



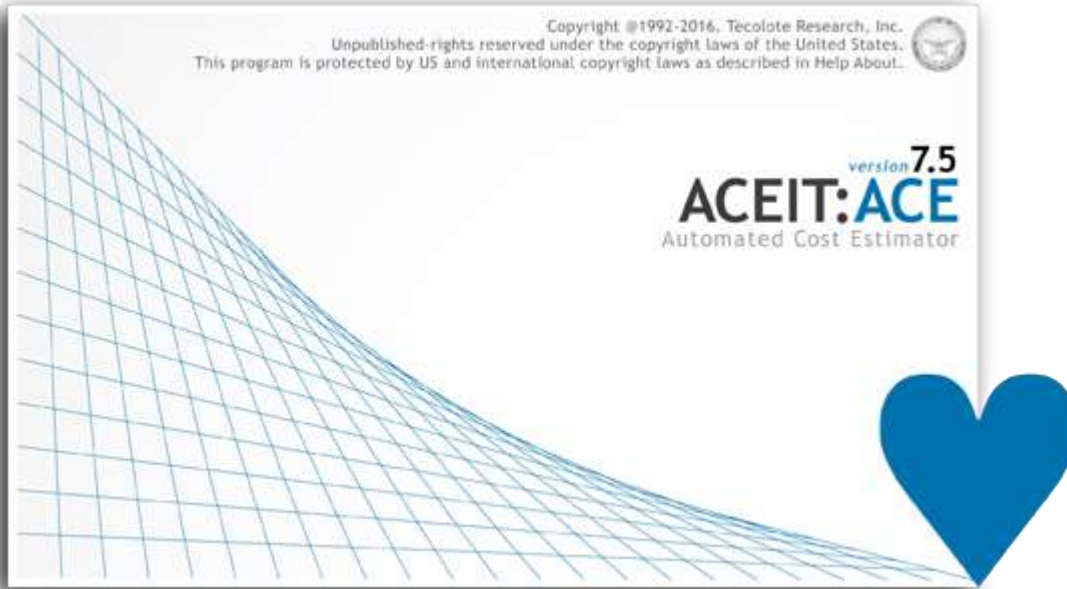
Automated Cost Estimating Integrated Tools

ACEIT Overview

Version 7.5

released August 2016





■ 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

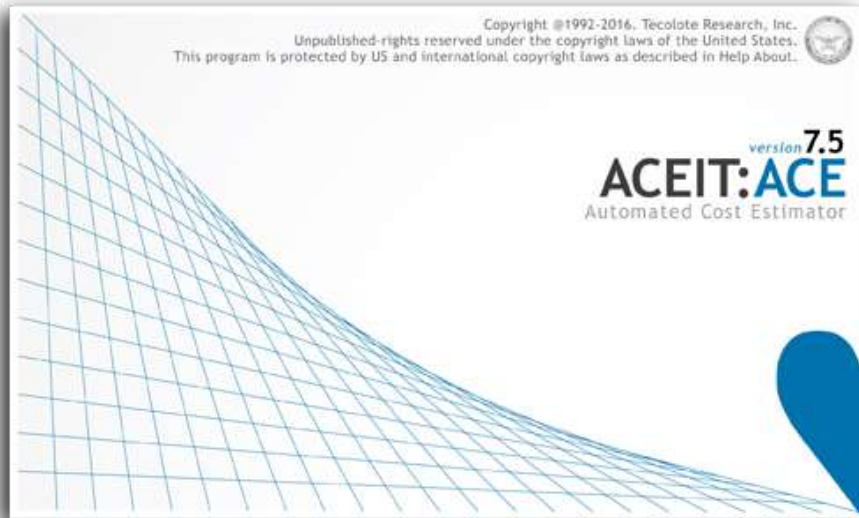
■ Team Approach to Develop ACEIT for and by Cost Analysts

- 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

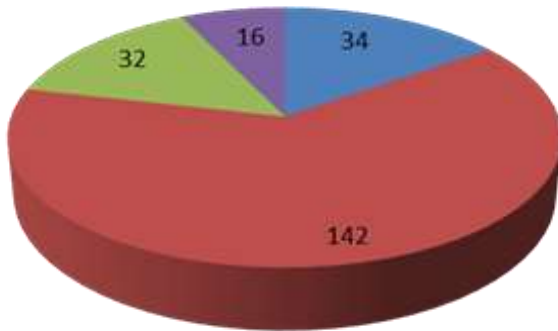
- *Army, Air Force, Navy, USMC*
- *NASA, USCG, DHS, Dept of Education, DOE*
- *Over 40 SETA and FFRDC companies*
- *Over 50 DoD contractors (Boeing, Lockheed, etc)*
- *Australian Defence*



Who is Using ACEIT?

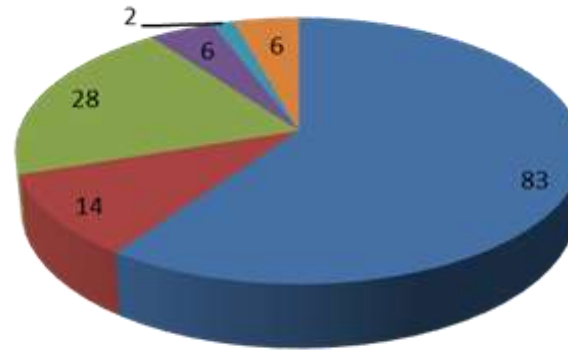
224 ACEIT Sites

Commercial US Govt Spt Ctr Foreign



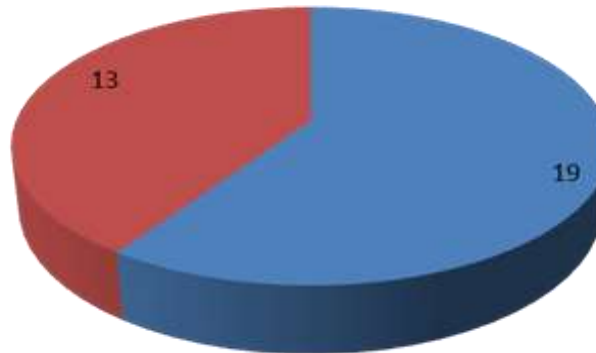
139 Government Sites

Army Federal Govt Other Air Force Navy USMC DOD Other



32 Support Contractor Sites

Army Other

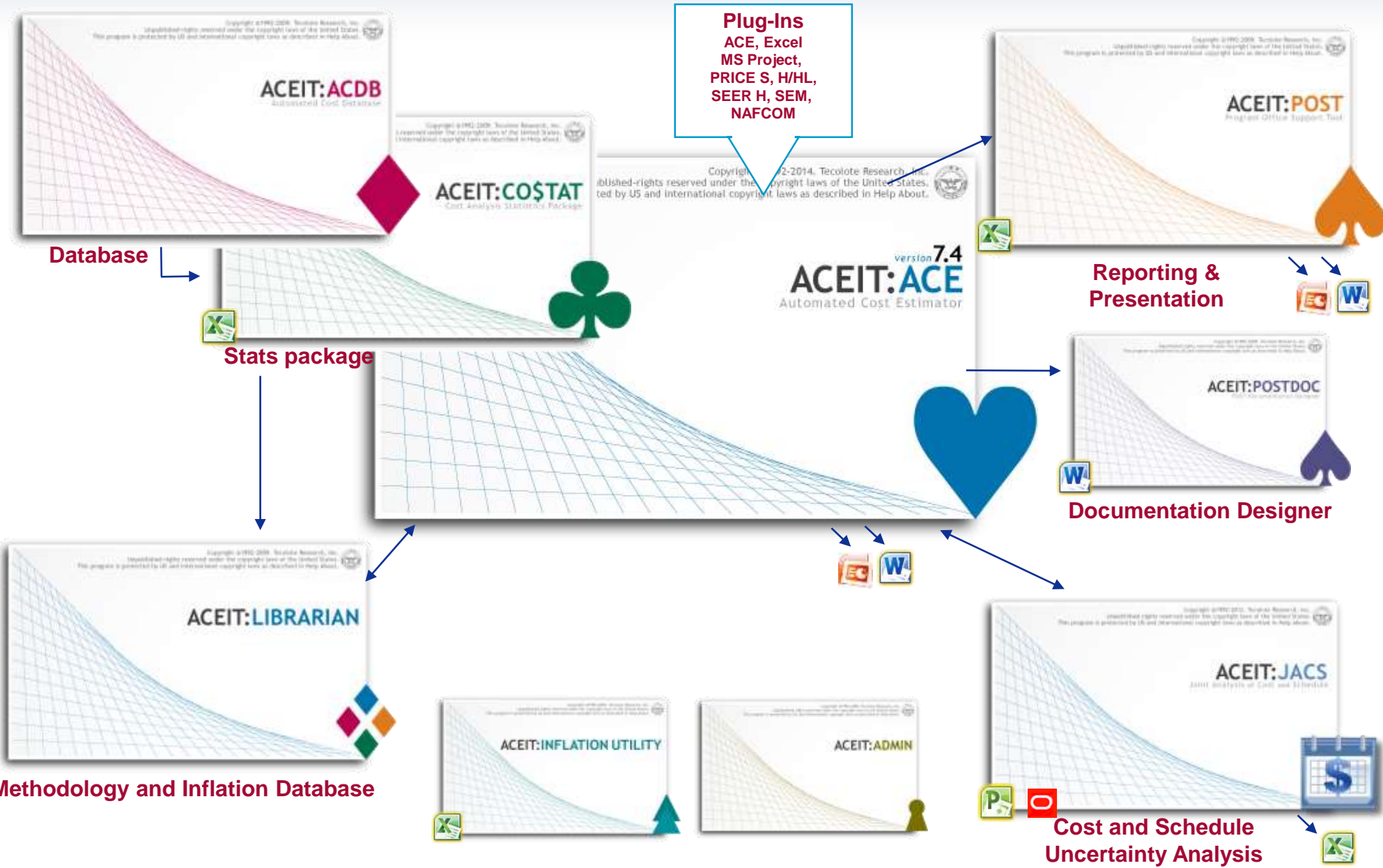


Tecolote Sites are not included in site counts

As of 19 Jan 2017



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 defensible 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





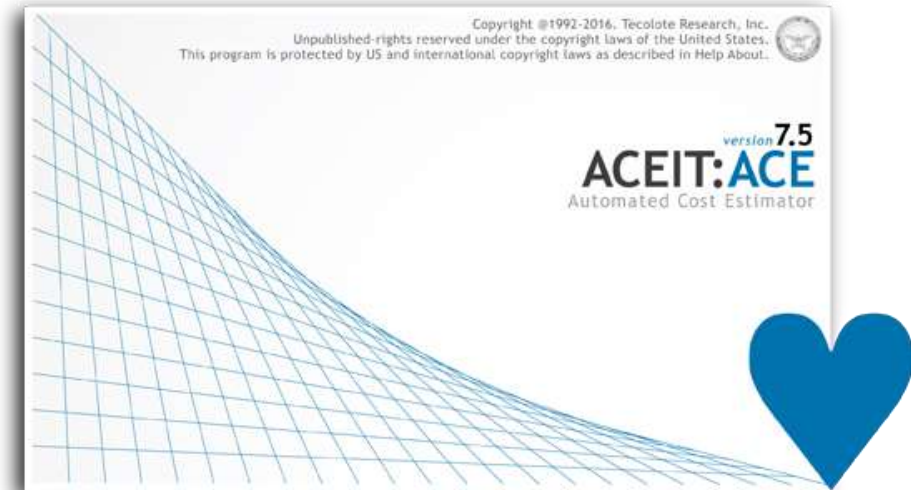
ACE is an Estimating Platform

■ 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



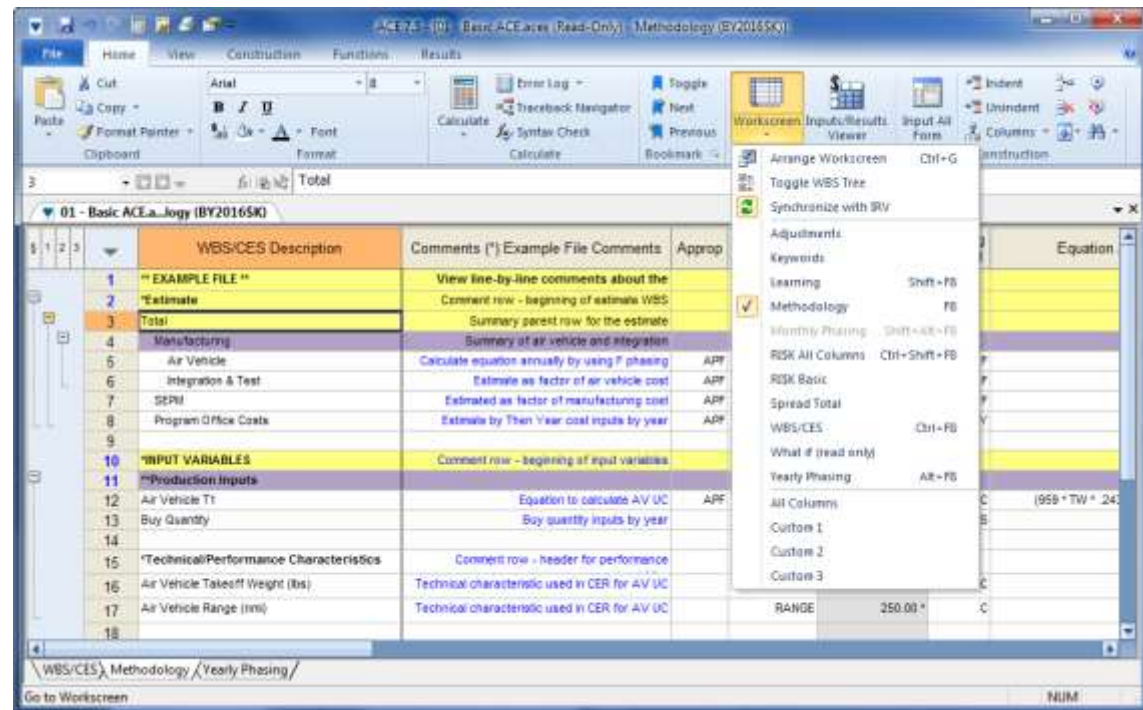
Create risk adjusted, integrated cost/schedule life cycle estimates for any project!



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

The screenshot displays the ACE7.5 software interface. The main window shows a table with columns for WBS/CES Description, Approp, Unique ID, and Tech Baseline. The table is organized into a hierarchy, with 'POWER GENERATION PLANT' as a major category. The 'Input All Form' dialog box is open, showing the 'Selected Row' as 10, which corresponds to 'Engine (with learning)'. The dialog includes fields for Title, Unique ID, Equation/Throughput, and various summary and adjustment options. A tree view on the left of the dialog shows the hierarchy of the selected row.

WBS/CES Description	Approp	Unique ID	Tech Baseline
3 * Powerplant System Estimate		*Estimate	
4 POWER GENERATION PLANT			\$ 421,421.495 (2)
5 RDT&E			\$ 132,527.587 (1)
6 Prime Mission Product			\$ 94,235.012 (1)
7 Hardware (HW)		HWS	\$ 32,598.291 (5)
8 Structure	RDTEA	StructDev\$	\$ 24,442.651 (5)
9 Cables, Conduits, and Connectors	RDTEA	CCCDev\$	\$ 2,206.065 (3)
10 Engine (with learning)	RDTEA		\$ 5,949.575 (5)
11 Software (SW)		SWS	\$ 40,318.358 (1)
12 CSC1	RDTEA		\$ 10,502.775 (1)
13 CSC2	RDTEA		\$ 11,982.184 (1)
14 CSC3	RDTEA		\$ 17,833.399 (2)
15 Integration and Assembly (I&A)	RDTEA		\$ 21,318.364 (1)
16 I&A Check-Out	RDTEA		\$ 7,613.701 (2)
17 HW/SW Integration	RDTEA		\$ 10,659.182 (1)
18 Tooling and Test Equipment	RDTEA		\$ 3,045.481 (1)
19 SEPM (RDT&E)	RDTEA		\$ 34,175.535 (3)
20 Training	RDTEA		\$ 699.763 (3)
21 Data	RDTEA		\$ 640.748 (3)
22 System Test and Evaluation (ST&E)	RDTEA		\$ 2,776.529 (5)



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

The screenshot shows the ACE 7.5 software interface with a spreadsheet titled "Demo ACE Sessi...ogy (BY2017SK)". The spreadsheet has the following columns: WBS/CES Description, Approp, Unique ID, Tech Baseline, Phasing Method, Equation / Throughput, and Fiscal Year. The data is organized into a hierarchy starting with "Powerplant System Estimate".

