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Accurately Mapping Third-party Tool Results into ACE

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 - 8+ years in the Los Angeles Division
 - Global Positioning System Wing, Deputy Task Manager
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- Sr. Consultant with Galorath, Inc.
 - 4+ years supporting the Los Angeles Division of Tecolote
 - Primarily supports GPS Wing



Third-party Tool Use with ACE

- **ACE supports third-party tools very well**
 - Parametric estimation tools (such as SEER tool suite)
 - Risk/Statistical tools (such as @Risk and Crystal Ball)
- **The results from these tools can be brought into ACE manually (typing the results into ACE) or in some automated fashion (e.g. using the Excel-to-Ace plug-in)**
- **This presentation will focus WHY and HOW to use the results from third-party tools in ACE**





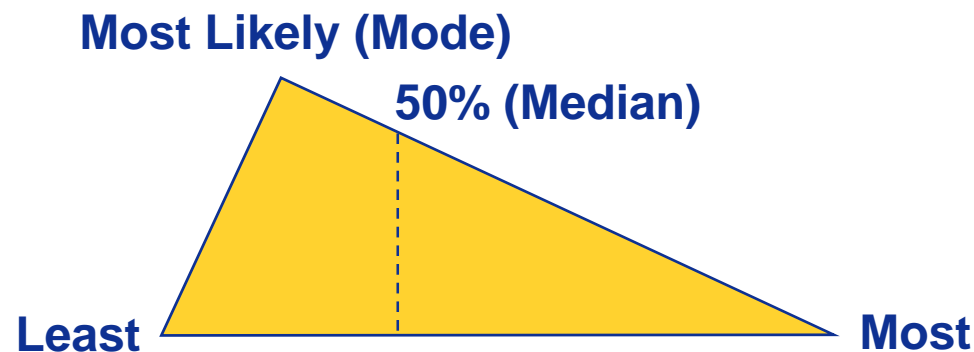
- **SEER suite of tools are parametric models that estimate the cost, effort, and schedule for the development and production of hardware and software**
- **Model of interest in this discussion is the SEER model for estimating software (SEER-SEM)**
 - There also exists SEER models for estimating hardware (SEER-H), and Integrated Circuits (SEER-IC)
- **Estimates generated with the SEER models will frequently be used as inputs into the ACEIT model in building a complete system estimate**
- *The process employed in this example uses SEER results, but can be used with results from any third-party tool*





There is an issue with using the standard distributions within ACE

- The standard result for SEER configuration items with risk adjusted inputs is the 50% confidence level value (median)
- For non-Normal type distributions, ACE is expecting the Most Likely value (mode)
- Example: A Triangular Distribution





Why this is an issue ...

- Illustration will use examples from SEER
- If you enter the output from SEER models (the 50% confidence value or median) into ACE as the Most Likely value, you may introduce statistical error
- For SEER models (and many other parametric models), a Lognormal distribution will provide a very good approximation of the results in the 50% to 80% confidence level areas of the S-curve; However, outside of this range the results may be significantly different

User-defined Cumulative Distribution Function (CDF) capability in ACEIT 7.1a, allows the results from third party tools to be mapped very accurately into ACE



