Cost Benefit Analysis (CBA) Metrics Calculated in ACE

ACEIT Users Workshop
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Overview

- Purpose
- What is a CBA?
- Why is a CBA Important?
- Modeling CBA Metrics in ACE
- Comparing alternatives with ACE and POST
- Conclusion

Purpose

- **Decisions about how to allocate resources are often supported by a Cost Benefit Analysis (CBA). CBAs consider both quantifiable and non-quantifiable benefits. Quantifiable benefits can be assigned a numeric value such as dollars and ranked based on project selection criteria. These selection criteria (metrics) can be calculated in ACE with the aid of several functions. This presentation will demonstrate the calculation/modeling of the most common metrics used in CBAs.**

EA/CBA Defined

…. a structured methodology that determines the costs and benefits of one or more alternatives and compares them in order to identify the best alternative to achieve a stated goal/objective.

– U.S. Army Cost Benefit Analysis Guide, January 2010

…. a systematic approach to identify, analyze, and compare costs or benefits of alternative courses of action that will achieve a given set of objectives.

– U.S. Army Cost Benefit Analysis Guide, January 2010

…. a conceptual framework for systematically investigating problems of choice. Posing various alternatives for reaching an objective, it analyzes the LCCE and benefits of each one, usually with a return on investment analysis.

– GAO Cost Estimating and Assessment Guide, March 2009

…. an objective method for making rational decisions among alternatives. Compares time-phased, economically-adjusted costs and benefits of solutions/alternatives for a defined problem/objective.

- SCEA Online

CBA Process

The CBA Eight-Step Process

ODASA Cost & Economics

Using analysis to make the case for a project or proposal:
Weighing the total expected costs against the total expected benefits
over the near, far, and lifecycle timeframes from an ***Army enterprise*** perspective.

COSTS

- The total of quantifiable and non-quantifiable costs
- Quantifiable costs
  - Direct
  - Indirect
  - Initial/Start up
  - Sustainment
  - Procurement
  - Salary and Benefits
- Non Quantifiable costs
  - Life/Safety/Health
  - Perception/Image
  - Opportunity
  - Risk/Uncertainty
  - Political

1. Define the Problem/Opportunity
2. Define the Scope; Formulate Facts and Assumptions
3. Define Alternatives
4. Develop Cost Estimate for Each Alternative
5. Identify Quantifiable and Non- Quantifiable Benefits
6. Define Alternative Selection Criteria
7. Compare Alternatives
8. Report Results and Recommendations

BENEFITS

- The total of quantifiable and non-quantifiable benefits
- Quantifiable benefits
  - Cost savings and avoidances
  - Increased productivity
  - Reduced processing time
  - Reduced error rates
  - Increase in capacity
- Non-quantifiable benefits
  - Better Information for decision making
  - Easier to use or access
  - Increase in choice or options
  - Reduced redundancy
  - Achievement of organizational goals/objectives

BENEFITS MUST BALANCE OR OUTWEIGH COSTS AND REQUIRED TRADE-OFFS

***** - This briefing focuses on steps 7 & 8***

– U.S. Army Cost Benefit Analysis Guide, April 2011

Why CBAs are Important

- **Offer a way to systematically assess costs and benefits for each alternative**
  - Monetary costs and benefits
    - E.g., Financial outlays, proceeds from sale of assets, savings
  - Non-monetary costs and benefits
    - E.g., Loss or gain in capability or performance
- **Compare relative strengths and weaknesses of each alternative to identify the most effective alternative that accomplishes the mission**
- **Provide information so management can make informed decisions on where to allocate resources**

Step 7 – Compare Alternatives

Modeling the Cost Portion of CBAs with ACE

- **Modeling CBAs in ACE is a two step process**
  - Estimate the CBA Alternatives
    - The Status Quo and each alternative need to be estimated
  - Perform the CBA Alternative Comparisons
    - Compare the results of the alternatives using various metrics
- **Alternatives can be modeled with a single ACE session (Cases) or with multiple ACE sessions**

Comparing the CBA Alternatives

- **No matter if you use a single ACE session or multiple ACE sessions, you need to compare the results of the alternatives**
- **Putting the Cases together**
  - Use ACE to build a CBA Summary Model (ACE 7.4 will include an example/template)
    - Use ACE-to-ACE plug-in to combine results from Status Quo and Alternatives
    - Use POST to develop standard reporting and charting (Hint: tie to CBA briefing template)
- **A CBA Summary Model makes metric calculations that compare alternatives (cases) easier to perform**
  - Math across cases is difficult since you cannot reference one case result from within another case

Common Metrics

- Cost Metrics
  - NET Benefits – The difference between the benefits and the costs (benefits-costs)
  - Net Present Value (NPV) – The present value (PV) of a project's benefits minus the PV of a project's cost; calculated as PV(benefits)-PV(costs)
  - Uniform Annual Cost (UAC) – Method used to compare alternatives with unequal lives; calculated by dividing the present value of the cost of an alternative by the sum of the discount factors for the periods covering the life of the alternative
- Index Metrics
  - Profitability Index (PI or benefit/cost ratio) – Relative profitability of any project or financial benefit gained from an investment; calculated as PV(benefits)/PV(costs); higher is better
    - Savings Investment Ratio (SIR) and Benefits Investment Ratio (BIR) are similar to PI
  - Cost/Benefit Ratio – Depicts "unit cost" of benefits; reciprocal of the PI; calculated as PV(costs)/PV(benefits); lower is better
- Year and Rate Metrics
  - Pay Back Period – Number of years required to recover initial investment
  - Break Even Year – The year in which the initial investment is recovered
  - Internal Rate of Return – Also known as Return on Investment (ROI); The discount rate that equates the present value of the benefits with the present value of the costs; discount rate where NPV=0

Economic Analysis Functions

- **ACE has four Economic Analysis functions to help with CBA metric calculations**
  - EADiscFact() - This function calculates the annual discounting cost multiplier (factor) used in present value calculations.
  - EAPayBckPd() - This function determines the payback period needed to recover an investment cost. It returns the fractional number of years required for cumulative savings to be greater than the total investment.
  - EABrkEvnYr() - This function determines the break even year for an investment. It returns the first fiscal year in which the cumulative savings is greater than or equal to the total of the investment.
  - EADiscVal() - This function determines the discounted value of a cost stream by multiplying a value by an annual discounting factor.

