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Since 1973

Accurately Mapping Third-party Tool Results into ACE

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The Presenters

- **Daniel Garcia**
  - Sr. Analyst with Tecolote Research
    - 8+ years in the Los Angeles Division
    - Global Positioning System Wing, Deputy Task Manager
  - ACEIT Instructor
- **Steve Sultzer**
  - Sr. Consultant with Galorath, Inc.
    - 4+ years supporting the Los Angeles Division of Tecolote
    - Primarily supports GPS Wing

Third-party Tool Use with ACE

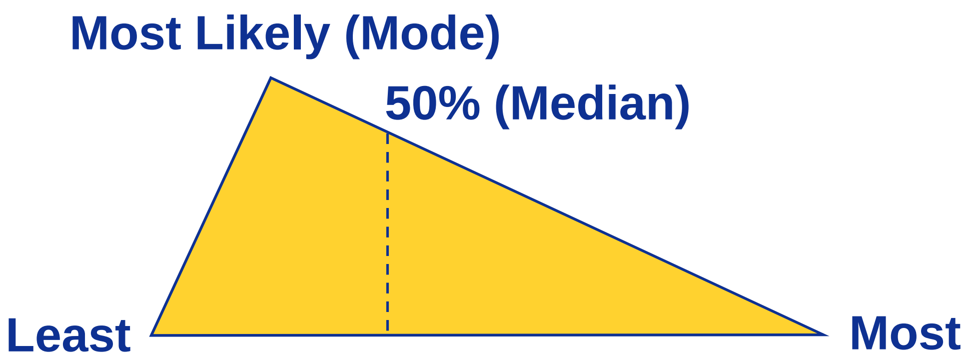
- **ACE supports third-party tools very well**
  - Parametric estimation tools (such as SEER tool suite)
  - Risk/Statistical tools (such as @Risk and Crystal Ball)
- **The results from these tools can be brought into ACE manually (typing the results into ACE) or in some automated fashion (e.g. using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

SEER Parametric Models

- **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**



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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

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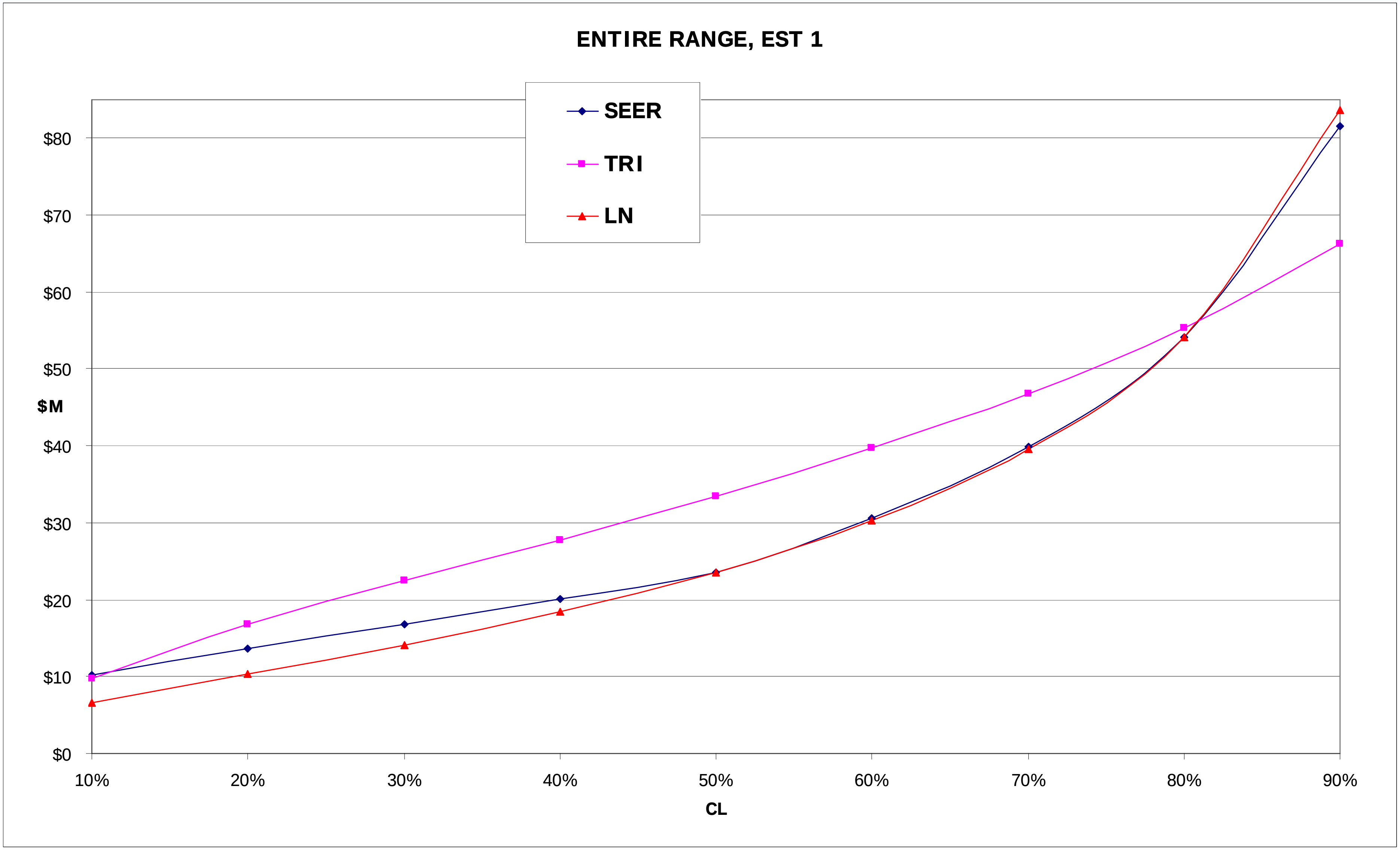
SEER Examples

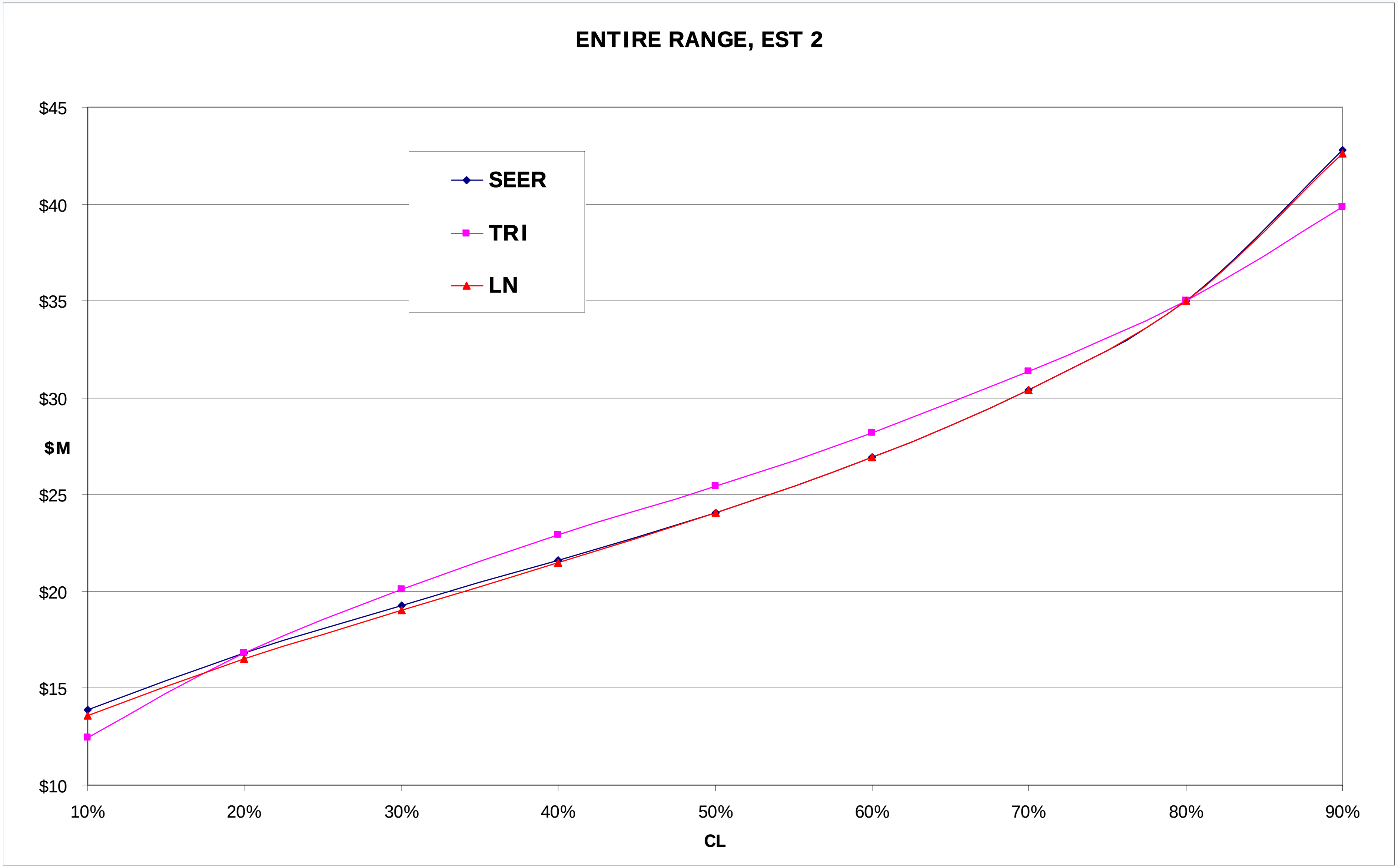
- **Example will use SEER and will demonstrate challenges with using current guidance**
- **Three estimates**
  - Estimate 1
    - ‘Regular’ right-skewed example
  - Estimate 2
    - Lower risk example
  - Estimate 3
    - High risk, highly right-skewed example