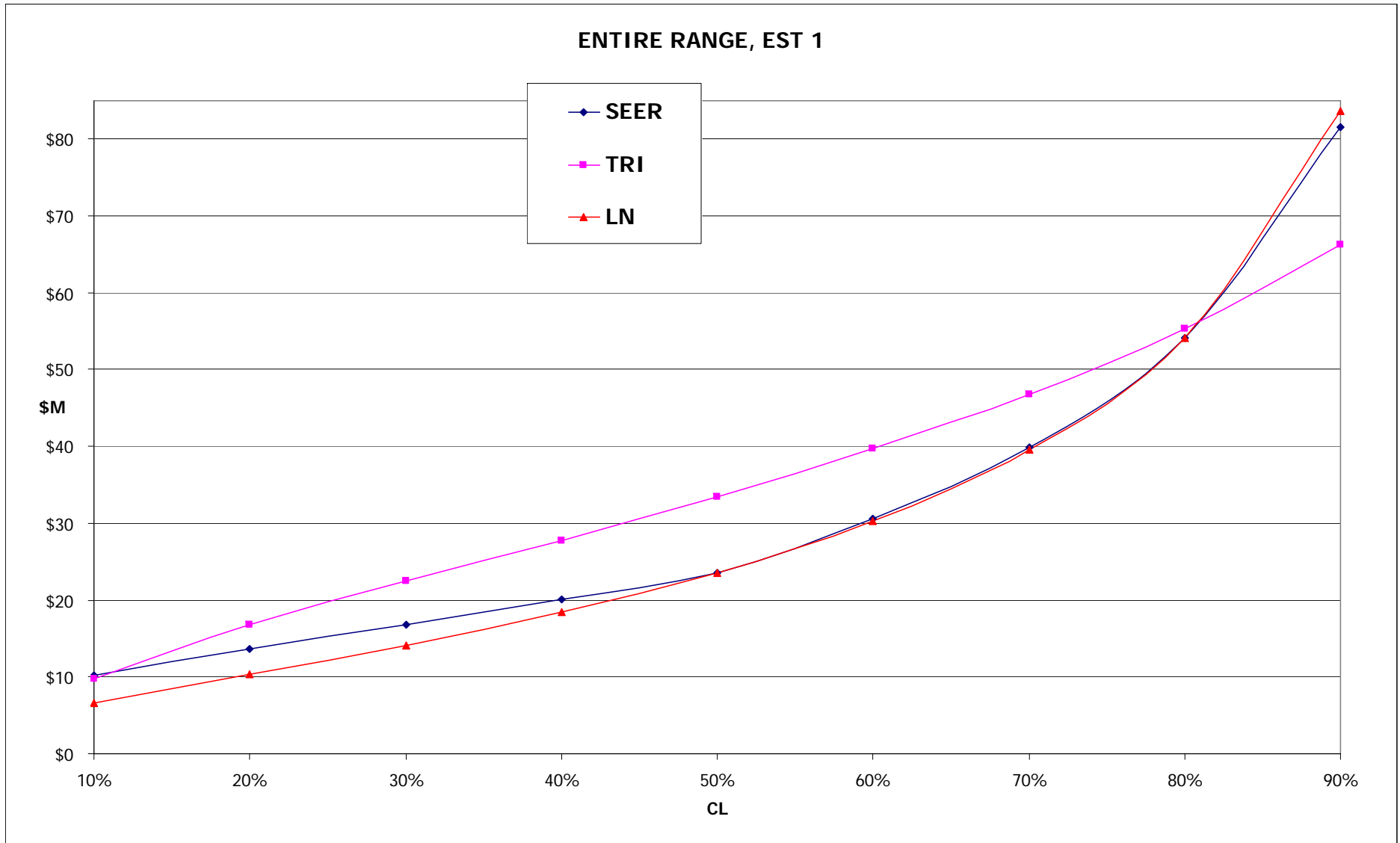


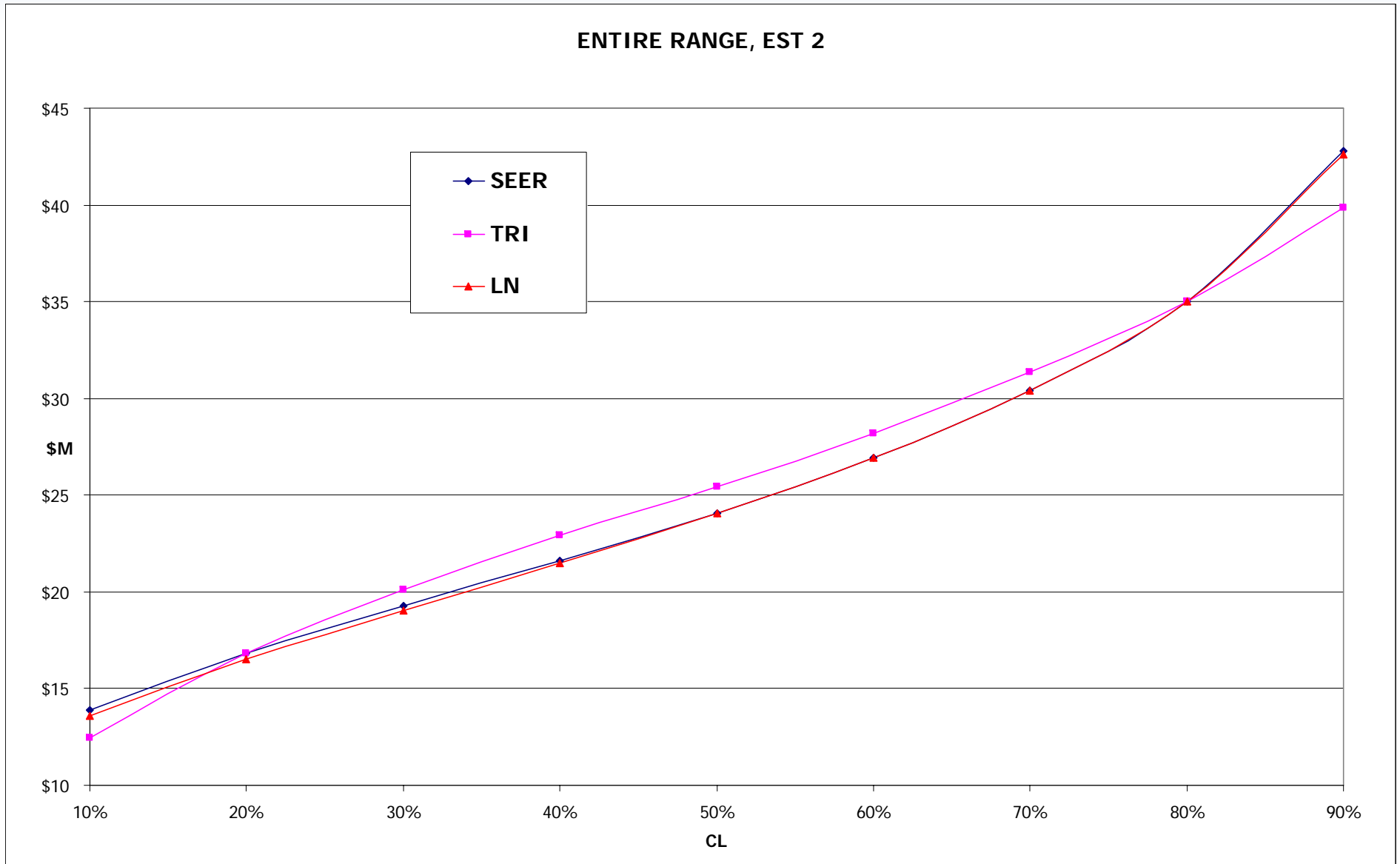
- **Example will use SEER and will demonstrate challenges with using current guidance**
- **Three estimates**
 - Estimate 1
 - 'Regular' right-skewed example
 - Estimate 2
 - Lower risk example
 - Estimate 3
 - High risk, highly right-skewed example