Discount Factor

- **The discount factor is used to calculate the present value of future costs and benefits**
- **Use the EADiscFact Function**

  EADiscFact (project_year, rate, method, [current_year] **)**

  - **Project Year – zero year of project**
  - **Rate – rate used to develop annual multipliers**
  - **Method – indicator variable for cost accrual method**

	WBS/CES Description	Unique ID	Pha	COA 1 - Status Quo	COA 2 - Propulsion and OM Mods	COA 3 - Propulsion, Ground Station and OM Mods	Equation / Throughput
18	*INPUT VARIABLES	*IN_VAR					
19	Present Value Year	PV_Yr	C	2012 *	2012 *	2012 *	FYBY
20	Discount Rate	DiscRate	C	7.000 *	7.000 *	7.000 *	7
21	Method to Discount (1= End, 2= Middle, 3=Beginning of year)	DiscMthd	C	2.000 *	2.000 *	2.000 *	2
22	Discount Factor	DiscFactor	F	14.240 *	14.240 *	14.240 *	EADISCFACT(PV_Yr-1, DiscRate, DiscMthd, FYYR)

t...dology (BY2012$K) | 07a - CBA Templ...wer (BY2012$K)

	WBS/CES Description	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022
18	*INPUT VARIABLES											
19	Present Value Year											
20	Discount Rate											
21	Method to Discount (1= End, 2= Mid											
22	Discount Factor	0.967	0.903	0.844	0.789	0.738	0.689	0.644	0.602	0.563	0.526	0.4

Present Value

- **All future costs and benefits are discounted to the present value**
  - The present value is used in several metric calculations like NPV, PI, and IRR
- **Benefits = Cost Savings + Cost Avoidances + Residual Value**
  - Cost Savings = Status Quo Operations – Alternative Operations

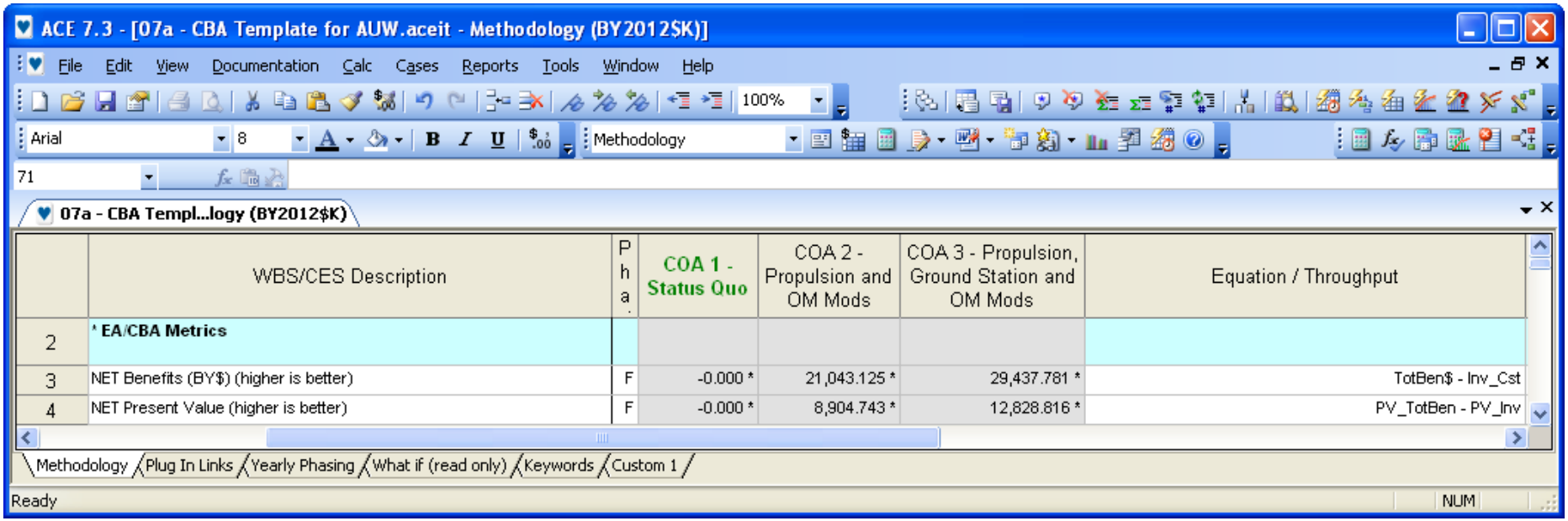
	WBS/CES Description	Unique ID	Pha.	COA 1 - Status Quo	COA 2 - Propulsion and OM Mods	COA 3 - Propulsion, Ground Station and OM Mods	Equation / Throughput
45	**' Status Quo minus Alternative Operations Cost (BY$)**						
46	Total Benefits (BY$)	TotBen$		0.000 *	25,932.475 *	37,061.761 *	
47	Cost Savings (Operations Costs) (BY$)	Save_OpCst	F	0.000 *	25,932.475 *	37,061.761 *	(SQ_MilPers$ + SQ_OS$) - (SelAlt_MilPers$ + SelAlt_OS$)
48	Cost Avoidances (BY$)		F	0.000 *	0.000 *	0.000 *	CstAv$
49	Residual Value (BY$)		F	0.000 *	0.000 *	0.000 *	Res$
50							
57	**' Status Quo minus Alternative Operations Cost (Present Value)**						
58	Total Benefits (PV)	PV_TotBen		0.000 *	11,965.320 *	17,195.539 *	
59	Cost Savings (PV)	PV_Sav	F	0.000 *	11,965.320 *	17,195.539 *	Save_OpCst * DiscFactor
60	Cost Avoidances (PV)	PV_CstAv$	F	0.000 *	0.000 *	0.000 *	CstAv$ * DiscFactor
61	Residual Value (PV)	PV_Res$	F	0.000 *	0.000 *	0.000 *	Res$ * DiscFactor

- **Costs = Alternative Investment – Status Quo Investment**

	WBS/CES Description	Unique ID	Pha.	COA 1 - Status Quo	COA 2 - Propulsion and OM Mods	COA 3 - Propulsion, Ground Station and OM Mods	Equation / Throughput
63	**'Alternative minus Status Quo Investment Cost**						
64	Cost Differential (Investment) (BY$)	Inv_Cst	F	0.000 *	4,889.350 *	7,623.980 *	SelAlt_RDTE$ + SelAlt_Proc$ - SQ_RDTE$ - SQ_Proc$
66	Cost Differential (Investment) (PV)	PV_Inv	F	0.000 *	3,060.576 *	4,366.722 *	Inv_Cst * DiscFactor

Net Present Value (NPV)

- **The difference between the present value of the benefits and the present value of the costs**
  - PV(benefits)-PV(costs)
  - Higher is better



	WBS/CES Description	Pha.	COA 1 - Status Quo	COA 2 - Propulsion and OM Mods	COA 3 - Propulsion, Ground Station and OM Mods	Equation / Throughput
2	* EA/CBA Metrics					
3	NET Benefits (BY$) (higher is better)	F	-0.000 *	21,043.125 *	29,437.781 *	TotBen$ - Inv_Cst
4	NET Present Value (higher is better)	F	-0.000 *	8,904.743 *	12,828.816 *	PV_TotBen - PV_Inv

Uniform Annual Cost

- **A measure of the relative cost of a project used to compare alternatives with unequal lives**
  - Calculated by dividing the present value of the costs of an alternative by the sum of the discount factors for the years the system provides benefits
  - UAC = PV(total project cost) / sum of discount factors

