet target deliverables milestones (includes funded work, e.g., funded risk mitigation activities)
  - ***Uncertainty*** to meet planned duration
  - Linkage between work efforts – dependencies internally and externally
  - Incorporation of ***discrete risk*** impacts into the schedule network
- **Cost**
  - Cost to accomplish scope of identified work activities
  - Mapping of WBS costs into high-level schedule activities
  - ***Uncertainty*** associated with costing of required resources
- **Risk Events**
  - Identification of events that will cause a technical/cost/schedule impacts
  - Quantification of events in terms of schedule, technical, and cost impacts
  - Identification of impacted schedule activities if risk event occurs and **uncertainty**
- **Risk Factors**
  - Risk Factors are activities that may or may not occur, with some percent likelihood.
  - When the activity occurs, the risk factor increased an impacted events cost and/or duration directly by a user defined percentage

Simple Interface - Data Entry



- **JACS Edit Form is analogous to the ACE Input All Form**
- **Systematically enter duration, cost, uncertainty and risk for a given task**
  - Mark task as a Hammock or as a Program Event
  - Map costs to relevant tasks and split into Time Dependent and Time Independent Costs
  - Specify uncertainty
  - Apply correlation
  - Create risk events
- **Data entered is stored directly into configured custom fields**

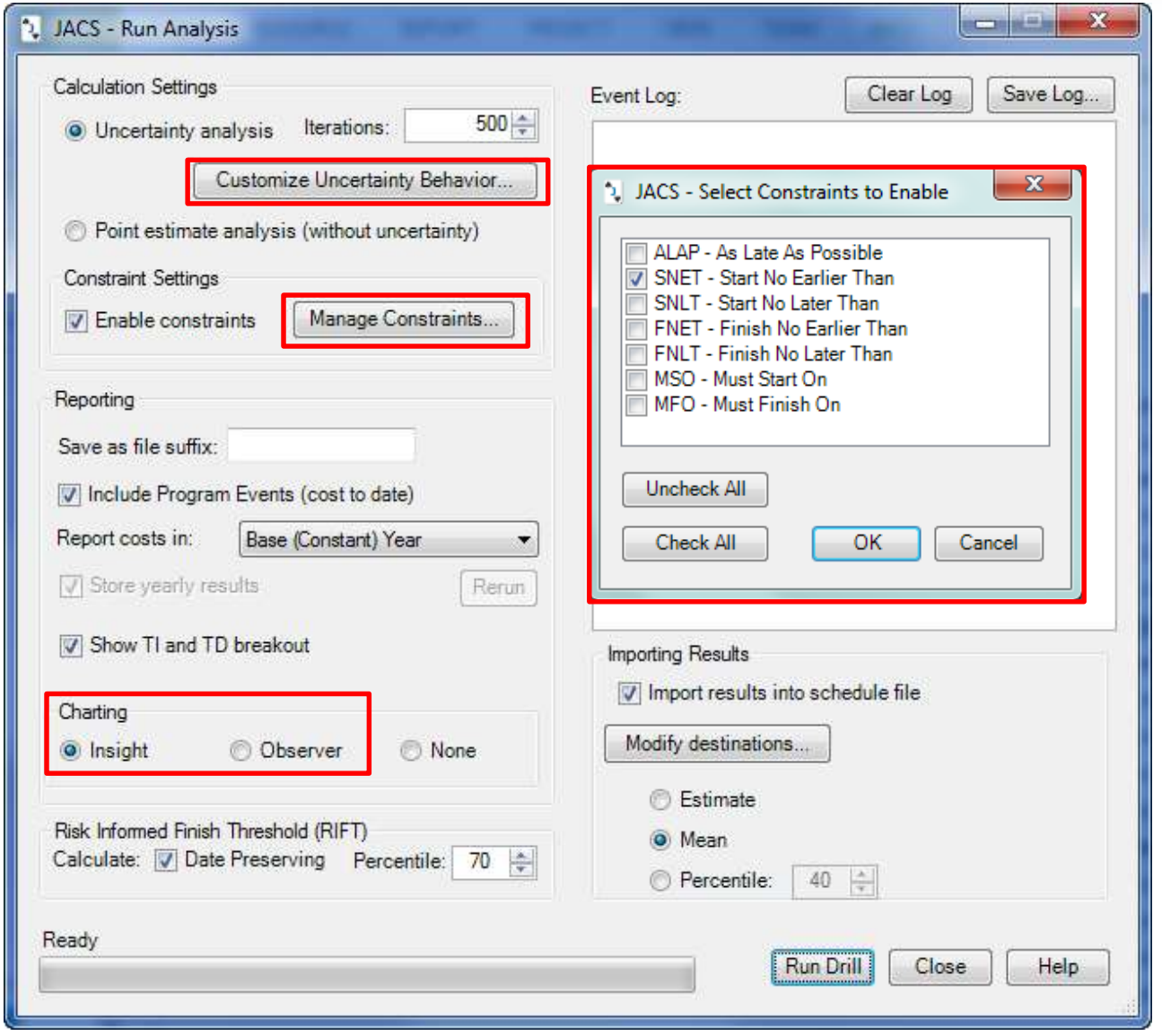
Table Format Available to View and Edit Custom Fields