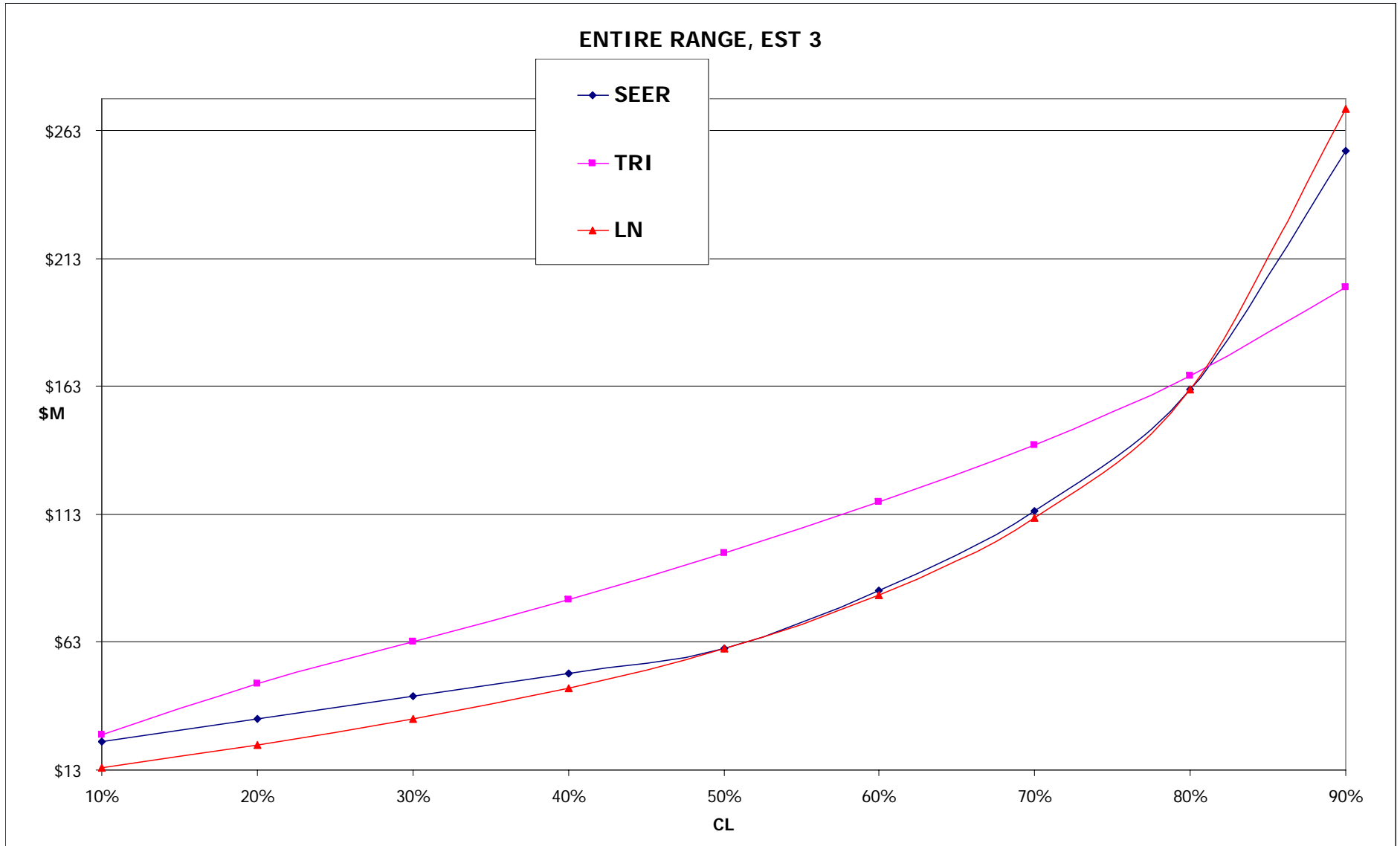
'Regular' right-skewed example







High risk, highly right-skewed





User-defined Cumulative Distribution Function (CDF)

■ **New in ACEIT 7.1**

- Allows the user to enter percentile/factor pairs to accurately describe a user-defined (or third-party model defined) risk distribution curve
- The percentile is the confidence level of the data point; the multiplier is the percentage of the 50% data point

■ **Example: Distribution curve where,**

<u>% CL</u>	<u>Value</u>	<u>Percentage to PE (50%CL value)</u>
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- **The CDF dialog allows the user to enter custom, specific Confidence Level % and Multiplier pairs to be entered**
- **This information can be**
 - Input manually in ACE
 - “Fat-fingered”
 - Copy/Pasted
 - Brought into ACE in an automated fashion using the Excel-to-ACE plug-in

Edit Custom CDF [X]

Name:

Confidence and multiplier must be in ascending order. The next multiplier can be equal to the previous one. Confidence is percentage number between 0 and 100. Multiplier is a factor of the point estimate. For example, you may have 1.0 at 50% confidence and 1.25 at 75% confidence.

	Confidence (%)	Multiplier
1	1.000000000000	0.680000000000
2	10.000000000000	0.606000000000
3	20.000000000000	0.755480000000
4	30.000000000000	0.831028000000
5	40.000000000000	0.914130800000
6	50.000000000000	1.000000000000
7	60.000000000000	1.100000000000
8	70.000000000000	1.210000000000
9	80.000000000000	1.331000000000
10	90.000000000000	1.464100000000
11	99.000000000000	1.610510000000
12		

Is discrete distribution (no interpolation)

OK Cancel Help



- **The easiest method of getting the risk information for each CSCI is by using the Flexible Export feature in SEER**
- **In the output section of the Flexible Export dialog are the risk outputs (Risk Development Schedule, Effort, and Cost)**
- **This feature will allow the user to output information to Excel quickly and easily**





Flexible Export Screen

Flexible Export [Close]

Load/Save Template Options Template

Available Outputs

- ETC Maint Cost
- RISK ANALYSIS REPORT
- Risk Probabilities
- Risk Development Schedule Months
- Risk Development Effort Months
- Risk Development Cost
- Risk Maintenance Effort Months
- Risk Maintenance Cost
- TIME PHASED DEFECTS REPORT
- MONTHLY DEFECTS
- Defects Inserted By Month
- Defects Removed By Month

Available Inputs

- [spacer]
- [new line]
- WBS Element Description
- WBS Element Index
- Unit Type
- Outline Number
- Analyst
- Created
- Modified
- Fiscal Year Start Month
- Cost Escalation Factor
- Productive Hours Per Person Month

Selected Choices

- WBS Element Description
- Risk Development Cost

Buttons: Add -, Add All -, Move Up, Move Down, Remove, Remove All

Current Template:
Cost Risk and Schedule Export (modified)