WBS/CES Description	Approp	Unique ID	Tech Baseline	Phasing Method	Equation / Throughput	Fiscal Year
* Powerplant System Estimate		* Estimate				
POWER GENERATION PLANT			\$ 421,421.495 (22%) *			
RDT&E			\$ 132,527.587 (14%) *			
Prime Mission Product			\$ 94,235.012 (10%) *			
Hardware (HW)		HWS	\$ 32,598.291 (52%) *			
Structure	RDTEA	StructDev\$	\$ 24,442,651 (54%) *	BE	15510.4 * StrucWgt	2005
Cables, Conduits, and Connecto	RDTEA	CCCDev\$	\$ 2,206,005 (38%) *	BE	CCCcost	2005
Engine (with learning)	RDTEA		\$ 5,949,575 (50%) *	BE	Engine_T1	
Software (SW)		SW\$	\$ 40,318.358 (8%) *			
CSCI1	RDTEA		\$ 10,502.775 (19%) *	BE	SWWrapRate\$ * HrsPerPersMth * CsciPM1	
CSCI2	RDTEA		\$ 11,982.184 (15%) *	BE	SWWrapRate\$ * HrsPerPersMth * CsciPM2	
CSCI3	RDTEA		\$ 17,833.399 (24%) *	BE	SWWrapRate\$ * HrsPerPersMth * CsciPM3	
Integration and Assembly (I&A)	RDTEA		\$ 21,318.364 (9%) *	BE		
I&A Check-Out	RDTEA		\$ 7,613.701 (24%) *		I&AWrapRate\$ * HrsPerPersMth * HwSW_Integ_Dur *	
HW/SW Integration	RDTEA		\$ 10,659.182 (9%) *		I&AWrapRate\$ * HrsPerPersMth * HwSW_Integ_Dur *	
Tooling and Test Equipment	RDTEA		\$ 3,045.481 (3%) *		I&AWrapRate\$ * HrsPerPersMth * HwSW_Integ_Dur *	
SEPM (RDT&E)	RDTEA		\$ 34,175.575 (38%) *	BE	SEPMWrapRate\$ * HrsPerPersMth * EMD_Dur *	
Training	RDTEA		\$ 699,760 (34%) *		TrgFactor * HWS	
Data	RDTEA		\$ 640,748 (32%) *	BE	DataFactor * (HWS + SW\$)	
System Test and Evaluation (ST&E)	RDTEA		\$ 2,776.529 (52%) *	BE	ST&EWrapRate\$ * HrsPerPersMth * ST&E_Dur *	



Standard Methods / Techniques to Ensure Reliable Calculations

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

- Logs to show potential estimate errors

WBS/CES Description	Approp	Unique ID	Point Estimate	Phasing Method	E
*Estimate		*Estimate			
Total			\$ 890,755.722 *		
RDT&E		RDTE\$	\$ 64,063.575 *		
Concept Refinement			\$ 1,034.093 *		
Contractor A	RDTEF		\$ 519.046 *	TY	
Contractor B	RDTEA		\$ 515.048 *	TY	
Technology Development			\$ 4,604.018 *		
Contractor A	RDTEF		\$ 2,302.009 *	TC	
Contractor B	RDTEA		\$ 2,302.009 *	TS	
System Development and Demonstration	RDTEF	- AIR FORCE	- Rsch, Dev, Test & Eval		
Development Engineering	RDTEA	- ARMY	- Rsch, Dev, Test & Eval, Army		
Air Vehicle	APF	- AIR FORCE	- Aircraft Procurement		
Basic Structure	APA	- ARMY	- Aircraft Procurement, Army		
Navigation/Guidance	OMF	- AIR FORCE	- O&M - Non-Pay, Non-POL		
Propulsion	MPF	- AIR FORCE	- Military Personnel - Total		
Ground Station	MPA	- ARMY	- Military Personnel (Composite), Army		
Procure OTS Parts	OMA	- ARMY	- Operation & Maintenance, Army		
Design New Parts	MIPF	- AIR FORCE	- Missile Procurement		
Software	OPF	- AIR FORCE	- Other Procurement		
Int & Assy	MCONF	- AIR FORCE	- Military Construction		
Prototype Manufacturing	OMF_P	- AIR FORCE	- O&M - GS & WB Pay Only		
Air Vehicle	OMF_F	- AIR FORCE	- O&M - Fuel		
Mobile Ground Station	MPF_P	- AIR FORCE	- Military Personnel - Pay Base		
SEPM	MPF_O	- AIR FORCE	- Military Personnel - Other Expense		
	MPF_R	- AIR FORCE	- Military Personnel - Retirement		
	MCF_R	- AIR FORCE	- MILCON - AF Reserve		
			\$ 3,206.330 *		
	RDTEF		\$ 2,855.320 *		
	RDTEA		\$ 351.010 *		
			\$ 20,812 *		

Error Log - 06 - Implementing O&S Estimating Methods.aces (BY2014\$K)

2 Unused Var 1 Information 3 Warning 2 Fatal

Error Code	Row #	Severity	Description	Col
PHZ534	46	Fatal	Missing or incorrect method on shared item.	Milestor
PHZ534	64	Fatal	Missing or incorrect method on shared item.	Milestor
PHZ644	47	Warning	Item summed with C-phased items.	Milestor
PHZ644	48	Warning	Item summed with C-phased items.	Milestor
MTH562	73	Warning	Unused variable 'Army_Trans\$'.	Milestor
MTH562	76	Warning	Unused variable 'ISStruc\$'.	Milestor
PHZ891	170	Warning	BY method used without fiscal year or units specified.	Equatic
MTH650	46	Information	Uses learning without R phasing	Equatic

Buttons: Set as Default, Goto Error, Copy, Close, Help

- Tools to trace model logic

Traceback Navigator (06 - Implementing O&S Estimating Methods.aces)

Row: 25: Software

Case: Point Estimate

Buttons: Copy Contents, Arrange Columns..., Clear History, Help, Print Report..., View Calc Details...

Description	ID	Equation	Total	Uners...	Approp...	Phasing
25: Software						
Equation						
25: Software	RDTE\$WS	SWLab\$ * SWLabHrs	\$ 4,885.163	(none)	RDTEF	MS
Start Date	aStartDate	SWDevStartDate	29SEP2012	(na)		
Finish Date	aFinishDate	SWDevEndDate	29DEC2014	(na)		
Predecessors						
117: Software Development Start Date	SWDevStartDate	DATEADD(DevStartDat...	29SEP2012	(none)	C	S
119: Software Design Review	SWDesignDate	DATEADD(SWDevStart...	29AUG2013	(none)	C	N
121: Software Code Review	SWCodeReviewDate	DATEADD(SWDesignD...	29SEP2014	(none)	C	A
123: Software Code Inspection	SWCodeInspectDate	DATEADD(SWCodeRe...	29NOV2014	(none)	C	N
124: Software Development End Date	SWDevEndDate	DATEADD(SWCodeIns...	29DEC2014	(none)	F	N
146: S/W Labor Hours	SWLabHrs	32500	32500	(none)	C	E
152: Software Labor Rate	SWLab\$	150	\$ 0.150	(none)	RDTEF	CTY
Successors						
17: Development Engineering		Sum of children	\$ 21,353.907			
106: S/W Maintenance		F(TTP * TLASTTP)@R...	\$ 1,978.932		OMF	F



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**

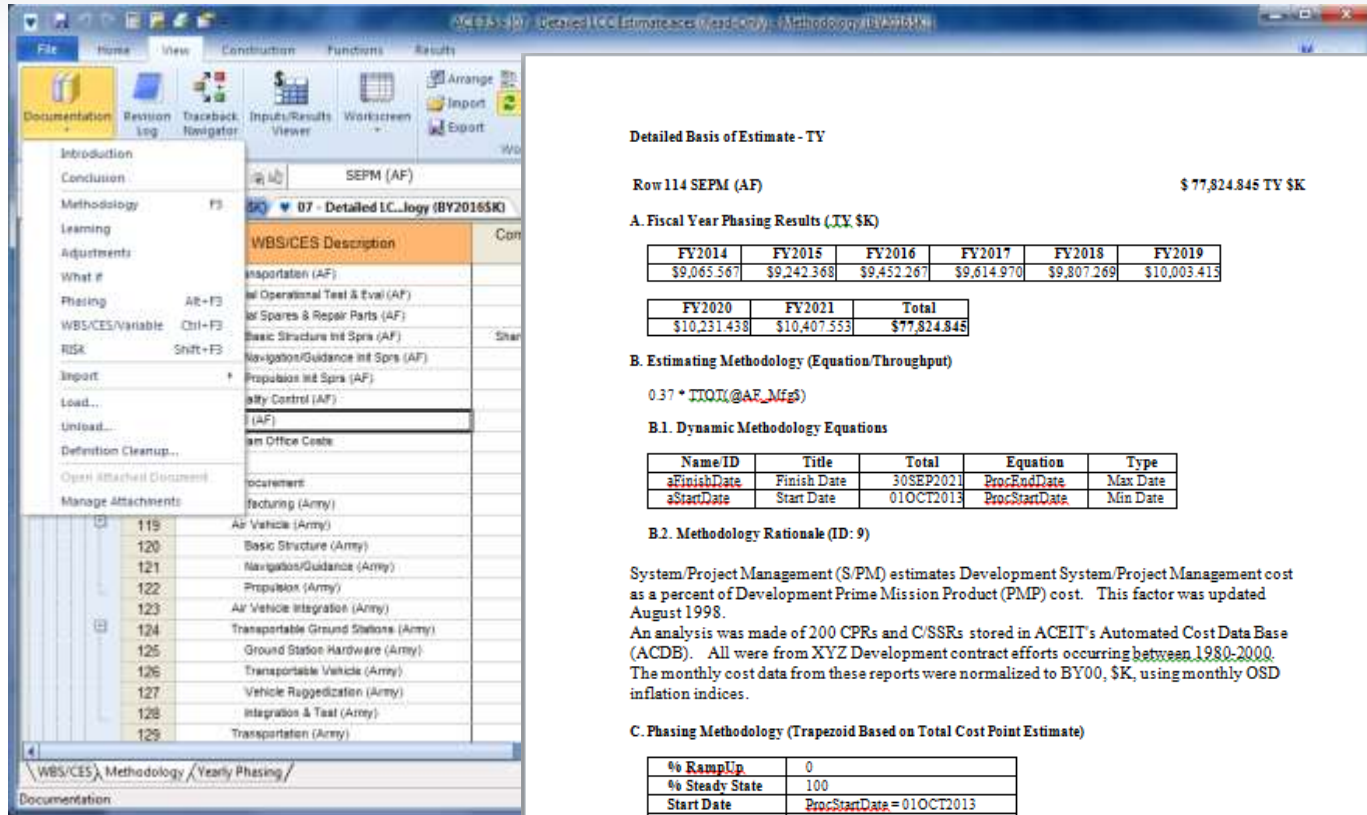
Getting data into ACE

- ACE-to-ACE
- Microsoft Excel
- Microsoft Project
- SEER

	WBS/CES Description	Equation / Throughput	Fiscal Year	Units	Start Date	Finish Date	SEER_ELEMENT (*) SEER Element	SEER_PROJEC
177								
178	***Totals C:\Documents and Settings\dellott\							
	UAV Software [TOTAL]		2000	\$			UAV Software	C:\Documents an
179								Data\Sessional/Exar
	Ground Segment [TOTAL]						Ground Segment	C:\Documents an
180								Data\Sessional/Exar
181	Flight Software [TOTAL]							
182								
183	*** Development Cost(BY) by Year							
	UAV Software [DEVCOST]							
184								
	Ground Segment [DEVCOST]							
185								
	Flight Software [DEVCOST]							
186								
187	*** Development Effort by Year (DE							
	UAV Software [DEVEFFORT]							
188								
	Ground Segment [DEVEFFORT]							
189								
	Flight Software [DEVEFFORT]							
190								
191								
192								



Full Estimate Documentation Capability



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

Detailed Basis of Estimate - TY

Row 114 SEPM (AF) \$ 77,824.846 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	\$10,003.413
FY2020	FY2021	Total			
\$10,231.438	\$10,407.553	\$77,824.846			

B. Estimating Methodology (Equation/Throughput)

0.37 * ITOTR(@AF_Mfg\$)

B.1. Dynamic Methodology Equations

Name/ID	Title	Total	Equation	Type
aFinishDate	Finish Date	30SEP2021	ProcEndDate	Max Date
sStartDate	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	CERRISK	1	n/a	RISK On/Off	1
100	AF_Mfg\$	\$217,921,211	TY \$K	Equation / Thro...	Sum of Children
184	ProcStartDate	01OCT2013	n/a	Start Date	DATEOF(FYCFIRSTYR(@TotBuyQty))
>231	TotBuyQty	176	n/a	Equation / Thro...	Sum of Children
185	ProcEndDate	30SEP2021	n/a	Finish Date	DATEOF(LASTYR(@TotBuyQty) - 1) - 1
>231	TotBuyQty	176	n/a	Equation / Thro...	Sum of Children

- 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

The top window, titled 'ACE 7.5 - [Demo ACE Session.aces - Inputs/Results Viewer (BY2017SK)]', shows a 'WBS/CES Description' table. The table has columns for 'Total' and fiscal years from FY 2011 to FY 2018. The data is as follows:

WBS/CES Description	Total	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017	FY 2018
* Powerplant System Estimate	\$ 421,421.495	\$ 19,821.990	\$ 34,295.710	\$ 24,132.870	\$ 23,281.942	\$ 21,539.642	\$ 6,359.856	\$ 3,095.577	\$ 42,278.880
POWER GENERATION PLANT	\$ 421,421.495	\$ 19,821.990	\$ 34,295.710	\$ 24,132.870	\$ 23,281.942	\$ 21,539.642	\$ 6,359.856	\$ 3,095.577	\$ 42,278.880
RD T&E	\$ 132,527.587	\$ 19,821.990	\$ 34,295.710	\$ 24,132.870	\$ 23,281.942	\$ 21,539.642	\$ 6,359.856	\$ 3,095.577	
Prime Mission Product	\$ 94,235.012	\$ 17,743.798	\$ 25,253.677	\$ 14,138.249	\$ 15,790.885	\$ 17,330.041	\$ 3,978.363		
Hardware (HW)	\$ 32,598.291	\$ 17,743.798	\$ 14,854.493						
Structure	\$ 24,442.651	\$ 14,184.044	\$ 10,258.607						

The bottom window, titled 'ACE 7.5 - [Demo ACE Session.aces - BY Phased By Appn (FY2017 SK, Time Phased Summary by Category, Case: Tech Baseline, Approp)]', shows a 'BY Phased By Appn' table. The table has columns for 'Approp', 'Total', and fiscal years from FY 2011 to FY 2018. The data is as follows:

Approp	Total	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017	FY 2018
* Powerplant System Estimate	\$ 421,421.495	\$ 19,821.990	\$ 34,295.710	\$ 24,132.870	\$ 23,281.942	\$ 21,539.642	\$ 6,359.856	\$ 3,095.577	
RDTEA	\$ 132,527.587	\$ 19,821.990	\$ 34,295.710	\$ 24,132.870	\$ 23,281.942	\$ 21,539.642	\$ 6,359.856	\$ 3,095.577	
OPA	\$ 288,893.908								\$ 42,278.880
Total:	\$ 421,421.495	\$ 19,821.990	\$ 34,295.710	\$ 24,132.870	\$ 23,281.942	\$ 21,539.642	\$ 6,359.856	\$ 3,095.577	\$ 42,278.880

- Time-Phased Base Year and Then Edit 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

The screenshot shows the ACE 7.5 software interface with a table comparing 'Tech Baseline' and 'Protect Scenario' values for various WBS/CES items. The table includes a 'TOTAL' column on the left and a 'WBS/CES Description' column. The 'Tech Baseline' column shows values with asterisks, and the 'Protect Scenario' column shows values with asterisks. The 'TOTAL' column is highlighted in blue.

TOTAL	WBS/CES Description	Tech Baseline	Protect Scenario
FY 2010			
FY 2011			
FY 2012			
FY 2013			
FY 2014			
FY 2015			
FY 2016			
FY 2017			
FY 2018			
FY 2019			
FY 2020			
FY 2021			
FY 2022			
FY 2023			
FY 2024			
FY 2025			
FY 2026			
	69 CCC Weight (Lbs)	495.0 *	600
	70		
	71 Structural Weight (Lbs)	1,275.0 *	1400
	72		
	73 Engine T1	\$ 664.410 *	\$ 664.410 *
	74		
	75 kWh per Ton	2.000 *	2.000 *
	76 Oil = 1, Coal = 0	1.0 *	1.0 *
	77 Learning Slope	95.000 *	97
	78		
	79 Development to Production Step Factor	0.776 *	.85
	80		
	81 * Quantities		
	82 Quantity (Development)	10.0 *	10.0 *
	83 Quantity (Procurement)	70.0 *	70.0 *
	84		
	85 * Software Section		
	86 Total SLOC	206,000.0 *	240,000.0 *
	87 CSCI 1 SLOC	55,000.0 *	65000
	88 CSCI 2 SLOC	62,000.0 *	75000
	89 CSCI 3 SLOC	89,000.0 *	100000
	90		



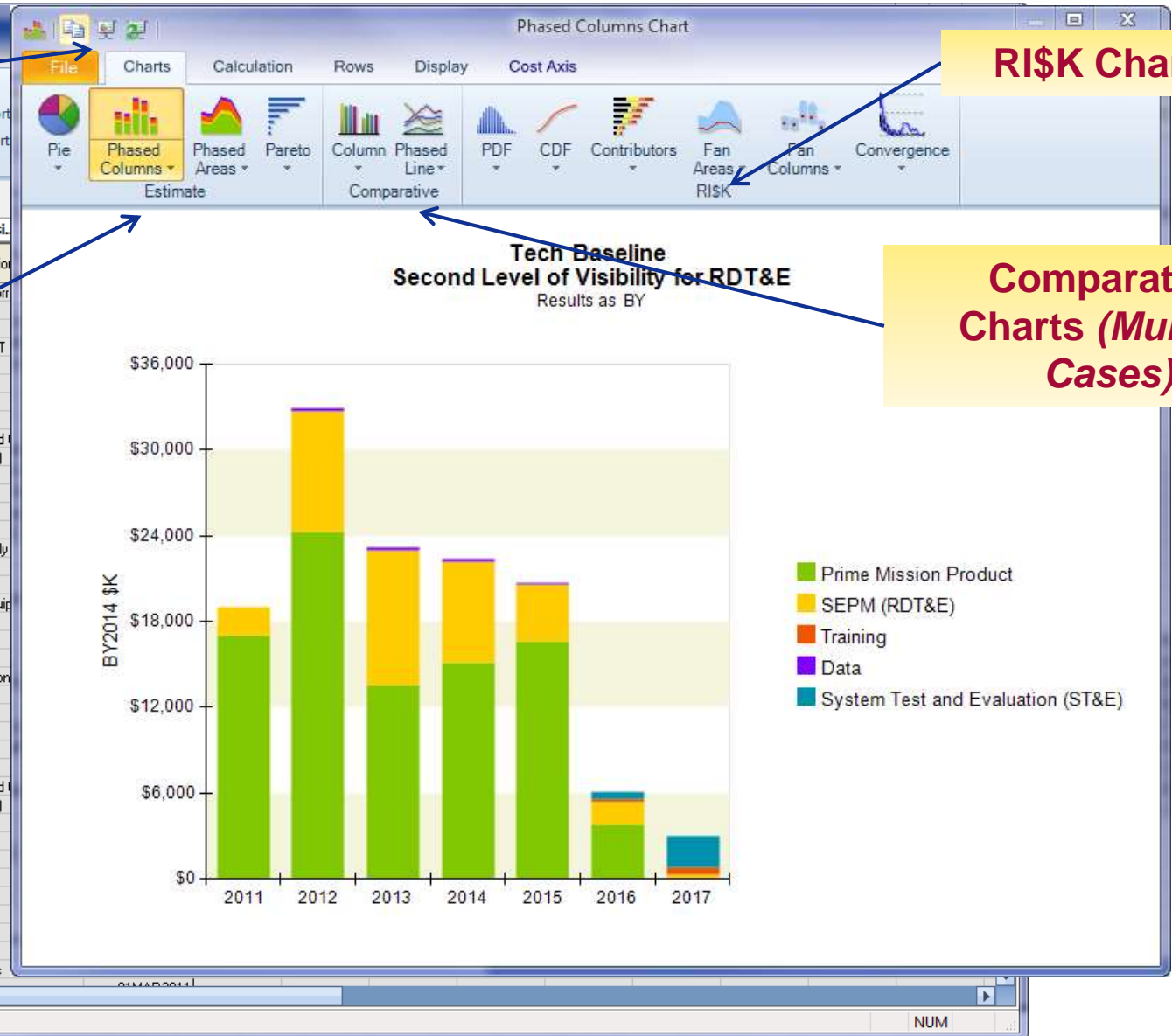
Graphically View Results in ACE

Export charts to PowerPoint or Word

RISK Charts

Estimate Charts (Single Case, Drill down)