- Data stored in "custom fields" directly within schedule file
- Provides full transparency to model inputs
- Allows non-JACS users to view the key inputs

Duration | TI and TD Costs | Risk Events

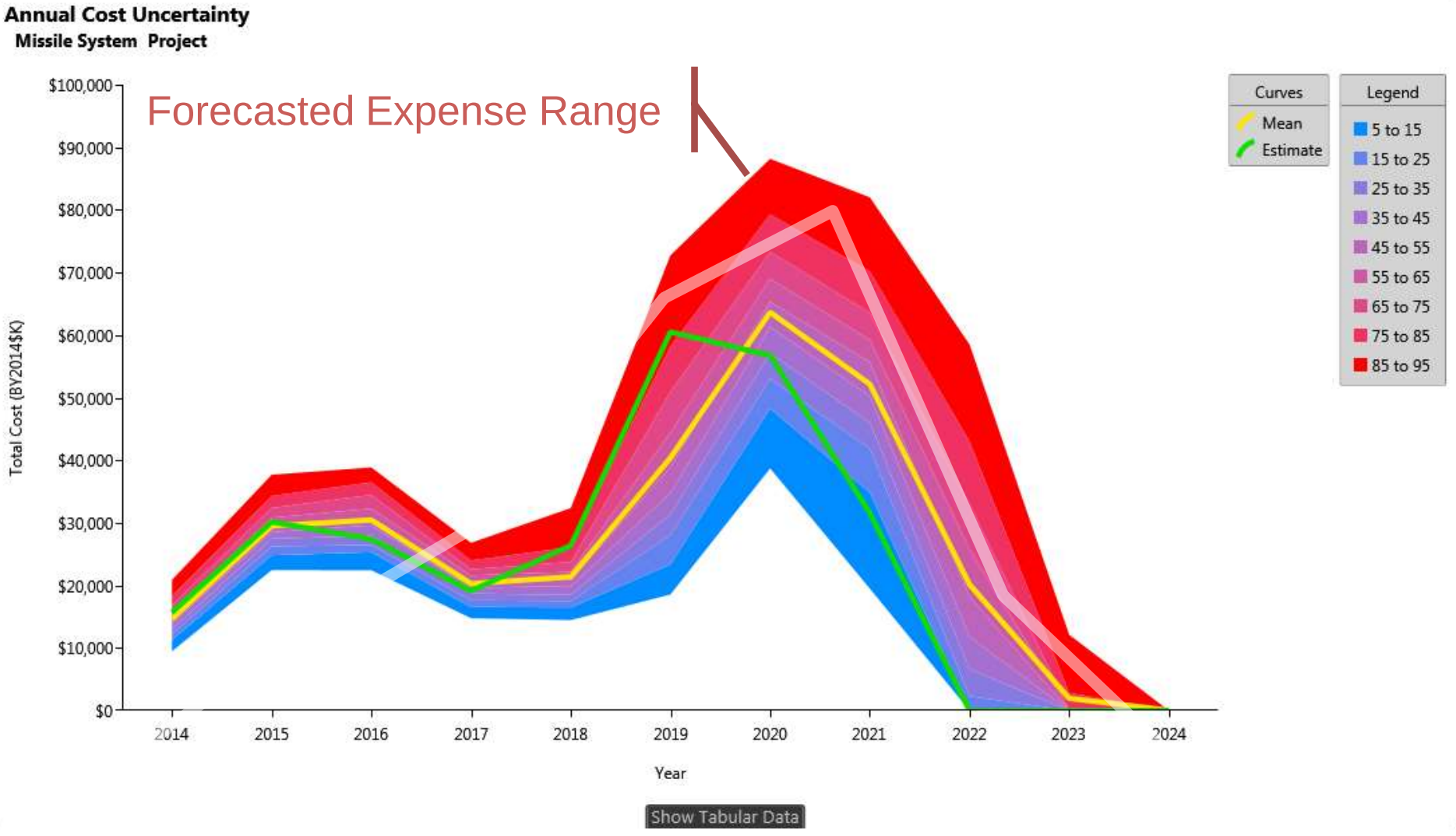
Name	Duration	JACS Duration Uncertainty	Cost	JACS Baseline Cost	JACS TI Task Cost	JACS TI Cost Uncertainty	JACS TI Spending Contour	JACS TD Task Cost	JACS TD Cost Uncertainty	JACS Threat ID	JACS Is Threat	JACS Threat % Likelihood	JACS Is Threat Active
Air Vehicle Project	**490 days**		**$30,920,000.00**	**$0.00**	**$0.00**			**$0.00**			**No**	**0**	**No**
Manufacturing	**490 days**		**$22,000,000.00**	**$0.00**	**$0.00**			**$0.00**			**No**	**0**	**No**
Air Vehicle (T1)	180 days	I(Manu=0.75)	$9,900,000.00	$9,900,000.00	$4,400,000.00		Early Peak	$5,500,000.00			No	0	No
Integration (T1)	90 days	I(Manu=0.75)	$1,480,000.00	$1,480,000.00	$900,000.00		Turtle	$580,000.00			No	0	No
Air Vehicle (T2)	180 days	I(Manu=0.75)	$9,200,000.00	$9,200,000.00	$5,500,000.00		Early Peak	$3,700,000.00			No	0	No
Integration (T2)	90 days	I(Manu=0.75)	$1,420,000.00	$1,420,000.00	$860,000.00		Turtle	$560,000.00			No	0	No
SEPM (Hammock)	**490 days**		**$8,400,000.00**	**$8,400,000.00**	**$0.00**			**$8,400,000.00**	**LN*(100,20)**		**No**	**0**	**No**
SEPM Start	0 days		$8,400,000.00	$0.00	$0.00			$0.00			No	0	No
SEPM Finish	0 days		$0.00	$0.00	$0.00			$0.00			No	0	No
Other	160 days	LN*(95,15)	$520,000.00	$520,000.00	$0.00			$520,000.00			No	0	No

