

# **THE NEW FACE OF ACEIT: PROGRAM OFFICE SUPPORT TOOL (POST)**

By Darren Elliott  
Tecolote Research Inc.

## **ABSTRACT**

Since 1988, the Automated Cost Estimating Integrated Tools (ACEIT) suite of software applications have evolved to continuously provide cost analysts with the key capabilities to develop reliable and defensible cost estimates. Its usage has grown throughout the cost community, being mandated as the required estimating platform for the U.S. Army, strongly recommended by the Air Force and in extensive use by over 200 Federal Government, Commercial Industry, and International organizations.

For these past 15 years, ACEIT has established a track record of progressive enhancement focusing on the critical areas of database development, data normalization, CER development, intrinsic modeling functions, risk analysis, documentation standards and report building. This has allowed all users to follow a reliable and systematic approach to cost model building with the end result being a fully documented, defensible and robust cost estimate. With the upcoming release of version 6.0, ACEIT takes a bold new step forward to provide considerable efficiency and productivity improvements for the users of an ACE cost estimate through the new Program Office Support Tool (POST). POST simplifies and automates many of the labor intensive but essential tasks of reporting and presentation preparation process that is a routine chore for all Program Office personnel, regardless of the estimating platform.

Prior to ACEIT 6.0, the ACE Executive application allowed cost models hosted in the Automated Cost Estimator (ACE) to be accessed and executed from within Excel. This has allowed users within a Program Office environment to access ACE model results, perform what-if drills, view risk analysis results, and develop custom reports, all without the need for extensive ACE experience. In ACEIT 6.0, a new Excel-based tool, POST, greatly enhances prior capability with features that specifically address the many needs of typical users within a Program Office.

This paper provides an overview of POST and details how it removes much of the agony associated with creating and updating crucial program cost information for review and presentation. This paper demonstrates the process of setting up an ACE session for POST, performing what-if /budget drills, and creating dynamic reports, charts, and PowerPoint presentations without having to laboriously create massive interlinked files that are a nightmare to maintain. For the most part, users with little or no previous ACEIT experience can accomplish all of the items discussed in this paper.

## **INTRODUCTION**

One scenario seems to be a constant with every cost analyst in our industry; it starts with the dreaded phone call or email that occurs late in the afternoon of the workday, usually around 3:59 PM. This message is usually a frantic request to have an updated estimate ready to be presented to the Program Manager by early the next morning. Of course as seasoned analysts in the program office environment, we've tried to plan for these unfortunate bumps in our lives by building complex spreadsheets and documents/presentations containing numerous linked worksheets and charts. However, as always, the excursion requires a minor change in the WBS structure, the need to present risk results, and management requests for several new cuts at the data. Fortunately, for ACEIT users, the cost estimating drill is relatively painless and we are able to generate new numbers very quickly. Unfortunately, the arduous task of updating links and creating the new charts will take us late into the night with us, once again, subsisting on caffeine and the local vending machine.

As the cost estimating industry has matured, numerous tools have been developed to improve our ability to develop estimates. These tools have enhanced our ability to estimate specific systems, develop quick ROMs, and produce an integrated and complete life cycle cost estimate. Although each of these tools have generated tremendous productivity gains and increased the quality of our estimates, they have not simplified the end job of creating presentation material that effectively communicates our cost estimates. Indeed, purveyors of these tools tend to spend more time trying to convince you to use their "standard" reports rather than show how to build yours. For each of us, this final step in our estimating process has been relegated to developing project specific spreadsheets that re-cut the estimates into the requested summary reports and appropriately formatted tables. Most of the time, these spreadsheets quickly become complex with multiple links and require a tremendous amount of effort for even the smallest change in the estimate or the WBS. Using embedded objects in PowerPoint or WORD generates massive files that rarely work if transferred to other machines and can stress even the most powerful systems. Regardless of how much effort we put into standardizing our spreadsheets they are rarely reusable for another project and always require a large effort for maintenance and verification.

It is this problem that concerned the Financial Management community of the USAF's Electronics System Center (ESC). To ease these time-consuming activities, ESC funded the Program Office Support Tool (POST) for release with ACEIT 6.0. With POST, ACEIT acquires a new face that is focused on the demands of the Program Office environment. POST is a dramatic improvement to ACEIT that is designed to replace labor intensive, repetitive tasks to migrate estimate results from ACE into typical Program Office products (tables, charts, presentations, documents) in an efficient manner.

## **ACEIT EVOLUTION**

For the past 15 years, ACEIT development has focused on helping the cost analyst build a quality and dynamic cost estimate. Each new product and feature developed for ACEIT was specifically identified by the Government to support how the Government wants cost

estimating done. To support cost research and CER development, the Automated Cost Database (ACDB) and Cost and Statistical Analysis (CO\$TAT) applications were built. ACDB was built with features and functionality designed specifically for data storage and normalization tasks. CO\$TAT is a streamlined statistical package that contains the regression analysis tools cost estimators need for learning curve analysis, univariate analysis, and multivariate linear/non-linear analysis. CO\$TAT was built to take data directly from ACDB and pass results direct to the Automated Cost Estimator (ACE) to seamlessly incorporate analyst developed methodologies, risk analysis information, and all associated documentation. However, analysts can populate CO\$TAT with data from any source. The ACEIT architecture stresses providing analysts the ability to calibrate and refresh their estimating methods with current data in an automated manner.

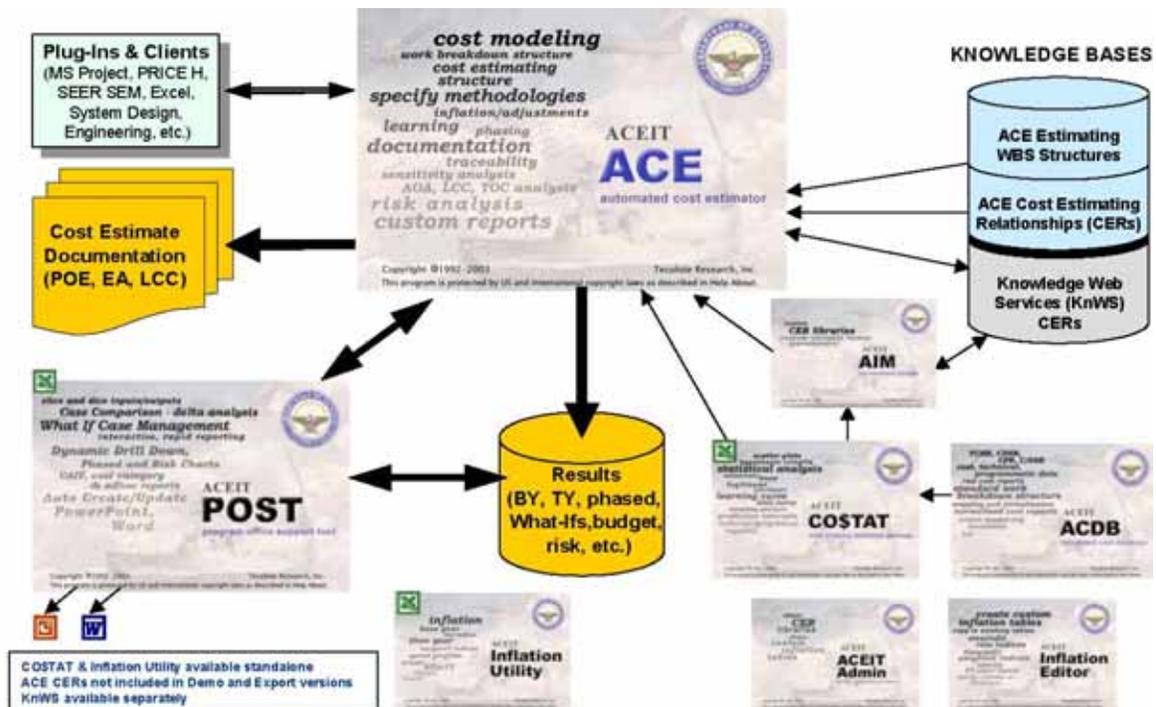
The ACE Information Manager (AIM) application allows cost research personnel to publish their developed CERs to libraries that can be shared across their network. This greatly enhanced the analyst community's ability to rapidly disseminate updated methodologies within their organization and provide easy access to integrate these relationships into ACE sessions.

The heart of the ACEIT software application is ACE; this is the tool used to build a cost estimate and contains all of the estimating relationships and documentation. All of the ACEIT software applications were designed to contribute to the creation and use and creation of reliable cost estimating models built by the user. Initial ACE development focused on providing a standardized platform to build a complete and fully documented life cycle cost estimate. These key features focused on simplifying the common, repetitive tasks required to develop and document a cost estimate so that an analyst could place more effort on improving the quality of the estimate instead of building the supporting infrastructure to generate an estimate.

These tasks included:

- Building standard work breakdown structures (WBS) as a place for the analyst to start building the estimate;
- Implementing a relational summation structure to simplify impacts of WBS changes;
- Providing online CER libraries to rapidly integrate relevant estimating methodologies;
- Handling of cost data normalization through the use of custom-developed or system-provided OSD, FAA, NASA or DoFA inflation tables;
- Incorporating learning curve calculation methods to support unit or cumulative average theory as well as broken, shared, and rate-adjusted learning;
- Intrinsic functions to assist in building the model;
- Ability to time-phase estimate results to create Then-Year budget results;
- Capability to conduct simultaneous side-by-side what-if excursions without permanently overwriting the underlying the methodology; and
- Simplifying the documentation of WBS descriptions, estimate assumptions, and methodology selections to create a fully documented Basis of Estimate.

