

Integrity - Service - Excellence



ACEIT's What-If Capability

Air Force Platform Integration Cost Estimating



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ACEIT User Workshop 2011



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Abstract

ACEIT's What-If Capability:

Air Force Platform Integration Cost Estimating

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Cost estimating serves a vital function within the Air Force. The Electronic System Center (ESC) at Hanscom AFB is responsible for the acquisition of a wide variety of communications systems for Air Force users. The Aerial Networking Division at ESC acquires, delivers and sustains Air Force and Joint systems to include communications, intelligence and airspace management capabilities supporting AF Global Continuous Operations. The ESC/HNA cost team has been a key player in producing cost estimates for platform integration of tactical communications equipment aboard many Air Force aircraft. In a constrained budget environment, Air Force senior leadership is continually considering cost, schedule, and technical tradeoffs. In this environment, it is imperative to be able to rapidly provide comparisons between a variety of what-if scenarios. This presentation will explore creating a dynamic ACE file, creating what-if cases, and leveraging POST to produce comparative reports.



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Aerial Networking Division *Overview*

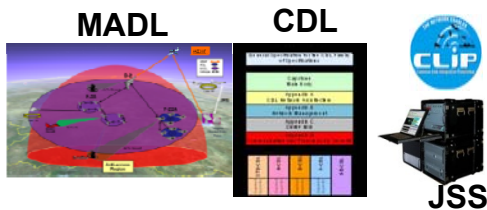


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Aerial Networking Division Snapshot



Waveforms/Link-16

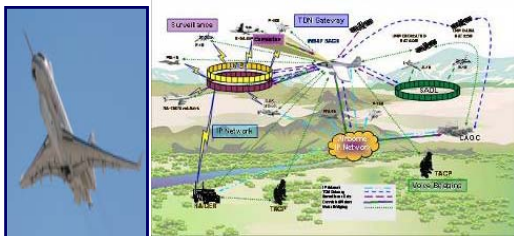


Foreign Military Sales



Quick Reaction Capability

Battlefield Airborne Comm Node (BACN)
Joint Urgent Operational Need (JUON)



15 ACAT II, III, Special Interest Programs

- Joint Tactical Radio Systems (AF JTRS)
- Air Support Operations Center (ASOC-M)
- BACN JUON
- Comm Airborne Layer Expansion (CABLE)
- Common Data Links (CDL)
- Common Link Integration Processing (CLIP)
- Joint Aerial Defense Sys Integrator (JADSI)
- Joint Range Extension (JRE/JTEP)
- JICO Support System (JSS)
- Link-16 Alaska (LAK)
- Multifunctional Advanced Data Link (MADL)
- Pocket J
- Situational Awareness Data Link (SADL)
- Senior Leader C3 Sys-Airborne (SLC3S-A)
- Tactical Air Control Party (TACP-M)

Foreign Military Sales (FMS)

- 20 FMS Cases

Personnel

- Military
- Civilian
- Advisory & Assistance Services (A&AS)
- Federally Funded Research & Development Center (FFRDC)

\$ 6.1B FYDP (FY08-15)

10 Prime Contractors

Air



Ground Systems



TACP-M JRE/JTEP

Integration



SIAP/JTM

**Executed ~\$700M in FY10
11 Major Contracting Actions**



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Interested Parties

OSD AT&L

Acquisition, Technology & Logistics

OSD CAPE

Cost Assessment & Program Evaluation

OSD NII

Networks & Information Integration

SAF AQIZ

Acquisition, Data Links

SAF A5

Plans and Requirements

SAF A8

Strategic Plans and Programs

ACC

Air Combat Command

AFC2IC

Command & Control Integration Center

AFMC

Air Force Materiel Command

Operators

All DoD Aerial Network Users

Must be flexible in order to address cost, schedule, and performance requirements of all interested parties and to meet war-fighter needs.



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Aerial Networking Division Mission Statement



*Conceptualize, acquire, and field
war winning aerial networking capabilities
on time & on cost*



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Aerial Networking Division Strategic Objectives



Enable Our People – Shape Our Workforce

- Deliver a workforce with the competencies to accomplish the mission

Provide a Quality Workplace

- Foster productive workplaces, workforce well-being, and AEF mission readiness

Align the Group

- Operate more effectively and efficiently

Integrate Capabilities

- **Deliver capabilities that are integrated & interoperable to increase combat capability**

Credibly Execute

- **Deliver “systems capabilities” on time, on cost**



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ESC/Aerial Networking Division ***Cost Estimating Requirements***



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Aerial Networking Division: Cost Estimating Requirements



- **Work Breakdown structure covering all elements of program cost**
- **Methodologies which are appropriate for the commodity and properly reflect program complexity**
- **Uncertainty analysis consistent with the guidance in the Air Force Cost Analysis Agency Cost Risk and Uncertainty Handbook**
- **Thoughtfully constructed cost estimating model which can be used as a program management decision-making tool**



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Aerial Networking Division: Typical What-If Drills



- **Schedule What-If Drills**
 - What-If there was a slip to the non-recurring integration effort contract award date?
 - What-If there was a change duration of the non-recurring integration effort?
- **Capability What-If Drills**
 - What-If the HW configuration were changed?
 - What-If the SW configuration were changed?
 - What is the impact on integration & installation cost?



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Aerial Networking Division: Typical What-If Drills



- **Schedule & Capability What-If Drills**
 - What-If the schedule assumptions and capability baseline were both changed?
 - What is the impact on integration & installation cost?



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Configuring Your ACE Session *Anticipating What-If Drills*



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Configuring Your ACE Session: Anticipating What-If Drills



- **ACE has a very powerful built in capability for running what-if drills**
- **A few quick tips will go a long way for making sure you can fully harness the capability**
 - Avoid hard-coding variables into equations; Make everything a variable!
 - Avoid %, BY, SY, TY phasing methods; These methods will not respond to schedule date/duration changes in an automated fashion
 - Spend a little extra time using functions to tie your procurement cost estimate to your development cost estimate



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Configuring Your ACE Session: Anticipating What-If Drills



- **Development start date and duration are key variables which can drive the entire model**
- **DateAdd Function can be used to calculate a finish date given a start date and duration**
 - Default functionality in ACE 7.2 is to NOT truncate fractional year/month durations when adding them to the start date

The screenshot shows the ACE 7.2 software interface. The title bar reads "ACE 7.2 - [ESC Aerial Networking Division Sample V5 17DEC2010.aceit - Methodology (BY2011\$M)]". The menu bar includes File, Edit, View, Documentation, Calc, Cases, Reports, Tools, Window, and Help. The toolbar contains various icons for file operations and editing. The status bar at the bottom shows "Ready" and "NUM".