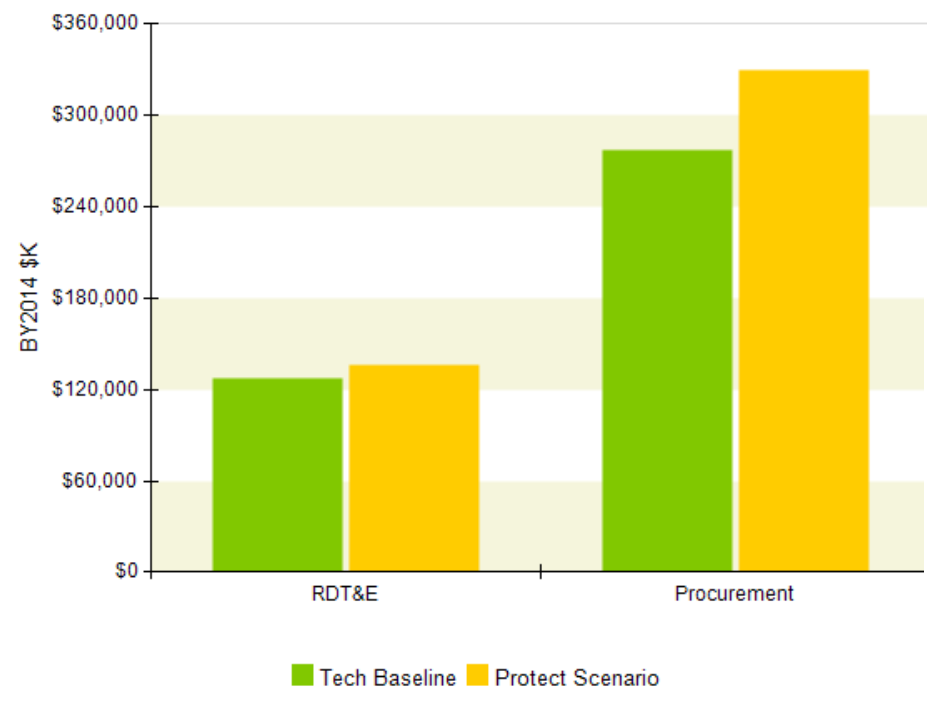
Comparative Charts (Multiple Cases)



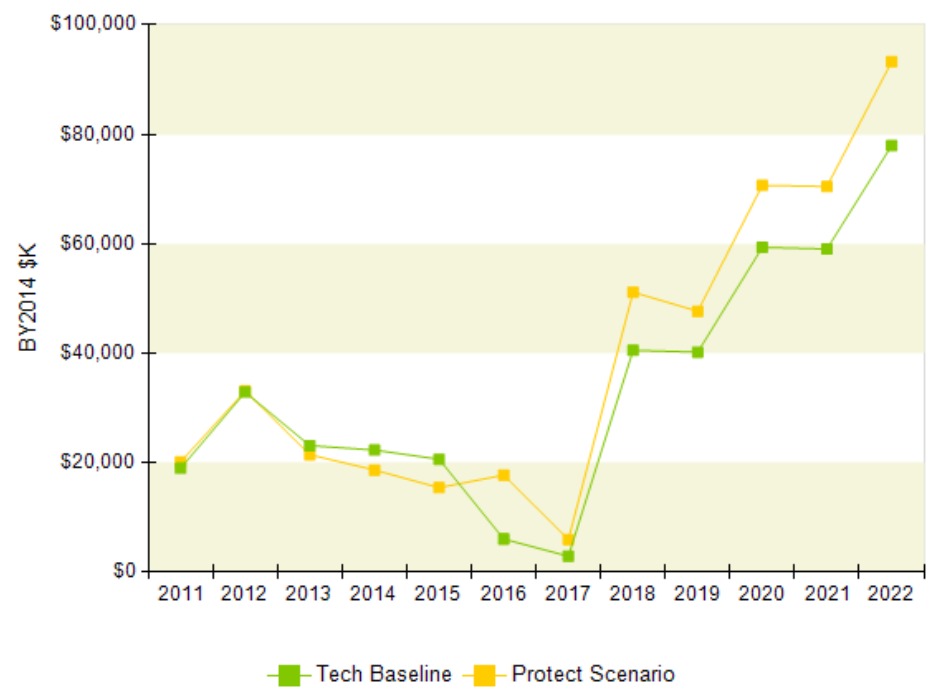


Graphical Outputs to Compare What-if Cases

Multiple cases
Second Level of Visibility for POWER GENERATION PLANT
 Results as BY



Multiple cases
POWER GENERATION PLANT
 Results as BY



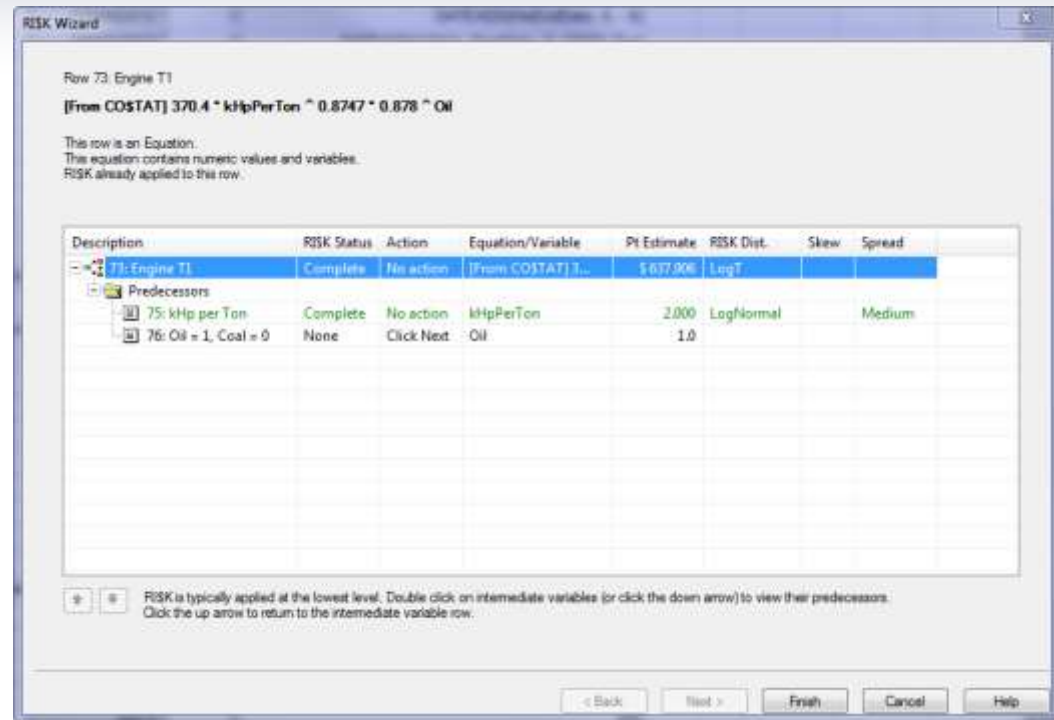


Uncertainty Analysis in ACE



- 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

Input All Form

Selected Row: 31
 Move Item: [Buttons]
 Goto: [Button]
 Include Children:

Title: SEPM (Procurement) Phasing Method: [Dropdown]
 Unique ID: [Text] Replace Unique ID [Button] Phasing Wizard [Button]
 Equation/Throughput: $0.37 * PMP\$$ Eqp Builder... CER Lib...

Summary | FY Inputs | Monthly | Learning | Spread Total | RISK | Defs

Right-Skewed Triangular distribution with High Spread

- NO uncertainty -- Point Estimate represents the exact eventual ou
- Point Estimate offers a close approximation of the eventual outcome
- Point Estimate offers a rough approximation of the eventual outcome
- Point Estimate is likely more than the eventual outcome
- Point Estimate is likely less than the eventual outcome
- Point Estimate is likely a lot more than the eventual outcome
- Point Estimate is likely a lot less than the eventual outcome
- I have defined my own distribution specification

Undo Redo Advanced Close Help

Basic mode:

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

Summary | Adjustments | FY Inputs | Monthly | Learning | Spread Total | RISK

RISK Distribution Specification

Distribution: **Triangular** P.E.Position: **Mode**

Available Parameters:

Parameter	Value	%	Val	Edit
Mode Percentile				
Low				
Low Percentile				
High				
High Percentile				
CV				
Std. Deviation				

RISK Specification:

Parameter	Value	%	Val	Edit
Spread	High	N/A	N/A	[Edit]
Skew	Right	N/A	N/A	[Edit]

Status: **Complete** Estimate: \$ 73,603.700*

Grouping: ID: Factors Grp ID... Strength: CorFactors

Cumulative Distribution Functions: View Custom CDFs

More RISK Options: More...

Advanced mode:

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



Correlation can be Assessed and Modeled

ACE 7.5 - [Demo ACE Session.aces - RISK Correlation (FY2017 SK, RISK Correlation, Case: Tech Baseline, with RISK)]

File Home View Construction Functions Results

Phased Narrative Inflation RISK DEC Statistics Results Export Report Template Edit Reports Import Report Template Export Report Template Favorites View Results Charts... Automatically Calculate Refresh View Export Report More Options

Demo ACE Sessio...logy (BY2017SK) Demo ACE Sessio...ine, with RISK

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									
15	19									

Grouping and Correlation Wizard

Group Name: HW Delete

Assign the same correlation to all elements: 0.000 Assign Correlation

Enter individual group strengths.
If you specify a dominant element with a "D", the remaining entries are the correlation with that element.

Enter a correlation matrix.
ACE will identify the dominant element and column of correlations that most closely replicates the entered matrix. NOTE: Your entered values are NOT SAVED. To save, copy/paste to a convenient location.

Automatically display strength column.

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

Add Row... Remove Row

< Back Next > Cancel Help



Risk Statistics Easily Available

ACE 7.5 - [Demo ACE Session.aces - Inputs/Results Viewer (BY2017SK)]

File Home View Construction Functions Results Display Cases

BY RISK Statistics Phased by Case

Point Estimate 50%

Calculate Copy All Zoom Bookmark Toggle

Configure Calculate Clipbo... Navigate

Override Session Options RISK Allocation Options

<Level 2 WBS Elements>

Prorate 0%

5

Demo ACE Sessio...logy (BY2017SK) Demo ACE Sessi...wer (BY2017SK)

	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 (I	\$ 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
28	Cables, Conduits, and Connectors (I	\$ 12,128.758	\$ 12,484.546	\$ 12,798.414	\$ 13,092.999	\$ 13,407.742	\$ 13,711.702	\$ 14,047.098

Ready NUM



Estimates can be Adjusted to Desired Confidence Levels

In constant or then year dollars

ACE Session Properties

General Calculation Errors Inflation

RISK and Config Reporting Format Summary Present Value

Configuration Defaults

Display Config Info

Set Config Info

RISK Report default setting

Display every 5th percentile

From 0%

To 100%

Display five user-defined percentiles

Sunk Years

Last Year:

2010

RISK Allocation

This process is used for Phased, Budgetary reports to cause probability level results to suit Allocation options do NOT affect RISK statistics

Allocate at 50 % probability

Allocation markers defined in: <Level 2

Allocate by Std Dev: From Statistics

RISK Phasing Profile: BackLoad

RISK PE Percent Adjustment: 0 %

Allocate then inflate (BY RISK statistics)

Inflate then allocate (TY/SY RISK statistics)

OK Cancel Set

ACE 7.5 - [Demo ACE Session.aces - TY Phased Funding (TY SK, Time Phased, Case: Tech Baseline, 50% CL allocated at Level 2)]

File Home View Construction Functions Results

Phased Narrative Inflation RISK DEC Statistics Results Reports

Import Report Template Export Report Template

Automatically Calculate Refresh View Export Report

Demo ACE Sessio...logy (BY2017SK) Demo ACE Sessio...ewer (BY2017SK) Demo ACE Session...ted at Level 2

	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

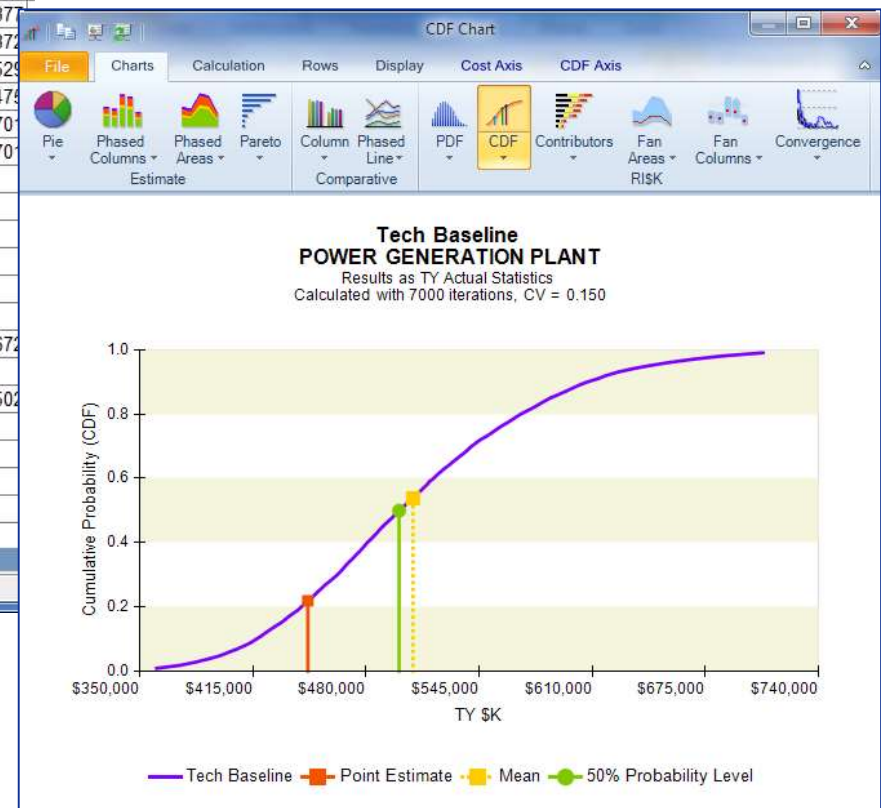
Ready NUM



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%)		\$ 9,842.700
21	CSCI1	RDTEA	\$ 10,738.008 (55%)		\$ 9,842.700
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

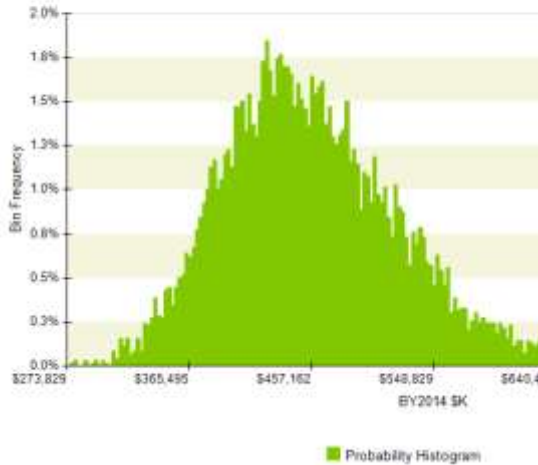


- TY RI\$K cumulative distribution curve

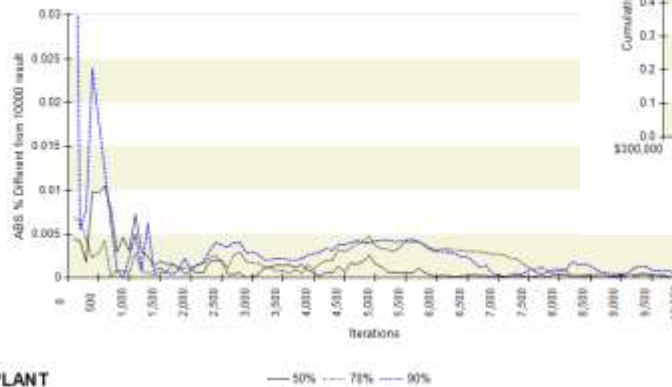


Graphical Outputs to Present Uncertainty Results

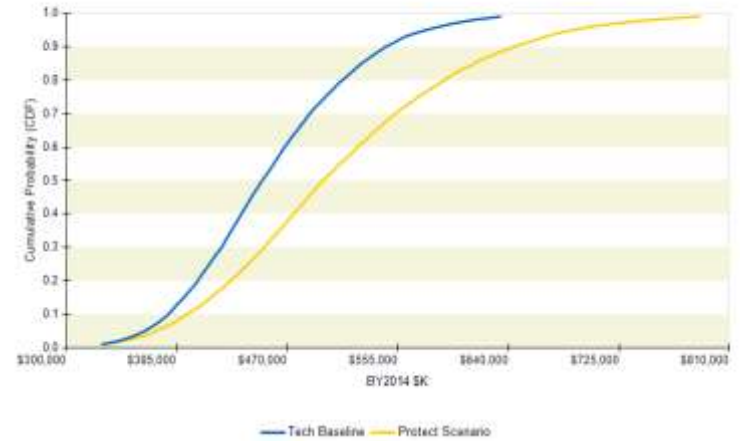
**Tech Baseline
POWER GENERATION PLANT**
Results as BY Statistics
Calculated with 7000 iterations, CV = 0.146