Through the years ACE has continuously been updated to enhance these capabilities and to include additional ones, such as, integrated risk analysis direct interaction with 3<sup>rd</sup> party applications through a robust API, and the ability to access ACE sessions from external software applications. ACE Executive was developed to allow ACE-build cost models to be accessed by other applications, such as Excel. This opened ACE to new group of users within the Program Office environment and allowed non-ACE users to view estimate results, perform what-if drills, view risk analysis results, and develop custom reports. The ACE Executive enhanced the utility of ACEIT by provided the ability to exploit Excel's built-in graphical capability for custom reporting, although it did not fully eliminate many how of the time-consuming tasks required within a Program Office. **Figure 1** illustrates how the ACEIT suite of software applications is integrated to automate the cost estimating environment.

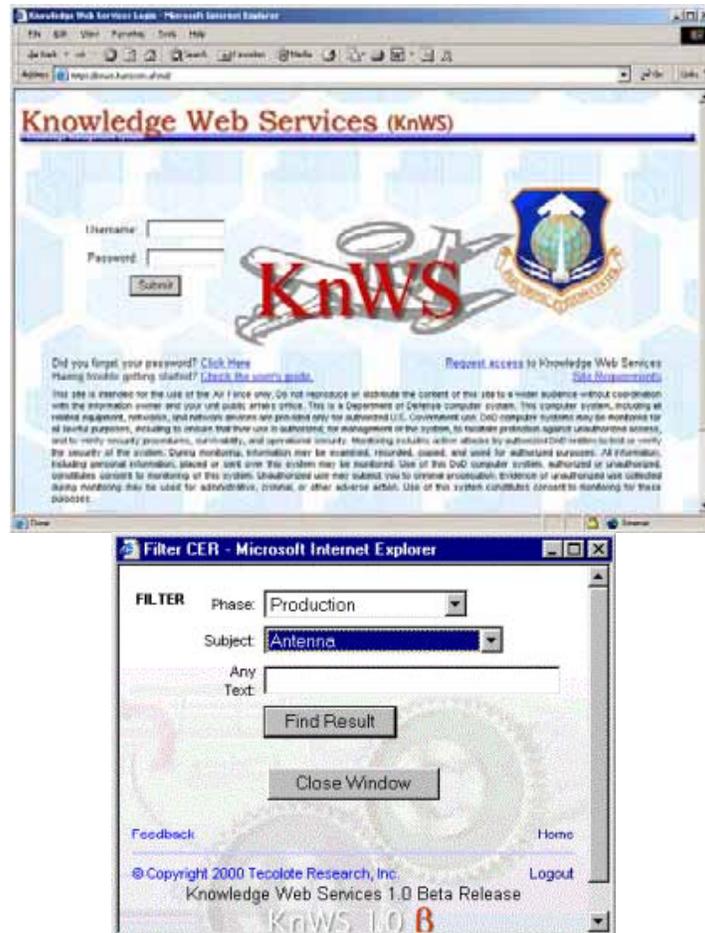


**Figure 1: ACEIT Applications**

Another recent evolution for ACEIT was the movement to web-based applications that have further enhanced productivity for cost estimators. In 2001, Tecolote Research Inc. was funded by the Electronic Systems Center (ESC) to deploy a web-based knowledge management system called Knowledge Web Services (KnWS). In addition to offering secure document management via the web, KnWS also provides two key features that integrate with ACEIT. These

features are the ability to run ACE sessions via a browser interface without the need for the user to have ACEIT installed on their machine. This expands the utility ACE-built cost models by allowing access to non-ACE users within a Program Office, but not

necessarily in the same geographic location. The second key ACEIT feature within KnWS is the capability to host on-line methodology libraries. This allows cost analysts to build custom CER libraries and disseminate them rapidly throughout their organization and to others in a controlled and secure manner. ACE users can easily search KnWS hosted CER libraries and bring suitable methodologies with supporting documentation directly into their ACE sessions. Currently, several organizations and programs (e.g., ESC, USCM, GPS) have implemented KnWS and enjoy the benefits of this web-based capability.



*Figure 2: Knowledge Web Services (KnWS)*

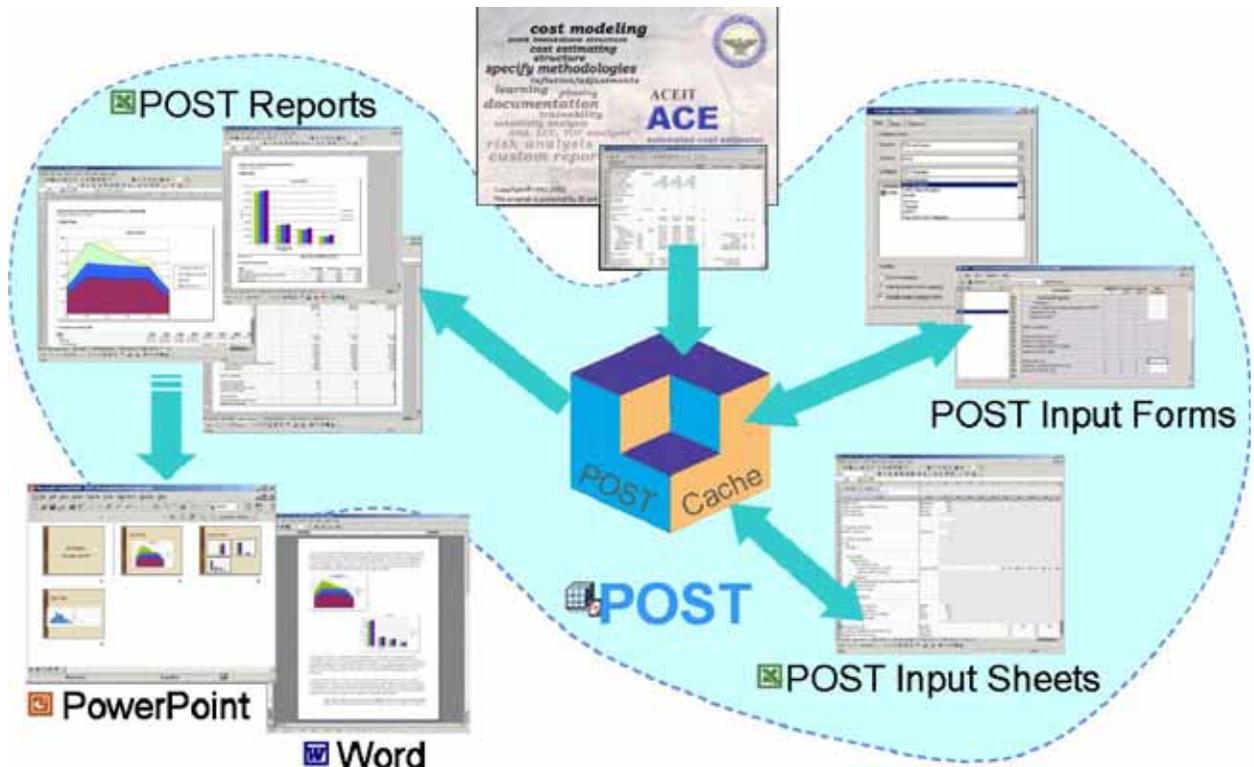
## **ACEIT 6.0: A REVOLUTION**

Up through the release of ACEIT 5.1b, the ACEIT software application has been on an evolutionary path that has focused on providing enhanced cost model building capability. The release of ACEIT 6.0 represents a revolutionary approach that introduces features aimed at the consumers of a cost estimate; implements an innovative architecture that transcends a 2-dimensional view of what-if analysis; and abandons the “all-encompassing spreadsheet” input/output paradigm that the ACE Executive was based upon.

ACEIT 6.0 provides numerous enhancements within ACE as well, such as: the ability to

use MS-Word as the documentation editor; row specific result formatting; auto-complete equation building; relational unique IDs; and expansion of 3<sup>rd</sup> party interoperability with direct interfaces to SEER-SEM and MS-Project (a PRICE H plug-in already exists in ACEIT). However the most dramatic improvement to ACEIT is the release of POST, which provides extensive capability in the areas of what-if case management, estimate reporting, drill-down analysis, and automated presentation/report generation. Prior to ACEIT 6.0, users were constrained to conduct side-by-side analysis only through the override of input parameters. This made viewing side-by-side excursions based on changes to time-phased inputs (e.g., buy quantities) a tedious activity if many cases are to be explored. ACE Executive provided the capability to conduct time-phased what-ifs, however the user was constrained to view and report the data in a defined spreadsheet row-by-column view containing all of the estimate inputs and results. With POST, these restrictions have been eliminated and the ACEIT user has a new frontier to explore.

POST is an application that is conceptually similar to the ACE Executive in that it allows ACE-built cost models to be accessed externally from ACE and is packaged as an Excel add-in. A key departure is that POST uses the concept of a cache to store data from sensitivity cases created within an ACE session, from a POST input worksheet, or from a POST input form. Through POST, a user can access an ACE session, view results and inputs for internal cases, develop alternative excursions, create graphical charts or tabular reports, and export desired charts or reports to PowerPoint and/or Word documents. An ingenious exploitation of MS Office concepts will permit POST users to rapidly create new reports and once complete, automatically update existing reports, presentations, and documents based on the refined analysis. **Figure 3** illustrates the high-level architecture of POST and identifies its key features. "POST" embodies the gray area in the chart and communicates/interfaces with ACE, Excel, PowerPoint and WORD



*Figure 3: Program Office Support Tool Architecture*

## ENABLING ACE SESSIONS FOR POST

Any ACE session can be enabled for POST. To simplify the process, we've made it 100% compatible with how sessions were enabled for ACE Executive. This is accomplished by using the "POST/Exec Wizard" within ACE to identify the elements of the model you need to expose in POST. **Figure 4** Illustrates the Wizard and a POST-enabled ACE session.