Buttons: Export, Save Template, Close, Help



- This information can be pasted into Excel

The screenshot shows a Microsoft Excel spreadsheet with the following data:

	A	B	C	D	E	F	G	H	I	J	K	L
1												
2	1%	10%	20%	30%	40%	50%	60%	70%	80%	90%	99%	
3												
4	ACE Test											
5												
6	Risk Estimate A											
7	4,817,276	10,159,981	13,670,119	16,843,839	20,072,111	23,593,273	30,538,901	39,928,696	54,160,638	81,580,504	206,003,825	
8	Risk Estimate B											
9	8,696,061	13,876,743	16,801,780	19,257,376	21,620,970	24,079,754	26,939,275	30,391,050	35,032,886	42,769,065	69,538,602	
10	Risk Estimate C											
11	9,903,861	23,391,007	32,667,985	41,239,828	50,098,553	59,892,000	82,542,062	113,648,999	161,424,965	254,586,314	682,821,878	
12												
13												
14												
15												
16												
17												
18												



- Once the information is in Excel, the percentile/factor pairs need to be created.
- To input the information into ACE manually, formulas in Excel to divide each value with the 50% value can be used

Microsoft Excel - Master File.xls:2

File Edit View Insert Format Tools Data Window Help

Type a question for help

Arial 10 B I U

Reply with Changes... Epd Review...

H7 =SEER Output!H7/SEER Output!\$F7

	A	B	C	D	E	F	G	H	I	J	K	
1												
2		1%	10%	20%	30%	40%	50%	60%	70%	80%	90%	99%
3												
4	ACE Test											
5												
6	Risk Estimate A											
7		20%	43%	58%	71%	85%	100%	129%	169%	230%	346%	873%
8	Risk Estimate B											
9		36%	58%	70%	80%	90%	100%	112%	126%	145%	178%	289%
10	Risk Estimate C											
11		17%	39%	55%	69%	84%	100%	138%	190%	270%	425%	1140%
12												
13												
14												
15												
16												
17												
18												

ACE Data - Automatic ACE Data - Manual SEER Output

Ready NUM



Type the Information into the CDF Window

Edit Custom CDF [X]

Name:

Confidence and multiplier must be in ascending order.
The next multiplier can be equal to the previous one.
Confidence is percentage number between 0 and 100.
Multiplier is a factor of the point estimate. For example,
you may have 1.0 at 50% confidence and 1.25 at 75%
confidence.

	Confidence (%)	Multiplier
1	1.000000000000	0.204000000000
2	10.000000000000	0.430000000000
3	20.000000000000	0.580000000000
4	30.000000000000	0.710000000000
5	40.000000000000	0.850000000000
6	50.000000000000	1.000000000000
7	60.000000000000	1.290000000000
8	70.000000000000	1.690000000000
9	80.000000000000	2.300000000000
10	90.000000000000	3.460000000000
11	99.000000000000	8.731000000000
12		

Is discrete distribution (no interpolation)

OK Cancel Help



*To automate the process you need
to follow a specific file format*

- **Sample files available in ACE Admin (“Excel Plug-in Example” files)**
- **You must leave the name of the ACE Input worksheet. You can delete rows that you are not using.**

Microsoft Excel - Excel Plug-in Example (row oriented).xls [Read-Only]

File Edit View Insert Format Tools Data Window Help

Arial 10 B I U

H17

	B	C	D	E	F	G	H	I	J	K
1	Cost Data Information			Cost or Non-cost			Yearly Cost or I			
2	WBS/CES Description	Link ID	Cost Phasing Method	Approp	Fiscal Year	Units	Total	FY 2006	FY	F
3	Total	TOTAL								
4	Manufacturing	MFGR								
5	Air Vehicle	AV	BY	MIPA	2006	\$K		\$9,086.95	\$9,086.95	
6	Integration	INT	BY	MIPA	2006	\$K		\$1,363.04	\$1,363.04	
7	SEPM	SEMP	BY	MIPA	2004	\$K		\$3,866.50	\$3,866.50	
8										
9	Systems Operational Life	OpLife						10		
10	COTS Antenna Unit Cost	COT\$		MIPA	2006	\$K	\$12.00			
11	Annual Processor Unit Cost	PROC\$	BY	MIPA	2006	\$K		\$8.00	\$7.00	
12	AV Replacement Factors Processor	ProcRepRate					0.016			
13	AV Replacement Factors Amplifier	AmpRepRate					0.018			
14	AV Replacement Factors Antenna	AntRepRate					0.025			
15	System Buy Schedule	BuyQty							5	5