‘Regular’ right-skewed example



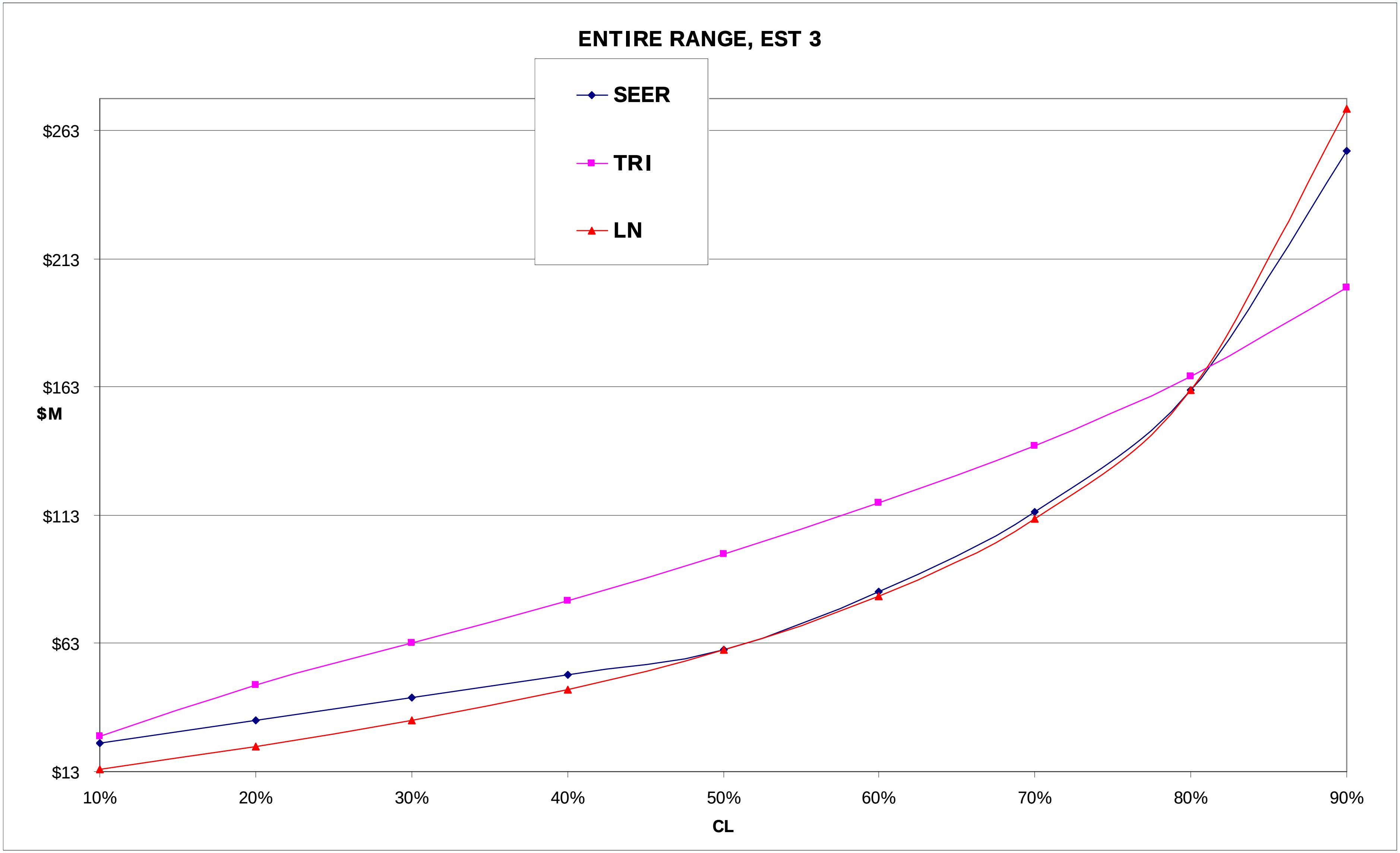
NOTIONAL DATA

Lower risk example



NOTIONAL DATA

High risk, highly right-skewed



NOTIONAL DATA

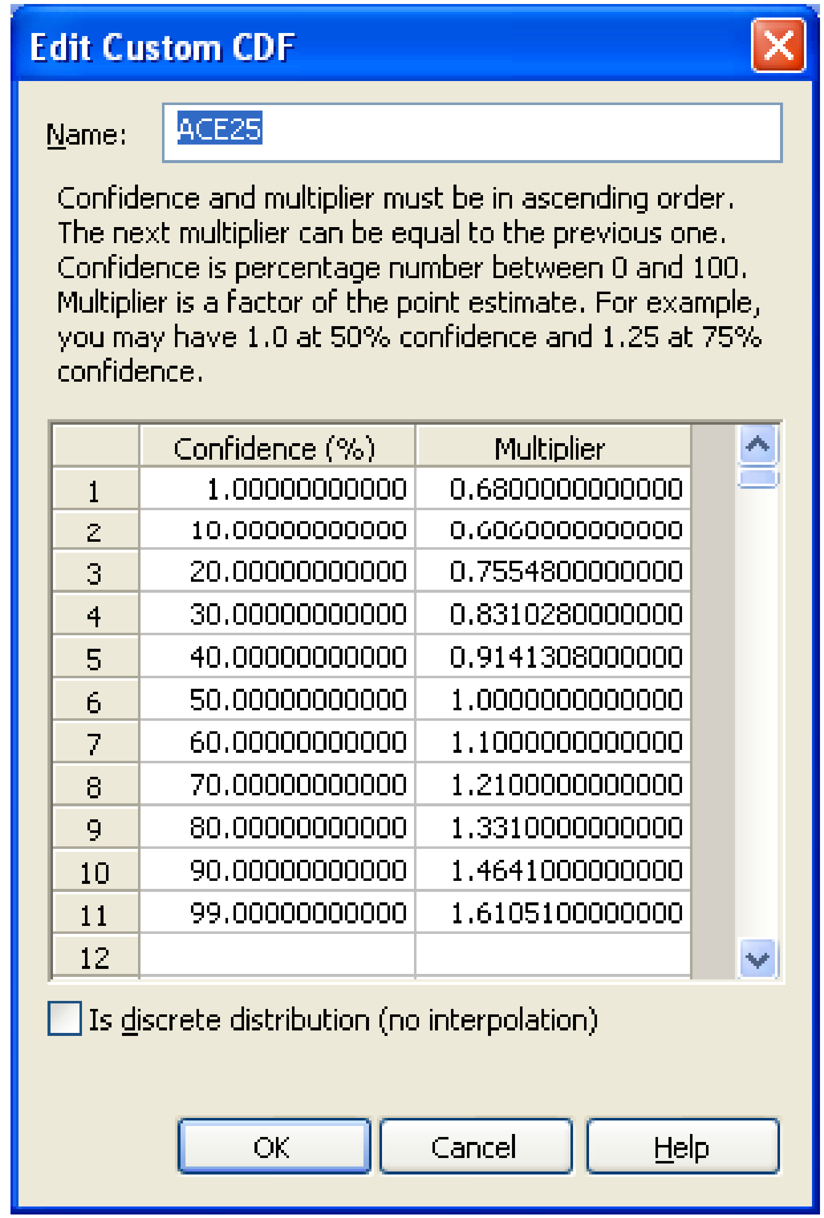
User-defined Cumulative Distribution Function (CDF)