Analyze Allows Specification of Scenarios

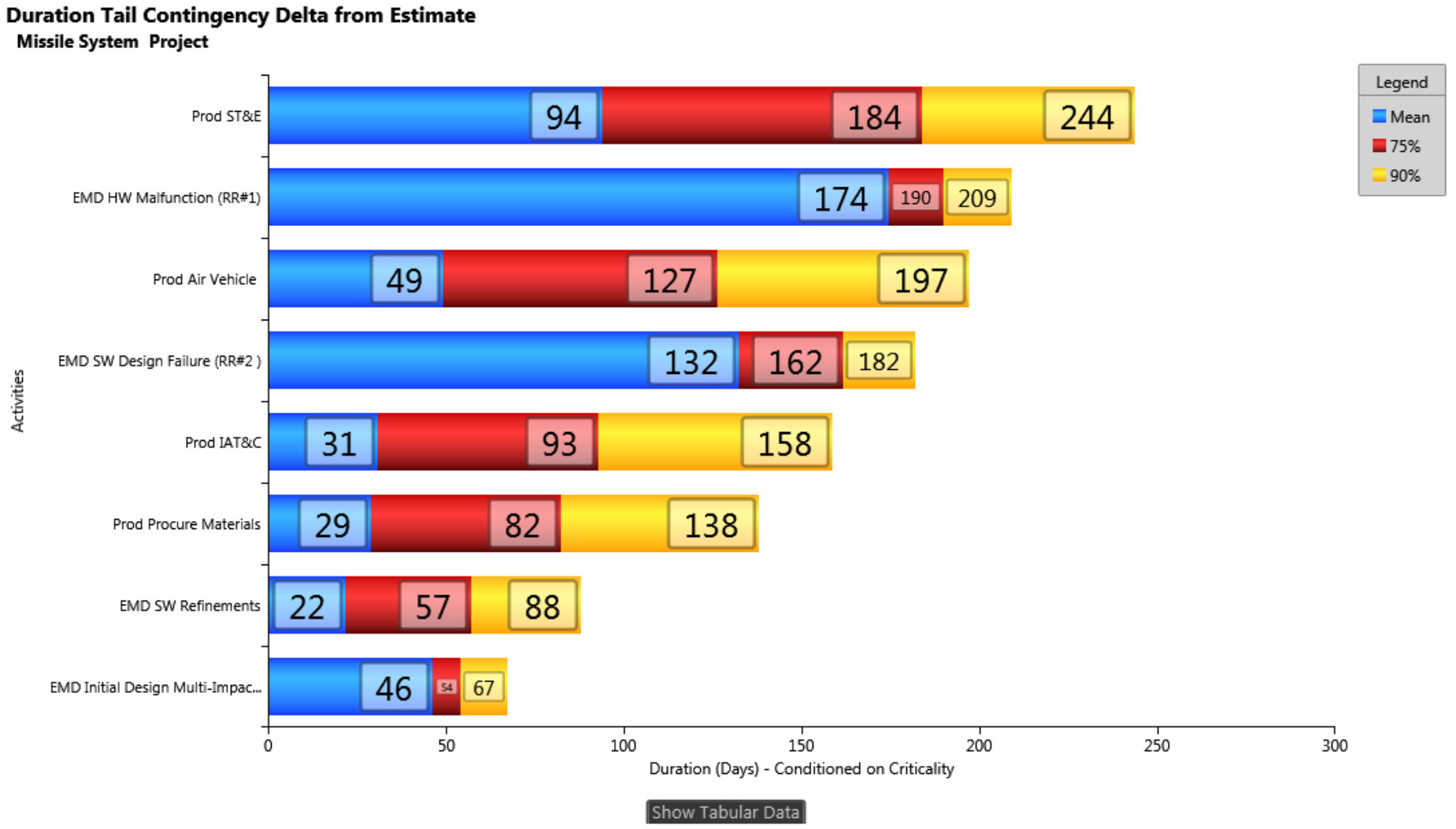


- Control various aspects of the simulation in the Analyze dialog
- The Run Drill button runs the simulation, then imports results into Project and creates a cache file of all the generated data
- Observer or Insight launches when the calculation is complete