The main window displays a table with the following data:

	WBS/CES Description	Unique ID	Baseline Capability (Pt Est)	Phasing Method	Equation / Throughput
40	*INPUT VARIABLES	*IN_VAR			
41	*RDT&E Inputs (Key Inputs for Phasing Colored Blue)				
42	Development Start Date	RDTEStartDate	01OCT2010 *	C	01OCT2010
43	Development Duration (Months)	RDTEDuration	24.0 *	C	24
44	Development Finish Date	RDTEFinishDate	30SEP2012 *	C	DateAdd(RDTEStartDate, 0, RDTEDuration, -1)

The formula bar above the table shows the function: `DateAdd(RDTEStartDate, 0, RDTEDuration, -1)`.



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Configuring Your ACE Session: Anticipating What-If Drills



- In this model, installations on test aircraft occur in the first year of development
- DateYr function is used as a best practice to show the intent of the logic here; it is not required

	WBS/CES Description	Unique ID	Baseline Capability (Pt Est)	Phasing Method	Equation / Throughput	Start Date	Finish Date
41	*RDT&E Inputs (Key Inputs for Phasing Colored Blue)						
49	Test Aircraft Installation Schedule (Driven by Dev Start Date)	TestAircraftnStallSked	2.0 *	F	2	=DateYr(RDTEStartDate)	=DateYr(RDTEStartDate)
50	New SW Development Labor Hours	NewSW_LaborHours	25,000.0 *	C	PlatformSWNewHours		
51	Labor Hours for Integration & Test of SW from Program X	ProgramX_SW_IntHours	25,000.0 *	C	25000		
52	Mission Computer/OPF Regression Test Labor Hours	MissionCompRegHours	15,000.0 *	C	15000		
53	Integration, Assembly, Test & Checkout (Factor of HW/SW Development)	RDTE_IATCO%	0.10 *	C	0.10		



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Configuring Your ACE Session: Anticipating What-If Drills



- **Current ACE 7.2 Functionality**
 - **Example 1 with F Phasing Method**
 - Equation/Throughput = 5, Start Date = 2011, Finish Date = 2011
 - Result = 5
 - **Example 2 with F Phasing Method**
 - Equation/Throughput = 5, Start Date = 01JUL2011, Finish Date = 30SEP2011
 - Result = 5
- **Future ACE 7.3 Functionality**
 - **Examples 1 and 2 above will still function in the same manner**
 - **Example 3 with FP Phasing Method**
 - Equation/Throughput = 5, Start Date = 01JUL2011, Finish Date = 30SEP2011
 - Result = $5 * 3/12 = 1.25$ (Prorates the yearly value from the equation)



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Configuring Your ACE Session: Anticipating What-If Drills



- **Procurement estimates (magnitude, phasing) for integration of communications systems on aircraft are driven by aircraft installation schedules**
- **A procurement or installation schedule, phased using the IS phasing method, is a hard-coded variable**
 - Additional modeling will be required to set up an ACEIT model link between RDT&E activities and these phased schedule variables
- **ACE session can be configured to slide the installation schedule, and hence all of the procurement cost elements, based on a slide in the RDT&E finish date**



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Configuring Your ACE Session: Anticipating What-If Drills



- **Automation: Linking the procurement phase installation schedule to the RDT&E finish date**
 - Baseline install schedule entered into Fiscal Year columns in yearly phasing screen; IS phasing method (**Unique ID: AircraftInstallSkedBaseline**)
 - Baseline install schedule starts directly after baseline RDT&E finish date; (**Unique ID: InstallStartDateBaseline**)
 - Baseline RDT&E finish date is 30SEP2012
 - Installation starts in 2013 (Interpreted as 01OCT2012)
 - Set up logic to calculate the new installation start date off of the RDT&E Finish Date; RDTEFinishDate +1 (**Unique ID: InstallStartDateCalculated**)
 - 30SEP2012 + 1 = 01OCT2012



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Configuring Your ACE Session: Anticipating What-If Drills



- **Automation: Linking the procurement phase installation schedule to the RDT&E finish date (continued)**
 - Set up logic to calculate the difference between the baseline start date and the calculated start date; this will allow the model to account for the fact that the user has changed the RDTE start date or duration and the installation phase estimate should “move” accordingly; **(Unique ID: AircraftInstallSlipMonths)**
 - Zero in the baseline case
 - Finally, set up logic to shift the baseline install schedule by the calculated number of slip months; **(Unique ID: AircraftInstallStartDateCalculated)**



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Configuring Your ACE Session: Anticipating What-If Drills



- **DateMonthDiff** will determine the number of months between the original and calculated install start dates
- **FYCSlip** will slip an install schedule by a number of months by prorating the value in the first year

ACE 7.2 - [ESC Aerial Networking Division Sample V5 17DEC2010.aceit - Methodology (BY2011\$M)]

File Edit View Documentation Calc Cases Reports Tools Window Help

Arial 10 Methodology

66 FYCSlip(AircraftInstallSlipMonths, @AircraftInstallSkedBaseline)

View Favorites(Shift+F10)

	WBS/CES Description	Unique ID	Baseline Capability (Pt Est)	Phasing Method	Equation / Throughput
61	*Procurement Inputs (Key Inputs for Phasing Colored Blue)				
62	Aircraft Installation Schedule (QTYs; Based on Program Input)	AircraftInstallSkedBaseline	50.0 *	IS	[Input Throughput]
63	Install Start Year (Baseline Based on Program Input)	InstallStartDateBaseline	2013 *	C	FYCFirstYr(@AircraftInstallSkedBaseline)
64	Install Start Date (Final Based on RDTE Finish Date)	InstallStartDateCalculated	01OCT2012 *	C	RDTEFinishDate + 1
65	Aircraft Installation Slip Months (Adjusts Sked Based on New RDT&E Start Date)	AircraftInstallSlipMonths	0.0 *	C	DateMonthDiff(InstallStartDateBaseline, InstallStartDateCalculated)
66	Aircraft Installation Schedule (QTYs; Final Based on RDTE Finish Date)	AircraftInstallStartDateCalculated	50.0 *	F	FYCSlip(AircraftInstallSlipMonths, @AircraftInstallSkedBaseline)
67	Procurement Contractor Labor Rate (\$/Hour)	PROC_Ctr_LaborRate\$	\$ 260.0 BY2011 \$ *	C	260

WBS/CES Yearly Phasing Methodology Learning Spread Total RISK Basic

View favorite estimate results NUM



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Configuring Your ACE Session: Anticipating What-If Drills



- Define each input as a variable for maximum flexibility

ACE 7.2 - [ESC Aerial Networking Division Sample V5 17DEC2010.aceit - Methodology (BY2011\$M)]

File Edit View Documentation Calc Cases Reports Tools Window Help

Methodology

*Procurement *Procurement Inputs (Key Inputs for Phasing Colored Blue)

ESC Aerial Netw...logy (BY2011\$M)