- **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,**

% CL	Value	Percentage to PE (50%CL value)
10% CL	= 60	0.50, (60/120)
30% CL	= 85	0.71, (85/120)
50% CL	= 120	1.00, (120/120)
70% CL	= 180	1.50, (180/120)
90% CL	= 285	2.38, (285/120)

CDF Screen

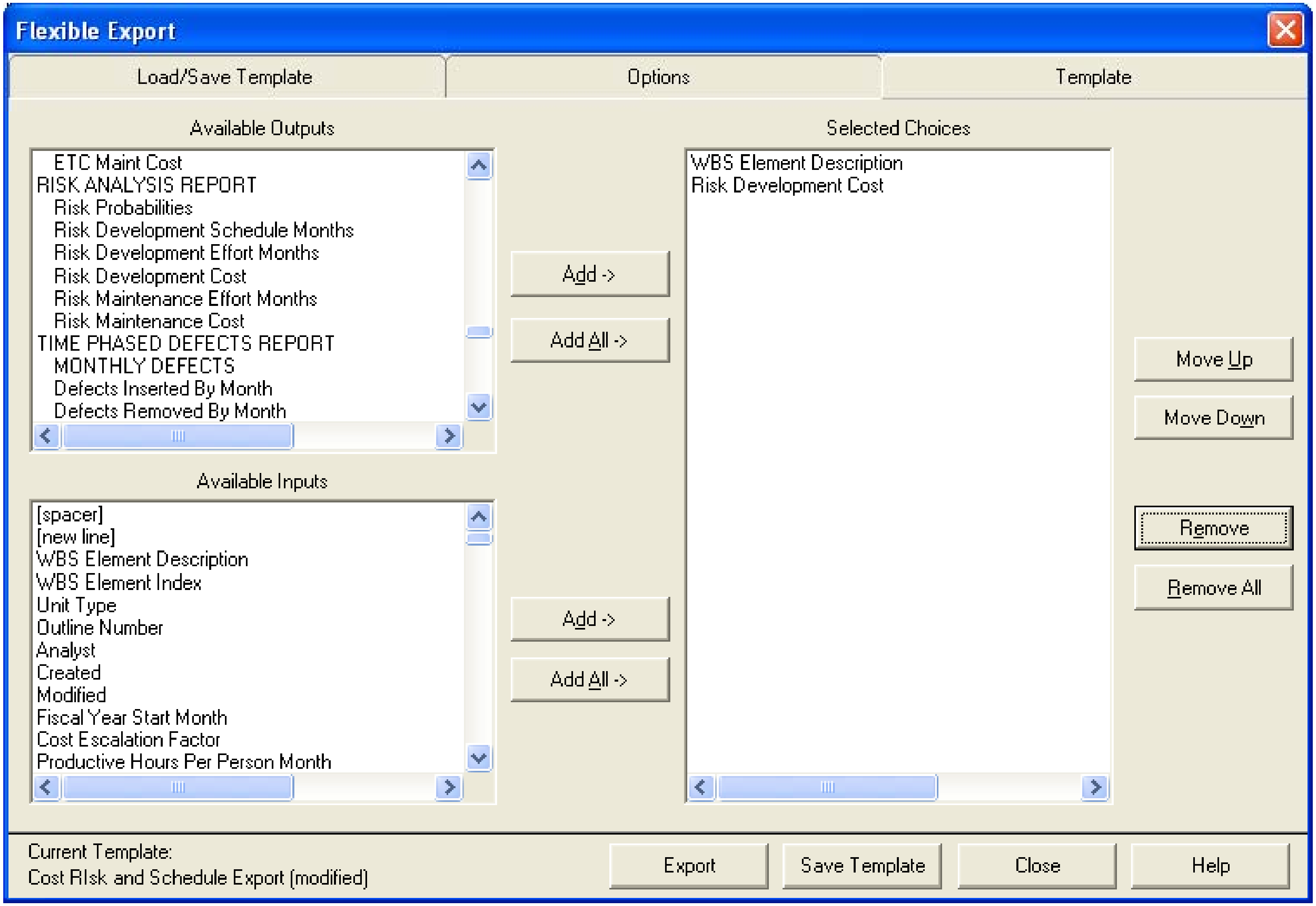
- The CDF dialog allows the user to enter custom, specific Confidence Level % and Multiplier pairs to be entered
- This information can be
  - Input manually in ACE
    - “Fat-fingered”
    - Copy/Pasted
  - Brought into ACE in an automated fashion using the Excel-to-ACE plug-in



Getting the SEER Output

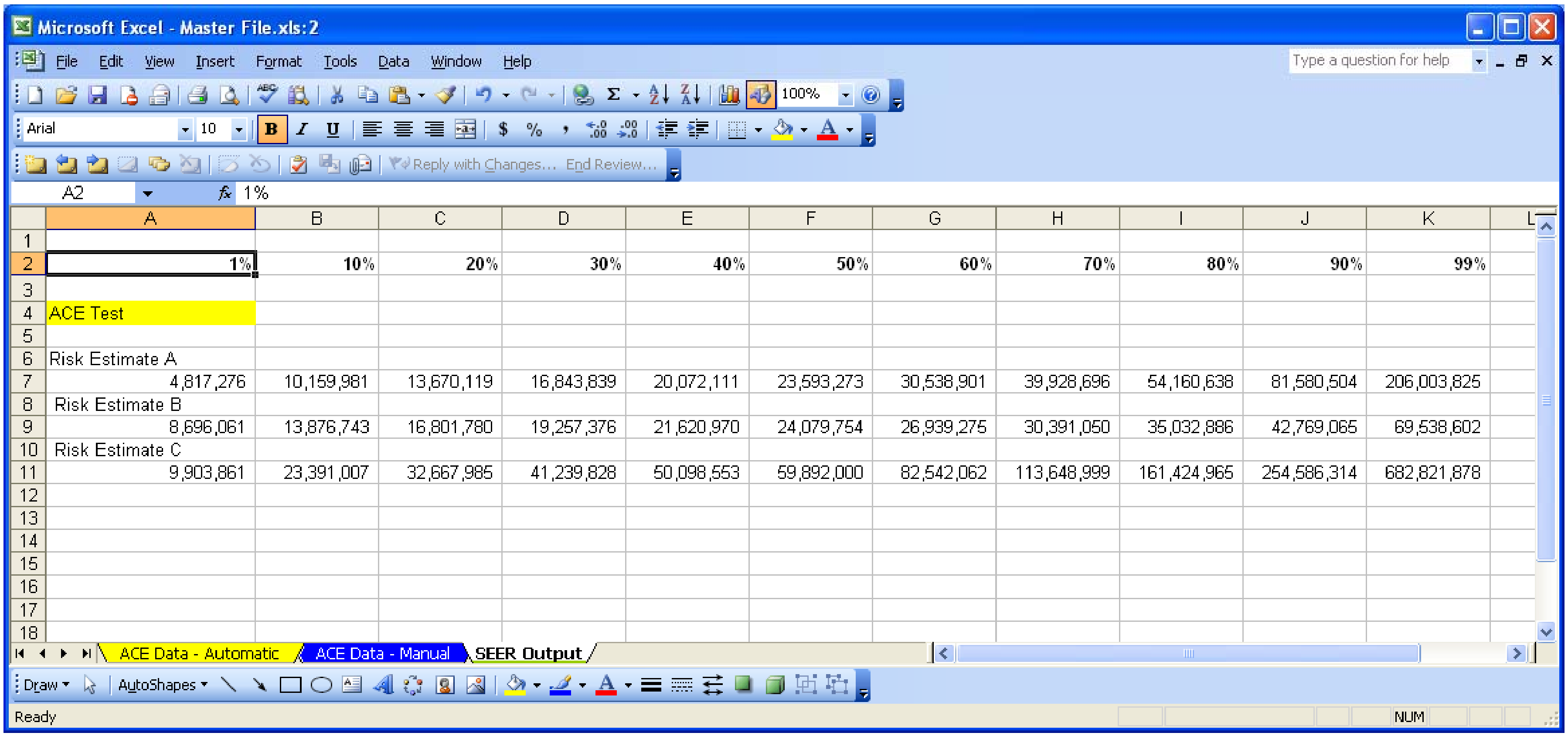
- The easiest method of getting the risk information for each CSCI is by using the Flexible Export feature in SEER
- In the output section of the Flexible Export dialog are the risk outputs (Risk Development Schedule, Effort, and Cost)
- This feature will allow the user to output information to Excel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