	WBS/CES Description	Unique ID	Pha.	COA 1 - Status Quo	COA 2 - Propulsion and OM Mods	COA 3 - Propulsion, Ground Station and OM Mods	Equation / Throughput
2	* EA/CBA Metrics						
16	Uniform Annual Cost (lower is better)		C	46,131.467 *	45,275.670 *	44,898.544 *	SelAlt_TotPV$ / DisFactSum
17							
18	*INPUT VARIABLES	*IN_VAR					
22	Discount Factor	DiscFactor	F	14.240 *	14.240 *	14.240 *	EADISCFACT(PV_Yr-1, DiscRate, DiscMthd, FYYR)
23	Sum of Discount Factors	DisFactSum	C	10.405 *	10.405 *	10.405 *	FYCCUM(@DiscFactor,OpLastYr)
37							
38	* Present Value for selected case						
39	Total Cost (Present Value)	SelAlt_TotPV$		$ 480,007.164 *	$ 471,102.421 *	$ 467,178.348 *	
40	RDT&E		F	$ 37,339.085 *	$ 37,799.418 *	$ 39,093.852 *	SelAlt_RDTE$ * DiscFactor
41	Procurement		F	$ 332,046.960 *	$ 334,647.203 *	$ 334,658.914 *	SelAlt_Proc$ * DiscFactor
42	Military Personel		F	$ 0.000 *	$ 0.000 *	$ 0.000 *	SelAlt_MilPers$ * DiscFactor
43	Operations & Support		F	$ 110,621.120 *	$ 98,655.800 *	$ 93,425.581 *	SelAlt_OS$ * DiscFactor

Profitability Index (PI) & Cost Benefit Ratio (CBR)

- **PI and CBR are the inverse of each other**
- **PI - the present value of total benefits divided by the present value of the total costs (Benefit/Cost ratio)**
  - PV(total benefits)/PV(total costs)
  - >1; Higher is better
- **CBR - the present value of total costs divided by the present value of the total benefits**
  - PV(total costs)/PV(total benefits)
  - <1; Lower is better

	WBS/CES Description	Pha.	COA 1 - Status Quo	COA 2 - Propulsion and OM Mods	COA 3 - Propulsion, Ground Station and OM Mods	Equation / Throughput
2	* **EA/CBA Metrics**					
5	Profitability Index (Benefit/Cost Ratio) (>1, higher is better)	C	0.000 *	3.909 *	3.938 *	IF(PV_Inv=0,0,PV_TotBen / PV_Inv)
8	Cost Benefit Ratio (<1, lower is better)	C	1.000 *	0.256 *	0.254 *	IF(PV_TotBen<=0,1,PV_Inv / PV_TotBen)

Savings Investment Ratio and Benefit Investment Ratio

- **Both ratios are related to the Profitability Index**
  - Slight variations in numerator and denominator
- **Savings Investment Ratio (SIR)**
  - SIR = PV(cost savings)/(PV(costs)-PV(residual value))
  - >1; Higher is better
- **Benefit Investment Ratio (BIR)**
  - BIR = (PV(cost savings)+PV(cost avoidance))/(PV(costs)-PV(residual value))
  - >1; Higher is better

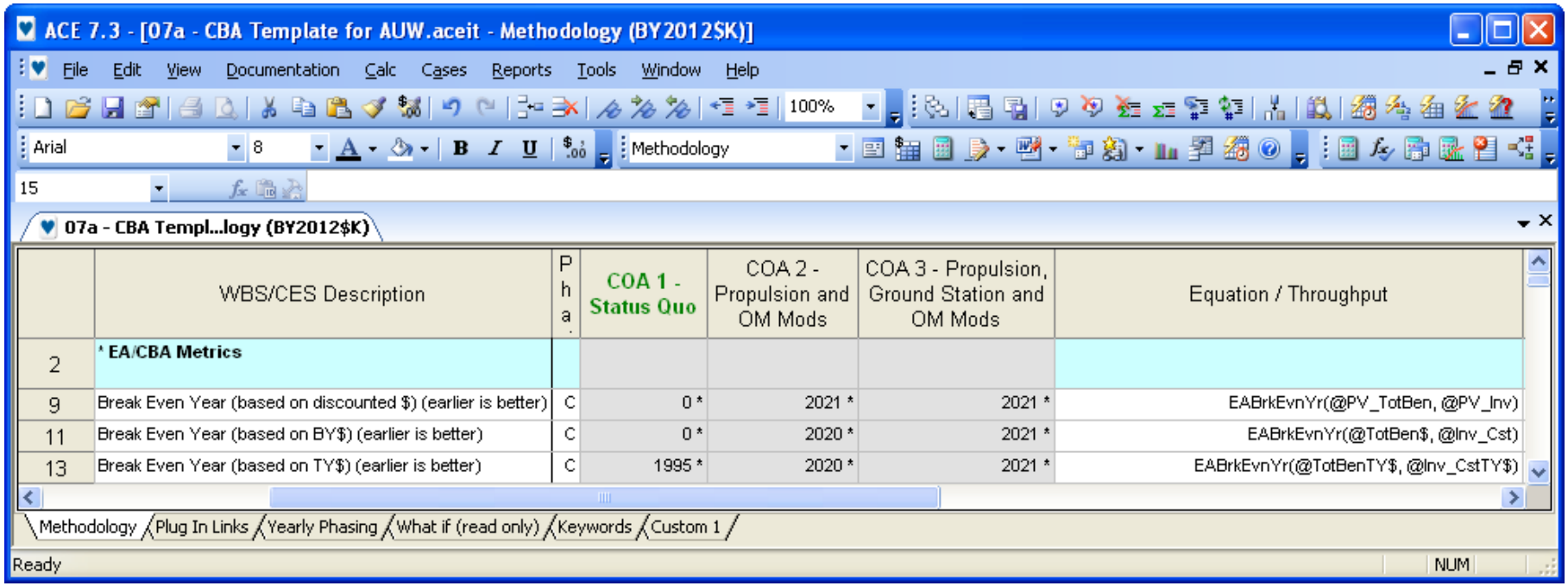
	WBS/CES Description	Pha.	COA 1 - Status Quo	COA 2 - Propulsion and OM Mods	COA 3 - Propulsion, Ground Station and OM Mods	Equation / Throughput
2	' **EA/CBA Metrics**					
6	Savings Investment Ratio (SIR) (>1)	C	0.000 *	3.909 *	3.938 *	IF(PV_Inv=0,0,PV_Sav / (PV_Inv-PV_Res$))
7	Benefit Investment Ratio (BIR) (>1)	C	0.000 *	3.909 *	3.938 *	IF(PV_Inv=0,0,(PV_Sav+PV_CstAv$) / (PV_Inv-PV_Res$))

Break Even Year

- The point (year) where the investment cost is recovered
- Use the EABrkEvnYr Function

  EABrkEvnYr (@savings, @invest**)**

  - @savings – row where the annual savings cost data is contained
  - @invest – row where the annual investment cost data is contained
- Calculation is typically in current year dollars but can be done in discounted or BY dollars