ACE Import Data | Logistics Report | Risk CDF Sample Data

Draw AutoShapes

Ready NUM





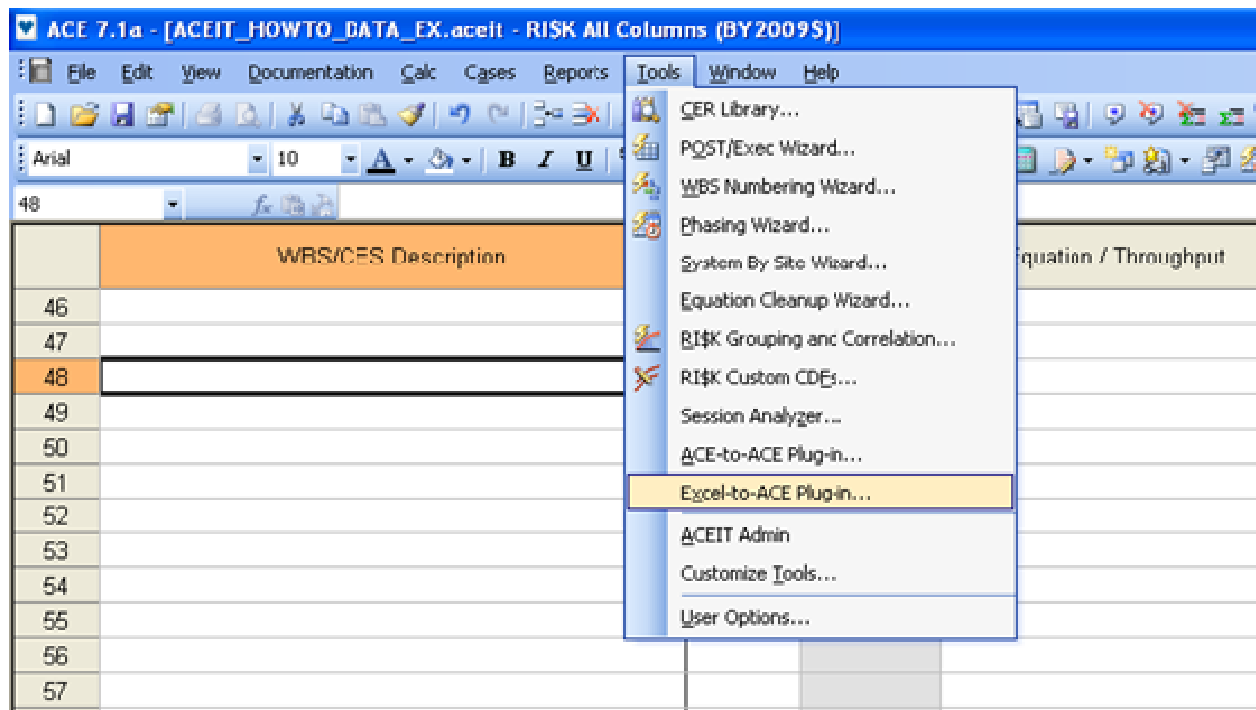
- Can use CSV macro (in the example files) or build cell using the CONCATENATE function in Excel

The screenshot shows Microsoft Excel with the following data in the spreadsheet:

	B	C	D	E	F	G	H	I
1							Risk parameters	
2	WBS/CES Description	Link ID	Approp	Fiscal Year	Units	Total	Probability Level	Point Estimate Multiplier
3	Risk Estimate A	Excel_CSCIA_SEER	3600	2007	\$M	23593273	1,10,20,30,40,50,60,70,80,90,99	0.204180064376825,0.430630417407538,0.57940748619320
4	Risk Estimate B	Excel_CSCIB_SEER	3600	2007	\$M	24079754	1,10,20,30,40,50,60,70,80,90,99	0.361135790672945,0.576282589930113,0.69775546710319
5	Risk Estimate C	Excel_CSCIC_SEER	3600	2007	\$M	59892000	1,10,20,30,40,50,60,70,80,90,99	0.165362001602885,0.39055311226875,0.54544822346891
6								
7								
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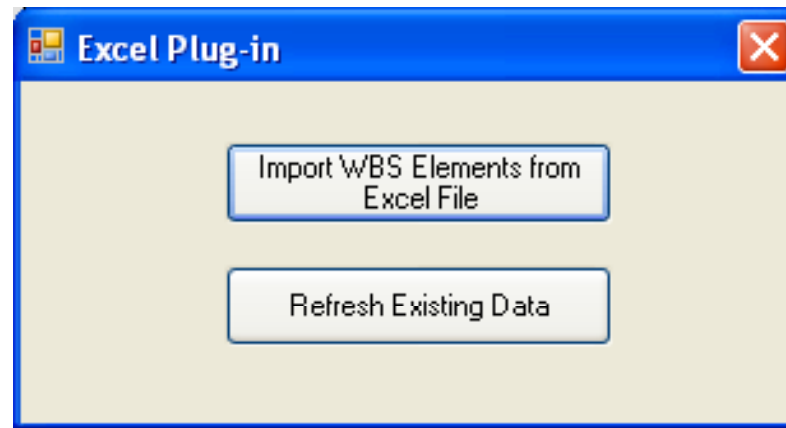