Flexible Export Screen



Preparing the Data for ACEIT

- **This information can be pasted into Excel**



Microsoft Excel - Master File.xls:2

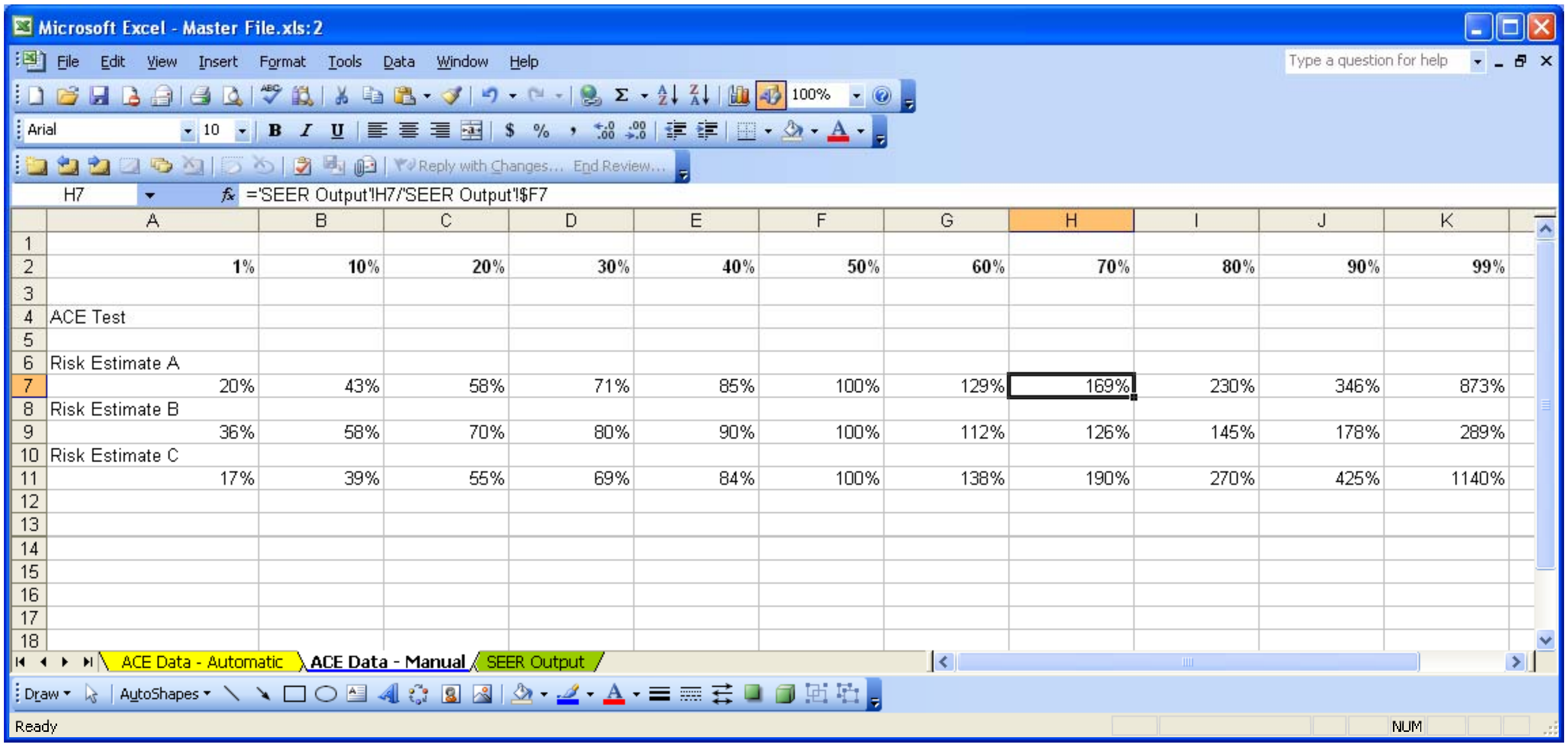
A2 1%

	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	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

ACE Data - Automatic | ACE Data - Manual | SEER Output

Manual Entry

- 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



	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%

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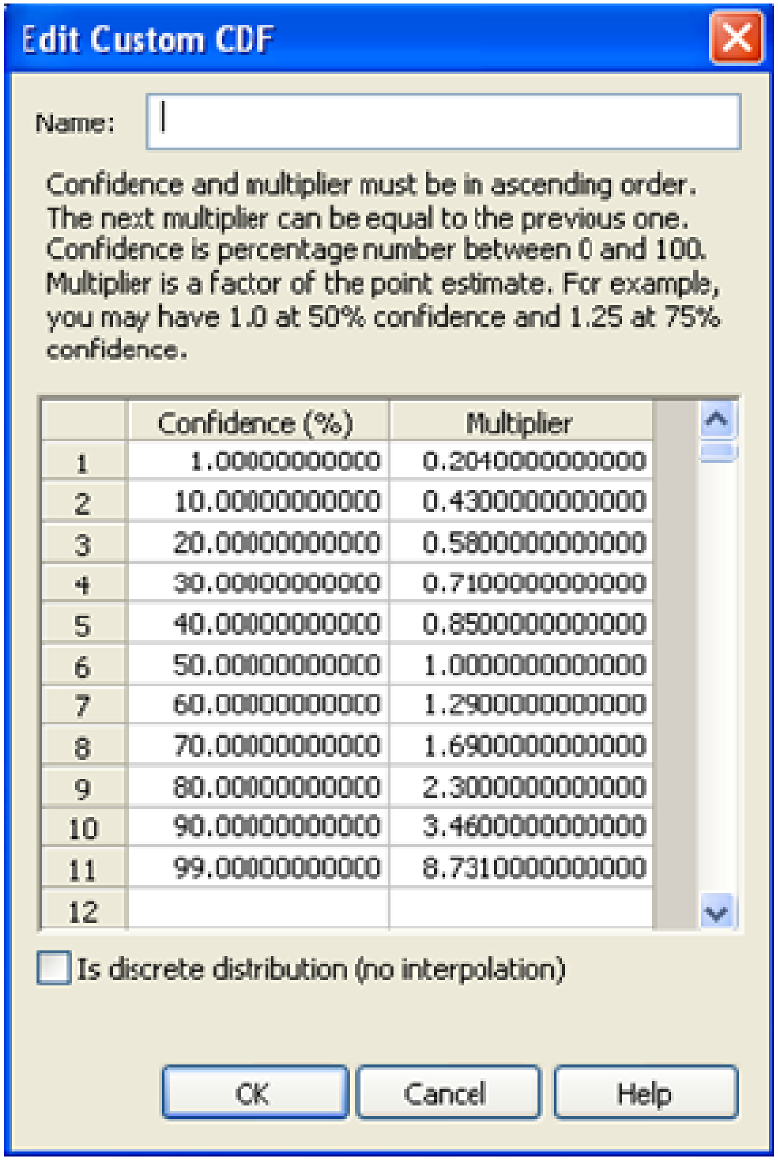
Type the Information into the CDF Window