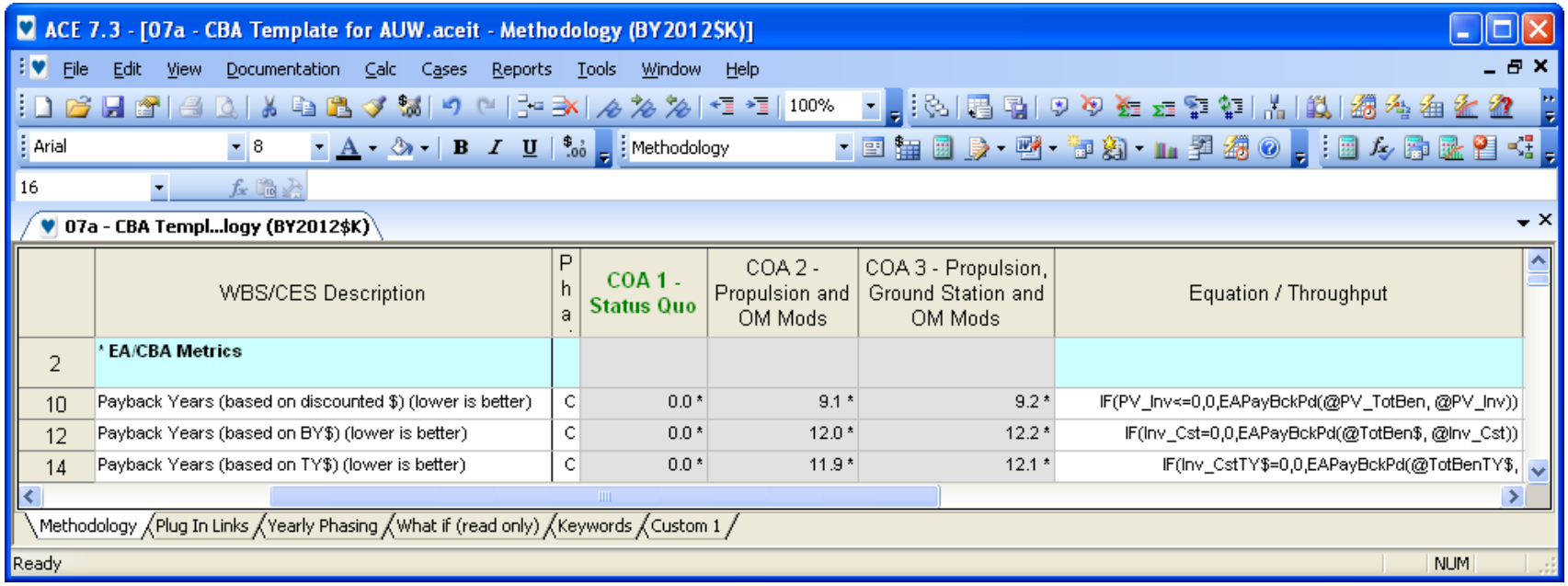
	WBS/CES Description	Pha	COA 1 - Status Quo	COA 2 - Propulsion and OM Mods	COA 3 - Propulsion, Ground Station and OM Mods	Equation / Throughput
2	* EA/CBA Metrics					
9	Break Even Year (based on discounted $) (earlier is better)	C	0 *	2021 *	2021 *	EABrkEvnYr(@PV_TotBen, @PV_Inv)
11	Break Even Year (based on BY$) (earlier is better)	C	0 *	2020 *	2021 *	EABrkEvnYr(@TotBen$, @Inv_Cst)
13	Break Even Year (based on TY$) (earlier is better)	C	1995 *	2020 *	2021 *	EABrkEvnYr(@TotBenTY$, @Inv_CstTY$)

Payback Period

- **The number of years (period) required to recover an investment cost**
- **Use the EAPayBckPd Function**

  EAPayBckPd (@savings, @invest**)**

  - **@savings – row where the annual savings cost data is contained**
  - **@invest – row where the annual investment cost data is contained**
- **Calculation is typically in current year dollars but can be done in discounted or BY dollars**



	WBS/CES Description	Pha	COA 1 - Status Quo	COA 2 - Propulsion and OM Mods	COA 3 - Propulsion, Ground Station and OM Mods	Equation / Throughput
2	* EA/CBA Metrics					
10	Payback Years (based on discounted $) (lower is better)	C	0.0 *	9.1 *	9.2 *	IF(PV_Inv<=0,0,EAPayBckPd(@PV_TotBen, @PV_Inv))
12	Payback Years (based on BY$) (lower is better)	C	0.0 *	12.0 *	12.2 *	IF(Inv_Cst=0,0,EAPayBckPd(@TotBen$, @Inv_Cst))
14	Payback Years (based on TY$) (lower is better)	C	0.0 *	11.9 *	12.1 *	IF(Inv_CstTY$=0,0,EAPayBckPd(@TotBenTY$,

Internal Rate of Return

- **Internal Rate of Return (IRR) – Also known as Return on Investment (ROI)**
  - The discount rate at which the present value of the investment cost equals the present value of the savings; discount rate where NPV=0
  - Calculate this value using the "Calc with CAIV" option
- **Set up an IRR CAIV line where PV(Benefits) - PV(Cost) = 0 at the IRR**
- **Use the EADiscVal Function**

  EADiscVal (value, project_year, rate, method, [current_year] **)**
  - **Value – the cost value to be discounted**
  - **Project Year – zero year of project**
  - **Rate – rate used to develop annual multipliers**
  - **Method – indicator variable for cost accrual method**

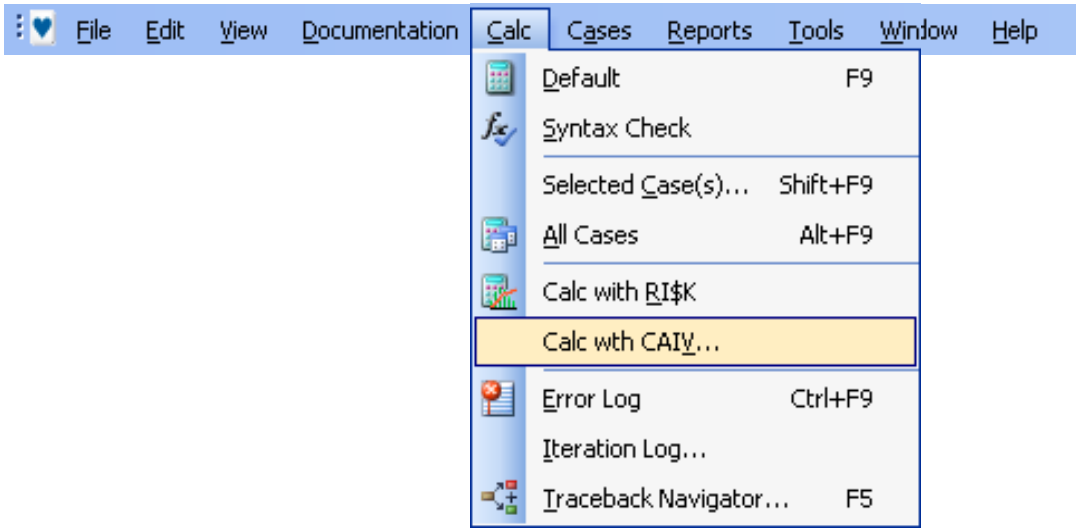
	WBS/CES Description	Pha	COA 1 - Status Quo	COA 2 - Propulsion and OM Mods	COA 3 - Propulsion, Ground Station and OM Mods	Equation / Throughput
18	'INPUT VARIABLES					
24	IRR CAIV line (where PV(Cost) = PV(Benefits))	F	-0.000 *	13,846.069 *	20,046.904 *	EADiscVal(TotBen$, PV_Yr-1,IRR, DiscMthd) - EADiscVal(Inv_Cst, PV_Yr-1,IRR, DiscMthd)
25						

Internal Rate of Return (cont.)