■ From Tools menu -> Excel-to-ACE Plug-in





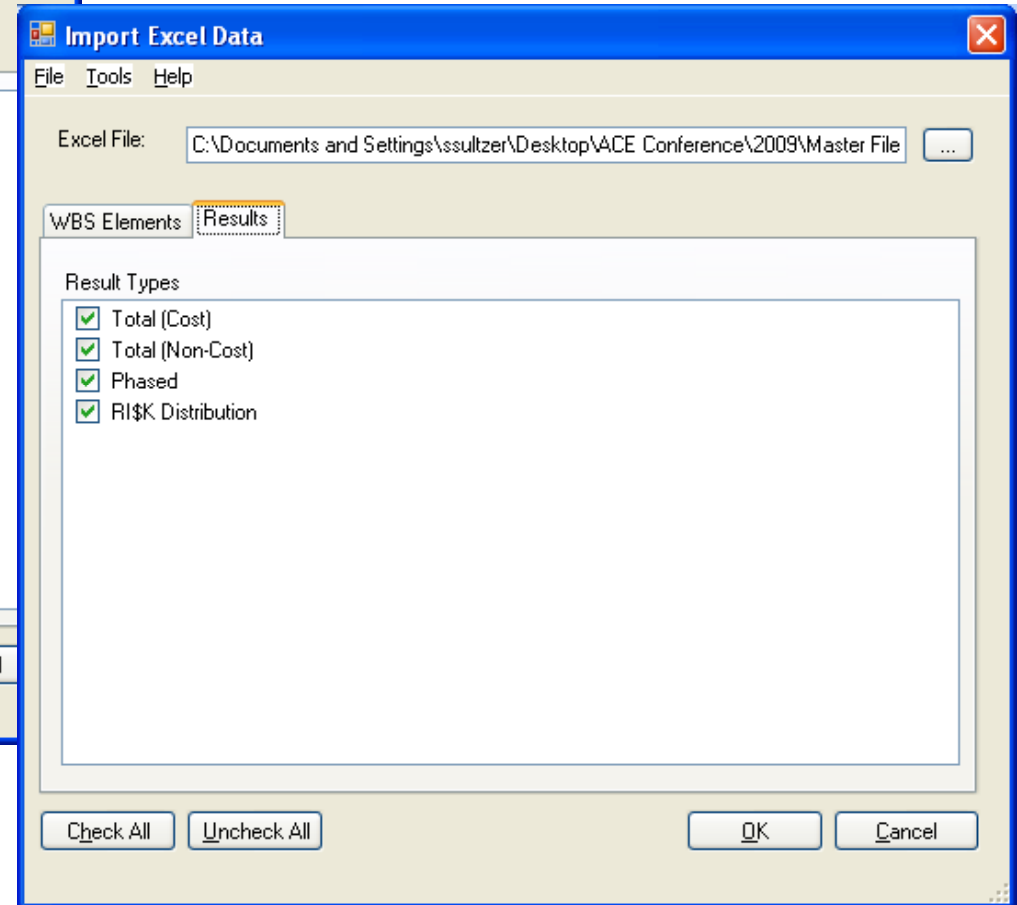
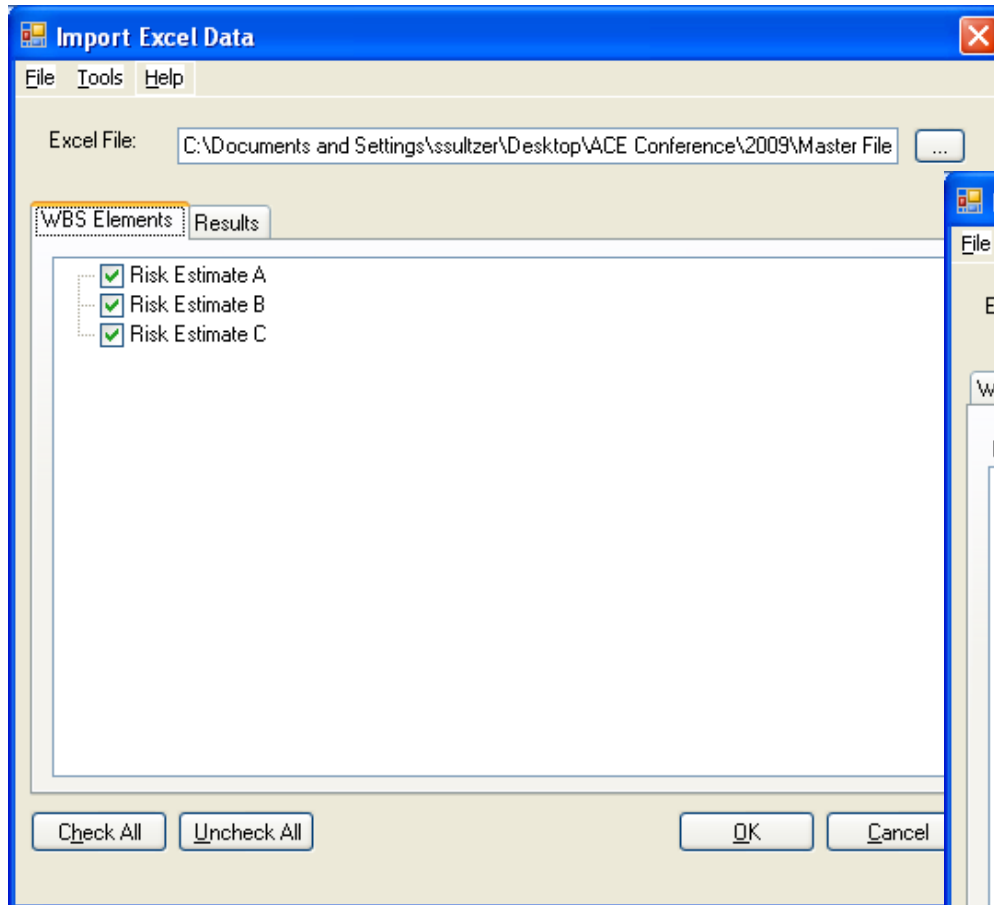
- **Excel-to-ACE Plug-in Dialog Box**



- **Use refresh option if updating an existing CDF**



- **Select a file. Make sure to check all of the WBS elements and risk distribution**