Edit Custom CDF

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	1.00000000000	0.2040000000000
2	10.0000000000	0.4300000000000
3	20.0000000000	0.5800000000000
4	30.0000000000	0.7100000000000
5	40.0000000000	0.8500000000000
6	50.0000000000	1.0000000000000
7	60.0000000000	1.2900000000000
8	70.0000000000	1.6900000000000
9	80.0000000000	2.3000000000000
10	90.0000000000	3.4600000000000
11	99.0000000000	8.7310000000000
12		

Is discrete distribution (no interpolation)

OK | Cancel | Help

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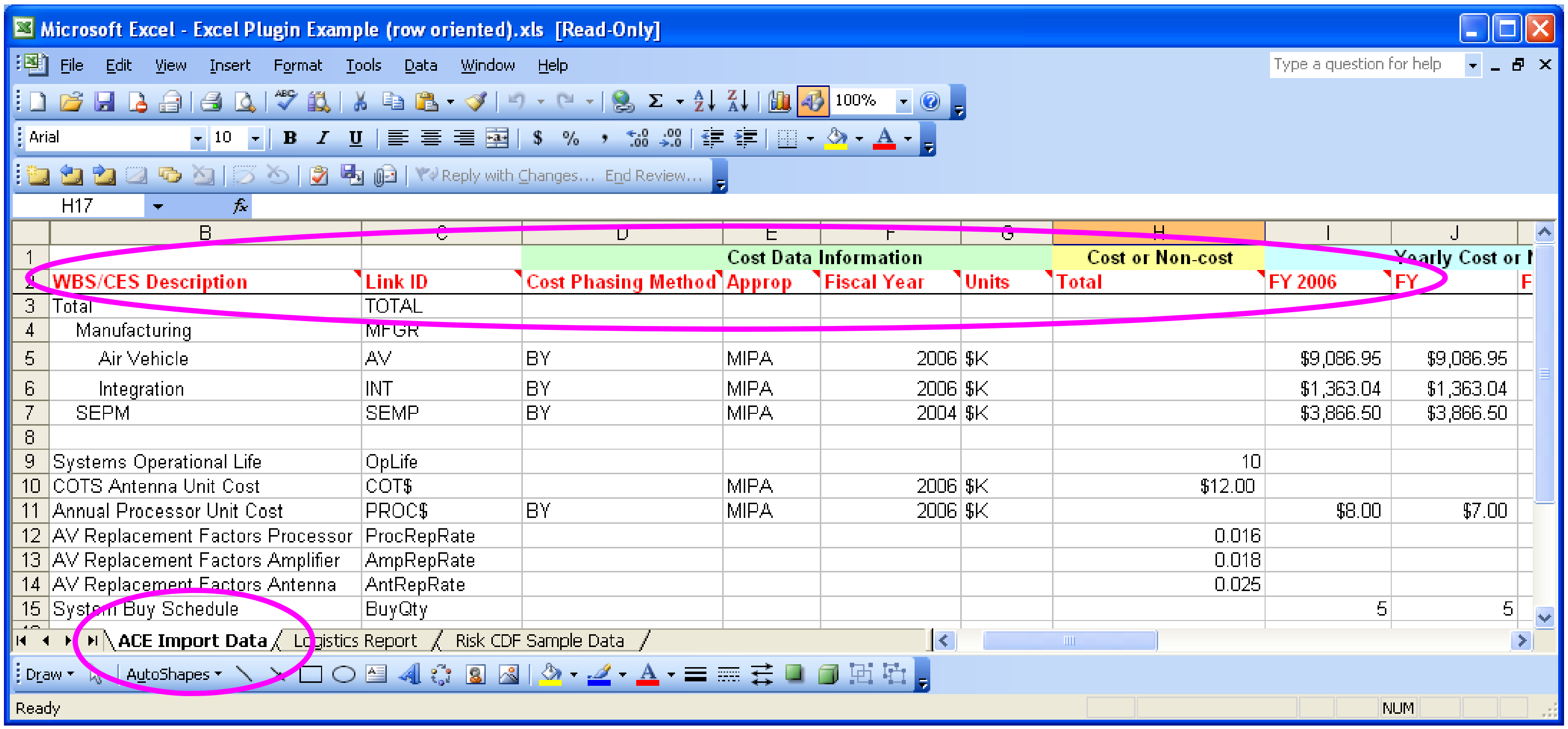
To automate the process you need to follow a specific file format

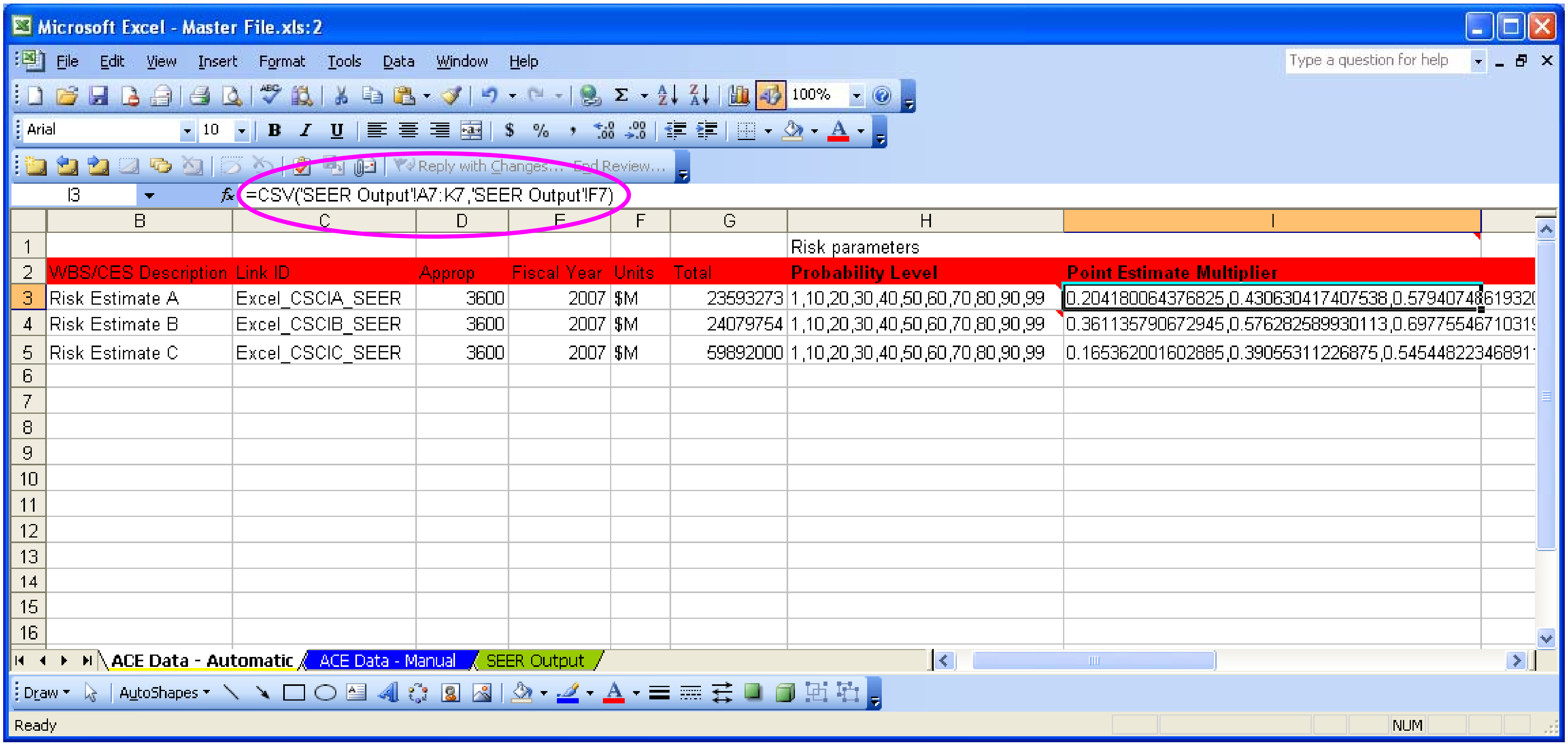
- **Sample files available in ACE Admin ("Excel Plug-in Example" files)**
- **You must leave the name of the ACE Input worksheet. You can delete rows that you are not using.**