Assess required funds over time

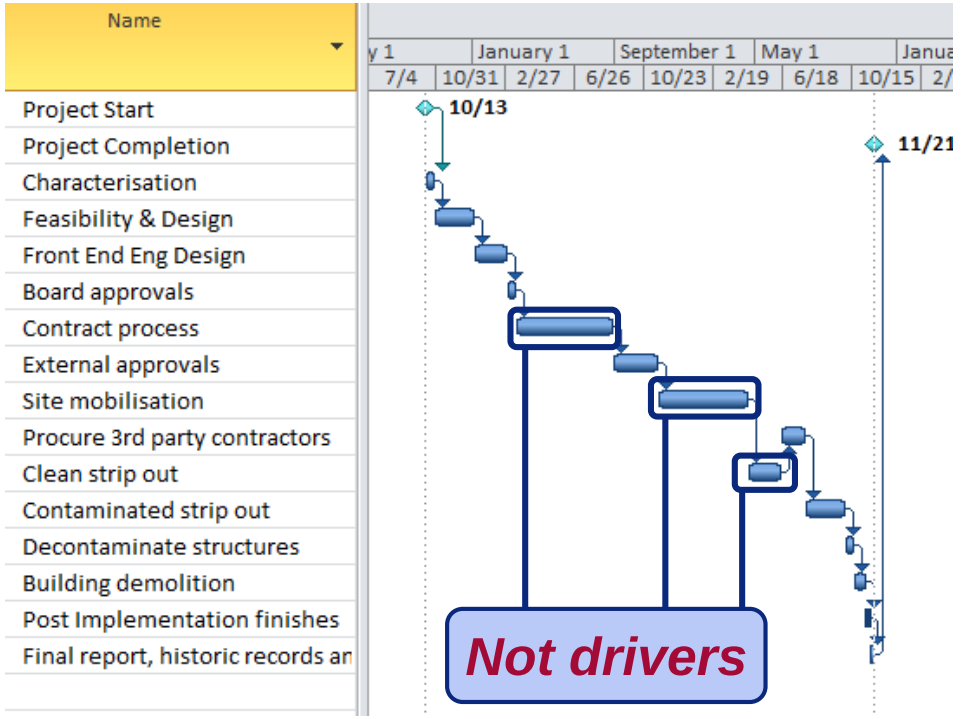


Identify areas with highest potential impact

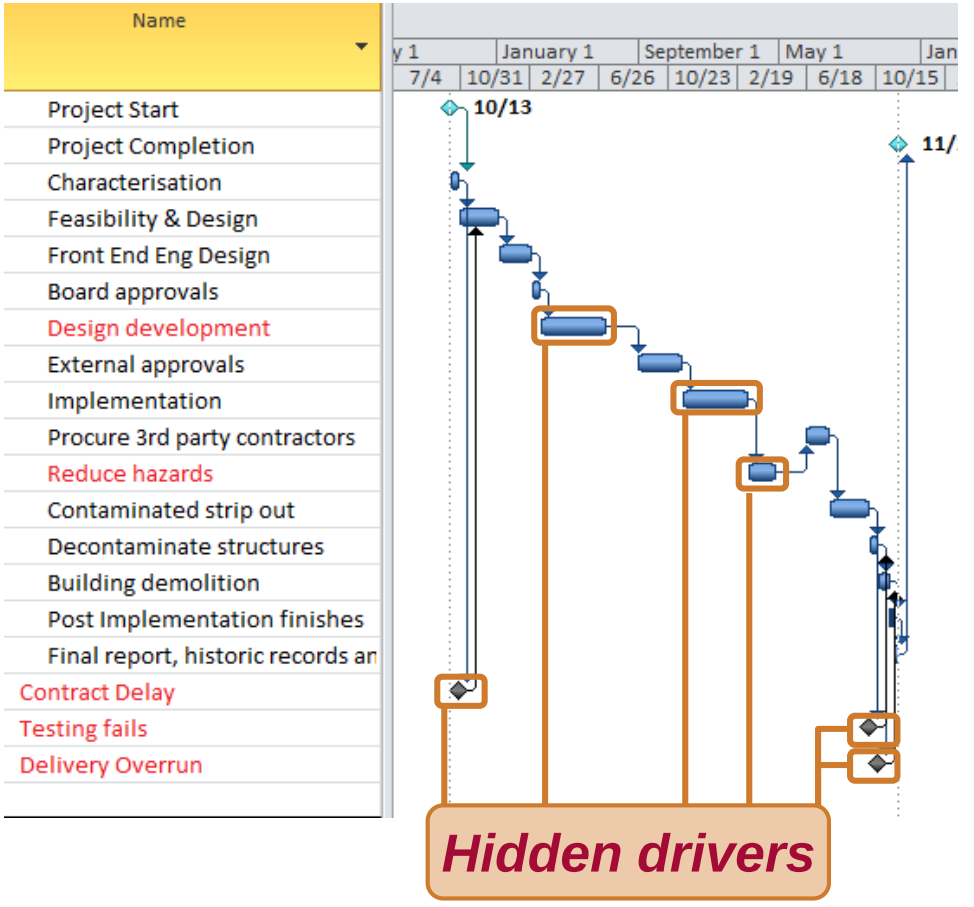


Find hidden problems

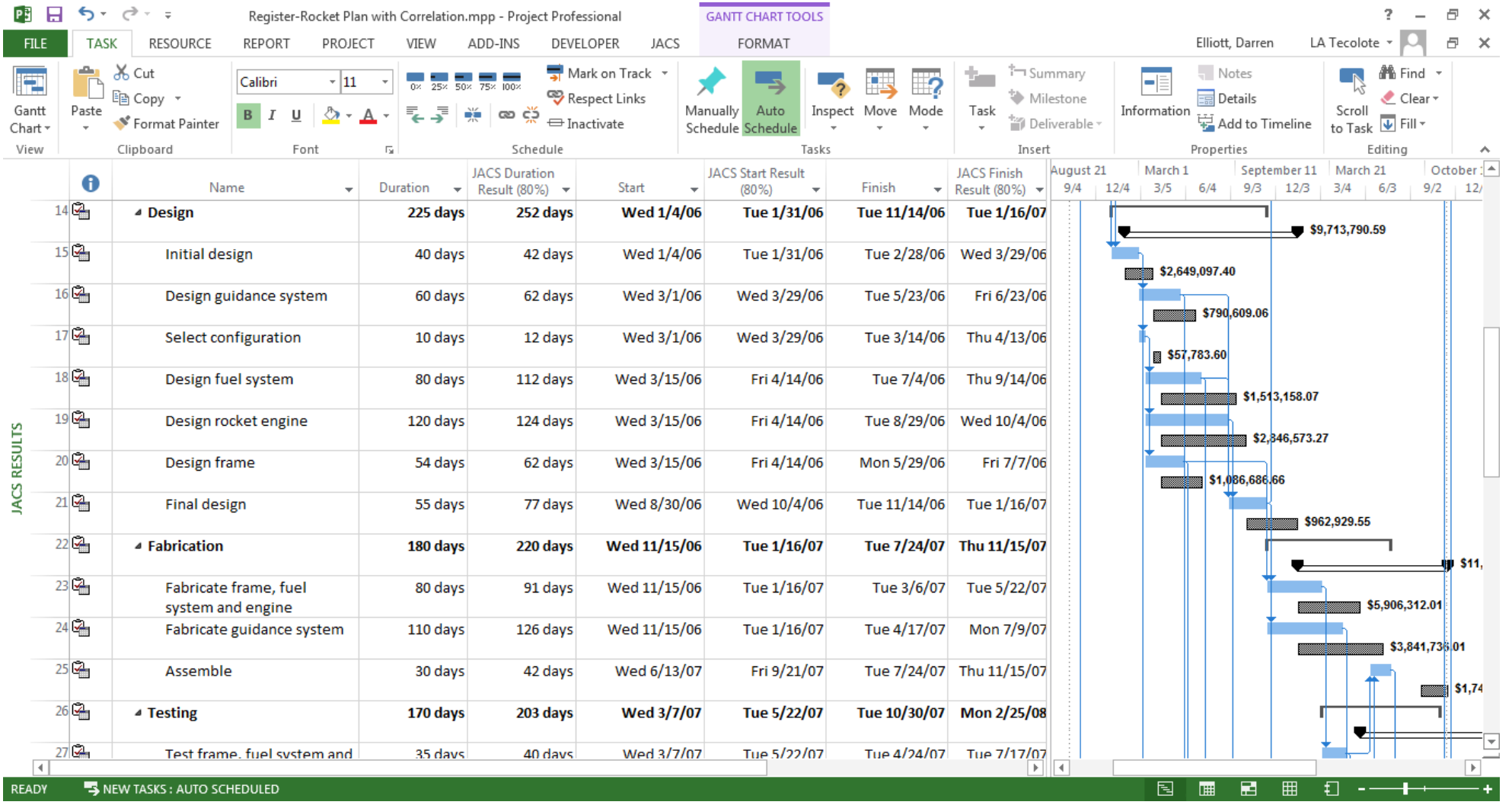
Deterministic Critical Path



Probabilistic Critical Path



View risk adjusted schedules



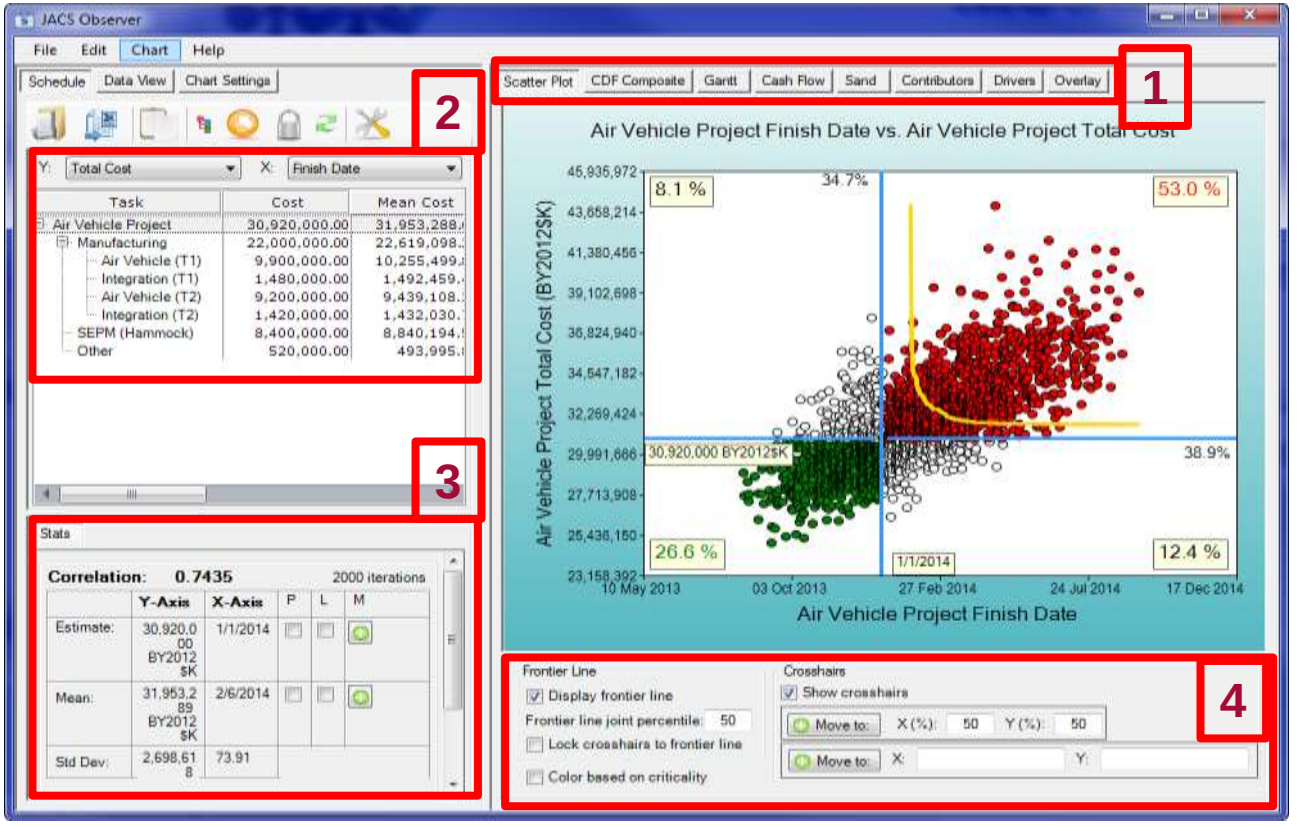
Insight Provides Executive Dashboard

Insight Provides Executive Dashboard

Insight Provides Executive Dashboard

Insight Provides Executive Dashboard

Observer enables detailed analysis



1. Select chart type
2. Select task and view data
3. View/Plot Uncertainty Metrics
4. Customize chart-specific options

Benefits of Using ACEIT

- **Implements standardized process and increases estimate quality**