Row	WBS/CEs Description	Approv	Unique ID	Phasing Method	Equation / Throughput	Fiscal Year	Units	Accession Code	Accession Type	
1	* Fiscal Year of Results (not valid for TV Phases)							R000Y00	OUTPUT	
2	* Date of Calculation							ICalcDate	OUTPUT	
3	* Time of Calculation							ICalcTime	OUTPUT	
4	* System Inflation Table for Calculation							ISystemInf	OUTPUT	
5	* Custom Inflation Table for Calculation							ICustomInf	OUTPUT	
6	ACE Session Date							ISessionDate	OUTPUT	
7	ACE Session Time							ISessionTime	OUTPUT	
8	* Risk Calculation confidence level							IRiskConf	INPUT	
9	* Risk Inflation							IRiskInfl	INPUT	
10	* Risk Allocation							IRiskAlloc	OUTPUT	
11	** DETAIL ESTIMATE				*DetailVBS					
12	ARMY CES (MISSILE)							ARMY_CES_\$	OUTPUT	
13	RD TIME FUNDED ELEMENTS							RDTIME_FUNDS	OUTPUT	
14	DEVELOPMENT ENGINEERING				DEV_ENGS			DEV_ENGS	OUTPUT	
15	AIR VEHICLE (Hardware)				BE	0.0500 * Phase * 1.1120 * CDR * 0.5004	1999	\$M	AIR_VEHICLES	OUTPUT
16	AIR VEHICLE (Software)				BE	DEVENGM*DEVENGLR			AIR_VEHICLES	OUTPUT
17	PROTOTYPE MANUFACTURING				ProtM			ProtM	OUTPUT	
18	AIR VEHICLE				AV_PMS			AV_PMS	OUTPUT	
19	COMPONENT 1				%	CL_PMS*CL_Qty		COMPONENT_1	OUTPUT	
20	COMPONENT 2				%	C2_PMS*C2_Qty		COMPONENT_2	OUTPUT	
21	COMPONENT 3				%	C3_PMS*C3_Qty		COMPONENT_3	OUTPUT	
22	COTS COMPONENT				%	COTS_PMS*COTS_Qty		COTS_COMPON	OUTPUT	
23	INTEGRASSY/TEST/CHKOUT				F	AV_PMS*15		INTEG_ASSY	OUTPUT	
24	SYSTEMS ENGINEERING/MGMT				F	[ESC Factor] 0.339*PMP_D		SYSTEMS_ENG	OUTPUT	
25	SYSTEMS TEST AND EVAL				F	[ESC Factor] 0.183*PMP_D		SYSTEMS_TEST	OUTPUT	
26	DATA				F	[ESC Factor] 0.189*PMP_D		DATA	OUTPUT	
27	OTHER RD TIME				TV	[Cut Throughput]		\$M	OTHER_RDTIME	OUTPUT
28	PROCUREMENT FUNDED ELEMENTS							PROCUREMENT	OUTPUT	
29	RECURRING PRODUCTION				PMP			PMP	OUTPUT	
30	MANUFACTURING				ManM			ManM	OUTPUT	
31	AIR VEHICLE				AV_M			AV_M	OUTPUT	
32	COMPONENT 1				R	4200 * S	1999	\$K	C1_M	OUTPUT
33	COMPONENT 2				R	1.69*NumOfCards*0.765*CompLength*Q	1998	\$K	C2_M	OUTPUT
34	COMPONENT 3				R	13.48*NumOfCards*0.345*Power*Q*21	1997	\$K	C3_M	OUTPUT
35	COTS COMPONENT				F	COTS_PMS*COTS_PMS		COTS_M	OUTPUT	
36	INTEGRASSY/TEST/CHKOUT				F	15*AV_M		INTEG_ASSY	OUTPUT	
37	RECURRING ENGINEERING							RECURRING_E	OUTPUT	
38	COMPONENT 1				F	IC1_M\$AV_M\$REC_ENGS		COMPONENT_1	OUTPUT	
39	COMPONENT 2				F	IC2_M\$AV_M\$REC_ENGS		COMPONENT_2	OUTPUT	
40	COMPONENT 3				F	IC3_M\$AV_M\$REC_ENGS		COMPONENT_3	OUTPUT	
41	COTS COMPONENT				F	ICOTS_M\$AV_M\$REC_ENGS		COTS_COMPON	OUTPUT	
42	QUALITY CONTROL				F	ManM*QC_FACI		QUALITY_CON	OUTPUT	
43	SYSTEMS ENGINEERING/MGMT				F	SEPM_IR\$SEPM_MM		SYSTEMS_ENG	OUTPUT	
44	TRAINING				F	student*Training		TRAINING	OUTPUT	
45	DATA				BE	0.00532 * PMP	2000	\$K	DATA	OUTPUT
46	DM FUNDED ELEMENTS							DM_FUNDED	OUTPUT	
47	SYSTEMS TEST AND EVAL							SYSTEMS_TEST	OUTPUT	

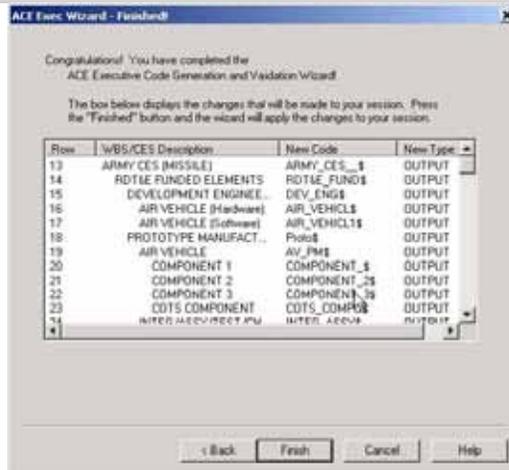


Figure 4: Enabling an ACE Session for POST

## What-Ifs and Budget Drills

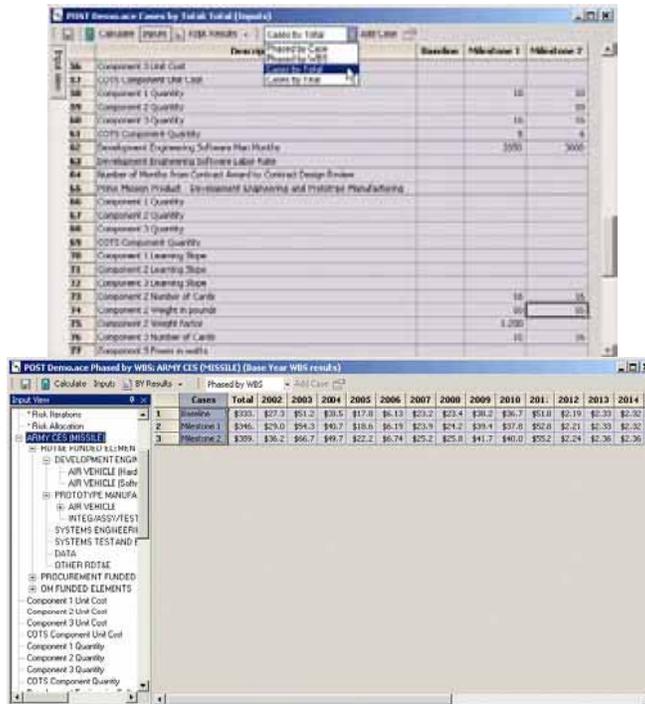
Once a session has been enabled for POST, users can easily access internally created excursions to view results and what-if inputs. **Figure 5** illustrates that the session enabled for POST contained multiple what-if excursions.

WBS/CES Description	Baseline	Milestone 1	Milestone 2
* Fiscal Year of Results (not valid for TY Phased Sheets)	2002	2002	2002
* Date of Calculation	24MAR2003	24MAR2003	24MAR2003
* Time of Calculation	20:09:46	20:09:46	20:09:46
* System Inflation Table for Calculation	OSD inflation Indices for FY 2002	OSD inflation Indices for FY 2002	OSD inflation Indices for FY 2002
* Custom Inflation Table for Calculation	None	None	None
* ACE Session Date			
* ACE Session Time			
* Risk Calculation confidence level			
* Risk Iterations			
* Risk Allocation			
** DETAIL ESTIMATE			
ARMY CES (MISSILE)	333,859*	346,593*	389,446*
RDT&E FUNDED ELEMENTS	141,059*	149,012*	181,724*
DEVELOPMENT ENGINEERING	40,900*	43,134*	56,925*
AIRVEHICLE (Hardware)	18,934*	20,537*	23,857*
AIRVEHICLE (Software)	22,046*	22,597*	33,069*
PROTOTYPE MANUFACTURING	31,573*	33,965*	38,864*
AIRVEHICLE	27,454*	29,535*	33,795*
COMPONENT 1	2,014*	2,876*	2,876*
COMPONENT 2	9,068*	9,068*	12,955*
COMPONENT 3	13,757*	15,722*	15,722*
COTS COMPONENT	2,616*	1,869*	2,242*
INTEG/ASSY/TEST/CHKOUT	4,110*	4,430*	5,069*
SYSTEMS ENGINEERING/MGMT	27,425*	29,143*	36,209*
SYSTEMS TEST AND EVAL	13,277*	14,109*	17,530*
DATA	13,712*	14,572*	18,104*
OTHER RDT&E	14,052*	14,052*	14,052*
PROCUREMENT FUNDED ELEMENTS	164,931*	169,595*	179,438*
RECURRING PRODUCTION	100,643*	100,798*	102,864*
MANUFACTURING	92,541*	92,689*	94,696*
AIR VEHICLE	80,470*	80,593*	82,344*
COMPONENT 1	32,462*	32,462*	32,462*
COMPONENT 2	14,390*	16,373*	17,823*
COMPONENT 3	14,931*	13,077*	13,373*
COTS COMPONENT	18,686*	18,686*	18,686*
INTEG/ASSY/TEST/CHKOUT	12,071*	12,090*	12,352*
RECURRING ENGINEERING	5,384*	5,384*	5,384*
COMPONENT 1	2,212*	2,212*	2,164*