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

	B	C	D	E	F	G	H	I	J
1				Cost Data Information			Cost or Non-cost		Yearly Cost or N
2	WBS/CES Description	Link ID	Cost Phasing Method	Approp	Fiscal Year	Units	Total	FY 2006	FY
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

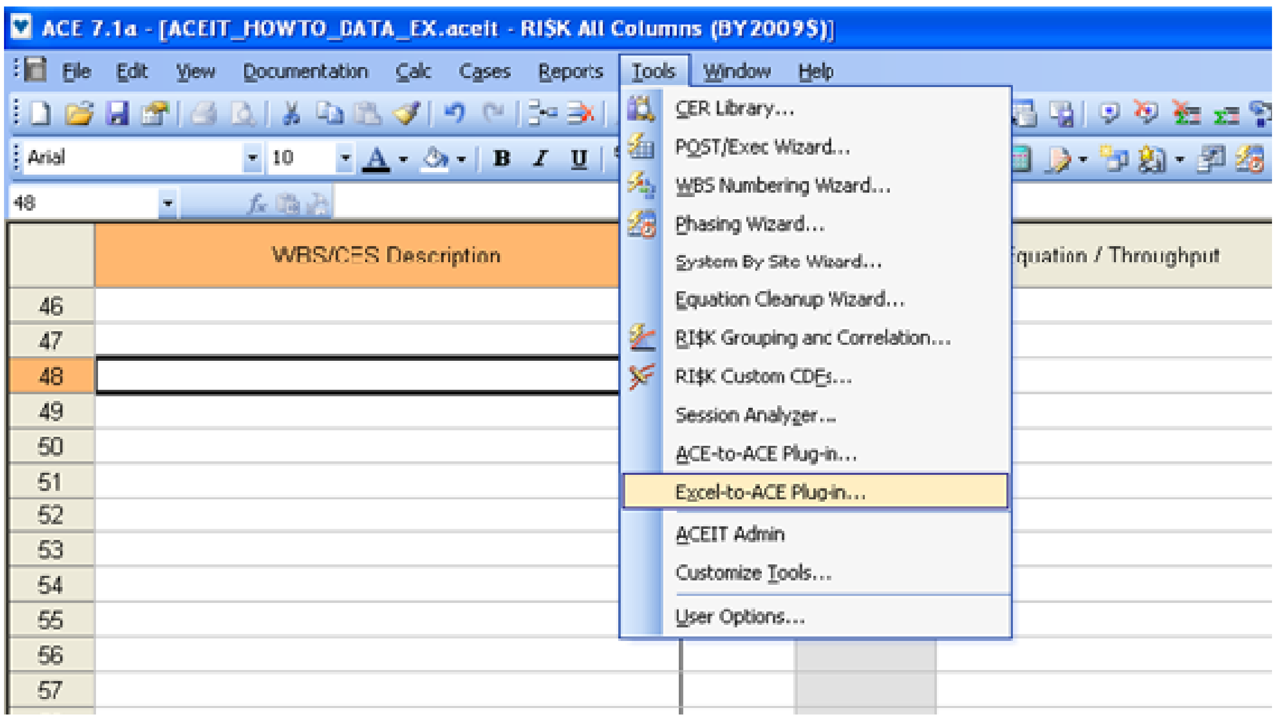
Automatic Entry

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



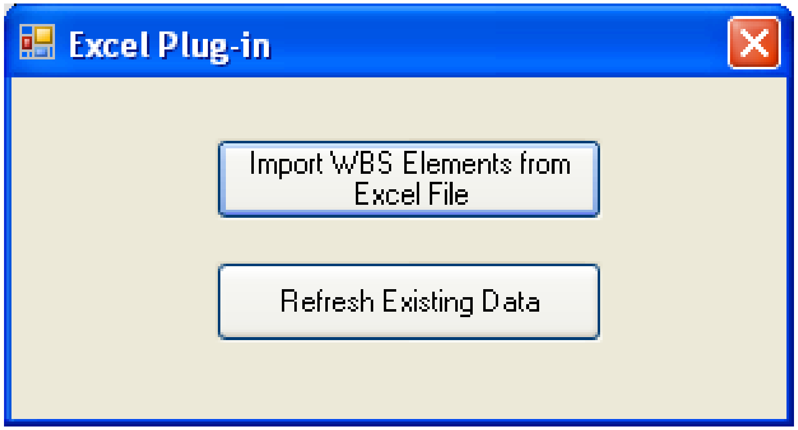
Accessing Plug-in