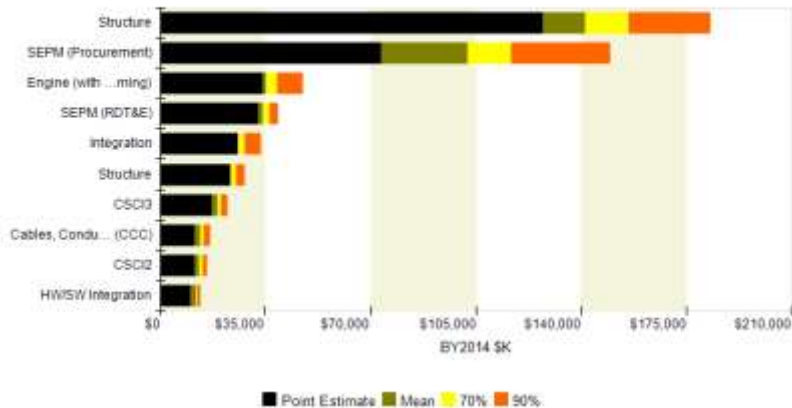
**Tech Baseline
Convergence for POWER GENERATION PLANT**
Calculated with 10000 iterations, CV = 0.145



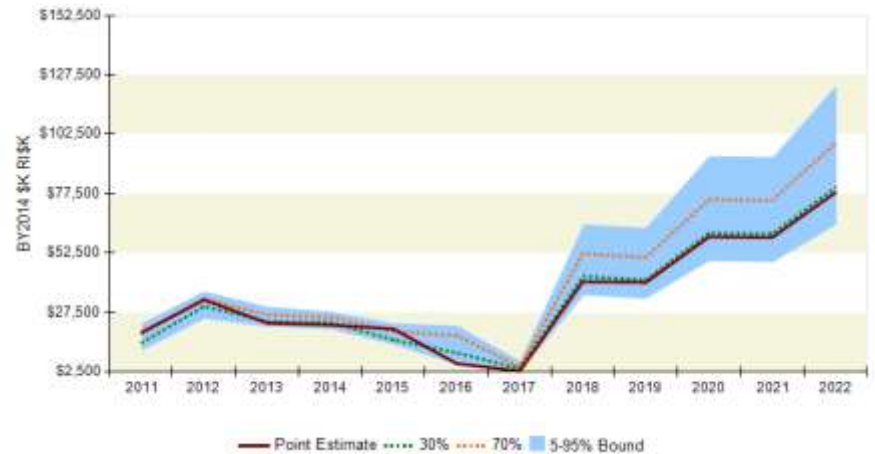
**Multiple cases
POWER GENERATION PLANT**
Results as BY Statistics
Calculated with 7000 iterations, CV (Tech Baseline) = 0.146

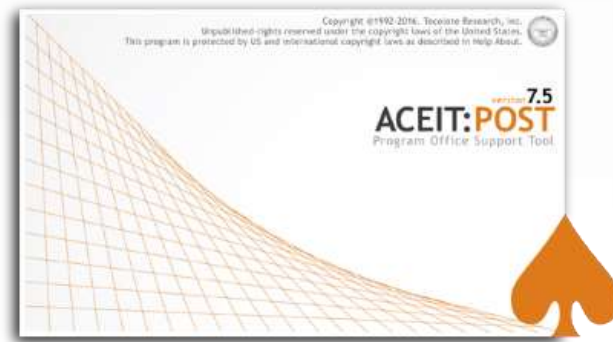
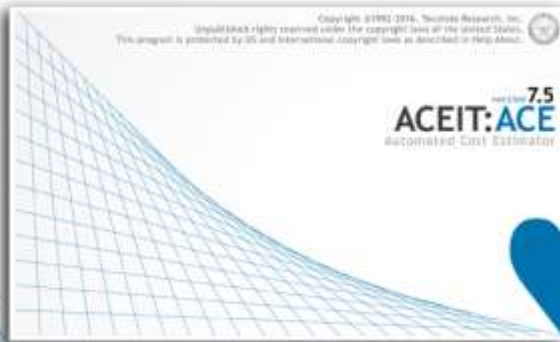


**Tech Baseline
Cost Contributors for POWER GENERATION PLANT**
Results as BY Statistics
Calculated with 7000 iterations, CV = 0.146
Sorted on 90% Total Value



**Tech Baseline
POWER GENERATION PLANT**
Annual BY2014\$K Costs By Year
Results as BY Statistics
Calculated with 7000 iterations, CV = 0.146





Excursions and Reports



■ Estimate Reports



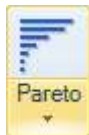
Pie



Phased Column



Phased Areas



Pareto

■ Comparison Reports



Column



Phased Line

■ RI\$K Reports



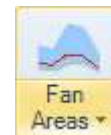
Histogram



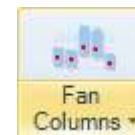
Cumulative Distribution



Contributors



Fan Area



Fan Columns



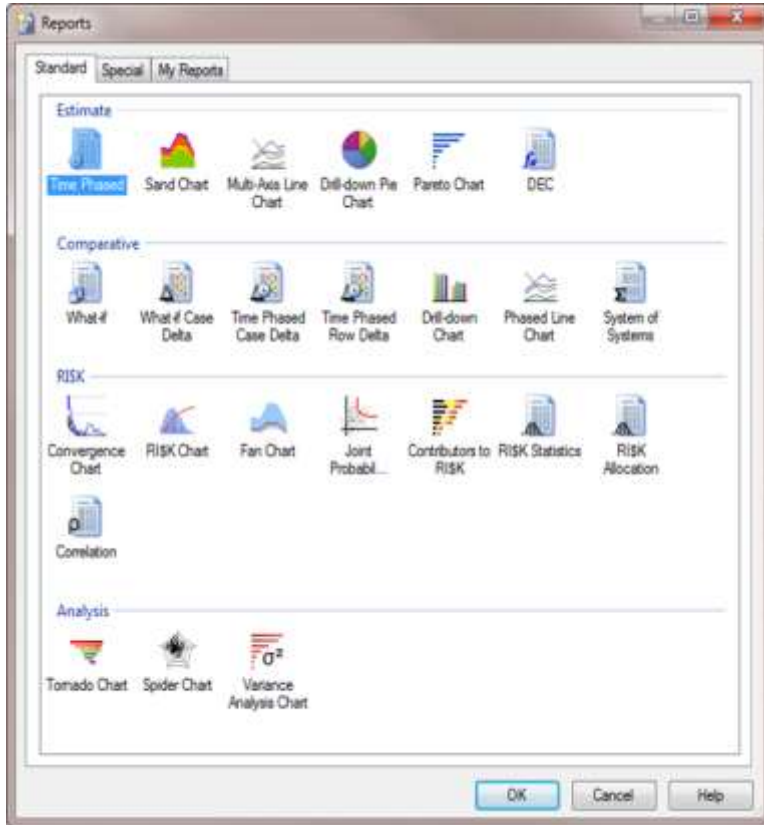
Convergence



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**



Graphical Charts

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

Tabular Reports

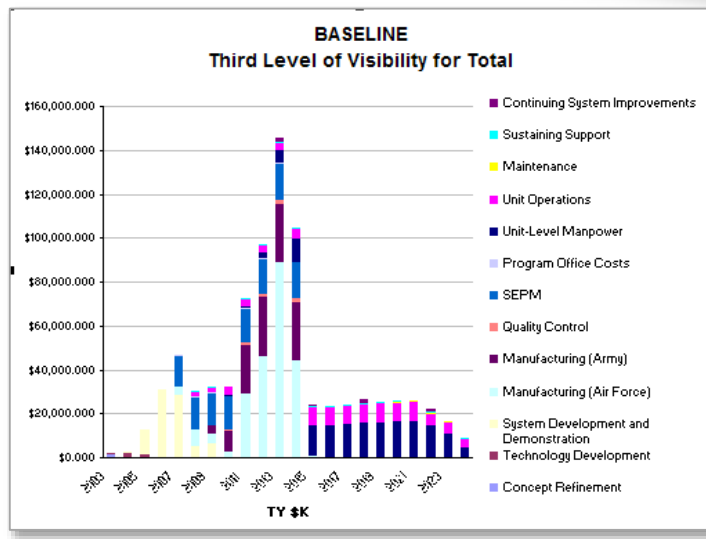
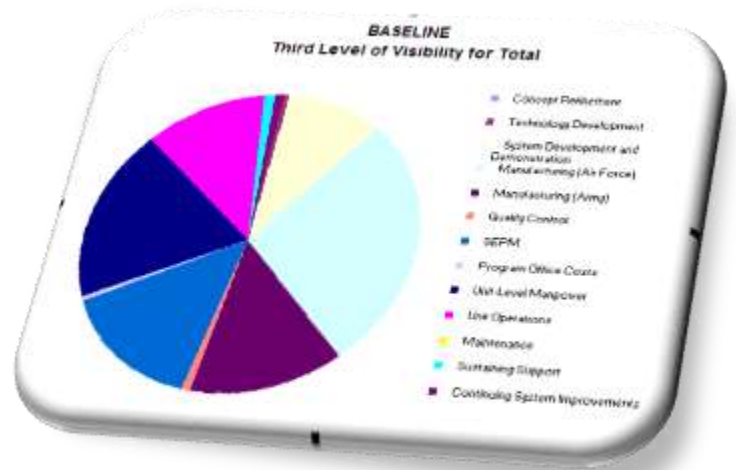
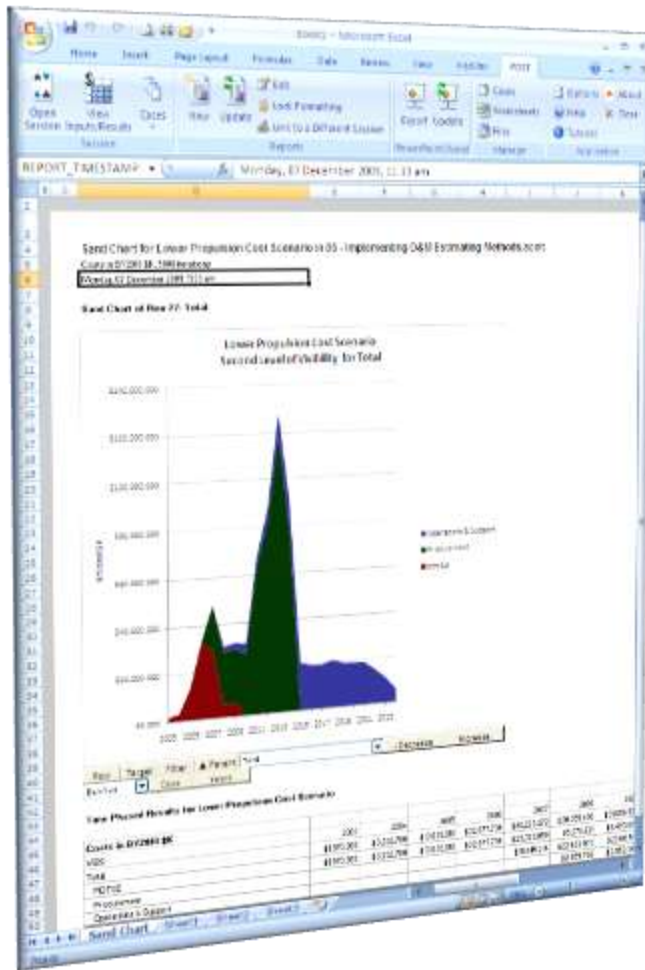
- **Estimate:**
 - Time Phased
 - DEC
- **Comparative:**
 - What If
 - What If Case Delta
 - Time Phased Case Delta
 - Time Phased Row Delta
 - System of Systems
- **RISK:**
 - Statistics
 - Allocation
 - Correlation



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

Book1 - Excel

Beane, Sabrina SB Tecolote

POST

Open View Inputs/ Cases New Update Edit Lock Formatting Link to a Different Session Session Results

Export Update Reports PowerPoint/Word Manage Application

M46

Time Phased Report for Tech Baseline in Demo ACE Session.aces
 Funding in TY \$K, 7000 iterations, TY Allocated at 70% from 'Level 2'
 Thursday, 25 May 2017, 9:50 AM

Rows Filter Then Year Case Years Show Prior/Complete

Time Phased Results from Tech Baseline

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	\$2,463.969	\$1,244.122	
19	SEPM (RDT&E)		\$6	\$8,400.672	\$9,443.182	\$9,627.644	\$4,785.962	\$1,671.161	\$310
20	Training							\$140.453	\$57
21	Data			\$157.502	\$177.048	\$180.506	\$183.510	\$67.420	\$5

Allocated from WBS level 2

Totals for each row close to desired confidence level

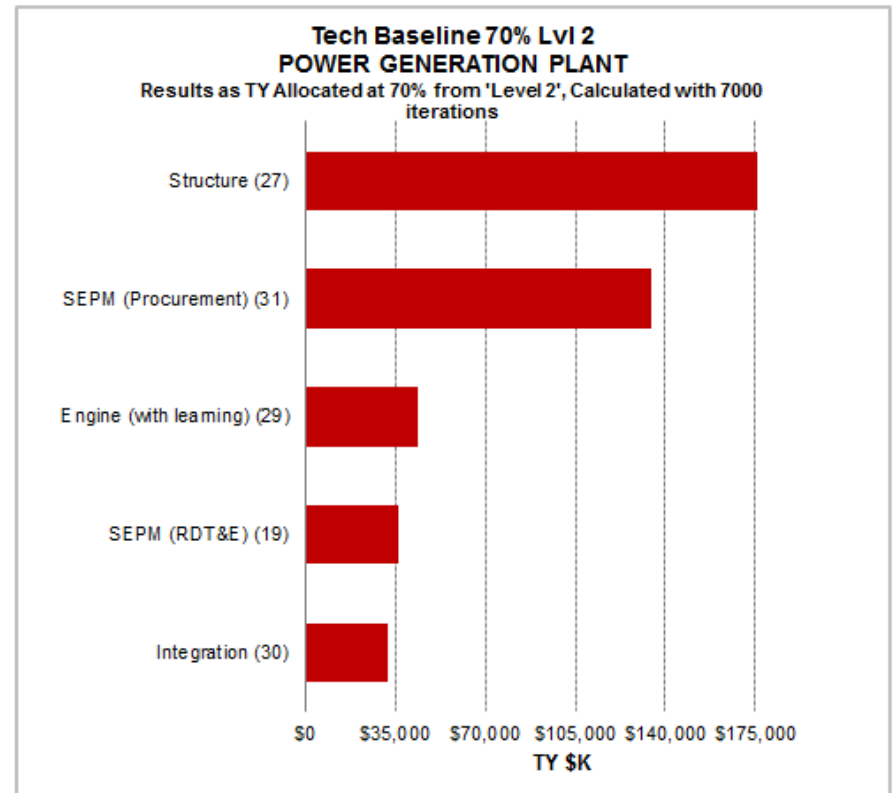
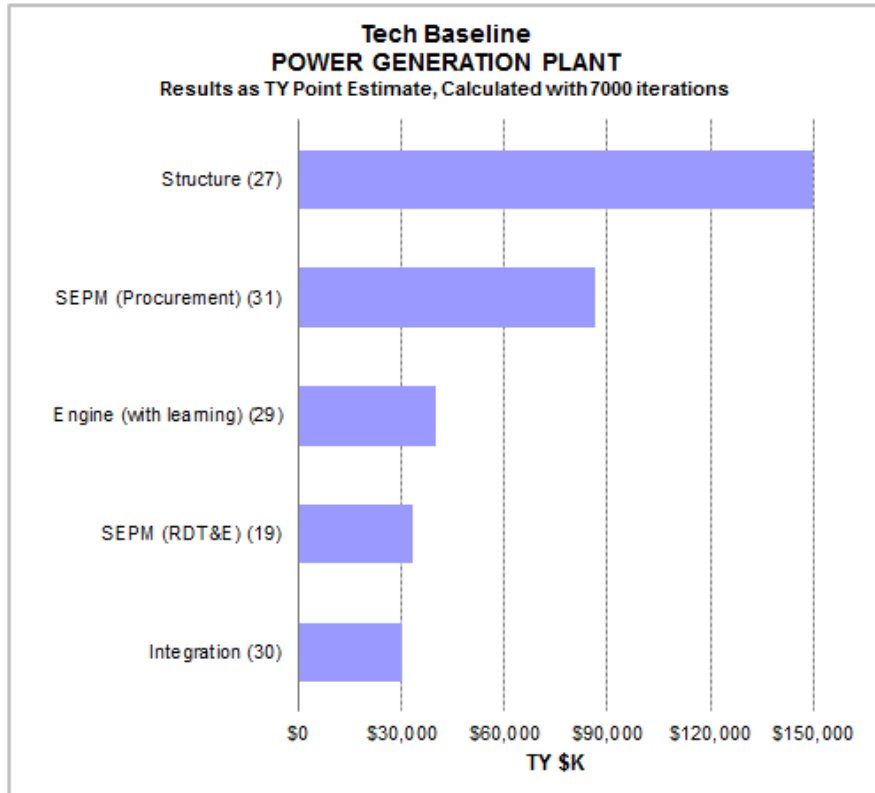
Time Phased Sheet1