	WBS/CES Description	Unique ID	Baseline Capability (Pt Est)	Phasing Method	Equation / Throughput
61	*Procurement Inputs (Key Inputs for Phasing Colored Blue)				
67	Procurement Contractor Labor Rate (\$/Hour)	PROC_Ctr_LaborRate\$	\$ 260.0 BY2011 \$ *	C	260
68	Production System Unit Cost	ProductionSystemUnitCost\$	\$ 2.6 *	C	PlatformProchHWBuild\$
69	Number of LRUs Per System	NumberLRUsPerSystem	13.0 *	C	PlatformLRUTotal
70	Installation Hours Per LRU (Aircraft T1)	T1_InstallHours_PerLRU	400.0 *	C	400
71	Installation Learning Curve Slope	Install_LC_Slope	85.0 *	C	85
72	Integration, Assembly, Test & Checkout (Factor of HW Production)	PROC_IATCO%	0.10 *	C	0.10
73	Initial Spares (Factor of HW Production)	INSPA%	0.10 *	C	0.10
74	System Engineering/Program Management (Factor of Air Vehicle Production)	PROC_SEPM%	0.20 *	C	0.20
75	Govt SE/PM Staffing Level	PROC_SPO_Heads	10.0 *	C	10
76	Govt SE/PM Yearly Labor Rate	PROC_SPO_YearlyRate\$	\$ 200.0 BY2011 \$K *	C	200
77	System Test & Evaluation (Factor of Air Vehicle Production)	PROC_STE%	0.05 *	C	0.05
78	Data (Factor of Air Vehicle Production)	PROC_DATA%	0.03 *	C	0.03
79	Contractor Fee	PROC_CTR_FEE%	0.10 *	C	0.10
80	Withholds/Assessments	PROC_TAX%	0.07 *	C	0.07

WBS/CES \ Yearly Phasing \ Methodology \ Learning \ Spread Total \ RISK Basic /

Ready NUM



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Configuring Your ACE Session: Anticipating What-If Drills



- **Setting up the model for capability excursions**
 - Breakout hardware system unit cost in a manner where system components can be included or excluded easily; HW items typically have development labor costs, prototype costs, and procurement costs; **you may consider writing in logic where the component can be “turned off” globally**
 - Breakout system software elements in a manner where system components can be included or excluded easily; **software include/exclude may be most easily achieved using ACE’s override capability**



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Configuring Your ACE Session: Anticipating What-If Drills



- **HW Item Include/Exclude Approach; On/Off Matrix can be used to remove HW item cost in all areas of the model**

ACE 7.2 - [ESC Aerial Networking Division Sample V3 11OCT2010.aceit - Methodology (BY2011\$M)]

File Edit View Documentation Calc Cases Reports Tools Window Help

Arial 10

Methodology

39

ESC Aerial Netw...logy (BY2011\$M)

	WBS/CES Description	Unique ID	Program Baseline	Phasing Method	Equation / Throughput
82	*Platform Configuration Work Area				
83	*Platform HW Configuration (1=Include, 0=Exclude)				
84	Platform LRU Total	PlatformLRUTotal	13.0 *		
85	Component 1	ConfigC1	1.0 *	C	1
86	Component 2	ConfigC2	1.0 *	C	1
87	Component 3	ConfigC3	1.0 *	C	1
88	Component 4	ConfigC4	1.0 *	C	1
89	Component 5	ConfigC5	1.0 *	C	1
90	Component 6	ConfigC6	1.0 *	C	1
91	Component 7	ConfigC7	1.0 *	C	1

WBS/CES / Yearly Phasing / Methodology / Learning / Spread Total / RI\$K Basic /



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Configuring Your ACE Session: Anticipating What-If Drills



- **HW Item Include/Exclude Approach; On/Off Matrix can be used to alter system prototype or production unit cost**

The screenshot shows the ACE 7.2 software interface. The main window displays a table with the following data:

	WBS/CES Description	Unique ID	Program Baseline	Phasing Method	Equation / Throughput
99	*Platform HW - Prototype System Unit Cost				
100	Prototype System HW Unit Cost	PlatformProtoHWBuild\$	\$ 2.9 *		
101	Component 1		\$ 0.2 *	C	200 * ConfigC1
102	Component 2		\$ 0.1 *	C	150 * ConfigC2
103	Component 3		\$ 0.3 *	C	250 * ConfigC3
104	Component 4		\$ 0.2 *	C	200 * ConfigC4
105	Component 5		\$ 0.1 *	C	145 * ConfigC5
106	Component 6		\$ 0.2 *	C	185 * ConfigC6
107	Component 7		\$ 0.2 *	C	230 * ConfigC7

The bottom of the window shows a navigation bar with the following tabs: WBS/CES, Yearly Phasing, Methodology, Learning, Spread Total, RI\$K Basic.



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ACEIT's What-If Capability ***Building What-If Cases in ACE***



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ACEIT's What-If Capability: Building What-If Cases in ACE



- Cases can be built in ACE within the Inputs/Results Viewer (can be launched from the View Menu)
- Once in the Inputs/Results Viewer, new Cases can be created using the Cases Menu (Command: Add Case)

	WBS/CES Description	Cost Interpretation	Total
131	*Platform SW Configuration		
132	Platform SW/Waveform Capabilities		21,000.0 *
133	Infrastructure Element 1		10,000.0 *
134	Capability 1		2,000.0 *
135	Capability 2		2,000.0 *
136	Capability 3		0
137	Infrastructure Element 2		5,000.0 *
138	Capability 4		0
139	Capability 5		2,000.0 *



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ACEIT's What-If Capability: Building What-If Cases in ACE



- Values shown in white cells can be overwritten; Asterisk after a value indicates the value was calculated by ACE
- Values in bold blue indicate a user override

ACE 7.2 - [ESC Aerial Networking Division Sample V5 17DEC2010.aceit - Inputs/Results Viewer (BY2011\$M)]

File Edit View Mode Calc Cases Reports Tools Window Help

Inputs Phased by Case

116

ESC Aerial Netwo...logy (BY2011\$M) ESC Aerial Netw...wer (BY2011\$M)

	WBS/CES Description	Cost Interpretation	Total
<input checked="" type="checkbox"/>	Baseline Capability (Pt Est)		
<input checked="" type="checkbox"/>	Baseline Capability & 1 Year Stretch		
<input checked="" type="checkbox"/>	Baseline Capability & 1.5 Year Stretch		
<input checked="" type="checkbox"/>	Baseline Capability & 2 Year Stretch		
<input checked="" type="checkbox"/>	Baseline Capability & 1 Year Delay		
<input checked="" type="checkbox"/>	Baseline Capability & 2 Year Delay		
<input checked="" type="checkbox"/>	Reduced Capability		
<input checked="" type="checkbox"/>	Reduced Capability & 1 Year Delay		
<input checked="" type="checkbox"/>	Reduced Capability & 2 Year Delay		
	131 *Platform SW Configuration		
	132 Platform SW/Waveform Capabilities		21,000.0 *
	133 Infrastructure Element 1		10,000.0 *
	134 Capability 1		2,000.0 *
	135 Capability 2		2,000.0 *
	136 Capability 3		0
	137 Infrastructure Element 2		5,000.0 *
	138 Capability 4		0
	139 Capability 5		2,000.0 *