- **Add a row for the IRR and give it a starting value**
  - This will be the free variable row that iterates until PV(Benefits) = PV(Cost)

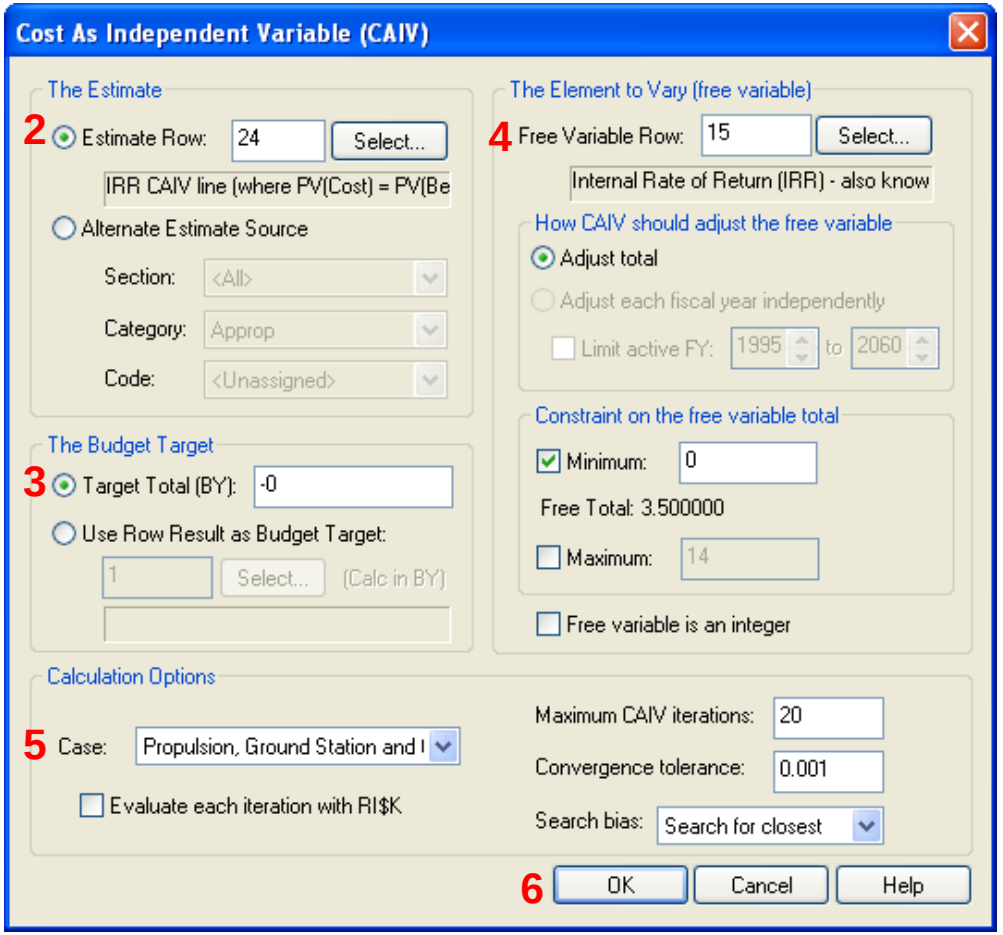
	WBS/CES Description	Pha.	COA 1 - Status Quo	COA 2 - Propulsion and OM Mods	COA 3 - Propulsion, Ground Station and OM Mods	Equation / Throughput
2	* EA/CBA Metrics					
15	Internal Rate of Return (IRR) - also known as Return on Investment (ROI) (higher is better)	C	3.500 *	3.500 *	3.500 *	3.5 [starting value for CAIV]

- **Steps to calculate with CAIV :**
  1. Select Calc/Calc with CAIV



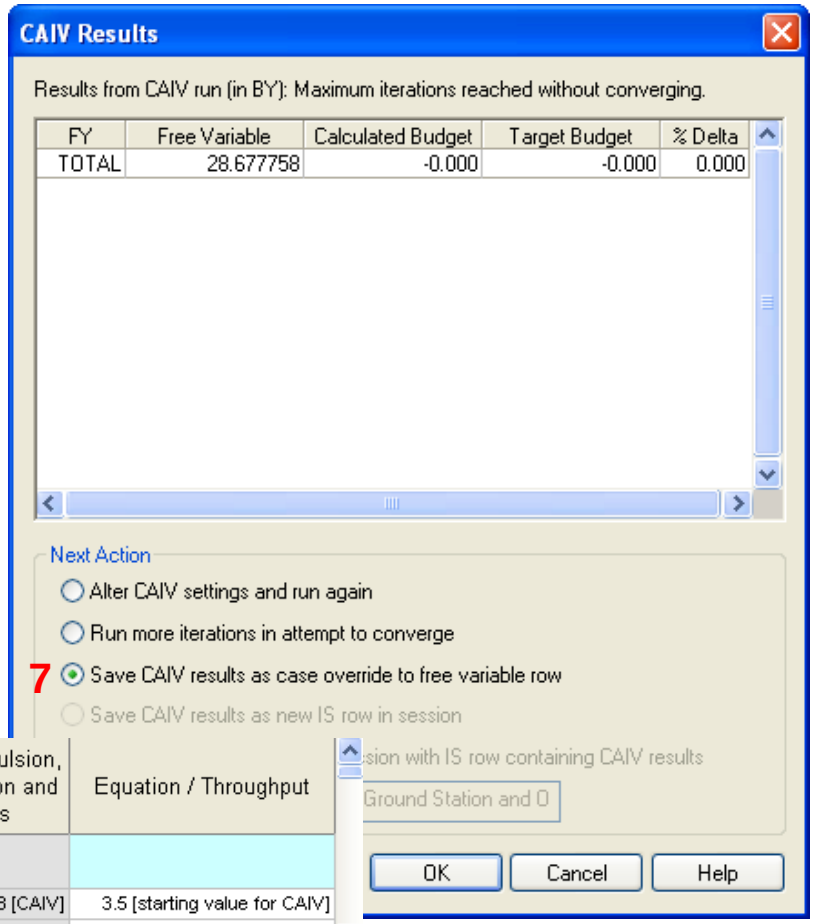
Internal Rate of Return (cont.)

- **Steps to calculate with CAIV (cont.):**
  2. Set Estimate Row to “IRR CAIV line (where PV(Cost) = PV(Benefits))” row
  3. Make sure Target Total (BY) is “0”
  4. Set Free Variable Row to “Internal Rate of Return (IRR) row
  5. Under Calculation Options select the appropriate case
  6. Click OK



Internal Rate of Return (cont.)