READY 75%



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



■ Identifies top contributors and impacts of uncertainty

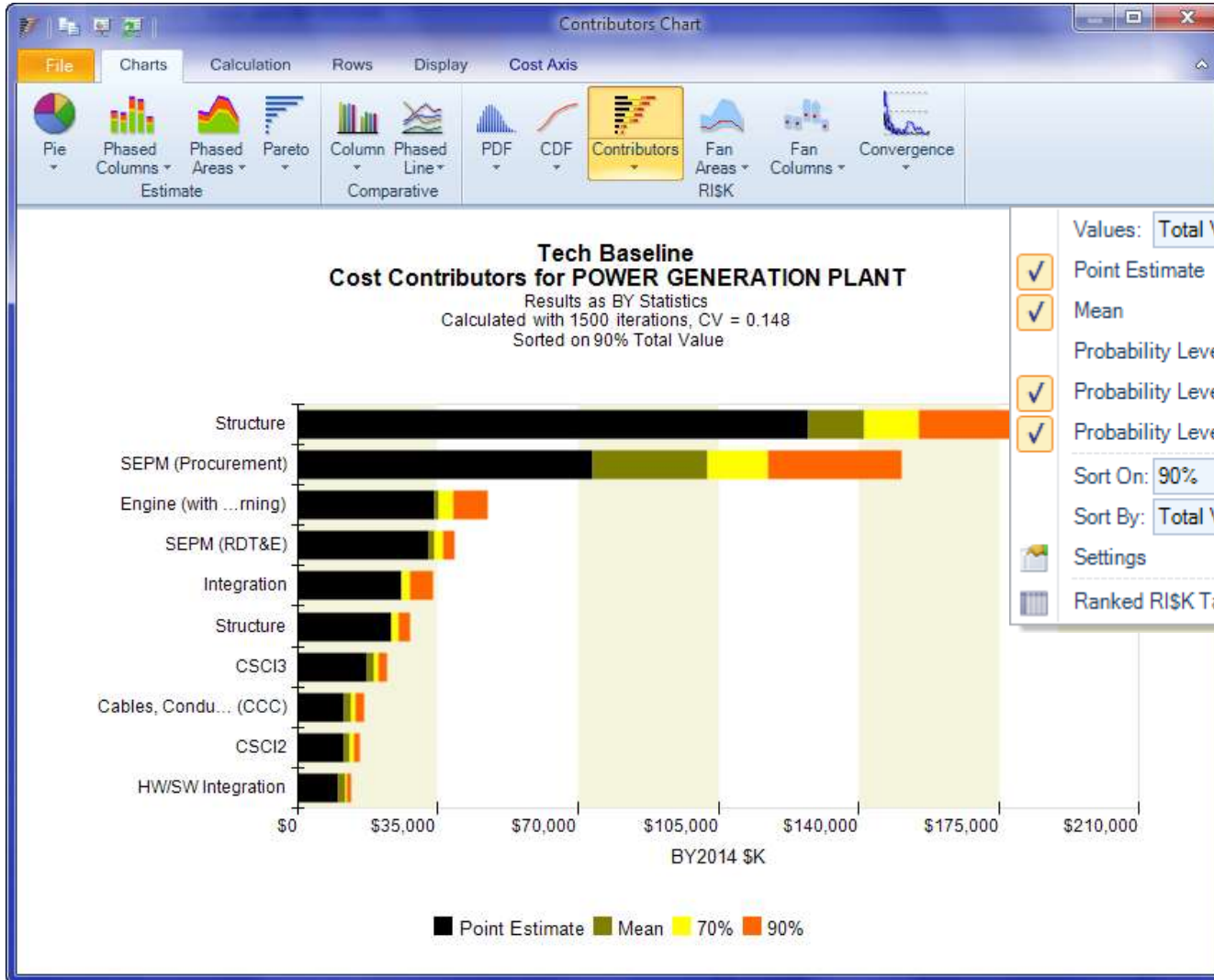
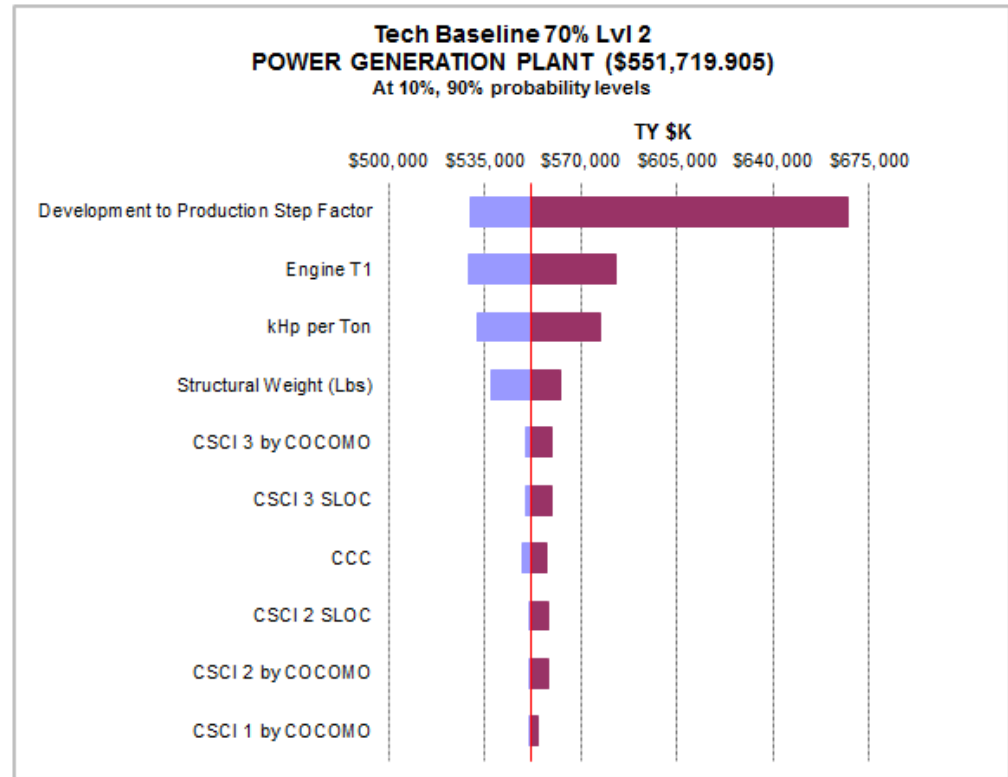
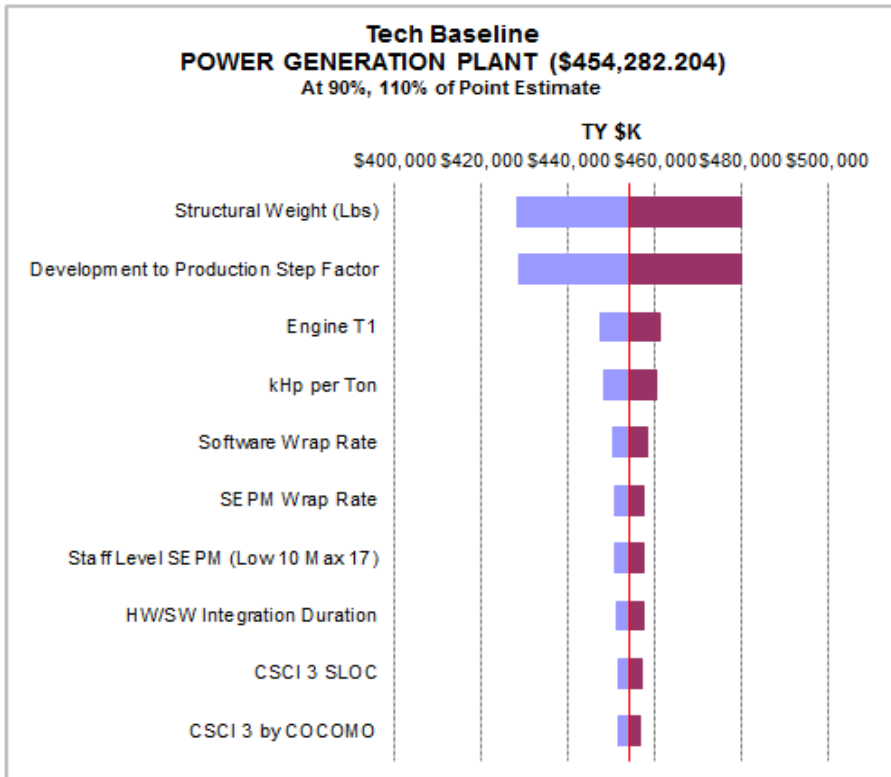


Chart drop-down provides access to user specified values to plot, probability levels, and sort options



Tornado Chart

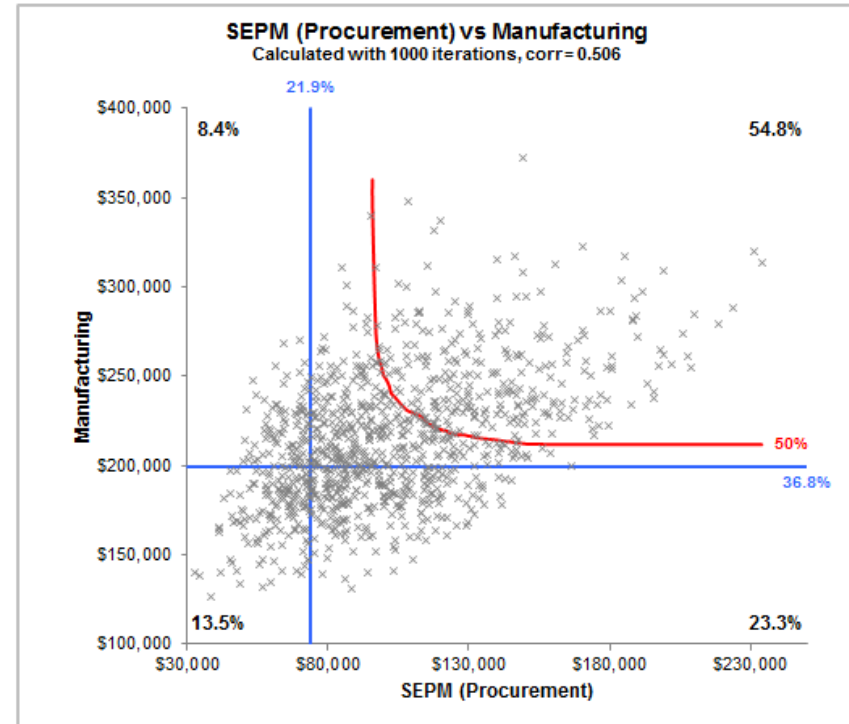
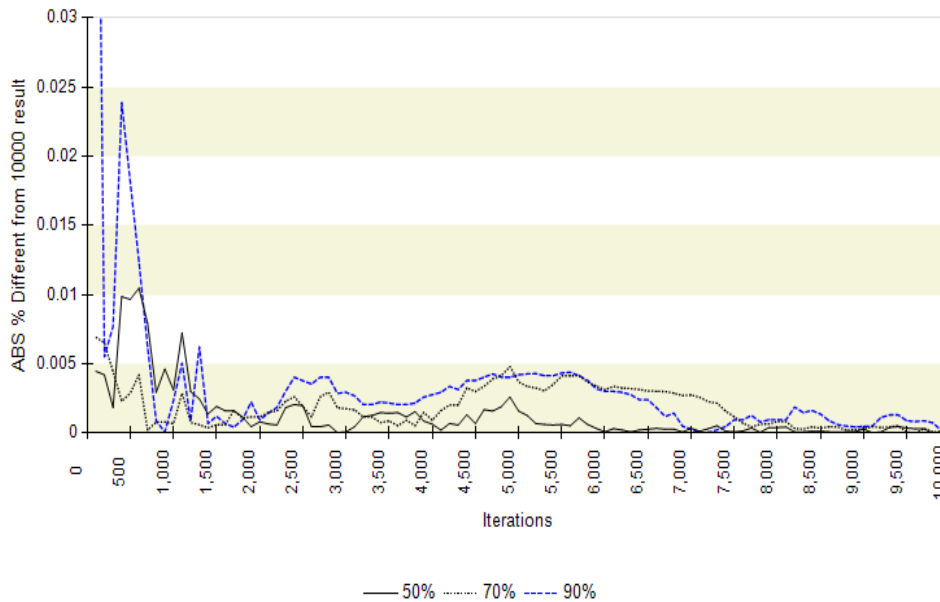
- Rank orders the impact of input variations on a specific cost result
 - Variations based on arbitrary Fixed Range or the model's RI\$K Range
 - RI\$K range captures the bounds assigned by the analyst which should make it a more realistic assessment





Other ACE/POST RISK Reports

Tech Baseline
Convergence for POWER GENERATION PLANT
 Calculated with 10000 iterations, CV = 0.145



- 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

The screenshot shows the 'Phased Report Options' dialog box with the following settings:

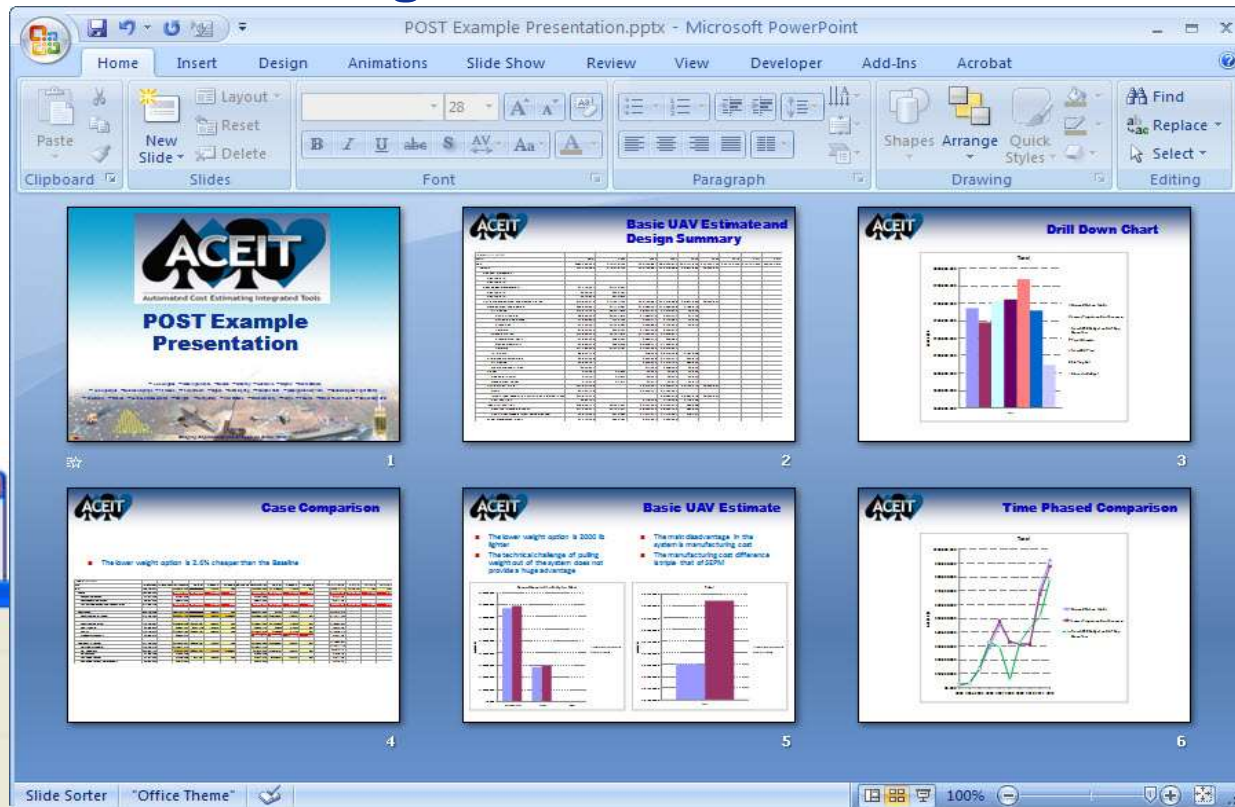
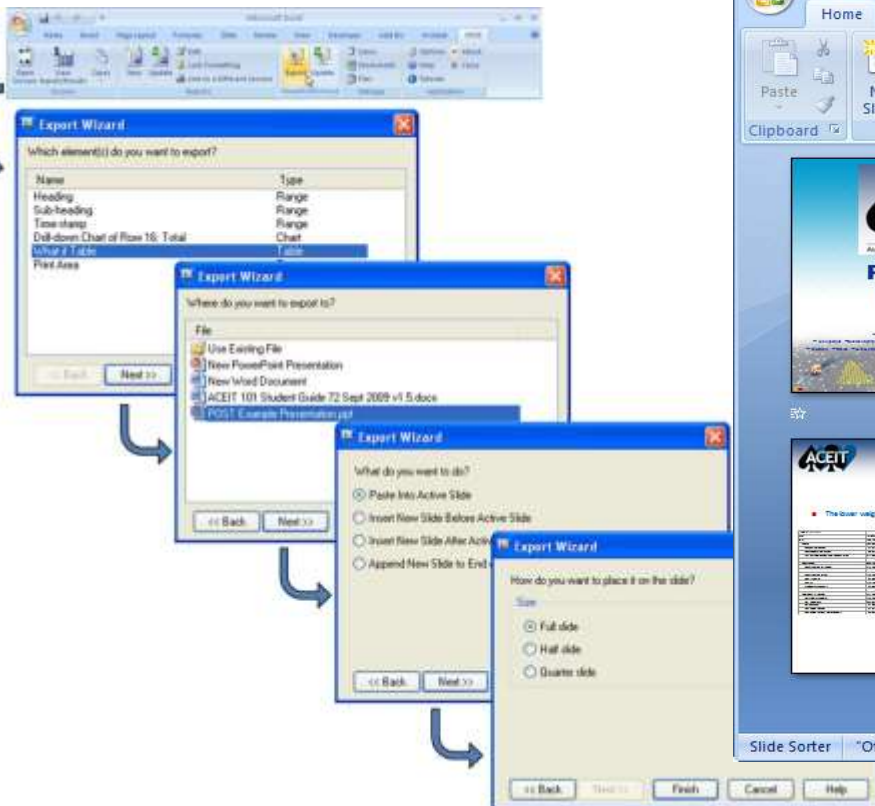
- Precision:** Use Session Format, Decimal Places: 0
- Report Type:** Obligations (Default), Implied Expenditures, Present Value, Reportable Base Year
- Present Value:** Real, Nominal, Override Session Settings
- Project Year:** 2013
- Period of Analysis:** 3 year(s)
- Discount Rate:** System Nominal Discount Rate: -1.400 %, User Defined Discount Rate: 0 %
- Discount Method:** Middle of Year (dropdown menu open showing: End of Year, Middle of Year, Beginning of Year)