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ACEIT's What-If Capability: Building What-If Cases in ACE



- Different views are available in the Inputs/Results viewer allowing for quick comparison between cases
- Cases with SW capabilities 3 and 4 excluded from the project have development labor hours set to zero

ACE 7.2 - [ESC Aerial Networking Division Sample V5 17DEC2010.aceit - Inputs/Results Viewer (BY2011\$M)]

File Edit View Mode Calc Cases Reports Tools Window Help

Inputs Cases by Total

130

ESC Aerial Netwo...logy (BY2011\$M) ESC Aerial Netw...wer (BY2011\$M)

TOTAL	WBS/CES Description	Baseline Capability & 1 Year Delay	Baseline Capability & 2 Year Delay	Reduced Capability	Reduced Capability & 1 Year Delay	Reduced Capability & 2 Year Delay
FY 2011	130					
FY 2012	131 *Platform SW Configuration					
FY 2013	132 Platform SW/Waveform Capabilities	25,000.0 *	25,000.0 *	21,000.0 *	21,000.0 *	21,000.0 *
FY 2014	133 Infrastructure Element 1	10,000.0 *	10,000.0 *	10,000.0 *	10,000.0 *	10,000.0 *
FY 2015	134 Capability 1	2,000.0 *	2,000.0 *	2,000.0 *	2,000.0 *	2,000.0 *
FY 2016	135 Capability 2	2,000.0 *	2,000.0 *	2,000.0 *	2,000.0 *	2,000.0 *
FY 2017	136 Capability 3	2,000.0 *	2,000.0 *	0	0	0
FY 2018	137 Infrastructure Element 2	5,000.0 *	5,000.0 *	5,000.0 *	5,000.0 *	5,000.0 *
FY 2019	138 Capability 4	2,000.0 *	2,000.0 *	0	0	0
FY 2020	139 Capability 5	2,000.0 *	2,000.0 *	2,000.0 *	2,000.0 *	2,000.0 *
	140					

Ready NUM



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ACEIT's What-If Capability: Building What-If Cases in ACE



- Different views are available in the Inputs/Results viewer allowing for quick comparison between cases
- Results can be viewed in BY, SY, or TY

ACE 7.2 - [ESC Aerial Networking Division Sample V5 17DEC2010.aceit - Inputs/Results Viewer (TY)]

File Edit View Mode Calc Cases Reports Tools Window Help

TY Results Cases by Total

130

ESC Aerial Netwo...logy (BY2011\$M) ESC Aerial Netwo...ults Viewer (TY)

TOTAL		WBS/CES Description	Baseline Capability (Pt Est)	Baseline Capability & 1 Year Stretch	Baseline Capability & 1.5 Year Stretch	Baseline Capability & 2 Year Stretch
FY 2011	1	*AF/ESC/Aerial Networking Division Example				
FY 2012	2					
FY 2013	3	Aircraft Platform Integration Sample Estimate	\$ 404.9	\$ 414.1	\$ 418.8	\$ 423.4
FY 2014	4	Research, Development, Test & Evaluation	\$ 96.0	\$ 99.9	\$ 101.9	\$ 103.9
FY 2015	5	Air Vehicle (AV)	\$ 49.5	\$ 49.9	\$ 50.2	\$ 50.4
FY 2016	6	Hardware	\$ 14.3	\$ 14.4	\$ 14.4	\$ 14.5
FY 2017	7	Non-Recurring Engineering (Labor)	\$ 5.6	\$ 5.6	\$ 5.6	\$ 5.7
FY 2018	8	Prototype Manufacturing (Material)	\$ 8.7	\$ 8.8	\$ 8.8	\$ 8.8
FY 2019	9	Software	\$ 14.6	\$ 14.7	\$ 14.8	\$ 14.9
FY 2020	10	New Development	\$ 5.6	\$ 5.7	\$ 5.7	\$ 5.7
	11	Integration & Test of Software from Other Source (Program X)	\$ 5.6	\$ 5.7	\$ 5.7	\$ 5.7
	12	Mission Computer/DFP SW Regression Testing	\$ 3.4	\$ 3.4	\$ 3.4	\$ 3.4
	13	Integration, Assembly, Test & Checkout	\$ 20.6	\$ 20.8	\$ 20.9	\$ 21.0

Ready NUM



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ACEIT's What-If Capability: Building What-If Cases in ACE



- **Ripple effect of schedule date/duration excursions**

ACE 7.2 - [ESC Aerial Networking Division Sample V5 17DEC2010.aceit - Inputs/Results Viewer (BY2011\$M)]

File Edit View Mode Calc Cases Reports Tools Window Help

Inputs Cases by Total

44

ESC Aerial Netwo...logy (BY2011\$M) ESC Aerial Netw...wer (BY2011\$M)

TOTAL	WBS/CES Description	Baseline Capability (Pt Est)	Baseline Capability & 1 Year Stretch	Baseline Capability & 1.5 Year Stretch	Baseline Capability & 2 Year Stretch	Baseline Capability & 1 Year Delay
FY 2011	41 *RDT&E Inputs (Key Inputs for Phasing Colored Blue)					
FY 2012	42 Development Start Date	01OCT2010 *	01OCT2010 *	01OCT2010 *	01OCT2010 *	01OCT2011
FY 2013	43 Development Duration (Months)	24.0 *	36	42	48	24.0 *
FY 2014	44 Development Finish Date	30SEP2012 *	30SEP2013 *	31MAR2014 *	30SEP2014 *	30SEP2013 *
FY 2015	45 RDT&E Contractor Labor Rate (\$/Hour)	\$ 220.0 BY2011 \$ *	\$ 220.0 BY2011 \$ *	\$ 220.0 BY2011 \$ *	\$ 220.0 BY2011 \$ *	\$ 220.0 BY2011 \$ *
FY 2016	46 Air Vehicle/HW Non-Recurring Engineering Labor Hours	25,000.0 *	25,000.0 *	25,000.0 *	25,000.0 *	25,000.0 *
FY 2017						