**Figure 5: Internal ACE What-If Cases**

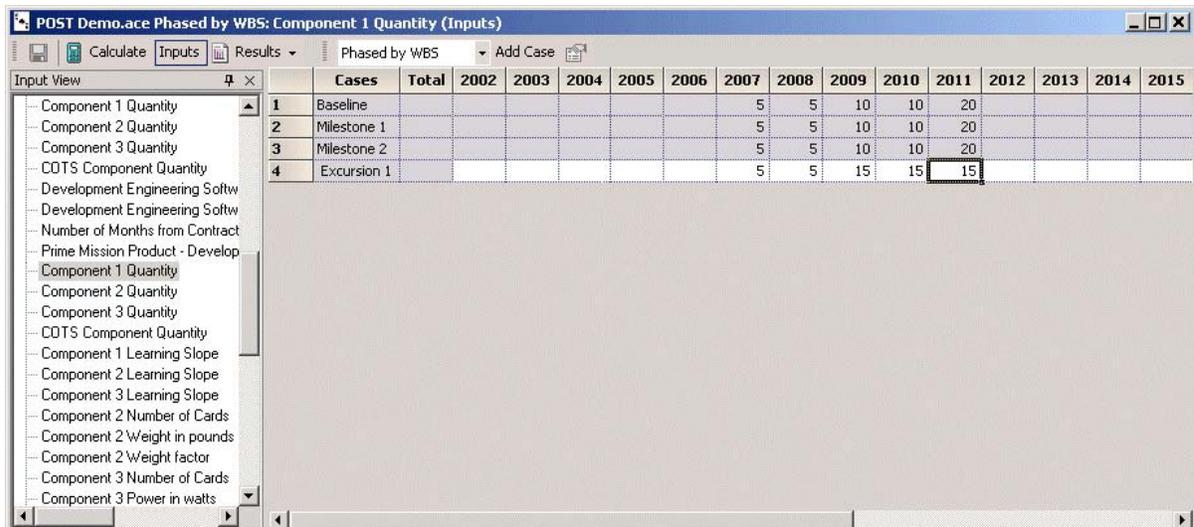
The POST Input/Result Viewer allows a non-ACE user to quickly view results and inputs for each of the cases developed within ACE. The powerful Input Form gives the user the ability to slice-and-dice the input data and estimate results (Base Year, Then Year, Same Year, Risk) via

multiple views (phased by case, phased by WBS, cases by total, cases by year) to manage the cases appropriately. **Figure 6** illustrates Inputs “Cases by Total” and BY Results “Phased by WBS” views of the data.



**Figure 6: POST Input / Result Viewer – Cases by Total and BY Results Phased by WBS Views**

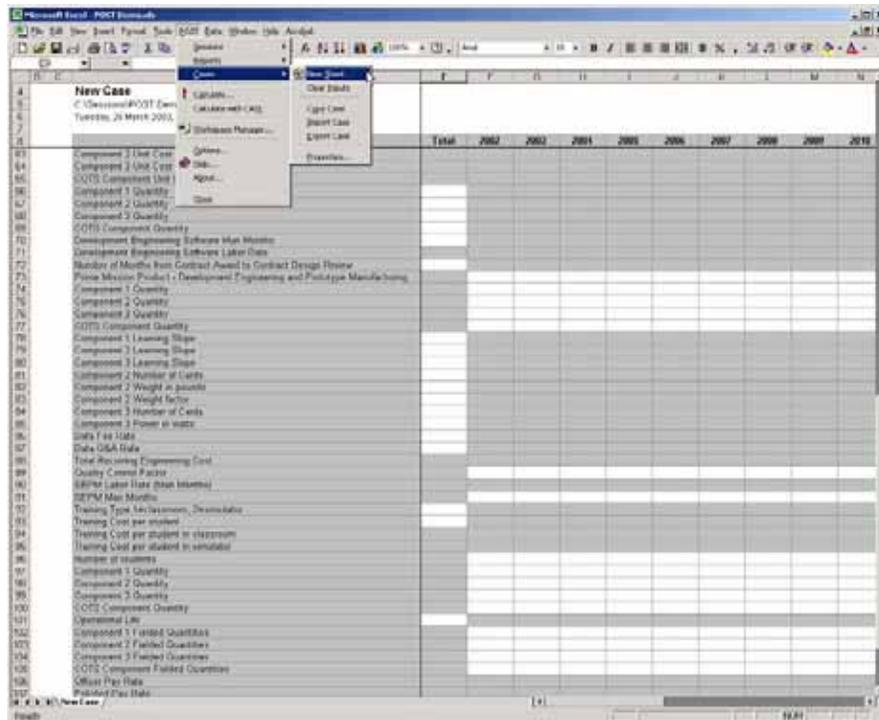
Once a session has been activated within POST, the user can easily conduct what-if excursions based on changes to constant or time-phased input parameters. POST stores all of the data associated with excursions conducted within ACE or POST in the cache. **Figure 7** illustrates a new case entered via the input form and a time-phased what-if excursion.



**Figure 7: POST Time-Phased Case Input Example**

For users that would like to have a worksheet view of their what-if case, POST provides the ability to create a Case Worksheet within an Excel workbook. This sheet allows users to specify constant or time-phased inputs for an alternative case. As with all POST excursions,

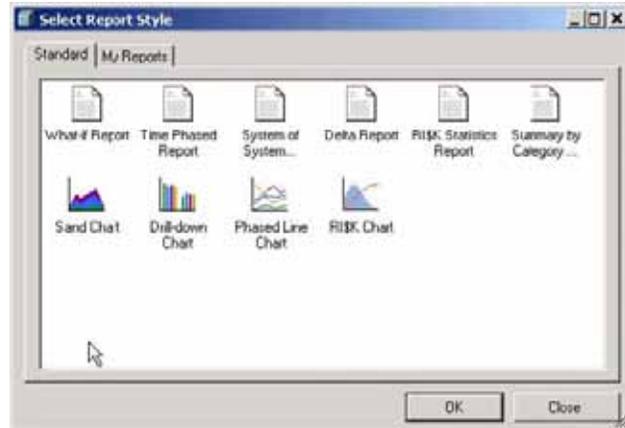
the inputs and results for excursions created on Case Worksheets are stored in the cache and accessible via the Input/Result Viewer. **Figure 8** illustrates an example of defining an excursion on a POST created Case Worksheet.



*Figure 8: POST Case Worksheet*

### **Rapid Reporting**

Important to all users is the ability to transform the results of a cost estimate into understandable reports and charts. **Figure 9** illustrates ten standard POST report types that are commonly used within a Program Office.



**Figure 9: POST Standard Reports**

All of the POST reports can be customized and saved for future use (My Reports). POST creates each report as a new worksheet within an Excel workbook. Reports can be generated from any excursion(s) contained within the POST cache, which can contain data from more than one ACE session. **Figure 10** illustrates the process to quickly generate a standard What-If Report.

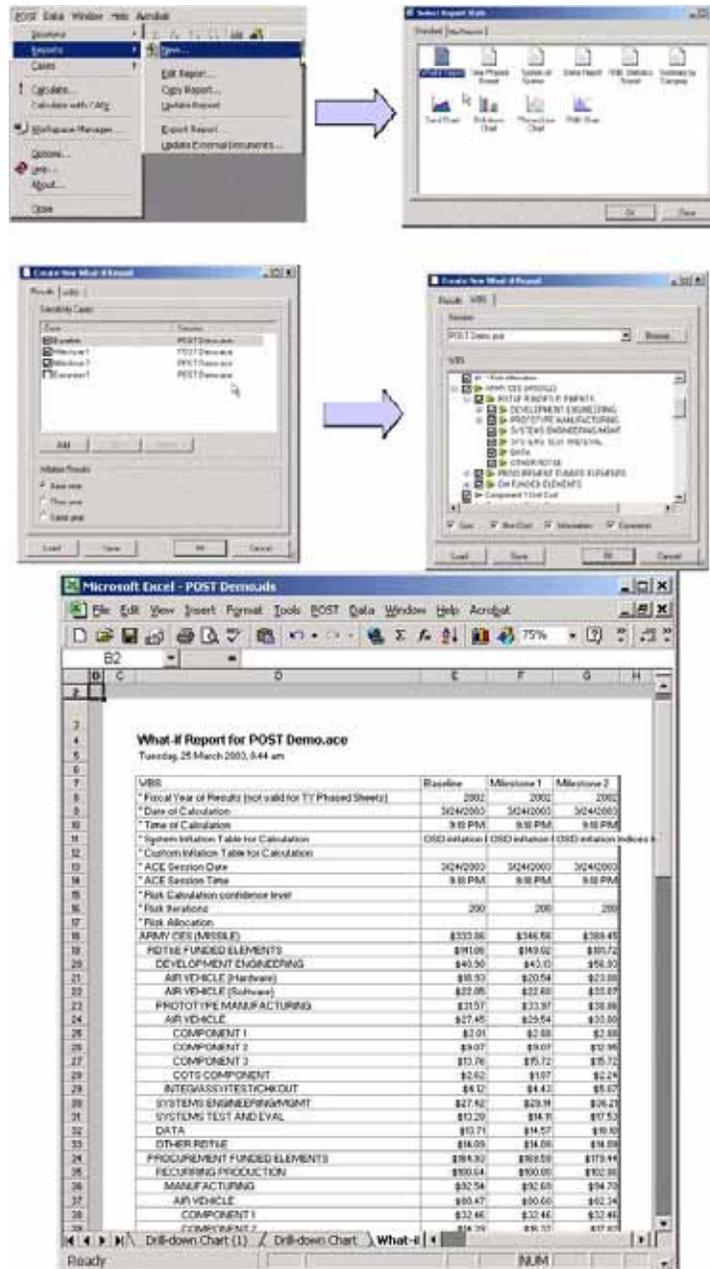


Figure 10: POST Standard What-If Report Generation Process

### Drill-Down Analysis

The ability to identify the major cost elements within an estimate is one of the key values we provide as cost analysts. POST provides interactive drill-down analysis to identify the major cost elements within a cost estimate. Like all the reports created by POST, charts are automatically updated when the case that is driving the report is updated. All controls for this capability are within immediate access to the POST user. **Figure 11** illustrates an example of the drill-down analysis capability available within POST. This capability makes it possible to have free-form presentations to rapidly review an estimate to identify cost drivers or to evaluate alternative costs side-by-side to understand where they differ.