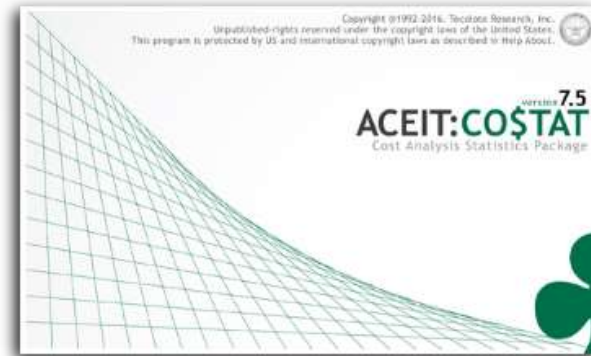
Buttons: OK, Cancel, Help



Presentations Can be Auto-Generated by ACE and POST

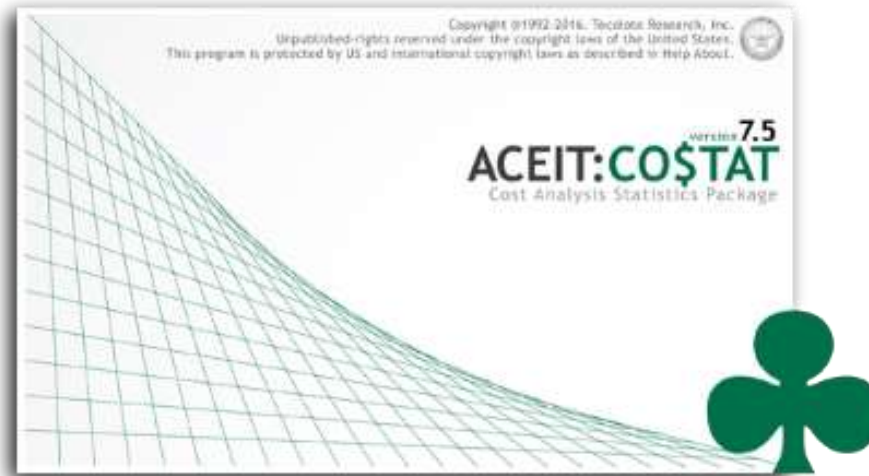
- Reports can be exported to PowerPoint
 - Built-in POST feature
 - Minimizes links and PPT file size
- Reports can be updated with a single button





Data Analysis – CO\$TAT





- **CO\$TAT 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)

The screenshot shows the Microsoft Excel interface with the COSTAT add-in. The ribbon includes tabs for Dataset, Analysis, and Application. The data table below is as follows:

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

The screenshot displays the Microsoft Excel interface with the COSTAT add-in. The 'Analysis' group in the ribbon is expanded, showing options like 'Log Linear', 'Non Linear', 'Linear', 'Learning', 'Beta', and 'Univariate'. A red box highlights the 'Log Linear' option, with a red arrow pointing to the 'Log Linear Model' dialog box. The dialog box is open, showing the 'Specifications' tab. The 'Case Name' is 'LogLinear 1', the 'Dependent Variable' is 'LbPerInch', and the 'Independent Variables' are 'Cost', 'Wgt', 'Dia', 'Act', 'CP', and 'ActByPred'. The 'Options' section includes 'Intercept (Non Origin)' checked, 'Weighing Variable' set to 'None', and 'Ridge Parameter' set to 'None'. The 'Method' is 'Least Squares', and 'Maximum Iterations' is 500. The 'Report Precision' section shows 'Number of Digits' set to 4. The background shows a spreadsheet with columns for 'Observations', 'Cost (\$M)', 'Weight (lbs)', 'Diameter (in)', and 'Weight Per Dia'.

Observations	Cost (\$M)	Weight (lbs)	Diameter (in)	Weight Per Dia
Obs 1	390	10.00	8.70	1.149
Obs 2	200	5.00	8.00	0.625
Obs 3	240	5.20	8.20	0.634
Obs 4	300	7.00		
Obs 5	460	12.00	9.00	1.333
Obs 6	560	17.80	9.50	1.874
Obs 7	700	21.00	9.20	2.283
Obs 8	800	25.00	9.70	2.577
Obs 9	500	18.00		



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:	$LbPerInch = 0.9975 * Wgt^{1.1} * Dia^{(-0.9987)} * 0.9396^{Act}$

II. Fit Measures (in Fit Space)

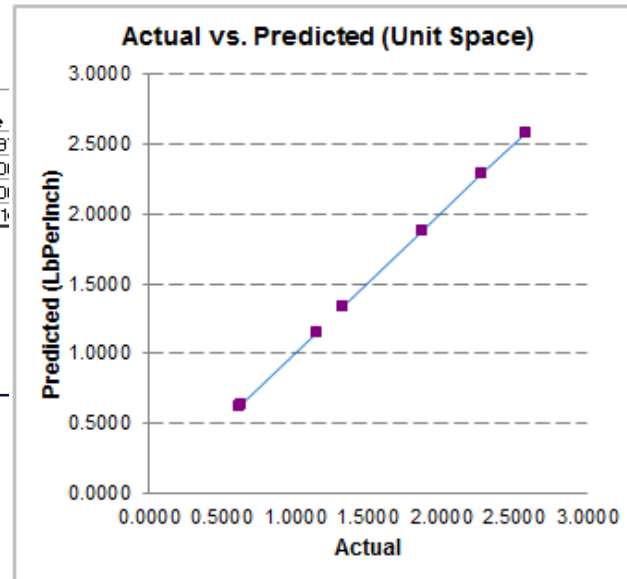
Coefficient Statistics Summary

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

Name	Value
Title Analyzed	4/9/2014 2:02:14 PM
Equation	Cost = 587.1 * Wgt ^ 0.9441 * Dia ^ (-1.2311) * 1.105 ^ Act
Notes	Multiclicative
Observations	7
DF	3
Adjusted R ²	99.30%
SE (Fit Space)	0.0435
F-Prob	100.00%
T-Prob Intercept	93.69%
T-Prob b1	99.46%
T-Prob b2	63.45%





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

Cases

Linear Log Linear Non Linear Learning Beta Univariate Distribution Finder Analysis Summary

Click here to add filter criteria

Type	Name	Status	Equation	DF	F-Prob	T-Prob Intercept	T-Prob b1	T-Prob b2	T-Prob b3	R ² 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 WgtPerInch...	Passed Criteria	Cost = 336.4 * LbPerInch ^ 0.9006	5	1.0000	1.0000	1.0000			98.4181	0.0656
Log Linear	LogLinear WgtPerInch...	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

Criteria: Criteria 1

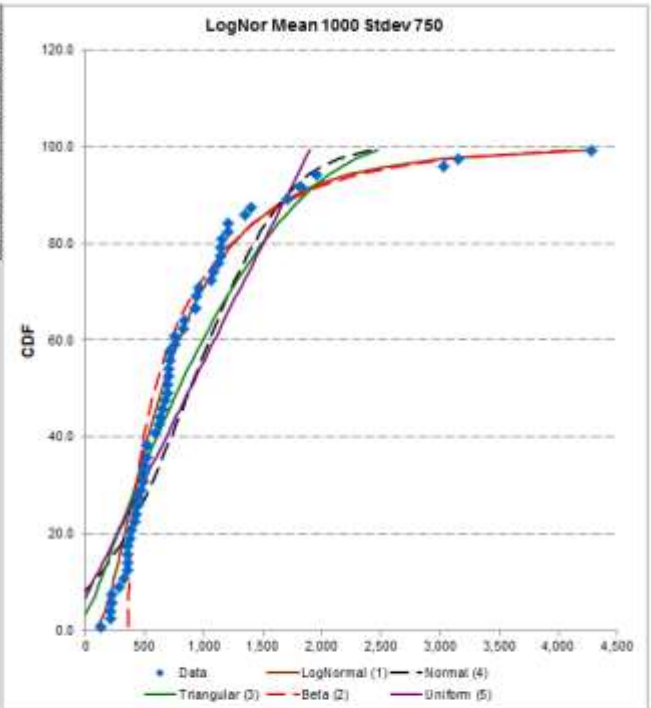
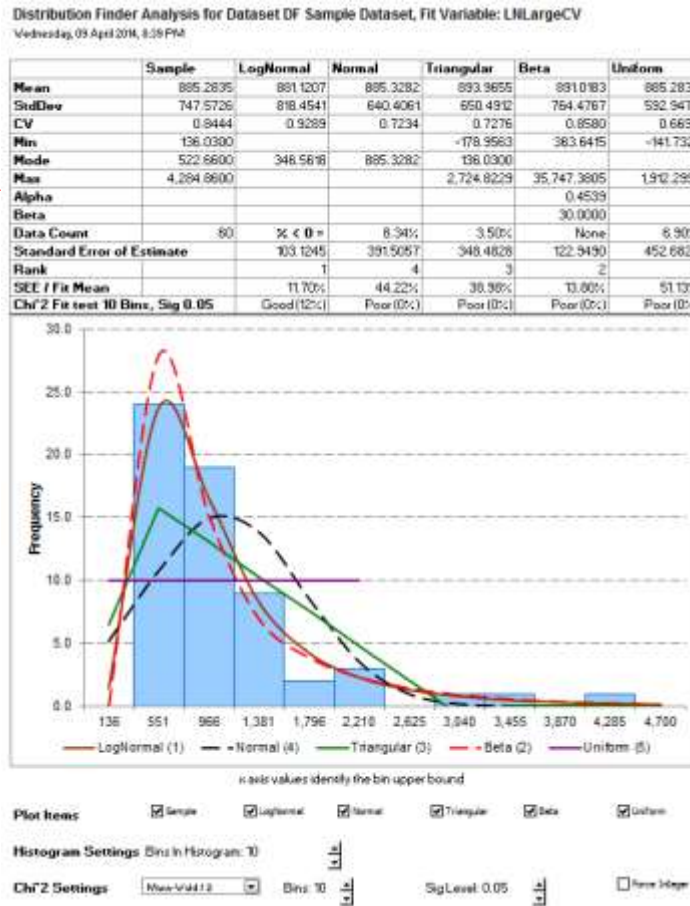
OK Cancel Apply Help



Distribution Finder

- 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)

	B	C
	Observations	LogNor Mean 1000 Stdev 750
3		
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





COSTAT Statistical Analysis

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

The screenshot shows the Microsoft Excel interface with the COSTAT add-in. The 'Export to ACE/Librarian' dialog box is open, displaying regression results for 'Cost'. The dialog includes options for 'Analysis Data' and 'Definitions', with 'Cost' selected. The 'Include RISK Distributions' section is checked, and 'Normal' is selected as the distribution form. The 'Costat Quantified Distribution' section is also checked, with 'Relative similarity of estimate to Dataset' set to 'Similar'. The 'Estimate' field is empty. The 'Low' and 'High' fields are also empty. The 'OK', 'Cancel', and 'Help' buttons are visible at the bottom of the dialog.

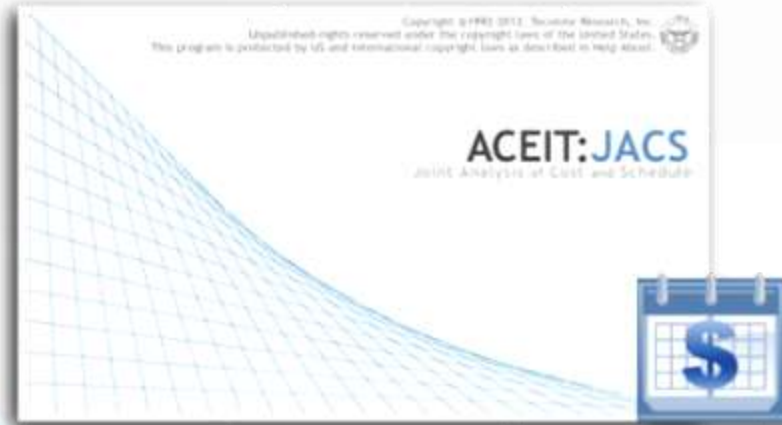
Below the dialog, a table in the spreadsheet summarizes the regression results. The table has columns for 'WBS/CES Description', 'Unique ID', 'Estimate', 'Equation', 'Distribution', 'Mode', and 'High (Percentile)'. The data is as follows:

WBS/CES Description	Unique ID	Estimate	Equation	Distribution	Mode	High (Percentile)
*INPUT VARIABLES	*IN_VAR					
Petro, Oil and Lub (POL) \$/FH		\$ 0.072 *	$(-0.6729) + 0.2385 * \text{FUEL}$	Normal	Mode	109.75
Fuel Capacity	Fuel	299.951 *	$12.04 + 0.01946 * \text{WGHT}$	Normal	Mode	124.31



COSTAT 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



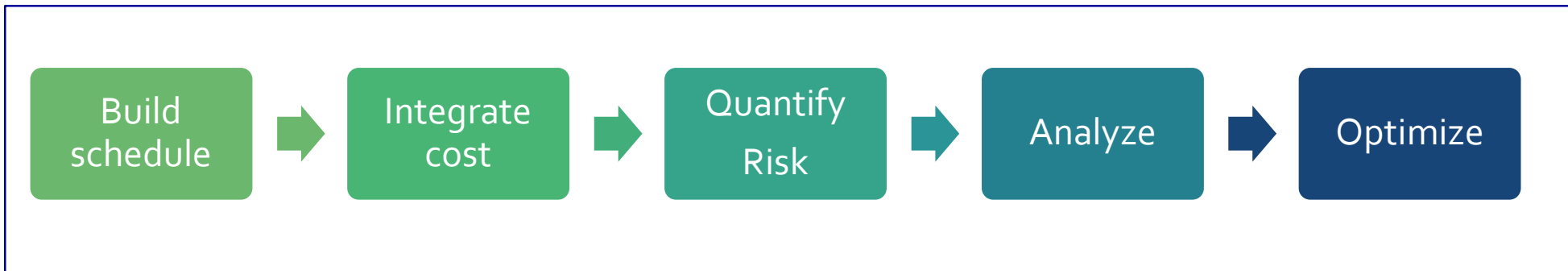


What is JACS?

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

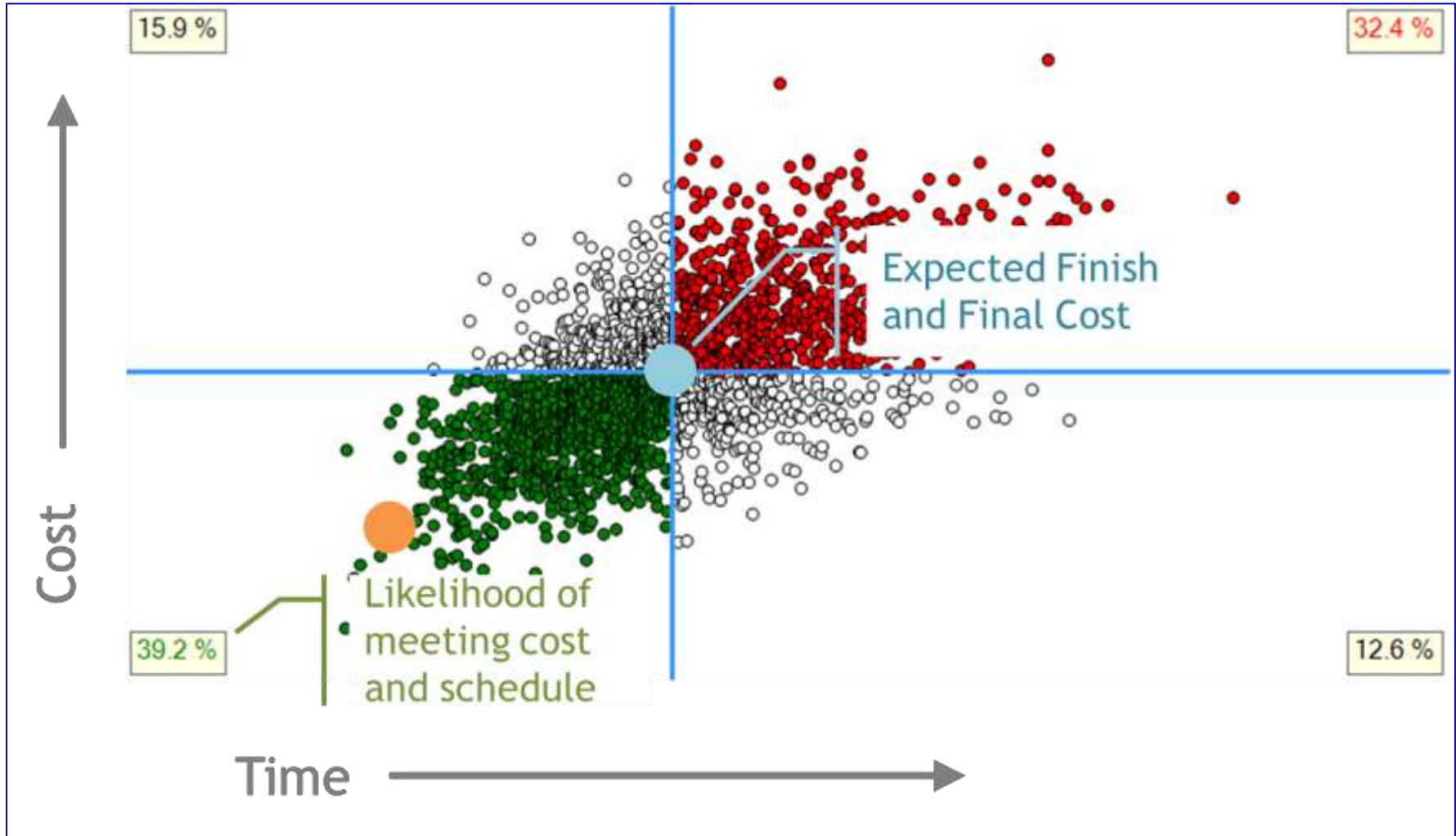
- Only application to provide all calculation data to allow advanced analytics
- Fully enables the analyst to assess, understand, and communicate results