Ready NUM

Case	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019
1 Baseline Capability (Pt Est)	10.0 *	10.0 *	10.0 *	10.0 *	10.0 *		
2 Baseline Capability & 1 Year Stretch		10.0 *	10.0 *	10.0 *	10.0 *	10.0 *	
3 Baseline Capability & 1.5 Year Stretch		5.0 *	10.0 *	10.0 *	10.0 *	10.0 *	5.0 *
4 Baseline Capability & 2 Year Stretch			10.0 *	10.0 *	10.0 *	10.0 *	10.0 *
5 Baseline Capability & 1 Year Delay		10.0 *	10.0 *	10.0 *	10.0 *	10.0 *	
6 Baseline Capability & 2 Year Delay			10.0 *	10.0 *	10.0 *	10.0 *	10.0 *
7 Reduced Capability	10.0 *	10.0 *	10.0 *	10.0 *	10.0 *		
8 Reduced Capability & 1 Year Delay		10.0 *	10.0 *	10.0 *	10.0 *	10.0 *	
9 Reduced Capability & 2 Year Delay			10.0 *	10.0 *	10.0 *	10.0 *	10.0 *

Ready NUM



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ACEIT's What-If Capability ***Generating Comparative Reports Using POST***



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ACEIT's What-If Capability: POST Reports



- **Comparative reports and graphs can very quickly be generated in POST (Program Office Support Tool)**
- **Reports can be ran on any of the cases generated in ACE**
- **Cases created in ACE cannot be edited in POST**
- **Additional cases can be created in POST in a similar manner as in ACE, using the POST Inputs/Results viewer**
- **The .cache file saves the information related to cases created in POST**
- **Run a RI\$K Convergence report in POST to determine an appropriate number of iterations for generating results for your ACE session**



ACEIT's What-If Capability: POST Reports



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- What-If Report compares inputs or results

Costs in BY2011 \$M			
WBS	Baseline Capability (Pt Est)	Baseline Capability & 1 Year Delay	Baseline Capability & 2 Year Delay
*INPUT VARIABLES			
*RDT&E Inputs (Key Inputs for Phasing Colored Blue)			
Development Start Date	01 Oct 2010	01 Oct 2011	01 Oct 2012
Development Duration (Months)	24	24	24
Development Finish Date	30 Sep 2012	30 Sep 2013	30 Sep 2014
RDT&E Contractor Labor Rate (\$/Hour)	\$0.000220	\$0.000220	\$0.000220
Air Vehicle/HW Non-Recurring Engineering Labor Hours	25,000.0	25,000.0	25,000.0
Number of Prototype Systems	3.0	3.0	3.0
Prototype System Unit Cost	\$2.9	\$2.9	\$2.9
Test Aircraft Installation Schedule (Driven by Dev Start Date)	2.0	2.0	2.0
New SW Development Labor Hours	25,000.0	25,000.0	25,000.0
Labor Hours for Integration & Test of SW from Program X	25,000.0	25,000.0	25,000.0
Mission Computer/OFP Regression Test Labor Hours	15,000.0	15,000.0	15,000.0
Integration, Assembly, Test & Checkout (Factor of HW/SW Development)	0.1	0.1	0.1
System Engineering/Program Management (Factor of Air Vehicle Development)	0.3	0.3	0.3
Govt SE/PM Staffing Level	15.0	15.0	15.0
Govt SE/PM Yearly Labor Rate	0.2	0.2	0.2
System Test & Evaluation (Factor of Air Vehicle Development)	0.2	0.2	0.2
Data (Factor of Air Vehicle Development)	\$0.1	\$0.1	\$0.1
Contractor Fee	0.1	0.1	0.1
Withholds/Assessments	0.1	0.1	0.1
*Procurement Inputs (Key Inputs for Phasing Colored Blue)			
Aircraft Installation Schedule (QTYs; Based on Program Input)	50.0	50.0	50.0
Install Start Year (Baseline Based on Program Input)	2013	2013	2013
Install Start Date (Final Based on RDTE Finish Date)	01 Oct 2012	01 Oct 2013	01 Oct 2014

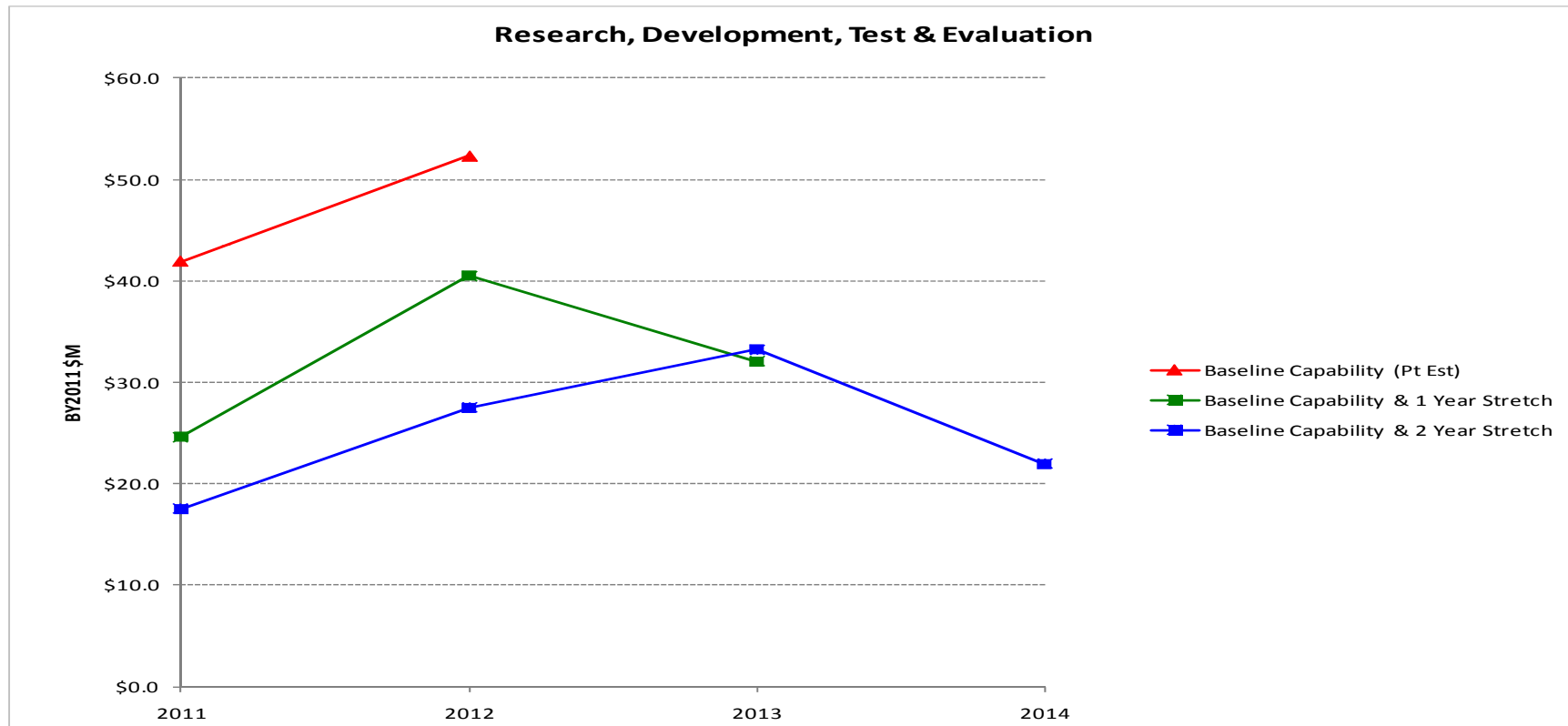


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ACEIT's What-If Capability: POST Reports