- **Steps to calculate with CAIV (cont.):**
  7. Once the CAIV calculation has converged you will have several options. Select "Save case results as case override to free variable row" and click OK
  8. You must now calculate the case to see results on the IRR row

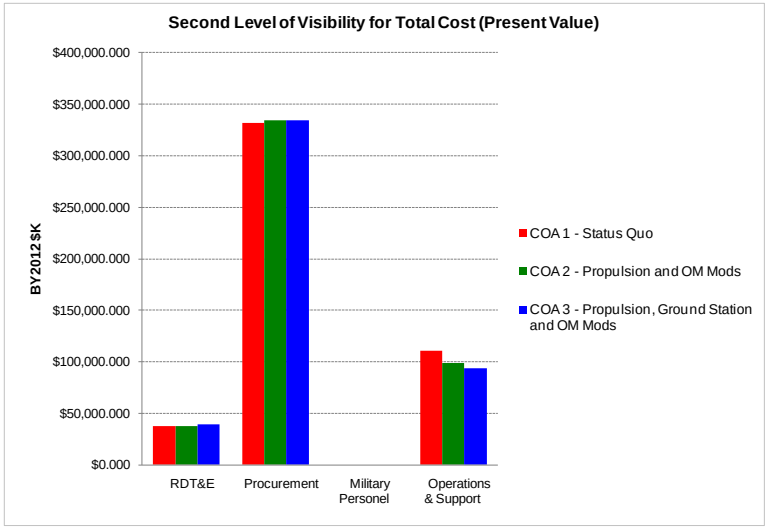


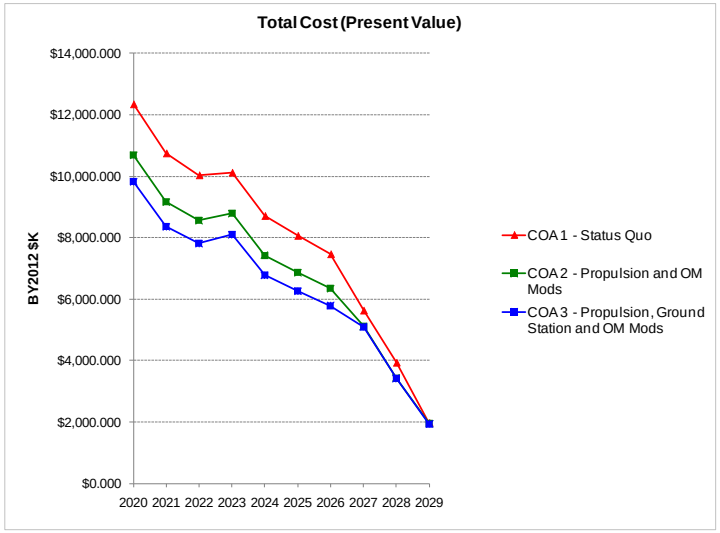
	WBS/CES Description	Pha	COA 1 - Status Quo	COA 2 - Propulsion and OM Mods	COA 3 - Propulsion, Ground Station and OM Mods	Equation / Throughput
2	* EA/CBA Metrics					
15	Internal Rate of Return (IRR) - also known as Return on	C	8 3.500 *	32.7184 [CAIV]	28.6778 [CAIV]	3.5 [starting value for CAIV]
24	IRR CAIV line (where PV(Cost) = PV(Benefits))	F	-0.000 *	-0.000 *	-0.000 *	EADiscVal(TotBen$,