Low cost

- Included in ACEIT software suite

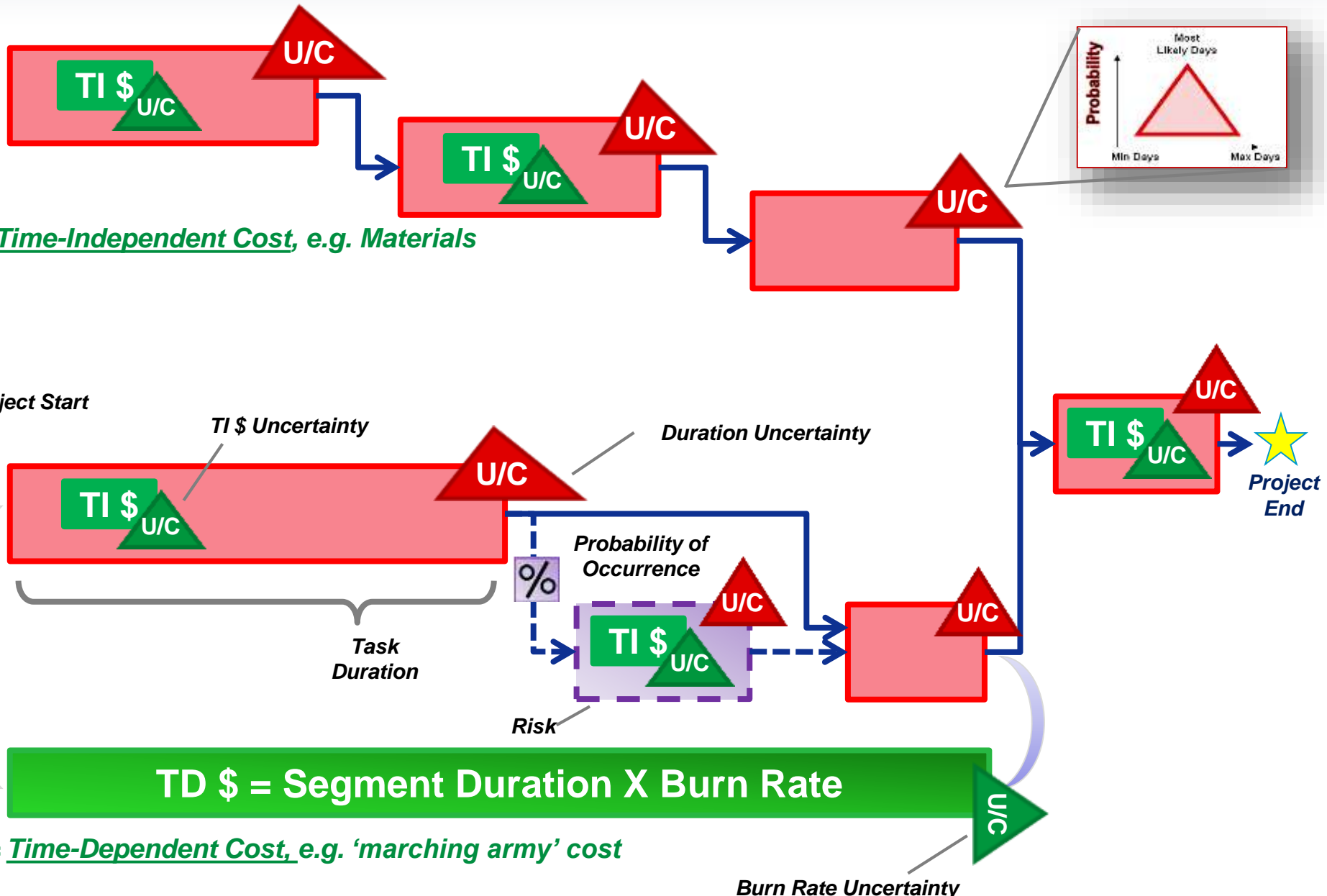


Identify Cost and Schedule Range





Integrated Risk & Uncertainty Landscape – the JACS Paradigm

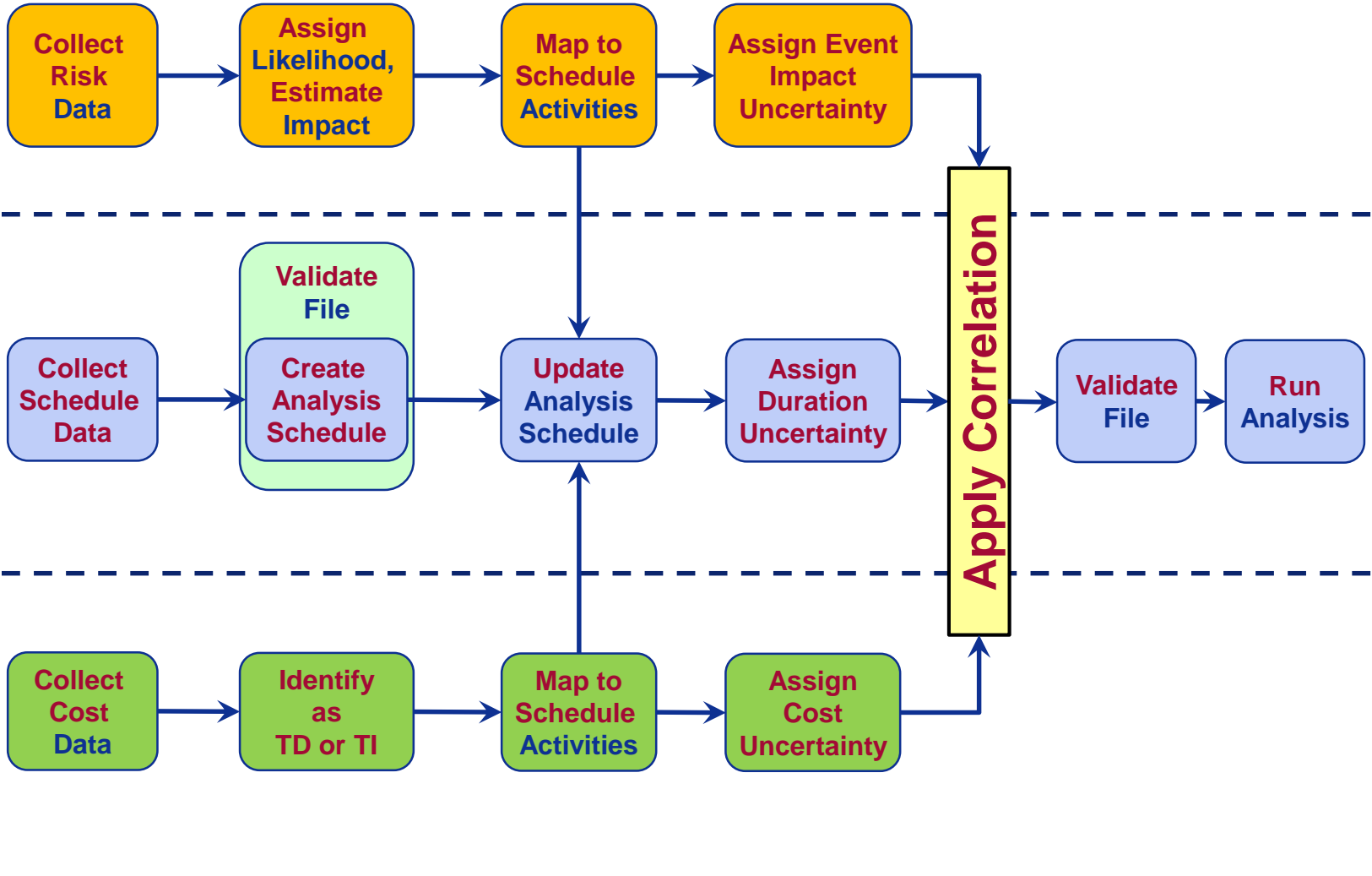
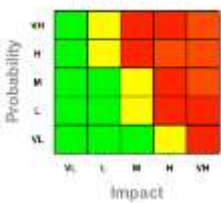




Fully Integrated Cost and Schedule Method (FICSM)

Risk

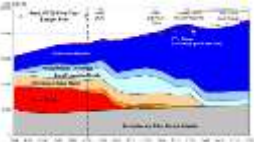
RISK MATRIX



Sched



Cost





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

The screenshot shows the 'JACS Edit Form' window for 'JACS Example 02a Advanced - with Risk Factors.mpp'. The 'Current Task' is '36' and 'Prod Procure Materials'. The 'WBS' is '530', '% Complete' is '0', and 'Remaining' is '530'. The 'Cost Inputs' section includes 'Total Cost' (28,700), 'Remaining' (0), and fields for 'Time-independent portion of task cost' (TI) and 'Time-dependent portion of task cost' (TD). The 'Task Uncertainty' section shows 'Duration Uncertainty', 'TI Cost Uncertainty', and 'TD Cost Uncertainty'. The 'Selected Uncertainty' section is set to 'Triangle' with 'Low: 85', 'Most Likely: 100', and 'High: 125'. The 'Correlation' section shows 'PRODDURATION' with a 'Shared Coef.' of '0.7'. The 'Discrete Risk' section has 'Risk occurs with likelihood (%)' set to '0' and 'Risk ID' empty. Buttons for 'Assign Fields...', 'Always on top', 'Revert', and 'Commit' are at the bottom.

- 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

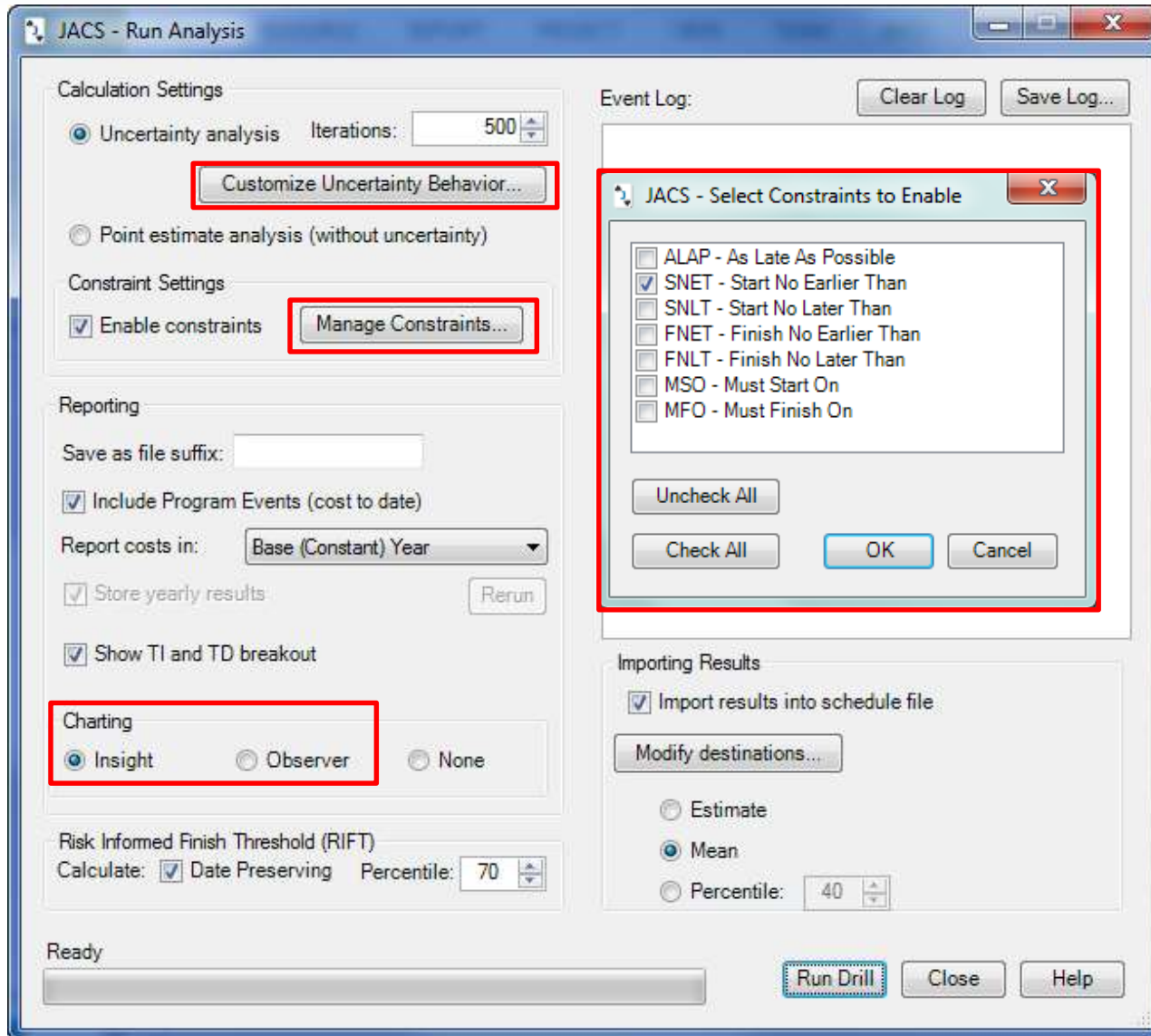
TI and TD Costs

Risk Events

Name	Duration	JACS Duration Incertainty	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

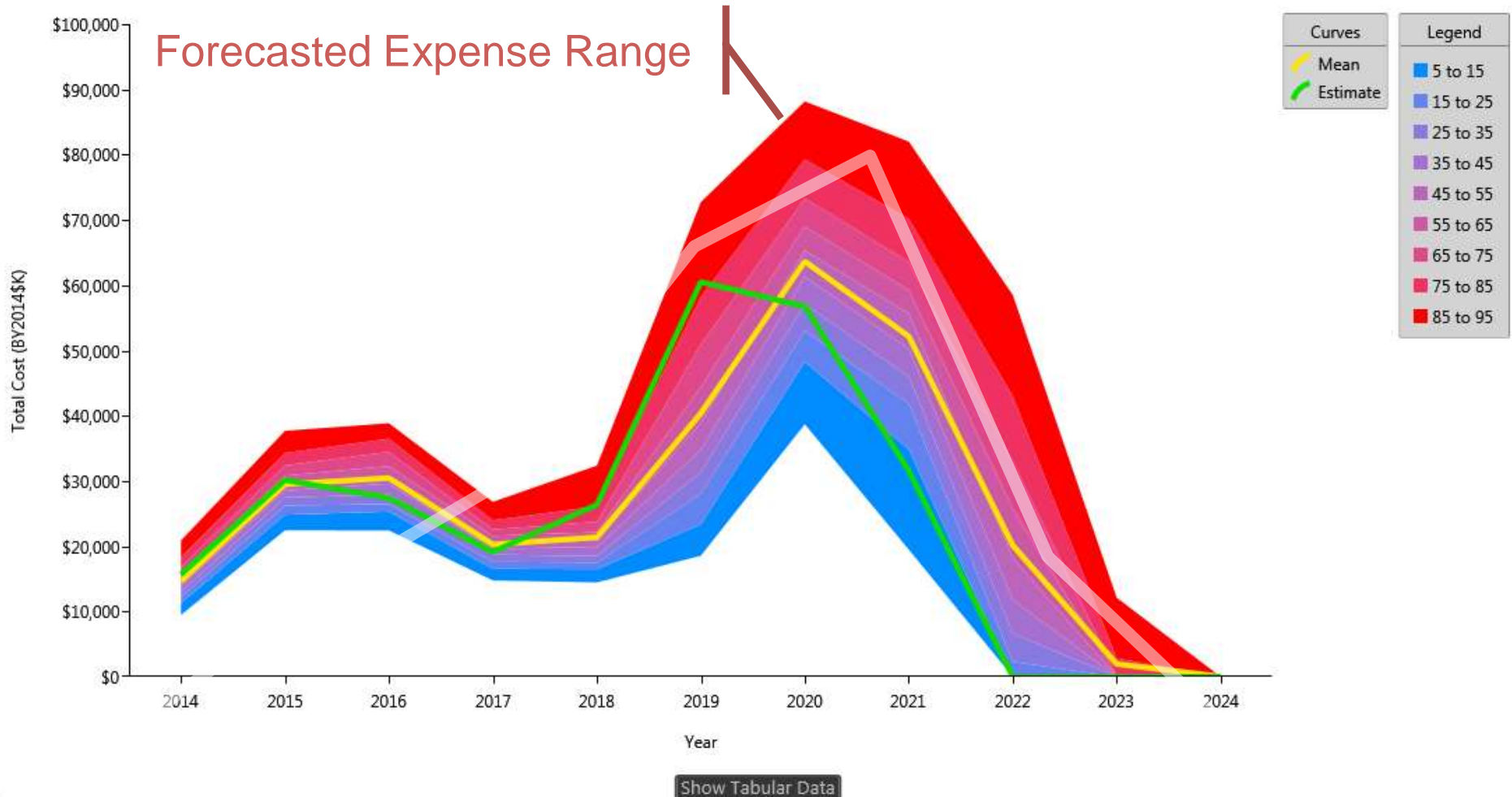


- Control various aspects of the simulation in the Analyze dialog
- The Run Drill button runs the simulation, then imports results into Project and creates a cache file of all the generated data
- Observer or Insight launches when the calculation is complete