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



Plug-in Dialog

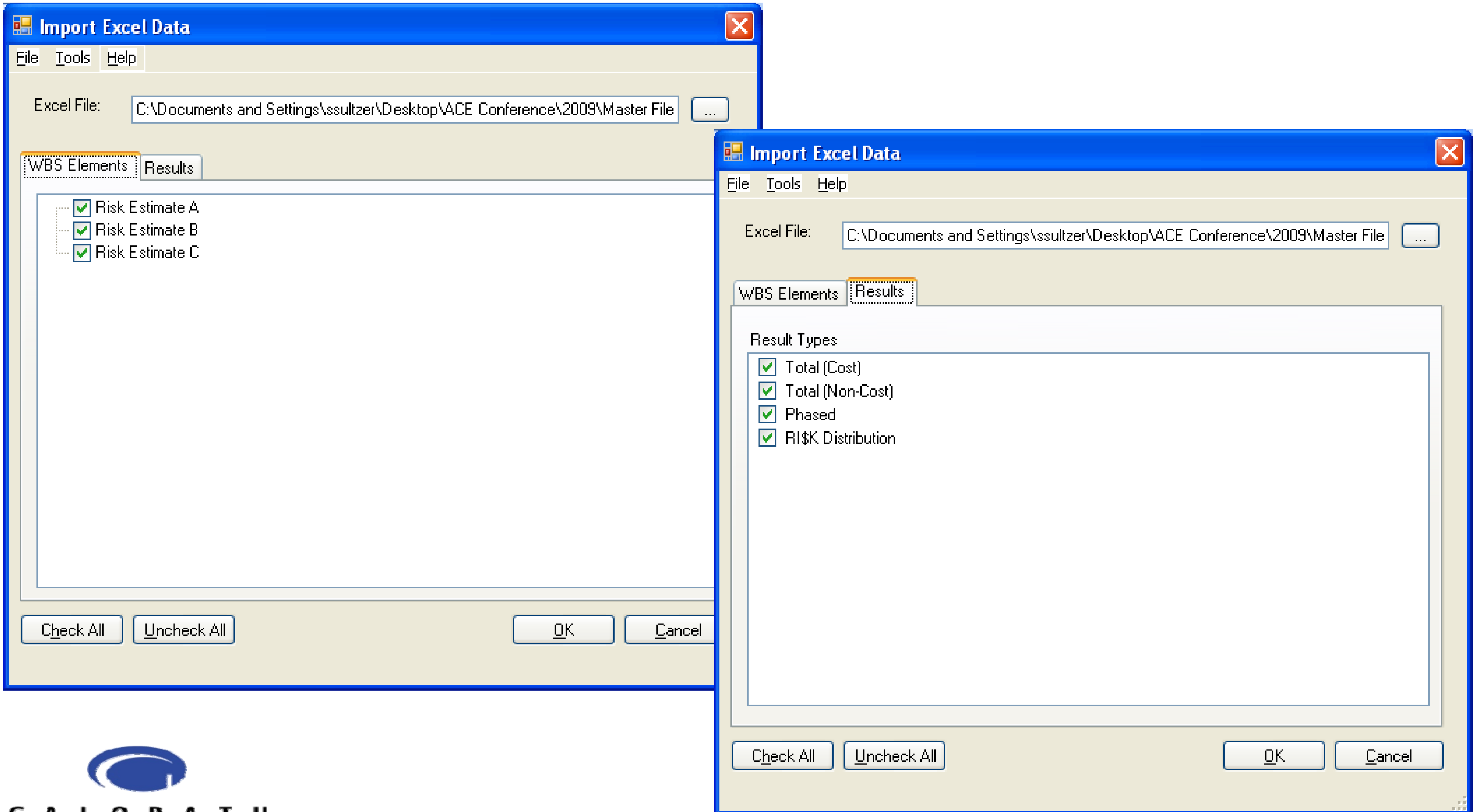
- **Excel-to-ACE Plug-in Dialog Box**



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

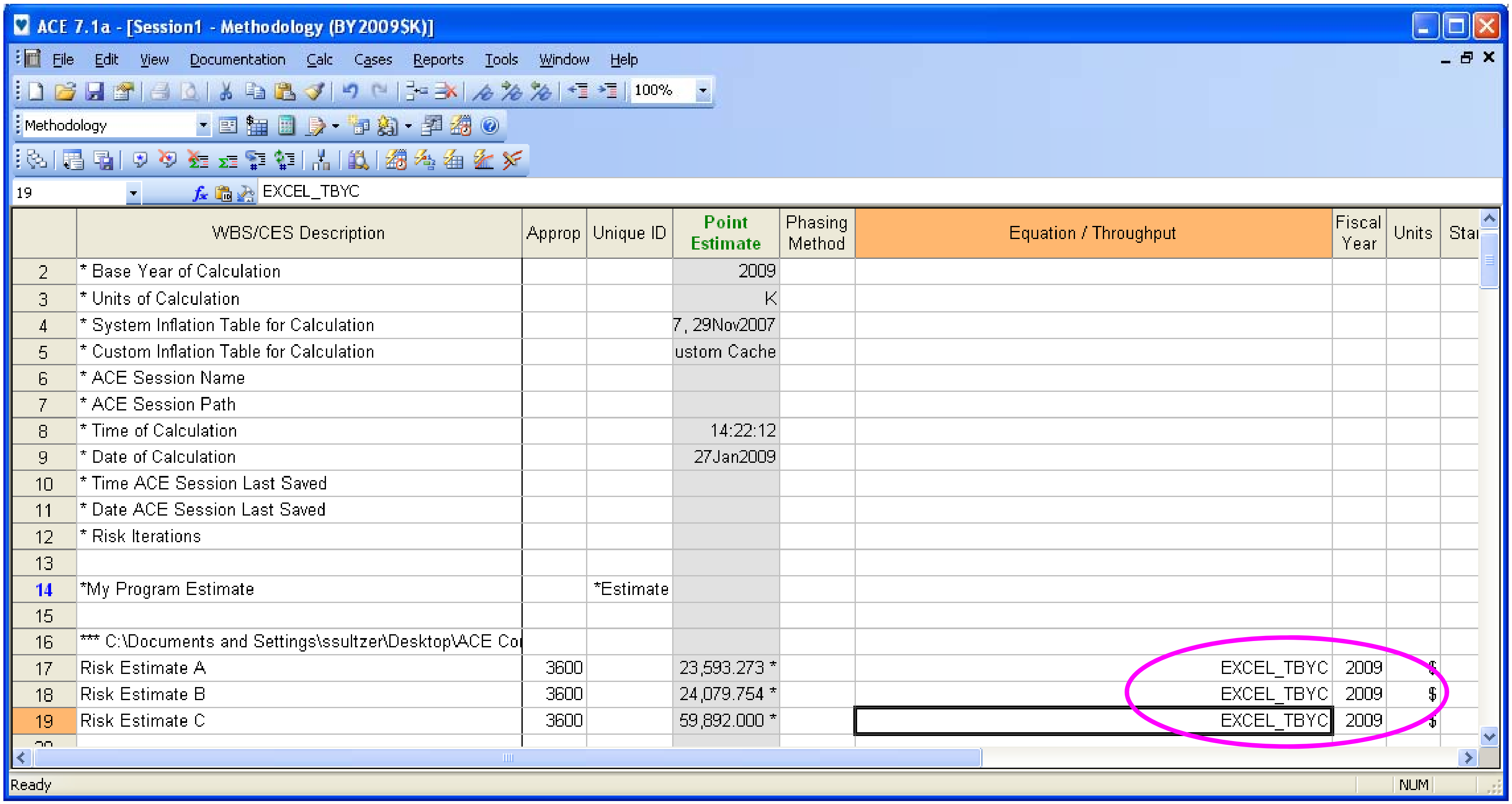
Plug-in Dialog

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

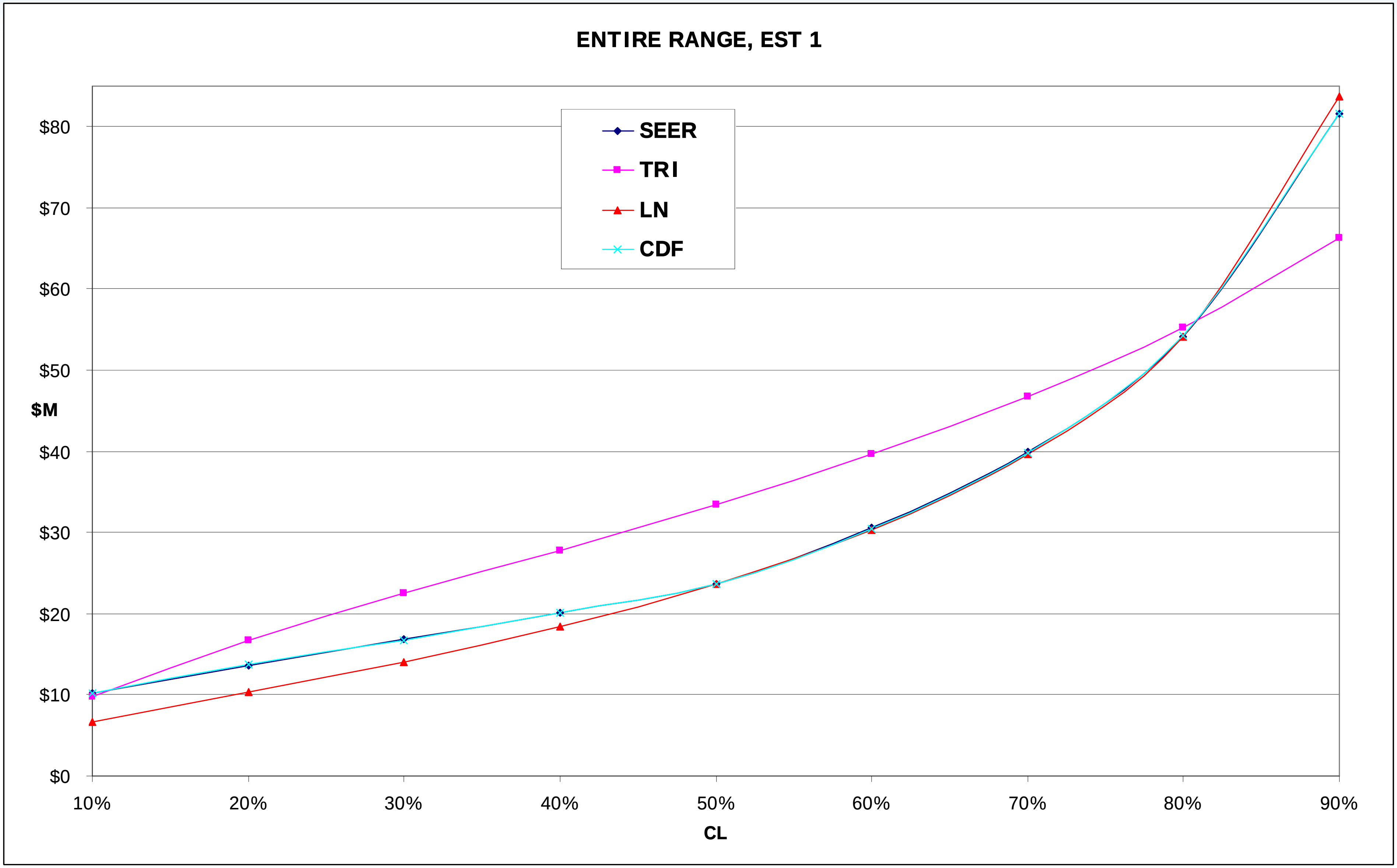


ACEIT Session

- Need to enter EXCEL_TBYC into Equation / Throughput

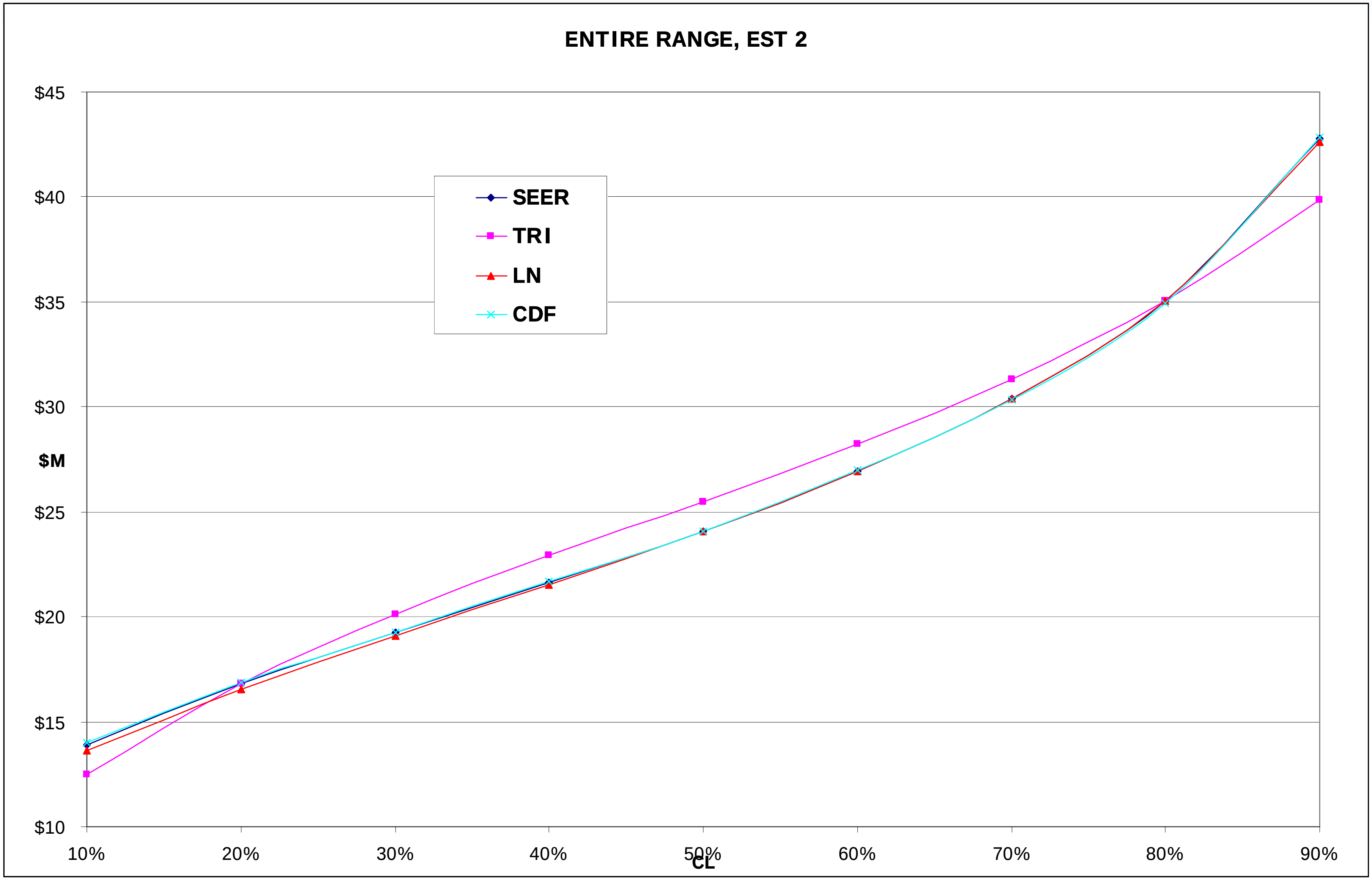