  - Supports development of consistent, systematic, and defendable Life Cycle Cost Estimates
  - Delivers integrated, automated documentation, with complete audit trail
  - Improves estimate review and verification process through consistent model structure
  - Contains industry approved algorithms and databases to model inflation, learning, and phasing
  - Integrates statistical and risk analysis to quantify uncertainty in estimates
  - Enhances quality by eliminating many errors often made in spreadsheets (which frequently go undetected)
- **Provides flexibility to model any system type**
  - Unlimited flexibility to model any type of system linking all life cycle phases and facilitate any type of Analysis of Alternatives
  - Huge variety of automated and customizable reports
- **Integrates with other applications through an open platform**
  - Ability to link to virtually any other tool
  - Robust Application Programming Interface (API) to facilitate electronic interaction
- **Reduces management challenges**
  - Structured modeling platform shortens time for ACE users to learn a new model
  - Eases organization-wide distribution of key standards (WBS, inflation, etc.)
  - Empowers the analysts to answer Key Program/Project Management questions

ACEIT Training Available to Enhance Effectiveness

- Instructors have real world experience using ACEIT to solve complex estimating problems
- Onsite courses available upon request

For more information please contact ACEIT Sales

Email: aceit_sales@tecolote.com

Phone: (805) 964-6963

Thank You