Step 8 – Report Results

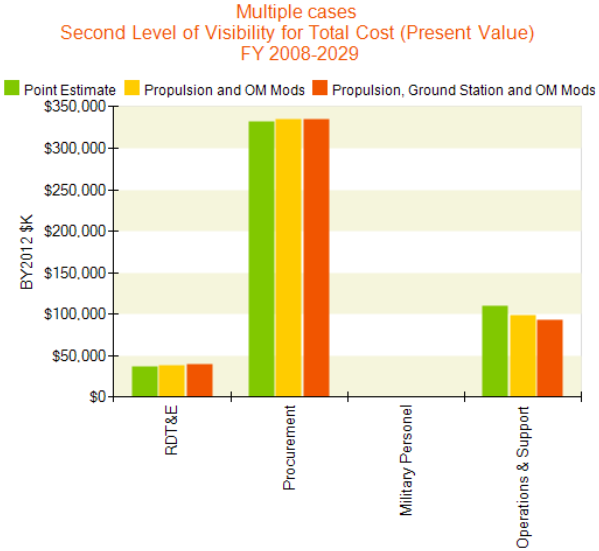
Compare Costs Across Alternatives

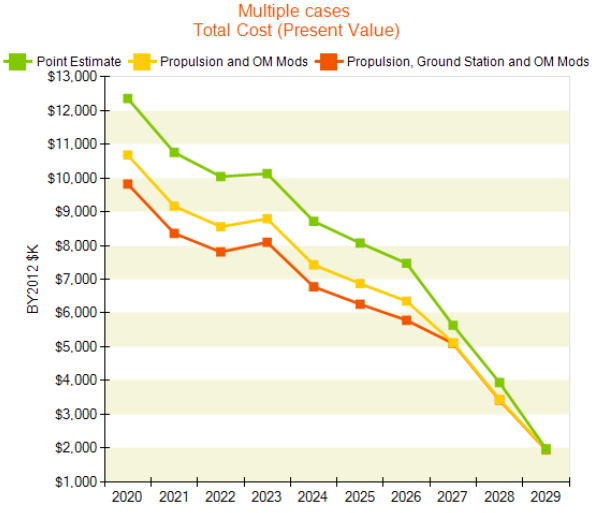
POST





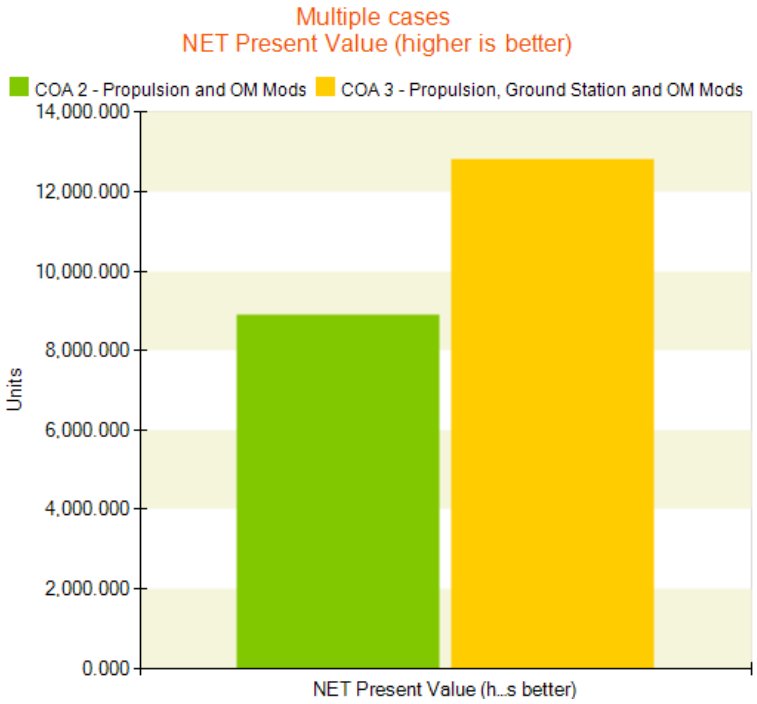
ACE

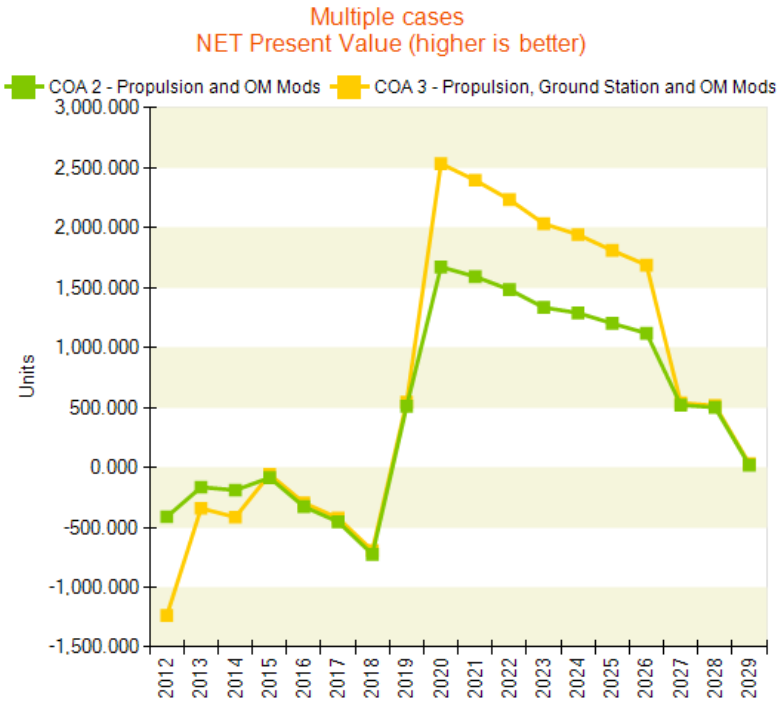




Compare Metrics

- **Net Present Value**





Time Phased Delta Report

- **Highlight the magnitude of Costs and Savings**

Costs in BY2012 $K	Total	2012	2013	2014	2015	2016	2017	2018	2019
COA 1 - Status Quo	$480,007.164	$47,078.654	$29,080.591	$28,365.880	$26,312.060	$54,140.531	$66,023.125	$90,387.824	$59,518.422
COA 2 - Propulsion and OM Mods	$471,102.421	$47,489.944	$29,244.399	$28,554.415	$26,396.596	$54,466.469	$66,475.906	$91,111.719	$59,00
Delta (Δ)	-$8,904.743	$411.290	$163.808	$188.535	$84.536	$325.938	$452.781	$723.896	-$
Percent Δ	(1.86%)	0.87%	0.56%	0.66%	0.32%	0.60%	0.69%	0.80%	(
Threshold	Low Save	Low Cost	Low Cost	Low Cost	Low Cost	Low Cost	Low Cost	Low Cost	Low Sa
COA 3 - Propulsion, Ground Station and OM	$467,178.348	$48,312.889	$29,420.694	$28,779.724	$26,368.863	$54,435.134	$66,444.634	$91,079.697	$58,973.13
Delta (Δ)	-$12,828.816	$1,234.235	$340.103	$413.843	$56.803	$294.603	$421.509	$691.873	-$54
Percent Δ	(2.67%)	2.62%	1.17%	1.46%	0.22%	0.54%	0.64%	0.77%	
Threshold	Save	Low Cost	Low Cost	Low Cost	Low Cost	Low Cost	Low Cost	Low Cost	Lo

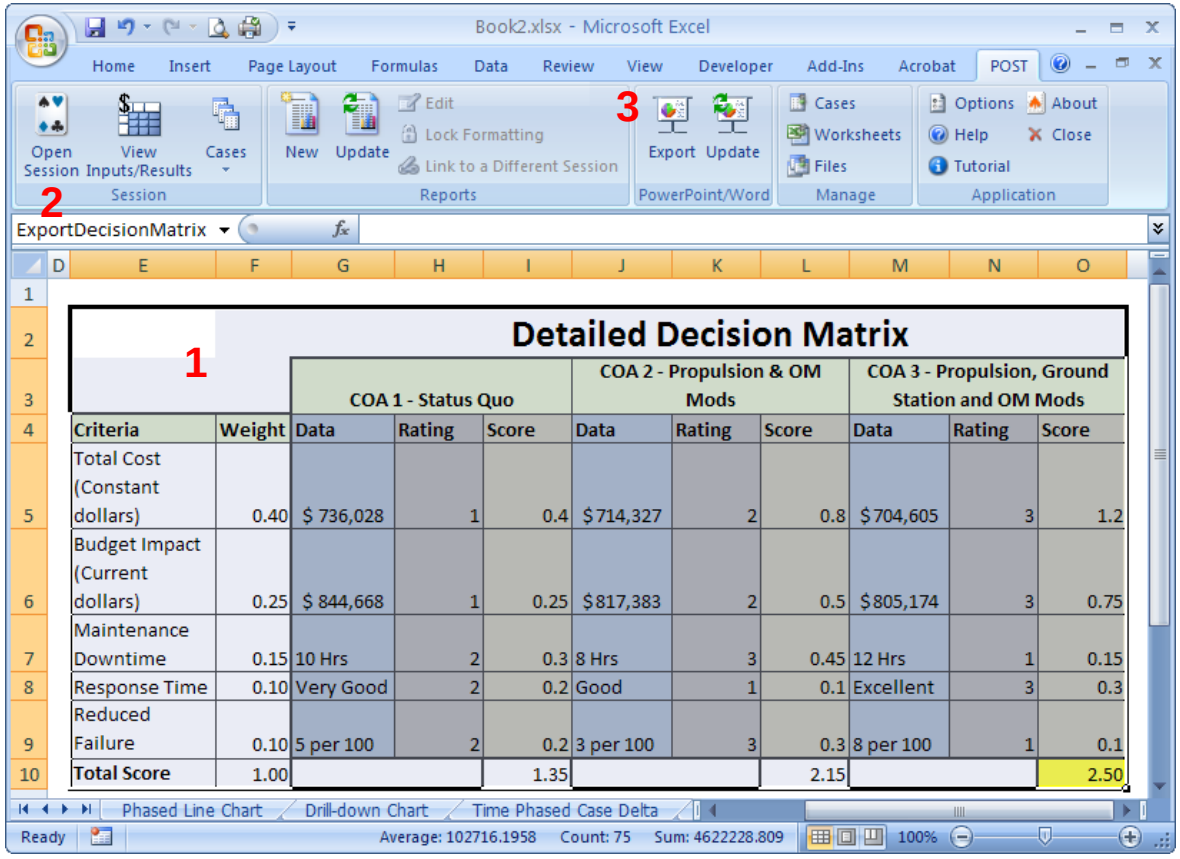
	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
8.422	$12,359.069	$10,759.141	$10,044.796	$10,130.220	$8,719.568	$8,071.846	$7,472.207	$5,635.516	$3,936.018	$1,971.696
$59,007.434	$10,685.187	$9,165.570	$8,559.461	$8,794.822	$7,429.224	$6,869.258	$6,351.265	$5,113.828	$3,434.333	$1,952.590
-$510.988	-$1,673.882	-$1,593.571	-$1,485.335	-$1,335.398	-$1,290.344	-$1,202.589	-$1,120.942	-$521.688	-$501.684	-$19.106
(0.86%)	(13.54%)	(14.81%)	(14.79%)	(13.18%)	(14.80%)	(14.90%)	(15.00%)	(9.26%)	(12.75%)	(0.97%)
w Save	Med Save	Med Save	Med Save	Med Save	Med Save	Med Save	Med Save	Save	Med Save	Low Save
973.133	$9,823.348	$8,361.547	$7,809.329	$8,094.974	$6,776.302	$6,260.137	$5,782.960	$5,095.783	$3,418.866	$1,940.335
-$545.289	-$2,535.721	-$2,397.594	-$2,235.467	-$2,035.246	-$1,943.266	-$1,811.709	-$1,689.247	-$539.733	-$517.152	-$31.361
(0.92%)	(20.52%)	(22.28%)	(22.25%)	(20.09%)	(22.29%)	(22.44%)	(22.61%)	(9.58%)	(13.14%)	(1.59%)
Low Save	High Save	High Save	High Save	High Save	High Save	High Save	High Save	Save	Med Save	Low Save