- Phased line chart compares results graphically



Costs in BY2011 \$M				
WBS	2011	2012	2013	2014
Baseline Capability (Pt Est)	\$41.9	\$52.3		
Baseline Capability & 1 Year Stretch	\$24.6	\$40.5	\$32.1	\$21.9
Baseline Capability & 2 Year Stretch	\$17.5	\$27.5	\$33.2	\$21.9



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ACEIT's What-If Capability: POST Reports



- Delta report compares the results of cases and classifies row deltas by user-configured thresholds

Funding in TY \$M					
WBS	Baseline Capability (Pt Est)	Reduced Capability	Delta (Δ)	Percent Δ	Threshold
*AF/ESC/Aerial Networking Division Example					
Aircraft Platform Integration Sample Estimate	\$404.9	\$314.7	(\$90.2)	(22.28%)	High
Research, Development, Test & Evaluation	\$96.0	\$82.1	(\$13.9)	(14.51%)	Low
Air Vehicle (AV)	\$49.5	\$41.9	(\$7.5)	(15.23%)	Medium
Sys Engineering/Program Management	\$18.5	\$16.6	(\$1.9)	(10.19%)	Low
System Test and Evaluation	\$7.4	\$6.3	(\$1.1)	(15.22%)	Medium
Training					
Data	\$2.5	\$2.1	(\$0.4)	(15.22%)	Medium
Installation	\$2.5	\$1.9	(\$0.6)	(23.08%)	High
Contractor Fee	\$7.4	\$6.3	(\$1.2)	(15.49%)	Medium
Withholds/Assessments	\$8.2	\$6.9	(\$1.3)	(15.49%)	Medium
Procurement (HW Production/Installation)	\$308.9	\$232.6	(\$76.3)	(24.69%)	High
Air Vehicle (AV)	\$155.4	\$114.2	(\$41.2)	(26.49%)	High
Sys Engineering/Program Management	\$44.2	\$36.0	(\$8.2)	(18.62%)	Medium
System Test and Evaluation	\$7.8	\$5.7	(\$2.1)	(26.49%)	High
Training					
Data	\$4.7	\$3.4	(\$1.2)	(26.49%)	High
Installation	\$36.3	\$27.9	(\$8.4)	(23.08%)	High
Initial Spares and Repair Parts	\$14.1	\$10.4	(\$3.7)	(26.49%)	High
Contractor Fee	\$26.2	\$19.8	(\$6.5)	(24.69%)	High
Withholds/Assessments	\$20.2	\$15.2	(\$5.0)	(24.69%)	High



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ACEIT's What-If Capability: POST Reports



- **Time Phased Delta Report compares the results of cases on a yearly basis and classifies deltas by user-configured thresholds**

Costs in BY2011 \$M	Total	2011	2012	2013	2014	2015	2016	2017
Baseline Capability (Pt Est)	\$378.4	\$41.9	\$100.9	\$58.8	\$56.8	\$55.9	\$55.4	\$8.8
Reduced Capability	\$294.5	\$35.9	\$81.0	\$44.2	\$42.6	\$42.0	\$41.6	\$7.3
Delta (Δ)	-\$83.9	-\$6.0	-\$19.9	-\$14.6	-\$14.1	-\$13.9	-\$13.8	-\$1.5
Percent Δ	(22.17%)	(14.27%)	(19.75%)	(24.84%)	(24.90%)	(24.93%)	(24.94%)	(16.90%)
Threshold	High	Low	Medium	High	High	High	High	Medium