‘Regular’ right-skewed example



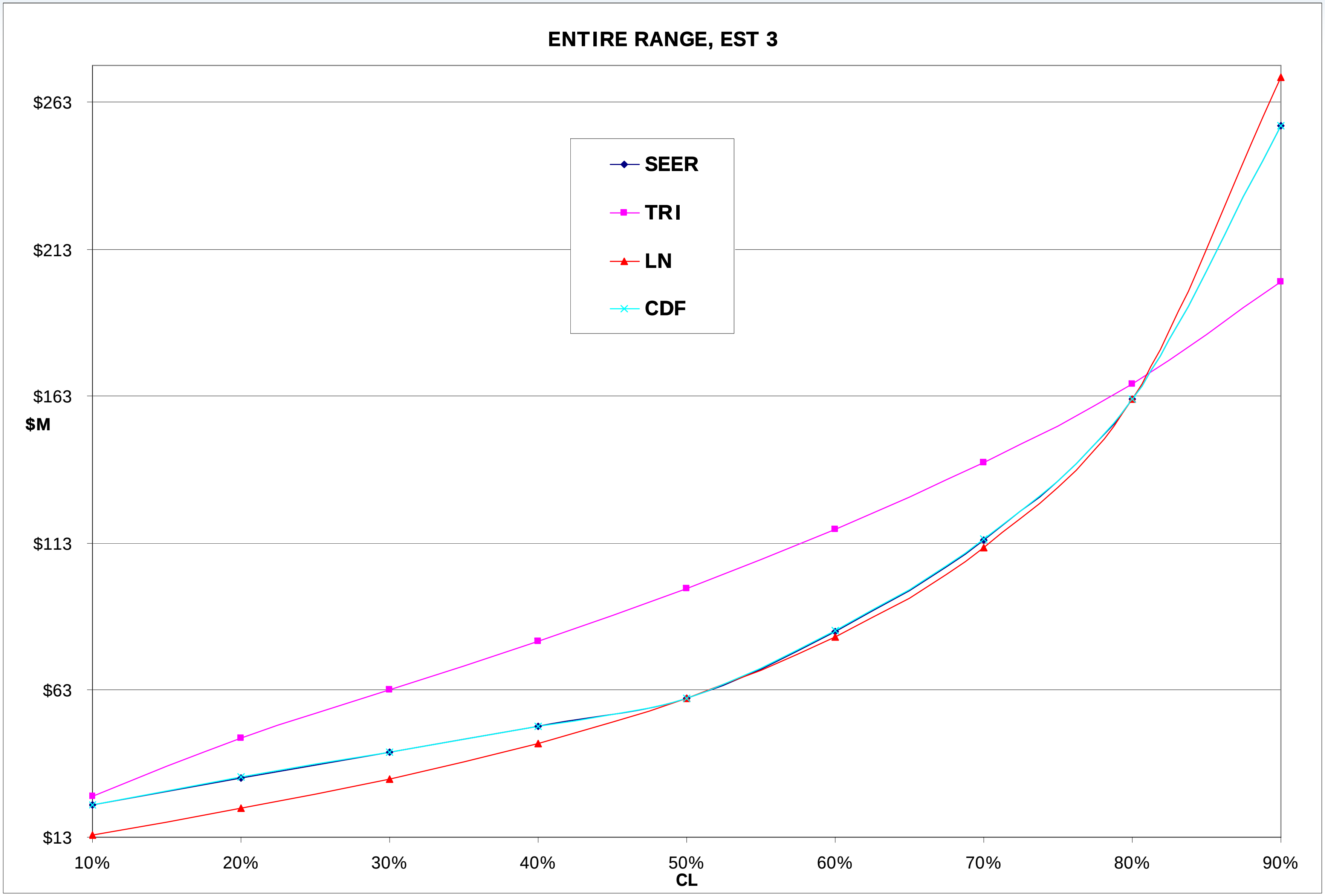
Results – Much better across the entire range

Lower risk example



Results – Much better across the entire range

High risk, highly right-skewed



Results – Much better across the entire range

Wrap Up

- **Questions?**

- **Please feel free to contact us:**
  - Daniel Garcia dgarcia@tecolote.com
  - Steve Sultzer sdsultzer@galorath.com

- **Thank you for your attention!**