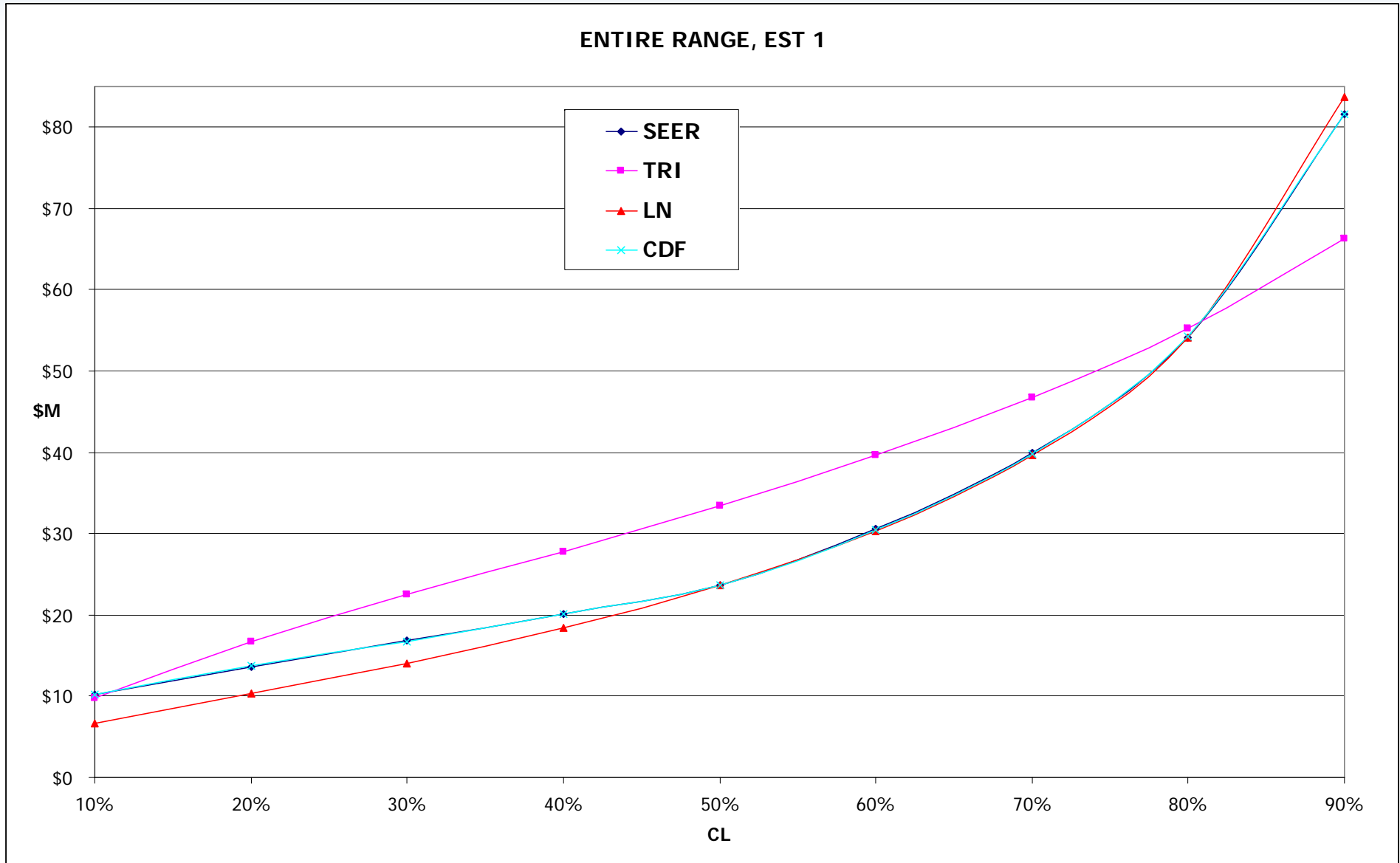
■ Need to enter EXCEL_TBYC into Equation / Throughput

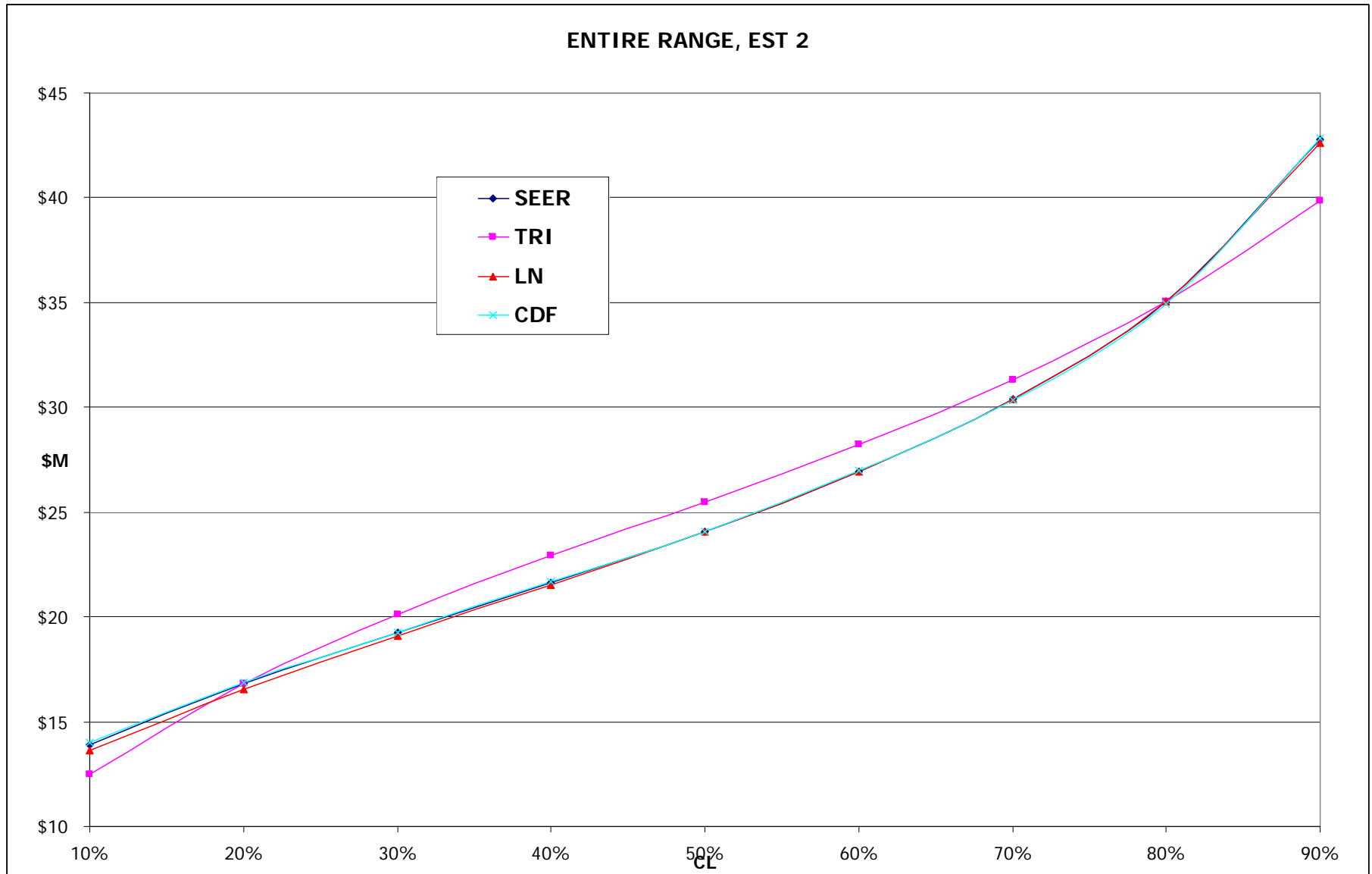
The screenshot shows the ACE 7.1a software interface. The title bar reads "ACE 7.1a - [Session1 - Methodology (BY2009\$K)]". The menu bar includes File, Edit, View, Documentation, Calc, Cases, Reports, Tools, Window, and Help. The toolbar contains various icons for file operations and calculations. The main window displays a table with the following columns: WBS/CES Description, Approp, Unique ID, Point Estimate, Phasing Method, Equation / Throughput, Fiscal Year, Units, and Start. Row 19 is highlighted in orange. The cell in the "Equation / Throughput" column for row 19 is circled in pink and contains the text "EXCEL_TBYC".