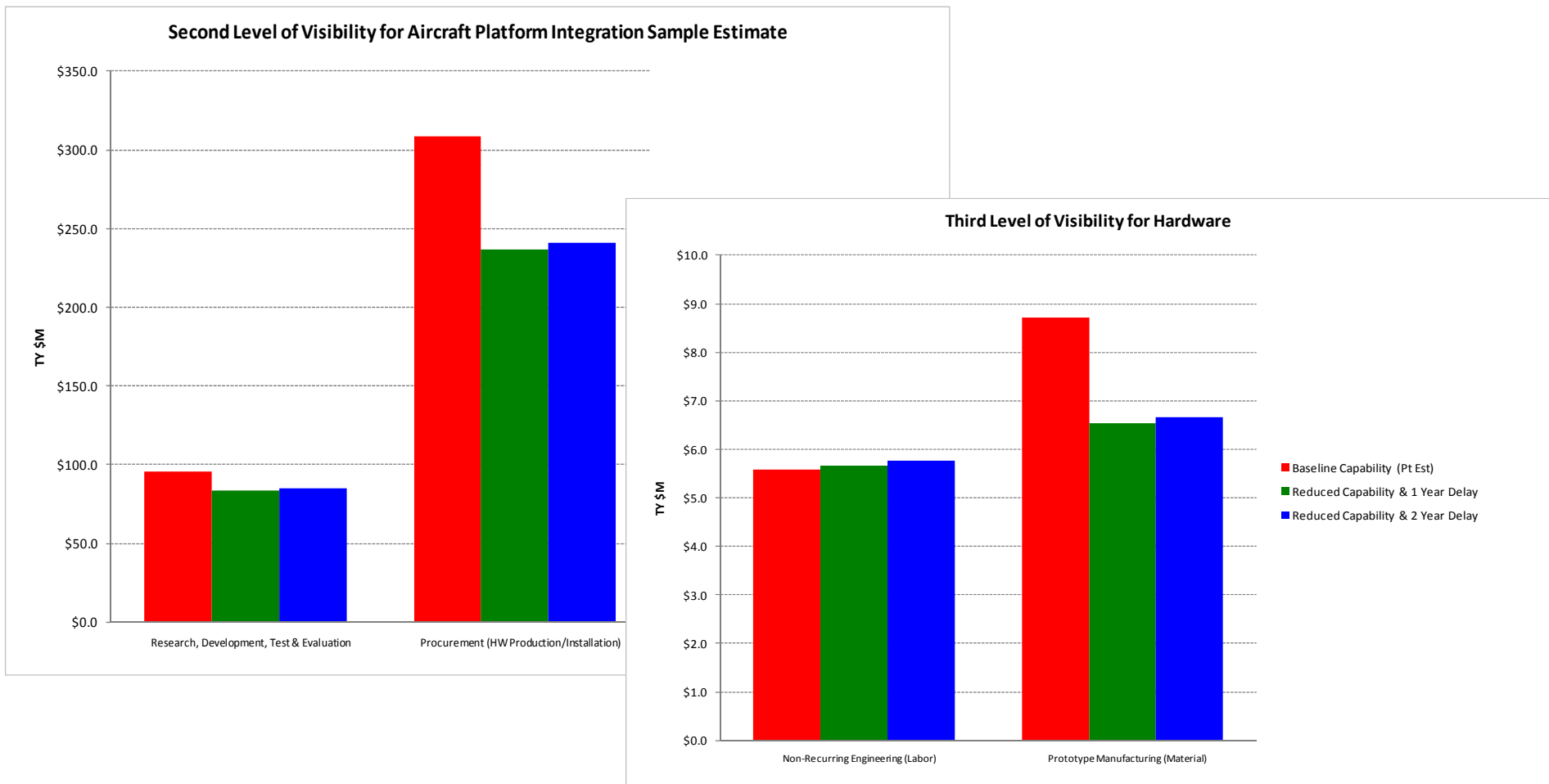


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ACEIT's What-If Capability: POST Reports



- Drill Down-Chart for visual comparison at any WBS level





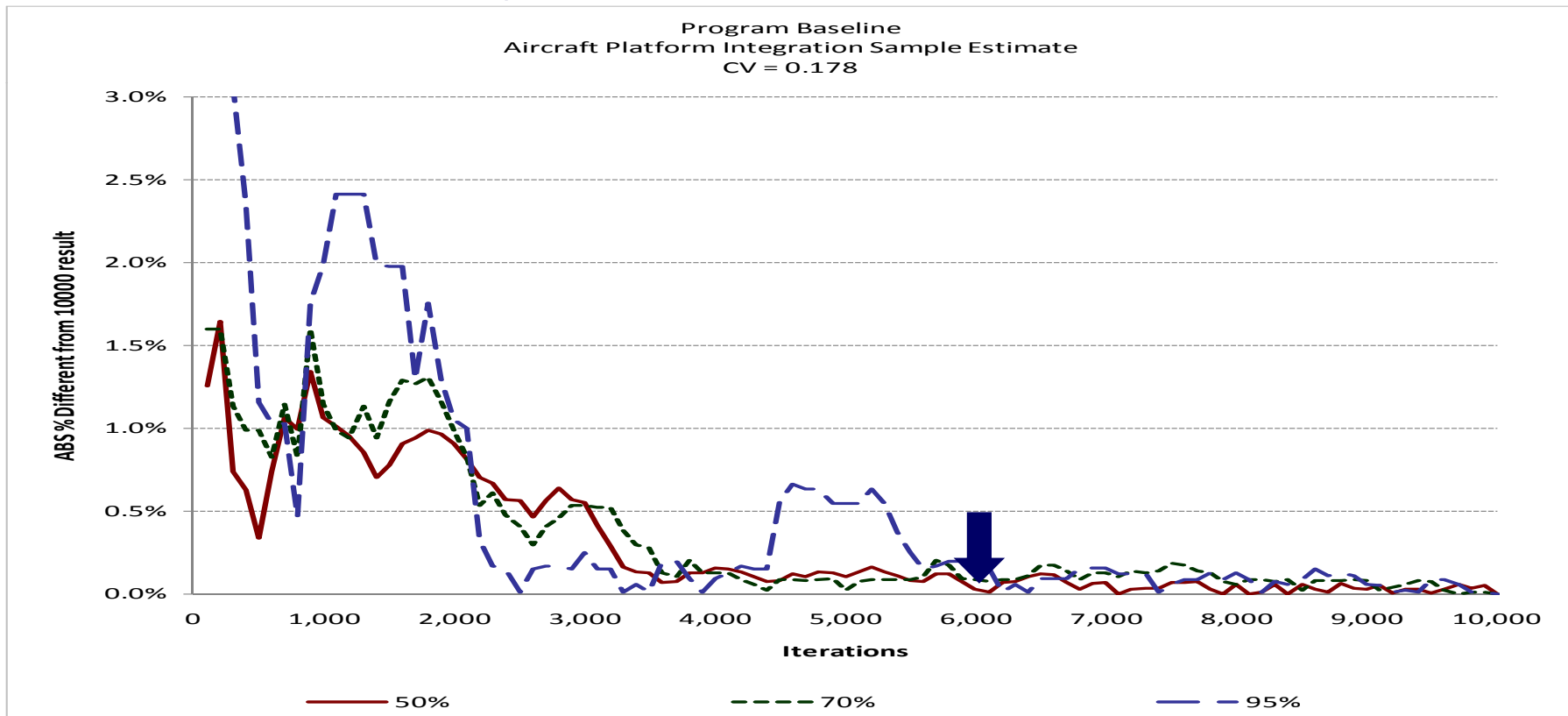
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ACEIT's What-If Capability: POST Reports



- **RI\$K Convergence Report**

- Use to determine the number of iterations required to produce a stable result (if you report at the mean, this would be the point after which the mean result changes less than 0.5% from the 10K iteration result)