Because POST allows users to compare cases from two or more ACE sessions together, many will exploit this feature for source selections. To fully make use of this concept requires standardizing the codes used to identify key WBS elements. The Army, DASA-CE, already has a task underway to add the necessary information to their standard WBSs to enable this powerful capability.

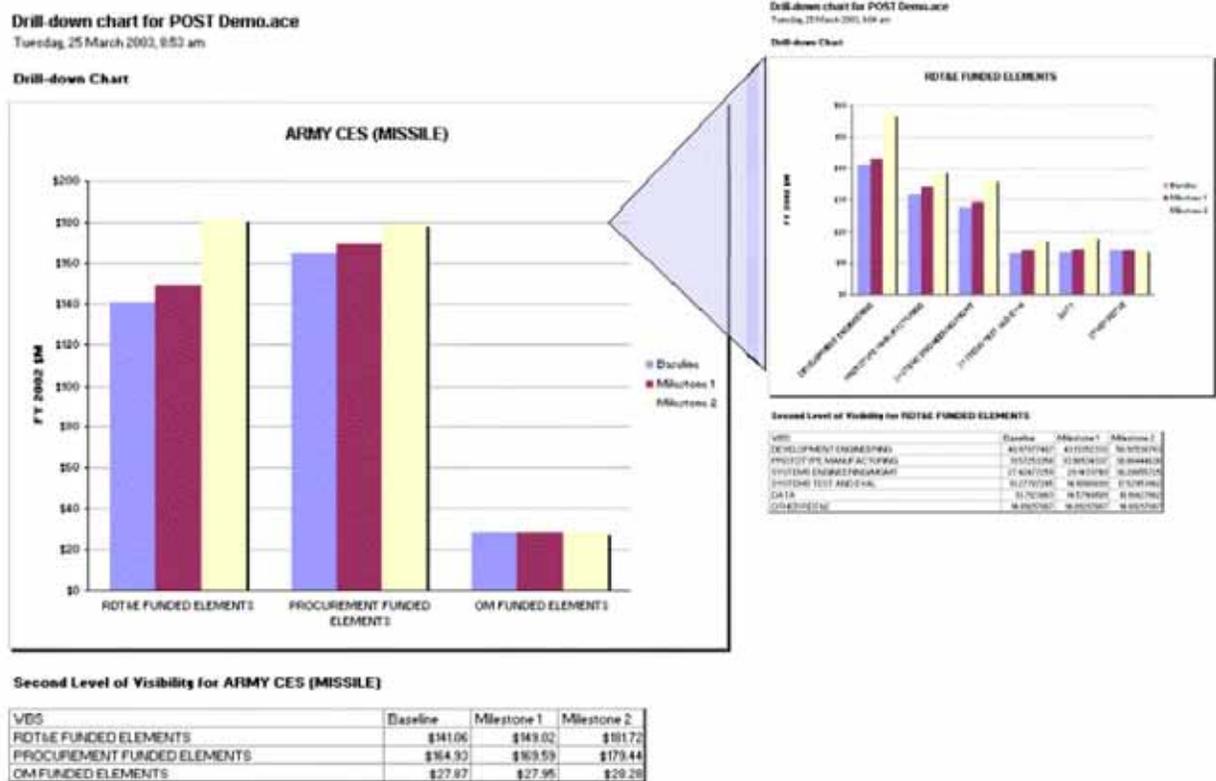


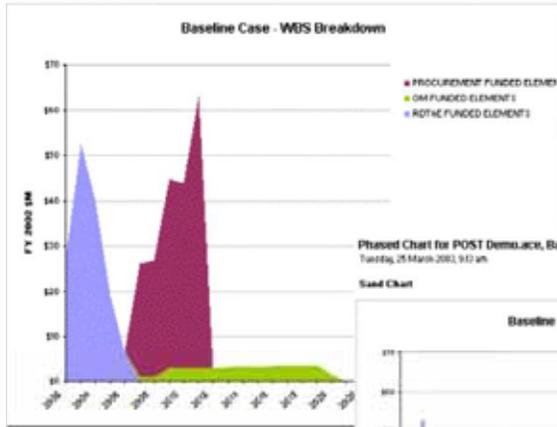
Figure 11: Drill-Down Capability

### Graphical View Over Time

Cost estimates support numerous activities within a Program Office with the most important being for budget substantiation. In developing estimates there are several important factors to be considered. First, the cost results are normally a stream of numbers phased over several years. Second, to use the results in a meaningful way within a Program Office the estimate must be rolled up under on Appropriations, Budget Line Items, Contract Line Items, and/or other cost categories. **Figure 12** illustrates some of the graphical reporting capability and roll-up capability that is provided by POST and ACEIT 6.0 and shows an estimate summarized in three different manners: by major WBS, by Appropriation, and by CLIN.

Phased Chart for POST Demo.ace, Baseline  
Tuesday, 25 March 2003, 9:10 am

Sand Chart

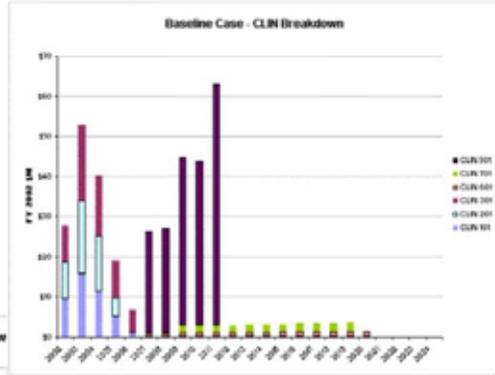


Second Level of Visibility for ARMY CES (MISSILE)

WBS	2001
ROTME FUNDED ELEMENTS	27.668474
PROCUREMENT FUNDED ELEMENTS	
OM FUNDED ELEMENTS	

Phased Chart for POST Demo.ace, Baseline  
Tuesday, 25 March 2003, 9:12 am

Sand Chart

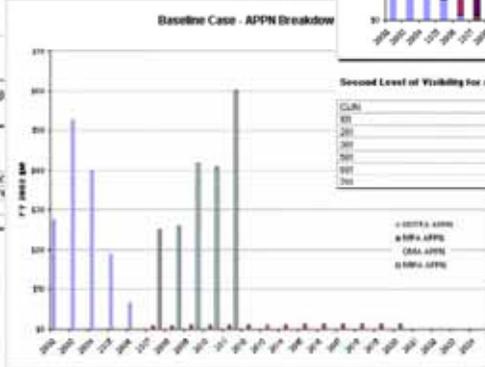


Second Level of Visibility for ARMY CES (MISSILE)

CLIN	2001	2002	2003	2004	2005
301	\$ 42782512	\$ 30739831	\$ 42438704	\$ 39420088	
302	\$ 12794421	\$ 22328473	\$ 6177903	\$ 68940873	
601	\$ 3887190	\$ 2739870	\$ 4683361	\$ 87123281	
600					

Phased Chart for POST Demo.ace, Baseline  
Tuesday, 25 March 2003, 9:10 am

Sand Chart



Second Level of Visibility for ARMY CES (MISSILE)

APPN	2001	2002	2003	2004	2005
ROTEA	27.668474	32.834481	41.006338	33.007305	
MPA					
OAS					
OTM					

**Figure 12: Time-Phased Result Charts**

The roll-up summarization capability in POST is derived from the structure of the underlying ACE session. Within ACE, the user can assign individual WBS elements to unique user-defined Cost Categories. This allows ACE to calculate roll-up summary results for any cost category within a session. Each WBS item can be assigned to multiple cost categories to further expand the manner in which an estimate can be sliced and diced. This feature can be used to re-summarize a cost estimate into budget line items, contract items, appropriation, contractor,

service, and numerous other ways in which an analyst (or program) wishes to allocate the cost. **Figure 13** illustrates a typical set-up within an ACE session the will empower the user to exploit POST's roll-up reports to view the estimate by APPN, CLIN, and Cost Element type (HW, SW, or Other).

	WBS/CES Description	Baseline	Approp	CLIN	Cost Element
12	** DETAIL ESTIMATE				
13	ARMY CES (MISSILE)	333.859*			
14	RDT&E FUNDED ELEMENTS	141.059*	RDTEA		
15	DEVELOPMENT ENGINEERING	40.980*	RDTEA		
16	AIR VEHICLE (Hardware)	18.934*	RDTEA	101	HW
17	AIR VEHICLE (Software)	22.046*	RDTEA	101	SW
18	PROTOTYPE MANUFACTURING	31.573*	RDTEA		
19	AIR VEHICLE	27.454*	RDTEA		
20	COMPONENT 1	2.074*	RDTEA	201	HW
21	COMPONENT 2	9.068*	RDTEA	201	HW
22	COMPONENT 3	13.757*	RDTEA	201	HW
23	COTS COMPONENT	2.676*	RDTEA	201	HW
24	INTEG/ASSY/TEST/CHKOUT	4.178*	RDTEA	201	Other
25	SYSTEMS ENGINEERING/MGMT	27.425*	RDTEA	301	Other
26	SYSTEMS TEST AND EVAL	13.277*	RDTEA	201	Other
27	DATA	13.772*	RDTEA	301	Other

**Figure 13: Enabling Roll-Up Summary Reports**

### Tabular Reports

In addition to the seamless graphical reporting provided by POST, tabular reports of the data results are also available. As like all other reports and charts, these tabular reports are created as new worksheets within an Excel workbook and enable the user to reformat the tables and use the values to create fully customized reports beyond POSTs broad capability. The summarization capability is also available to POST users in creating tabular reports. **Figure 14** illustrates an example of a Time-Phased report. An example of a What-If report was previously provided in **Figure 10**.