Custom Reports

- ACE and POST have numerous standard tabular and graphical output options
- Organizations sometimes like to see results in a format not part of the standard output options
- Use POST to create a custom output format and export to PowerPoint

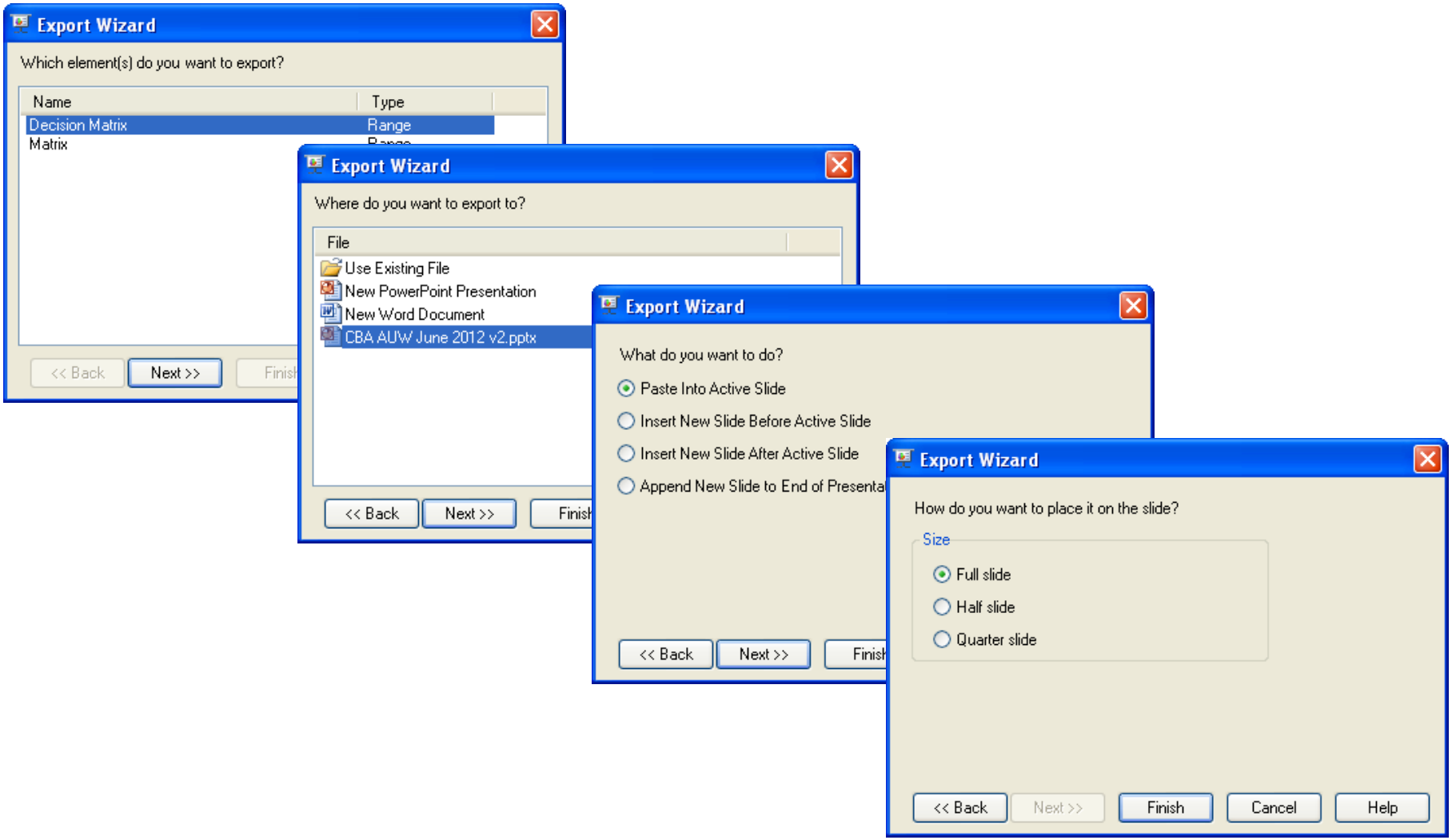
Creating Custom Reports

- **Use Excel and POST to create/export standard reports**
  1. Create a custom output in Excel and link to results from a standard POST report
  2. Give it an “Export” range name
  3. Export to PowerPoint as usual



Custom Reports (cont.)

- **Export Wizard recognizes range name**



Custom Report

- **Custom Report can be updated like other POST reports**

Detailed Decision Matrix

		COA 1 - Status Quo			COA 2 - Propulsion & OM Mods			COA 3 - Propulsion, Ground Station and OM Mods		
Criteria	**Weight**	**Data**	**Rating**	**Score**	**Data**	**Rating**	**Score**	**Data**	**Rating**	**Score**
Total Cost (Constant dollars)	0.40	$ 736,028	1	0.4	$714,327	2	0.8	$704,605	3	1.2
Budget Impact (Current dollars)	0.25	$ 844,668	1	0.25	$817,383	2	0.5	$805,174	3	0.75
Maintenance Downtime	0.15	10 Hrs	2	0.3	8 Hrs	3	0.45	12 Hrs	1	0.15
Response Time	0.10	Very Good	2	0.2	Good	1	0.1	Excellent	3	0.3
Reduced Failure	0.10	5 per 100	2	0.2	3 per 100	3	0.3	8 per 100	1	0.1
Total Score	1.00			1.35			2.15			2.50

Conclusions

- **ACEIT can be used effectively to support Army CBA requirements**
  - At the core of a successful CBA is a solid estimate – ACEIT implements the standard Army Cost Estimating Process
  - Status Quo and multiple Alternative estimates easily combined via ACE-to-ACE Plug-In (not shown)
  - CBA Metrics are easily calculated
  - POST can be used to automate reports and link to the CBA briefing template
- **Extensions**
  - For apples-to-apples comparison, use ACEIT/RI$K to perform CBA with consistent risk-adjusted estimates (e.g., normalized to 50% cost confidence level).