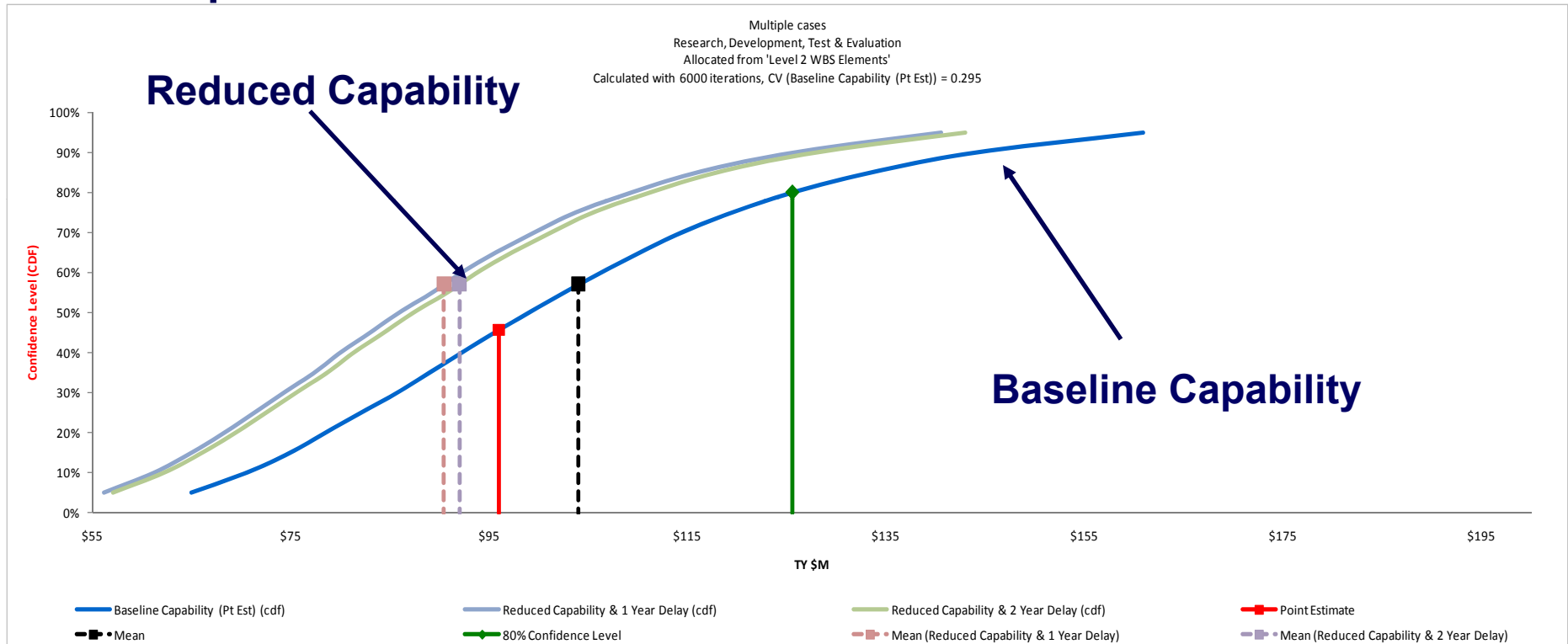


ACEIT's What-If Capability: POST Reports



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- Plot the S-Curves for multiple cases on the same chart for purposes of comparison



Markers (Reference case: Baseline Capability (Pt Est))	Costs	Confidence
Point Estimate	\$96.0	45.6%
Mean	\$104.0	57.1%
80% Confidence Level	\$125.6	80.0%
Mean (Reduced Capability & 1 Year Delay)	\$90.5	57.1%
Mean (Reduced Capability & 2 Year Delay)	\$92.0	57.1%



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ACEIT's What-If Capability ***Conclusion***



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ACEIT's What-If Capability: Conclusion



- In today's fiscally constrained environment, it is more important than ever to be able to use our cost estimating models to conduct cost, schedule, and technical tradeoffs
- ACEIT provides a powerful what-if capability which can be fully harnessed via thoughtful model construction and usage of ACE functions
- POST provides a variety of comparative reports which can be used as tools to aid our decision-making leadership
- ESC's Aerial Networking Division has fully utilized these tools to aid in acquisition strategy development, technical baseline development, and budget requests for its platform integration projects



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Thank You



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Backup



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ACEIT's What-If Capability *Alternative Implementation: Working With Years*



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Configuring Your ACE Session: Anticipating What-If Drills



- **Automation: Linking the procurement phase installation schedule to the RDT&E finish year**
 - Baseline install schedule entered into Fiscal Year columns in yearly phasing screen; IS phasing method (**Unique ID: AircraftInstallSkedBaselineAlt**)
 - Baseline install schedule starts year after baseline RDT&E finish year; (**Unique ID: InstallStartYearBaselineAlt**)
 - Baseline RDT&E finish date is 30SEP2012
 - Installation starts in 2013 (Interpreted as 01OCT2012)
 - Set up logic to calculate the new installation start year off of the RDT&E Finish Date; DateYr (RDTEFinishDate)+1 (**Unique ID: InstallStartYearCalculatedAlt**)



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ACEIT's What-If Capability: Pitfalls of Working With Years



- **Beware! Working exclusively with years in this manner can lead to potentially large inaccuracies**
- **Example**
 - Suppose the RDT&E finish date were to slip from 30SEP2010 to 05OCT2010 (5 day slip)
 - Original installation start year is FY11 (01OCT2010)
 - The new installation start year is calculated as $\text{DATEYR}(05\text{OCT}2010)+1 = 2011 + 1$
 - This results in an installation start year of FY12 (01OCT2011) (360 day slip)



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Configuring Your ACE Session: Anticipating What-If Drills



- **Automation: Linking the procurement phase installation schedule to the RDT&E finish year (continued)**
 - Set up logic to calculate the difference between the baseline start year and the calculated start year; this will allow the model to account for the fact that the user has changed the RDTE start date or duration and the installation phase estimate should “move” accordingly; **(Unique ID: AircraftInstallSlipYearsAlt)**
 - Finally, set up logic to shift the baseline install schedule by the calculated number of slip years; **(Unique ID: AircraftInstallSkedCalculatedAlt)**



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Configuring Your ACE Session: Anticipating What-If Drills



- **FYCVaI** is used to slip the install schedule

ACE 7.2 - [ESC Aerial Networking Division Sample V5 17DEC2010.aceit - Methodology (BY2011\$M)]

File Edit View Documentation Calc Cases Reports Tools Window Help

Arial 10 Methodology

*Additional Co *Additional Considerations for Programming (Working with Years)

ESC Aerial Netw...logy (BY2011\$M) ESC Aerial Netw...jewer (BY2011\$M)

	WBS/CES Description	Unique ID	Baseline Capability (Pt Est)	Phasing Method	Equation / Throughput
141	*Additional Considerations for Programming (Working with Years)	*AddtlConsid			
142	*Okay method when working with full year slips; can be VERY problematic with small slips				
143	*RDTE Setup for Working With Years				
144	Development Start Date	RDTEStartDateAlt	01OCT2010 *	C	01OCT2010
145	Development Duration (Years)	RDTEDurationAlt	2.0 *	C	2.0
146	Development Finish Date	RDTEFinishDateAlt	30SEP2012 *	C	DateAdd(RDTEStartDateAlt, RDTEDurationAlt, 0, -1)
147	Test Aircraft Installation Schedule (Driven by Dev Start Date)		2.0 *	F	2
148	*PROC Setup for Working With Years				
149	Aircraft Installation Schedule (QTYs; Based on Program Input)	AircraftInstallSkedBaselineAlt	50.0 *	IS	[Input Throughput]
150	Install Start Year (Baseline Based on Program Input)	InstallStartYearBaselineAlt	2013 *	C	FYCFirstYr(@AircraftInstallSkedBaselineAlt)
151	Install Start Year (Final Based on RDTE Finish Date)	InstallStartYearCalculatedAlt	2013 *	C	DateYr(RDTEFinishDateAlt) + 1
152	Aircraft Installation Slip (Adjusts Sked Based on New RDT&E Start Date)	AircraftInstallSlipYearsAlt	0.0 *	C	InstallStartYearCalculatedAlt-InstallStartYearBaselineAlt
153	Aircraft Installation Schedule (QTYs; Final Based on RDTE Finish Date)		50.0 *	F	FYCVaI(@AircraftInstallSkedBaselineAlt, FYR-AircraftInstallSlipYearsAlt)

WBS/CES \ Yearly Phasing \ Methodology \ Learning \ Spread Total \ RISK Basic

Ready NUM