B	C	D	E	F	G	H	I	J	K	L	M	N
4		<b>Time Phased report for POST Demo.ace, Baseline, FYSM</b>										
5		Tuesday, 21 March 2006, 9:59 am										
7		WBS	Total	Prior	2003	2004	2005	2006	2007	2008	2009	To Complete
8		ARMY CES (MISSILE)	\$378.23	\$27.66	\$52.69	\$40.29	\$18.01	\$6.65	\$26.14	\$26.87	\$41.74	\$104.06
9		RDT&E FUNDED ELEMENTS	\$148.31	\$27.66	\$52.69	\$40.29	\$18.01	\$6.65				
10		DEVELOPMENT ENGINEERING	\$42.40	\$8.42	\$5.68	\$11.42	\$4.95	\$0.82				
11		AIR VEHICLE (Hardware)	\$19.59	\$4.31	\$7.29	\$5.39	\$2.29	\$0.23				
12		AIR VEHICLE (Software)	\$22.81	\$5.11	\$8.39	\$6.04	\$2.68	\$0.59				
13		PROTOTYPE MANUFACTURING	\$30.65	\$6.00	\$6.00	\$0.01	\$3.07					
14		AIR VEHICLE	\$28.39	\$5.95	\$11.29	\$9.62	\$2.93					
15		COMPONENT 1	\$2.08	\$0.41	\$0.83	\$0.63	\$0.21					
16		COMPONENT 2	\$9.38	\$1.83	\$3.73	\$2.89	\$0.97					
17		COMPONENT 3	\$14.23	\$2.78	\$5.66	\$4.32	\$1.47					
18		COTS COMPONENT	\$2.71	\$0.53	\$1.00	\$0.02	\$0.01					
19		INTEG/ASSY/TEST/CHKOUT	\$4.26	\$0.83	\$1.69	\$1.29	\$0.44					
20		SYSTEMS ENGINEERING/MGMT	\$20.37	\$5.07	\$9.84	\$8.07	\$3.14	\$0.35				
21		SYSTEMS TEST AND EVAL	\$13.73	\$2.89	\$5.25	\$3.90	\$1.52	\$0.17				
22		DATA	\$14.10	\$2.10	\$5.42	\$4.03	\$1.57	\$0.17				
23		OTHER RDT&E	\$14.37		\$2.52	\$2.95	\$4.45	\$5.05				
24		PROCUREMENT FUNDED ELEMENTS	\$194.00					\$25.12	\$25.92	\$41.94	\$101.13	
25		RECURRING PRODUCTION	\$18.71					\$4.81	\$3.52	\$23.94	\$66.44	
26		MANUFACTURING	\$105.29					\$12.52	\$11.40	\$22.01	\$63.27	
27		AIR VEHICLE	\$95.03					\$10.89	\$9.99	\$19.94	\$55.01	
28		COMPONENT 1	\$38.30					\$4.73	\$4.17	\$7.78	\$21.62	
29		COMPONENT 2	\$16.98					\$2.10	\$1.85	\$3.45	\$9.59	

**Figure 14: Time-Phased Tabular Report Examples**

### Case Comparison (Delta Report)

A common report required for cost estimators within a Program Office is to assess the delta costs between multiple alternatives. This is often used to identify and describe how a cost estimate has changed between certain points in the project's life, for example

between Milestone reviews. Additionally, these reports can support reconciling two estimates to develop a single position (e.g., source selection comparison of Government estimate to contractor proposal). Program Manager's are very interested in understanding where the changes have occurred and the extent of the difference.

Normally this is accomplished by creating a worksheet that lists like items side-by-side so that they can be compared. POST provides this capability out of the box and eliminates maintenance effort required if a comparison is needed between two different elements or the underlying WBS structure changes. **Figure 15** provides an example of this report comparing the delta between estimates developed at Milestone 1 and Milestone 2. This report provides delta information in terms of change in value (Absolute delta) and percentage change (Relative). In addition, the user can set threshold values to flag elements that have a percentage greater than the user-defined threshold.

**Delta Report for POST Demo.ace**  
 Wednesday, 26 March 2003, 10:40 am

WBS	Milestone 1 Reference	Milestone 2 Totals	Absolute Δ	Relative Δ	Threshold
* Fiscal Year of Results (not valid for TY Phased Sheets)	2002				
* Date of Calculation	3/26/2003				
* Time of Calculation	8:31 AM				
* System Inflation Table for Calculation	OSD Inflation Indices for FY 2002				
* Custom Inflation Table for Calculation					
* ACE Session Date	3/26/2003				
* ACE Session Time	8:31 AM				
* Risk Calculation confidence level					
* Risk Iterations	200				
* Risk Allocation					
ARMY CES (MISSILE)	\$392.02	\$379.23	\$12.79	3.52%	Low
RD/TE FUNDED ELEMENTS	\$154.54	\$146.01	\$8.53	5.53%	Low
DEVELOPMENT ENGINEERING	\$44.83	\$42.40	\$2.23	4.99%	Low
AIR VEHICLE (Hardware)	\$21.25	\$19.59	\$1.66	7.80%	Low
AIR VEHICLE (Software)	\$23.38	\$22.81	\$0.57	2.44%	Low
PROTOTYPE MANUFACTURING	\$36.12	\$32.65	\$3.47	7.04%	Low
AIR VEHICLE	\$30.54	\$28.00	\$2.54	7.04%	Low
LUMP SUM 1	\$2.17	\$2.09	\$0.08	3.000%	High
COMPONENT 2	\$8.38				
COMPONENT 3	\$18.06	\$16.23	\$1.83	12.50%	Medium
COTS COMPONENT	\$193	\$2.71	(\$1.77)	-0.00%	High
INTEGRASSYTESTCHKOUT	\$4.58	\$4.26	\$0.32	7.04%	Low
SYSTEMS ENGINEERING/MGM*	\$20.15	\$28.37	\$1.79	5.90%	Low
SYSTEMS TEST AND EVAL	\$14.59	\$11.73	\$2.86	5.90%	Low
DATA	\$15.07	\$14.19	\$0.89	5.90%	Low
OTHER RD/TE	\$14.87				
PROCUREMENT FUNDED ELEMENTS	\$199.95	\$194.09	\$5.87	2.74%	Low
RECURRING PRODUCTION	\$18.89	\$18.71	\$0.18	0.85%	Low
MANUFACTURING	\$180.46	\$175.29	\$5.17	0.85%	Low
AIR VEHICLE	\$85.18	\$85.03	\$0.15	0.85%	Low
COMPONENT 1	\$28.30				
COMPONENT 2	\$19.02	\$19.00	\$2.04	12.18%	Medium
COMPONENT 3	\$15.45	\$17.64	(\$2.19)	-14.17%	Medium
COTS COMPONENT	\$22.11				
INTEGRASSYTESTCHKOUT	\$14.28	\$14.25	\$0.02	0.85%	Low
RECURRING ENGINEERING	\$6.26				
COMPONENT 1	\$2.57	\$2.59	(\$0.01)	-0.23%	Low
COMPONENT 2	\$1.30	\$1.16	\$0.15	11.80%	Medium
COMPONENT 3	\$1.01	\$1.79	(\$0.75)	-14.43%	Medium
COTS COMPONENT	\$1.38	\$1.39	(\$0.00)	-0.20%	Low
QUALITY CONTROL	\$3.17	\$3.16	\$0.01	0.23%	Low
SYSTEMS ENGINEERING/MGM*	\$78.29	\$74.00	\$5.29	6.67%	Low
TRAINING	\$0.71				
DATA	\$0.63	\$0.63	\$0.00	0.15%	Low
DM FUNDED ELEMENTS	\$37.33	\$37.84	\$0.09	0.20%	Low
SYSTEM SPECIFIC BASE OPS	\$17.02				
OFFICERS	\$4.84				
ENLISTED	\$13.16				
REPL SPARES (REPAIRABLE)	\$20.11	\$20.01	\$0.09	0.47%	Low

**Figure 15: Case Comparison Report**

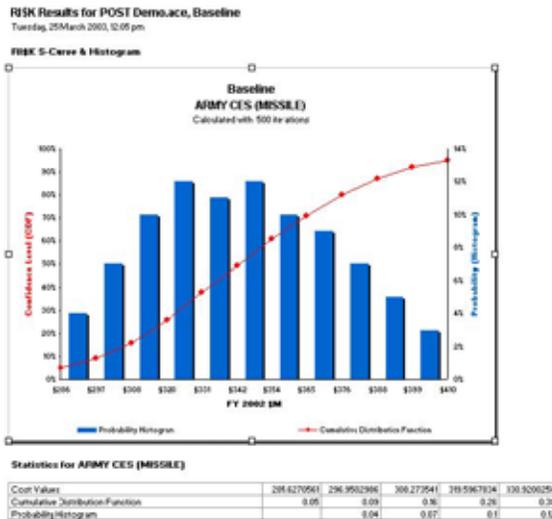
**Interactive Risk Reports**

Assessing the uncertainty of our estimates and adjusting the point estimate to a specified confidence level are two items of high importance in the cost estimator's world. Through POST, non-ACE users can view the results of the risk analysis in tabular (**Figure 16**) and graphical (**Figure 17**) forms. Additionally, POST allows users to develop meaningful time-phased risk-adjusted estimates in either BY or TY units. The basis of the risk-

adjusted estimate is conducted within ACE. The chart on the right in **Figure 17** is new to the ACEIT suite of tools. It permits the user to define up to 3 costs to be highlighted. The default will be the point estimate (red), 50% estimate (yellow) and 80% estimate (green). Of course, since the chart is merely an Excel chart, the user is free to change colors, and add or delete items. POST will update the data as the model or case overrides change but POST will not change your edits to the format of the chart.