	WBS/CES Description	Approp	Unique ID	Point Estimate	Phasing Method	Equation / Throughput	Fiscal Year	Units	Start
2	* Base Year of Calculation			2009					
3	* Units of Calculation			K					
4	* System Inflation Table for Calculation			7, 29Nov2007					
5	* Custom Inflation Table for Calculation			ustom Cache					
6	* ACE Session Name								
7	* ACE Session Path								
8	* Time of Calculation			14:22:12					
9	* Date of Calculation			27Jan2009					
10	* Time ACE Session Last Saved								
11	* Date ACE Session Last Saved								
12	* Risk Iterations								
13									
14	*My Program Estimate		*Estimate						
15									
16	*** C:\Documents and Settings\ssultzer\Desktop\ACE Co								
17	Risk Estimate A	3600		23,593.273 *		EXCEL_TBYC	2009	\$	
18	Risk Estimate B	3600		24,079.754 *		EXCEL_TBYC	2009	\$	
19	Risk Estimate C	3600		59,892.000 *		EXCEL_TBYC	2009	\$	



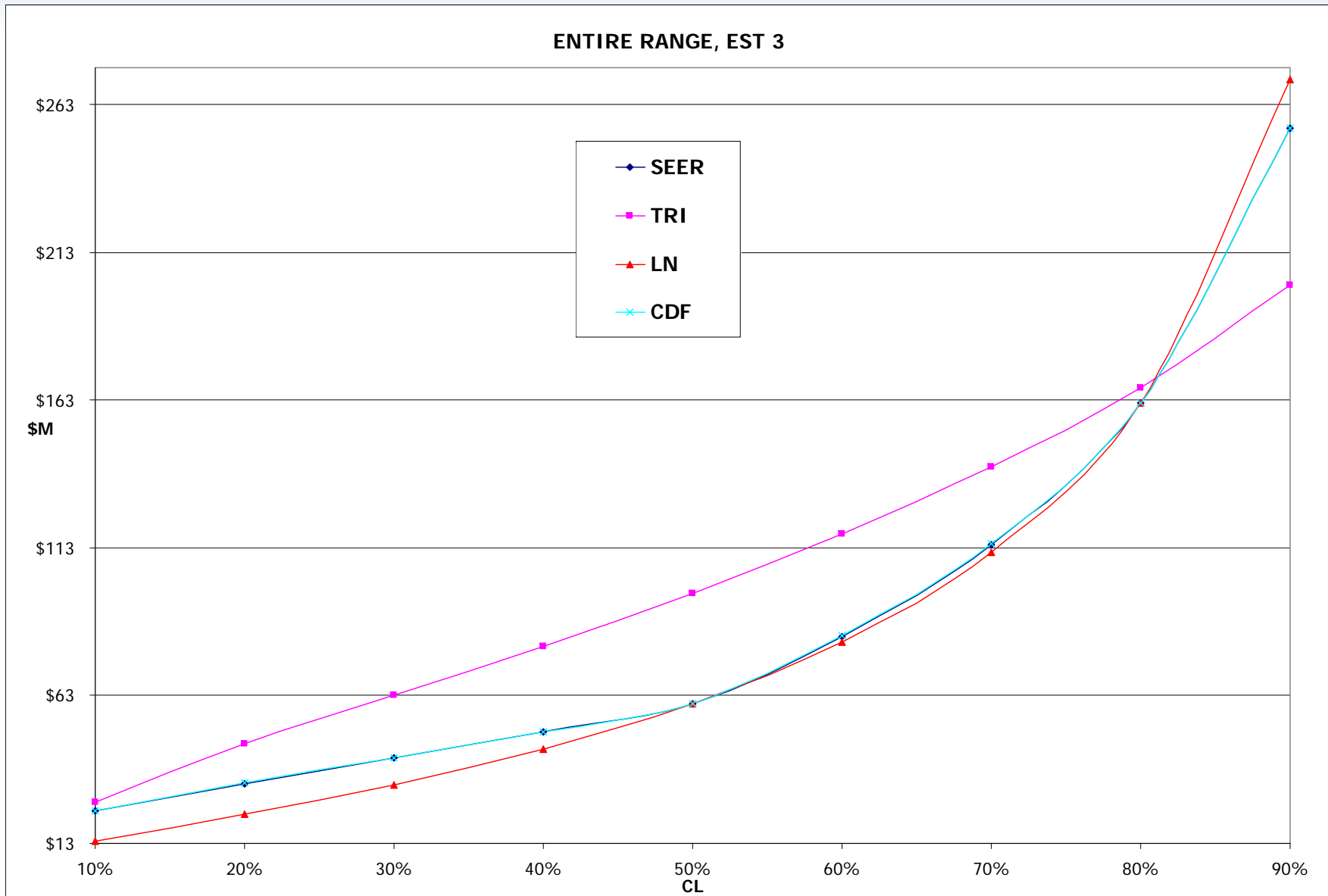
'Regular' right-skewed example







High risk, highly right-skewed





■ Questions?

■ Please feel free to contact us:

- Daniel Garcia dgarcia@tecolote.com
- Steve Sultzer sdsultzer@galorath.com

■ Thank you for your attention!