Assess required funds over time

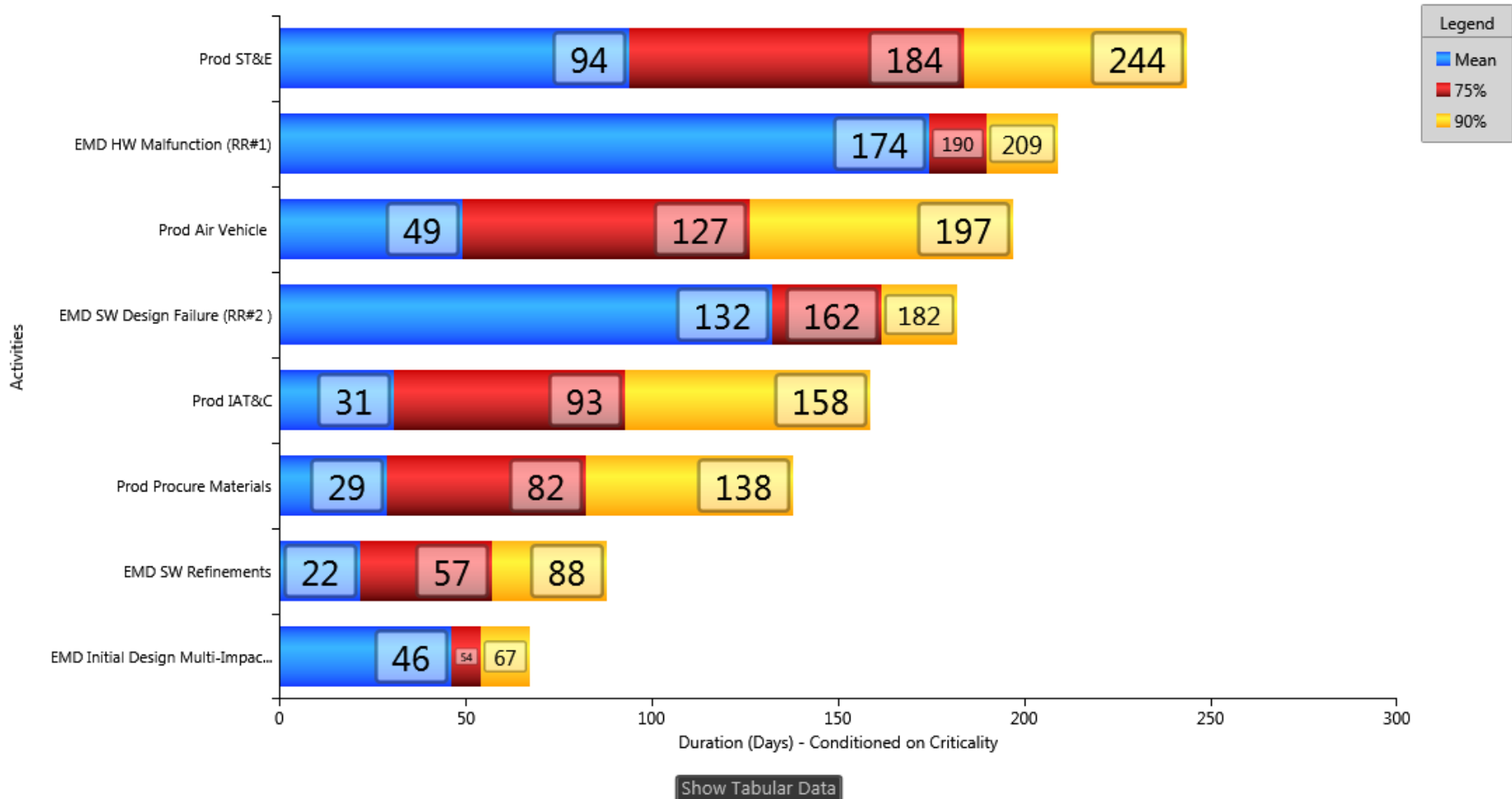
Annual Cost Uncertainty Missile System Project





Identify areas with highest potential impact

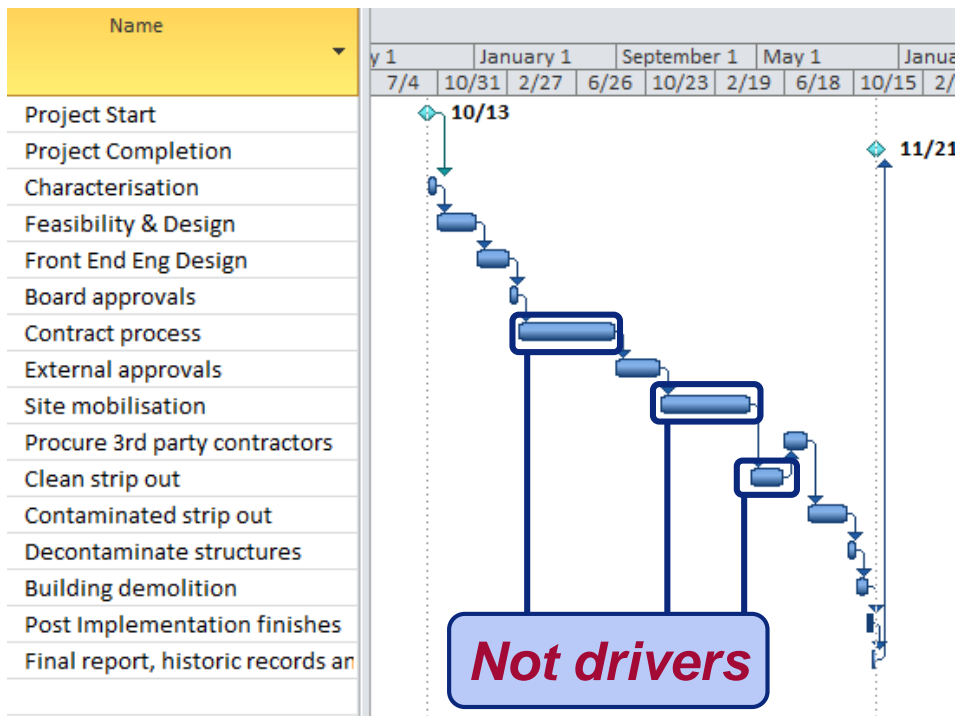
Duration Tail Contingency Delta from Estimate
Missile System Project



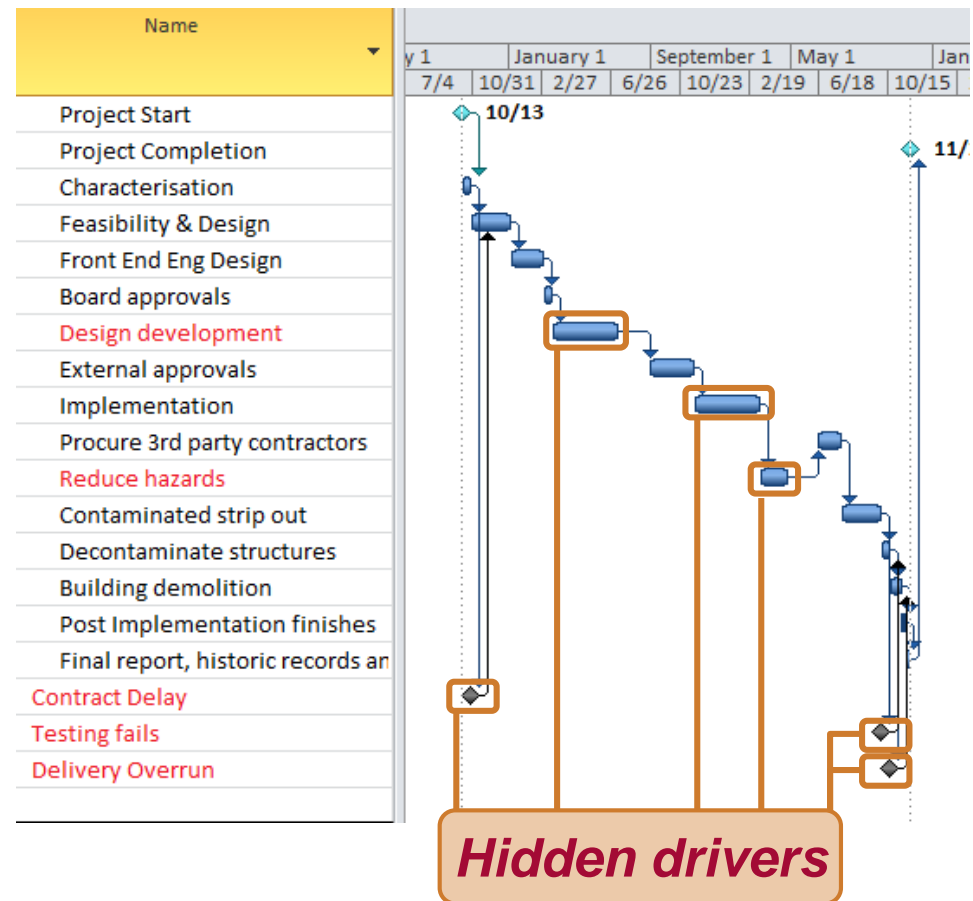


Find hidden problems

Deterministic Critical Path



Probabilistic Critical Path





View risk adjusted schedules

Register-Rocket Plan with Correlation.mpp - Project Professional

GANNT CHART TOOLS

Elliott, Darren LA Tecolote

FILE TASK RESOURCE REPORT PROJECT VIEW ADD-INS DEVELOPER JACS FORMAT

Clipboard: Paste, Copy, Format Painter, Cut

Font: Calibri, 11

Schedule: Mark on Track, Respect Links, Inactivate

Tasks: Manually Schedule, Auto Schedule, Inspect, Move, Mode

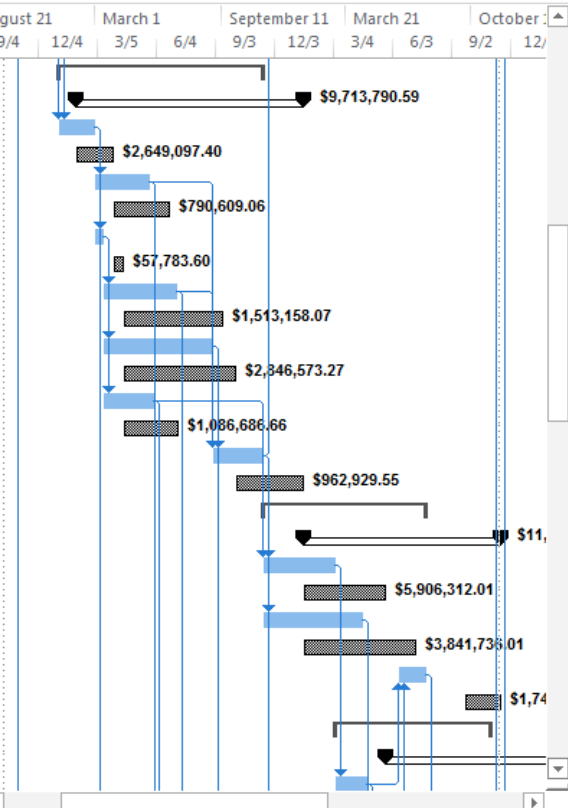
Insert: Task, Deliverable, Milestone, Summary

Properties: Information, Notes, Details, Add to Timeline

Editing: Find, Clear, Scroll to Task, Fill

Name	Duration	JACS Duration Result (80%)	Start	JACS Start Result (80%)	Finish	JACS Finish Result (80%)	August 21		March 1		September 11		March 21		October 12	
							9/4	12/4	3/5	6/4	9/3	12/3	3/4	6/3	9/2	12/2
14 Design	225 days	252 days	Wed 1/4/06	Tue 1/31/06	Tue 11/14/06	Tue 1/16/07										
15 Initial design	40 days	42 days	Wed 1/4/06	Tue 1/31/06	Tue 2/28/06	Wed 3/29/06										
16 Design guidance system	60 days	62 days	Wed 3/1/06	Wed 3/29/06	Tue 5/23/06	Fri 6/23/06										
17 Select configuration	10 days	12 days	Wed 3/1/06	Wed 3/29/06	Tue 3/14/06	Thu 4/13/06										
18 Design fuel system	80 days	112 days	Wed 3/15/06	Fri 4/14/06	Tue 7/4/06	Thu 9/14/06										
19 Design rocket engine	120 days	124 days	Wed 3/15/06	Fri 4/14/06	Tue 8/29/06	Wed 10/4/06										
20 Design frame	54 days	62 days	Wed 3/15/06	Fri 4/14/06	Mon 5/29/06	Fri 7/7/06										
21 Final design	55 days	77 days	Wed 8/30/06	Wed 10/4/06	Tue 11/14/06	Tue 1/16/07										
22 Fabrication	180 days	220 days	Wed 11/15/06	Tue 1/16/07	Tue 7/24/07	Thu 11/15/07										
23 Fabricate frame, fuel system and engine	80 days	91 days	Wed 11/15/06	Tue 1/16/07	Tue 3/6/07	Tue 5/22/07										
24 Fabricate guidance system	110 days	126 days	Wed 11/15/06	Tue 1/16/07	Tue 4/17/07	Mon 7/9/07										
25 Assemble	30 days	42 days	Wed 6/13/07	Fri 9/21/07	Tue 7/24/07	Thu 11/15/07										
26 Testing	170 days	203 days	Wed 3/7/07	Tue 5/22/07	Tue 10/30/07	Mon 2/25/08										
27 Test frame, fuel system and	35 days	40 days	Wed 3/7/07	Tue 5/22/07	Tue 4/24/07	Tue 7/17/07										

JACS RESULTS



READY NEW TASKS : AUTO SCHEDULED



Insight Provides Executive Dashboard





Insight Provides Executive Dashboard





Insight Provides Executive Dashboard



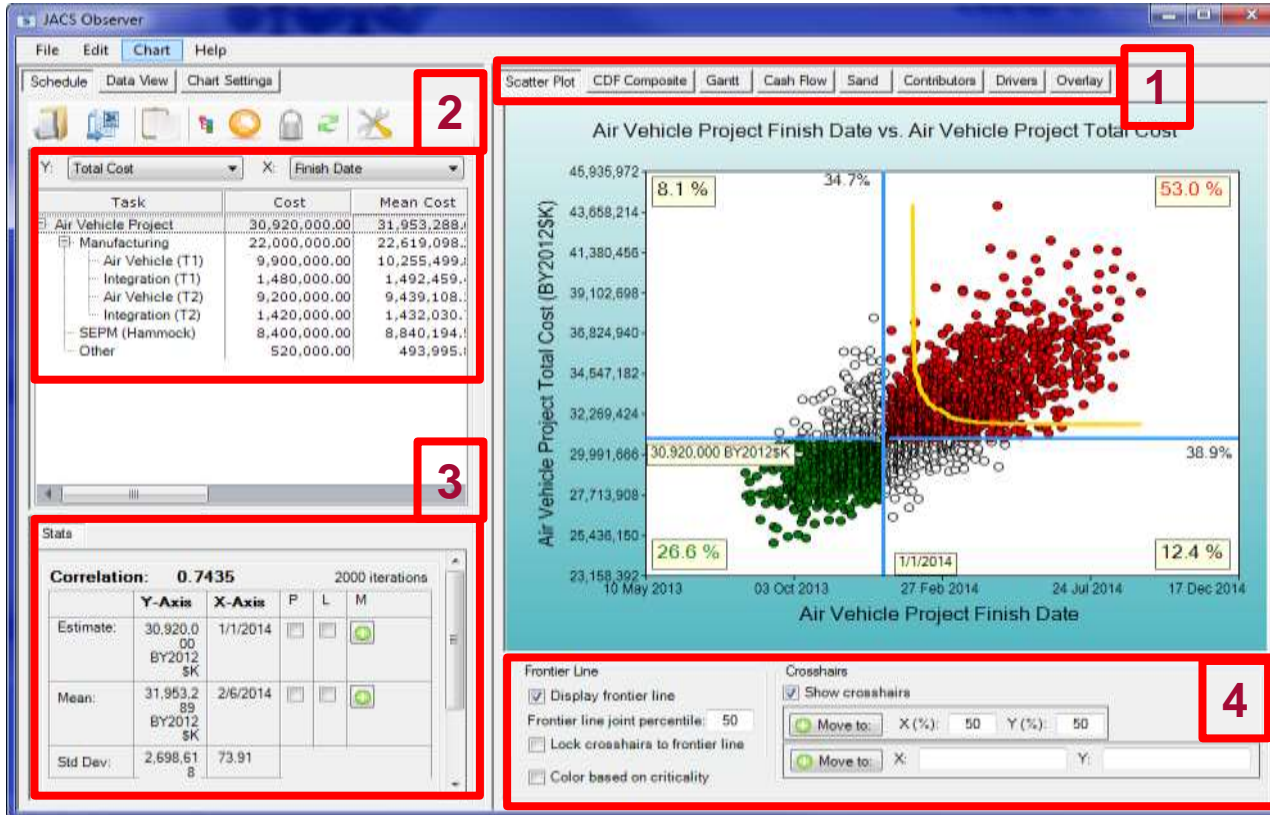


Insight Provides Executive Dashboard





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 defensible 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

Course Offerings

Basic Course

ACEIT 101: Introduction to ACE, CO\$TAT, and POST

Basic Course

ACEIT 101a: Refresher - Reviewing and Updating ACE Models

Basic Course

RI\$K 102: Introduction to Cost Risk Analysis and ACEIT RI\$K

Advanced Course

ACEIT 201: Next Steps in ACE, CO\$TAT, and POST

Custom Course – onsite only

Build a custom course from material in our standard course offerings above

Basic Course

JACS: Joint Analysis of Cost and Schedule

Custom Course – onsite only

Basic through Advanced Cost Risk and Uncertainty Analysis using Crystal Ball

Specialized

Mechanics Training: Customer Specific training in ACEIT Features, Techniques, and Implementation



**For more information please contact
ACEIT Sales**

Email: aceit_sales@tecolote.com

Phone: (805) 964-6963

Thank You