POST Demo.ace RISK by Case: Baseline (RISK)		RISK by Case																			
WBS		Point Estimate	5%	10%	15%	20%	25%	30%	35%	40%	45%	50%	55%	60%	65%	70%	75%	80%	85%	90%	95%
11	ARMY CES (MISSILE)	\$33.86	\$285.0	\$296.6	\$305.6	\$309.5	\$316.6	\$321.4	\$328.0	\$333.3	\$338.9	\$343.7	\$349.9	\$354.9	\$362.7	\$367.2	\$369.9	\$376.4	\$386.7	\$394.0	\$407.5
12	RDTRM FUNDED ELEMENTS	\$141.06	\$111.2	\$117.7	\$122.8	\$127.3	\$130.7	\$135.7	\$138.3	\$140.5	\$145.7	\$150.3	\$152.5	\$156.1	\$160.2	\$166.9	\$170.3	\$177.1	\$183.6	\$191.0	\$200.4
13	DEVELOPMENT ENGINEERING	\$40.98	\$29.02	\$30.90	\$32.60	\$34.00	\$35.37	\$36.81	\$38.01	\$39.27	\$40.09	\$41.33	\$42.80	\$44.04	\$45.81	\$46.93	\$48.05	\$49.50	\$52.12	\$54.47	\$56.90
14	AIR VEHICLE (Software)	\$18.93	\$10.22	\$12.04	\$13.10	\$14.05	\$15.24	\$16.37	\$16.99	\$18.09	\$18.67	\$19.30	\$20.26	\$20.81	\$21.73	\$22.55	\$24.02	\$25.30	\$27.28	\$28.81	\$31.44
15	AIR VEHICLE (Software)	\$22.05	\$12.81	\$14.58	\$15.94	\$17.08	\$18.09	\$19.00	\$19.84	\$20.62	\$21.35	\$22.05	\$22.74	\$23.47	\$24.25	\$25.09	\$26.00	\$27.01	\$28.15	\$29.51	\$31.28
16	PROTOTYPE MANUFACTURING	\$31.57	\$24.76	\$25.82	\$27.14	\$28.29	\$28.74	\$29.22	\$29.90	\$30.32	\$31.06	\$32.05	\$32.82	\$33.79	\$34.54	\$36.17	\$36.62	\$38.23	\$39.60	\$42.17	\$45.61
17	AIR VEHICLE	\$27.45	\$21.17	\$22.19	\$23.48	\$24.28	\$24.69	\$25.53	\$26.00	\$26.41	\$26.94	\$27.31	\$28.49	\$29.10	\$29.86	\$30.95	\$31.90	\$32.95	\$34.06	\$35.90	\$38.77
18	COMPONENT 1	\$2.01	\$1.13	\$1.29	\$1.40	\$1.50	\$1.59	\$1.68	\$1.76	\$1.84	\$1.93	\$2.01	\$2.10	\$2.20	\$2.30	\$2.42	\$2.55	\$2.70	\$2.89	\$3.15	\$3.58
19	COMPONENT 2	\$9.07	\$7.09	\$7.48	\$7.76	\$7.99	\$8.20	\$8.38	\$8.56	\$8.73	\$8.90	\$9.07	\$9.24	\$9.42	\$9.61	\$9.81	\$10.03	\$10.29	\$10.59	\$10.99	\$11.61
20	COMPONENT 3	\$13.76	\$7.74	\$8.78	\$9.57	\$10.25	\$10.86	\$11.45	\$12.02	\$12.59	\$13.17	\$13.76	\$14.38	\$15.03	\$15.74	\$16.53	\$17.42	\$18.47	\$19.77	\$21.54	\$24.47
21	COTS COMPONENT	\$2.62	\$1.73	\$1.90	\$2.02	\$2.12	\$2.21	\$2.30	\$2.38	\$2.46	\$2.54	\$2.62	\$2.70	\$2.79	\$2.88	\$2.98	\$3.10	\$3.23	\$3.39	\$3.60	\$3.95
22	INTEGR/ASSY/TEST/CHKOUT	\$4.12	\$2.38	\$2.72	\$3.02	\$3.18	\$3.33	\$3.47	\$3.57	\$3.83	\$4.01	\$4.10	\$4.38	\$4.63	\$4.84	\$5.06	\$5.31	\$5.57	\$6.17	\$6.75	\$8.00
23	SYSTEMS ENGINEERING/MGMT	\$27.43	\$19.14	\$22.19	\$24.06	\$25.63	\$27.10	\$30.04	\$30.96	\$32.11	\$33.14	\$35.44	\$36.34	\$37.93	\$39.62	\$41.97	\$44.54	\$47.45	\$50.39	\$53.83	\$57.67
24	SYSTEMS TEST AND EVAL	\$13.28	\$8.80	\$10.53	\$11.37	\$12.36	\$13.23	\$13.72	\$14.48	\$15.15	\$15.78	\$16.49	\$17.24	\$18.32	\$19.64	\$20.27	\$22.02	\$23.77	\$25.66	\$27.50	\$29.86
25	DATA	\$13.71	\$4.05	\$5.16	\$6.72	\$7.58	\$8.32	\$8.90	\$9.44	\$10.05	\$10.73	\$11.16	\$12.01	\$12.63	\$13.95	\$13.89	\$14.32	\$15.12	\$16.15	\$17.33	\$19.02
26	OTHER RDTRM	\$14.09	\$4.49	\$5.87	\$6.94	\$7.83	\$8.62	\$9.33	\$9.99	\$10.60	\$11.17	\$11.72	\$12.23	\$12.73	\$13.20	\$13.65	\$14.09	\$14.55	\$15.07	\$15.68	\$16.48
27	PROCUREMENT FUNDED ELEMENTS	\$164.93	\$127.7	\$135.2	\$139.6	\$144.9	\$149.0	\$153.0	\$155.8	\$159.4	\$161.8	\$164.6	\$168.0	\$170.3	\$172.9	\$175.8	\$180.4	\$184.4	\$188.8	\$194.4	\$201.0
28	REQUIRING PRODUCTION	\$100.64	\$98.68	\$98.95	\$99.22	\$99.44	\$99.63	\$99.83	\$99.94	\$100.1	\$100.2	\$100.3	\$100.5	\$100.6	\$100.7	\$100.9	\$101.0	\$101.2	\$101.4	\$101.6	\$102.0
29	MANUFACTURING	\$92.54	\$92.54	\$92.54	\$92.54	\$92.54	\$92.54	\$92.54	\$92.54	\$92.54	\$92.54	\$92.54	\$92.54	\$92.54	\$92.54	\$92.54	\$92.54	\$92.54	\$92.54	\$92.54	\$92.54
30	AIR VEHICLE	\$80.47	\$80.47	\$80.47	\$80.47	\$80.47	\$80.47	\$80.47	\$80.47	\$80.47	\$80.47	\$80.47	\$80.47	\$80.47	\$80.47	\$80.47	\$80.47	\$80.47	\$80.47	\$80.47	\$80.47
31	COMPONENT 1	\$32.46	\$32.46	\$32.46	\$32.46	\$32.46	\$32.46	\$32.46	\$32.46	\$32.46	\$32.46	\$32.46	\$32.46	\$32.46	\$32.46	\$32.46	\$32.46	\$32.46	\$32.46	\$32.46	\$32.46
32	COMPONENT 2	\$14.39	\$14.39	\$14.39	\$14.39	\$14.39	\$14.39	\$14.39	\$14.39	\$14.39	\$14.39	\$14.39	\$14.39	\$14.39	\$14.39	\$14.39	\$14.39	\$14.39	\$14.39	\$14.39	\$14.39
33	COMPONENT 3	\$14.93	\$14.93	\$14.93	\$14.93	\$14.93	\$14.93	\$14.93	\$14.93	\$14.93	\$14.93	\$14.93	\$14.93	\$14.93	\$14.93	\$14.93	\$14.93	\$14.93	\$14.93	\$14.93	\$14.93
34	COTS COMPONENT	\$18.69	\$18.69	\$18.69	\$18.69	\$18.69	\$18.69	\$18.69	\$18.69	\$18.69	\$18.69	\$18.69	\$18.69	\$18.69	\$18.69	\$18.69	\$18.69	\$18.69	\$18.69	\$18.69	\$18.69
35	INTEGR/ASSY/TEST/CHKOUT	\$12.07	\$12.07	\$12.07	\$12.07	\$12.07	\$12.07	\$12.07	\$12.07	\$12.07	\$12.07	\$12.07	\$12.07	\$12.07	\$12.07	\$12.07	\$12.07	\$12.07	\$12.07	\$12.07	\$12.07
36	REQUIRING ENGINEERING	\$5.38	\$4.41	\$4.67	\$4.82	\$4.91	\$5.05	\$5.26	\$5.37	\$5.48	\$5.54	\$5.64	\$5.74	\$5.82	\$5.88	\$6.00	\$6.14	\$6.31	\$6.47	\$6.69	\$6.86
37	COMPONENT 1	\$2.22	\$1.84	\$1.97	\$2.06	\$2.15	\$2.22	\$2.29	\$2.36	\$2.43	\$2.51	\$2.59	\$2.68	\$2.77	\$2.86	\$2.97	\$3.08	\$3.20	\$3.34	\$3.51	\$3.73
38	COMPONENT 2	\$0.98	\$0.31	\$0.41	\$0.48	\$0.55	\$0.60	\$0.65	\$0.70	\$0.74	\$0.78	\$0.82	\$0.85	\$0.89	\$0.92	\$0.95	\$0.98	\$1.01	\$1.05	\$1.09	\$1.15

**Figure 16: Risk Result Tabular Report**



RISK Results for POST Demo.acx, Baseline  
Tuesday, 25 March 2003, 12:06pm

RISK S-Curve with Intercepts

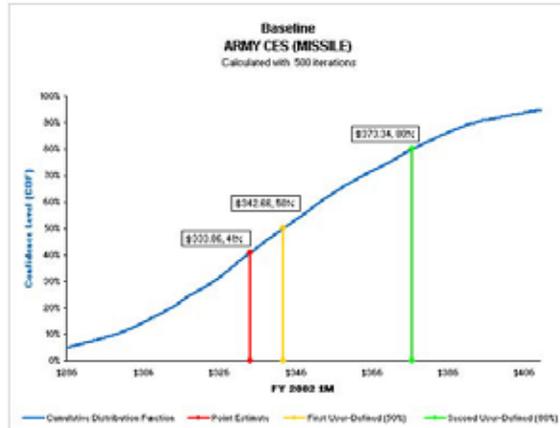
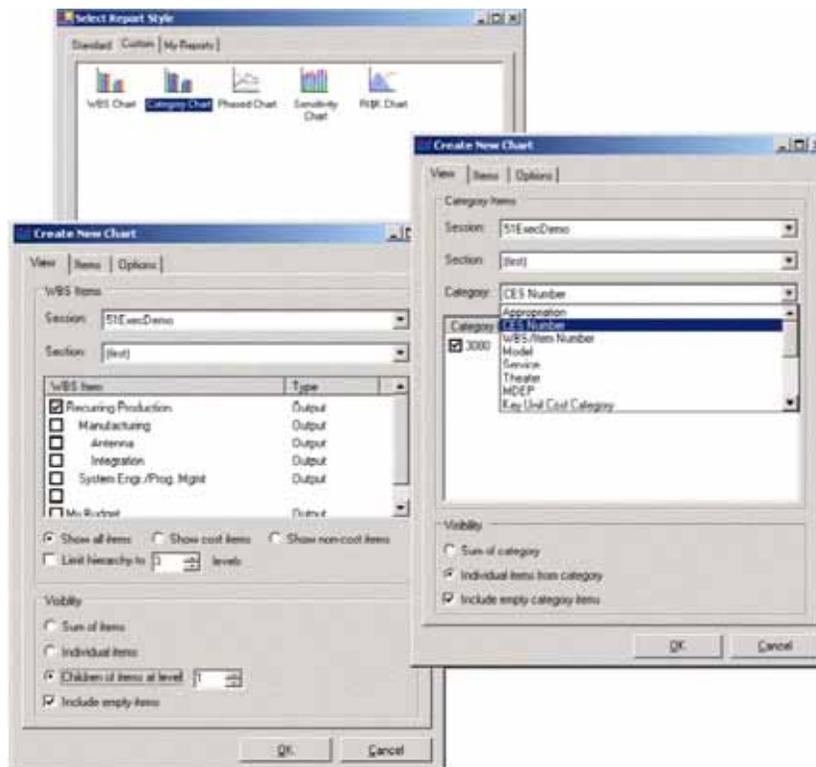


Figure 17: Risk Charting Capability

### Full Control Over Data and Display

Although POST provides many powerful standardized reports, we expect that most users will need to develop customized views of their data. To support this essential requirement, POST provides full control over the data to display. Users are guided through a report customization wizard that allows them to specify the report/chart type, the WBS elements to include, the result type (TY, BY, or SY), roll-up method, and whether to include risk. **Figure 18** illustrates the options available for creating custom reports



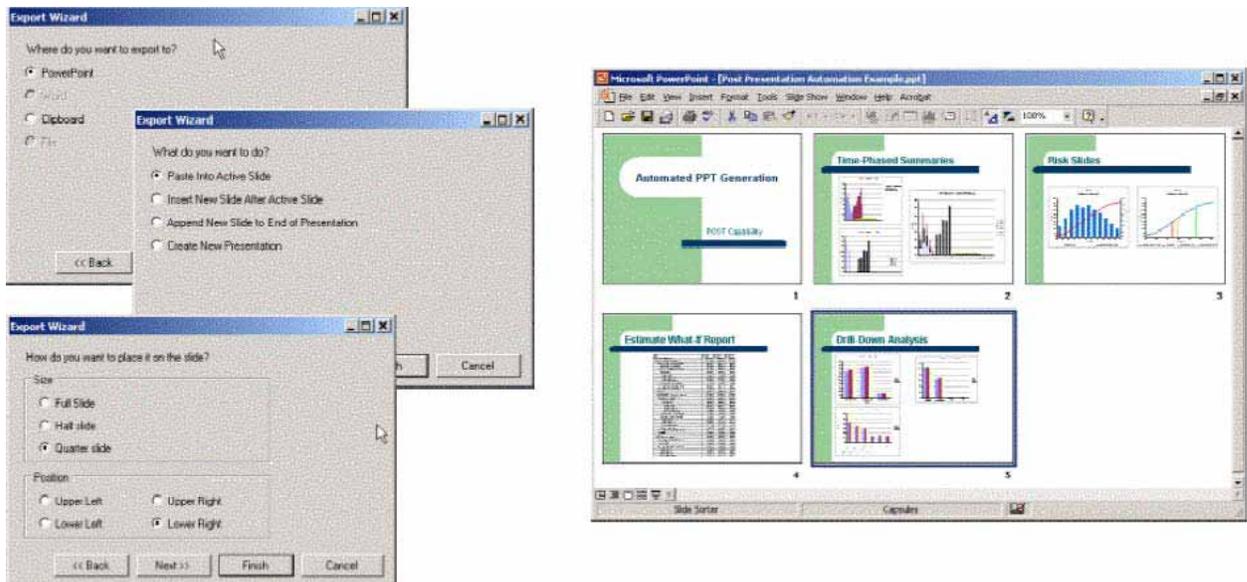
*Figure 18: Custom Reporting*

### Automated Presentations

A vital function of the Program Office is to communicate the results of the estimate via effective presentation material. These presentations convey to decision-makers and reviewers the funds needed for the program and the important funding elements. Through POST, the creation and specifically the updating of presentations and documents are greatly simplified.

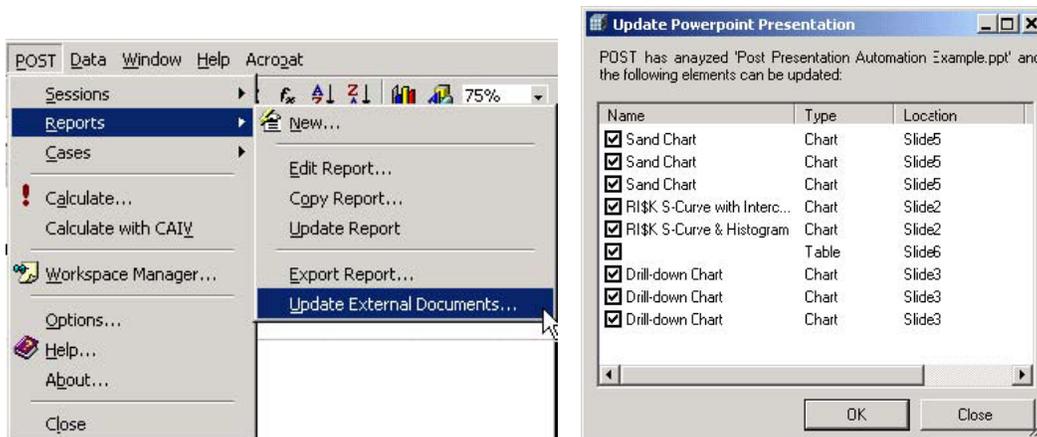
POST provides the ability to export all of the created reports and charts directly into a PowerPoint presentation or MS Word document. These reports and charts are placed as pictures within the documents to minimize file size. This process eliminates the need to link charts and

tables into the documents and removes the problems arising from link maintenance and explosion in file size. **Figure 19** illustrates how POST reports and charts can be exported to a PowerPoint presentation.



*Figure 19: Automated Presentation Creation*

Once the reports and charts are placed within a document or presentation they can be re-sized, updated, moved to another sheet, copied and placed throughout the presentation and adjusted in size and shape. No matter what you do to the object in WORD or PowerPoint, POST provides a truly amazing capability to update every chart and report in a document with revised results through the click of a single button (**Figure 19**), no matter how many reports/charts need to be updated. This capability will save users many hours of work and provide immediate value to the Program Office environment.



*Figure 20: Automated Presentation Update*

## CONCLUSION

The release of POST in ACEIT 6.0 truly places a “new face” for ACEIT that is focused on activities within a Program Office. Through POST, non-ACE users obtain windows into the ACE cost model and are able to use the cost estimate results for effective communication. Although ACEIT 6.0 will not eliminate the late afternoon frantic email or phone call, it will provide some piece of mind that dinner will not always be from the office vending machine.

## BIOGRAPHY

**Darren Elliott**: Mr. Elliott has over 13 years in the field of cost estimating and analysis for complex military acquisition programs. He has experience in leading, executing and contributing to life cycle cost model development and source selections for numerous systems, such as Launch Vehicles, Communications, Electronics, Satellites, Missiles, and Multi Mission Aircraft. His current position as the Director of Product and Service Operations for the Software Products/Services Group at Tecolote Research Inc requires him to have intimate knowledge of the issues surrounding cost analysts and the applicability of software tools to support their work activities. Since 1994, he has actively been teaching cost estimating, statistical analysis, and risk modeling with focus on the ACEIT suite of tools. His background also includes several years of product management experience for the development and global rollout of wireless software infrastructure and supporting consulting services.

Mr. Elliott obtained his Bachelor of Science in Electrical Engineering degree from the University of California at Los Angeles. His emphasis was on communication systems and network technologies. In addition, he has an MBA from California State University at Dominguez Hills.

**Address:**

Darren Elliott  
Tecolote Research, Inc.  
5266 Hollister Ave. No 301  
Santa Barbara, CA 93111

**Tel:** (805) 964-6963

**Fax:** (805) 964-7329

**E-mail:** <mailto:de Elliott@tecolote.com>