

Fulfilling GAO Documentation Requirements using ACEIT



- **Presenters: Jermaine Garland & Michael O’Sullivan, Tecolote Research Inc.**
- **The often overlooked aspect of a high-quality cost estimate is the documentation. Documentation adds validity and repeatability to the estimate through proper sourcing of inputs and the identification of methodologies, respectively. This presentation takes a look into the documentation/reporting features of ACEIT and applies them to the documentation requirements listed in the Government Accountability Office (GAO) Cost Estimating and Assessment Guide. As a best practice, cost estimate documentation should address how the estimate satisfies the 12-step cost estimating process and corresponding best practices identified in GAO guide for creating high-quality cost estimates.**

- **GAO 12 Step Cost Estimating Process**
- **Documentation Steps**
- **GAO/ACEIT Crosswalk**
- **Documentation/Keywords Workscreen**
- **Report Building**
- **Report Descriptors**
- **Report Row Range**
- **Report Layout**
- **Report Favorite**
- **Export Template**
- **GAO Best Practice Checklist**
- **Live Demonstration**

GAO 12 Step Cost Estimating Process

1. Define estimate's purpose
2. Develop estimating plan
3. Define program characteristics
4. Determine estimating structure
5. Identify ground rules and assumptions
6. Obtain Data
7. Develop point estimate and compare it to an independent cost estimate
8. Conduct sensitivity analysis
9. Conduct risk and uncertainty analysis
10. Document the estimate
11. Present estimate to management for approval
12. Update the estimate to reflect actual costs and changes

*GAO Cost Estimating and Assessment Guide, March 2009

Documentation Steps

1. System description
2. Program inputs
3. Estimating methodology and data by WBS cost element
4. Sensitivity analysis
5. Risk and uncertainty analysis
6. Management approval
7. Updates reflecting actual costs and changes

* GAO Cost Estimating and Assessment Guide, March 2009

■ Estimating methodology and data by WBS cost element

GAO Documentation Description	ACEIT Reporting Area
Defines the cost element and describe how it was derived	WBS/CES/VAR Definition
Summarizes costs spread by fiscal year in constant year dollars, matching the current program schedule	Fiscal Year Phasing Results
Details the method, source, models, and calculations for developing the estimate	Estimating Methodology
Identifies direct and indirect labor rates, labor hours, material and subcontractor costs, overhead rates, learning curves, inflation indexes, and factors, including their basis	Estimating Methodology/Learning Curve Parameters/Variables/Variables-Time Phased/Cost Adjustments
Shows the calculation of the cost estimate, with a logical link to input data	Estimating Methodology
Identifies and discusses significant cost drivers	Estimating Methodology
Discusses the cross-check approach for validating the estimate	Estimating Methodology



GAO/ACEIT Crosswalk (cont'd)

■ Sensitivity analysis

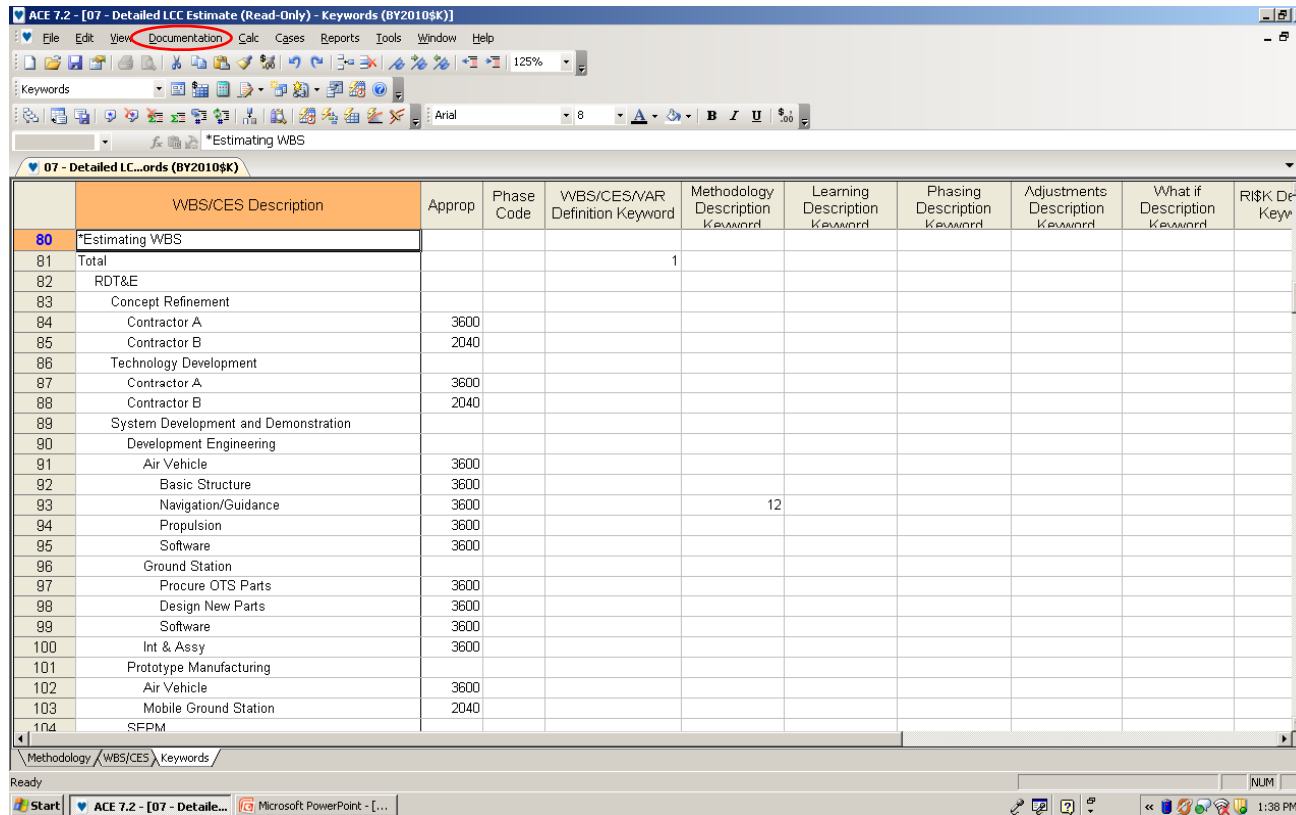
GAO Documentation Description	ACEIT Reporting Area
Describes the effect of changing key cost drivers and assumptions independently	What if Definition
Identifies the major cost drivers that should be closely monitored	What if Definition

■ Risk and uncertainty analysis

GAO Documentation Description	ACEIT Reporting Area
Discusses sources of risk and uncertainty, including critical assumptions, associated with the estimate	RISK Parameters
The effect of uncertainty associated with the point estimate is quantified with probability distributions, and the resulting S curve is fully documented; the method for quantifying uncertainty is discussed and backed up by supporting data	RISK Parameters/RISK Definition (S curves created in POST)
The basis for contingency reserves and how they were calculated is fully documented	RISK Parameters/RISK Definition

Documentation/Keywords Worksreen

- **Step 1: Apply documentation to each WBS/CES element in the specified definition/description column using the Documentation tab**
 - Once documentation is entered on a row the specified definition/description column(s) will list keywords via the Keywords worksreen

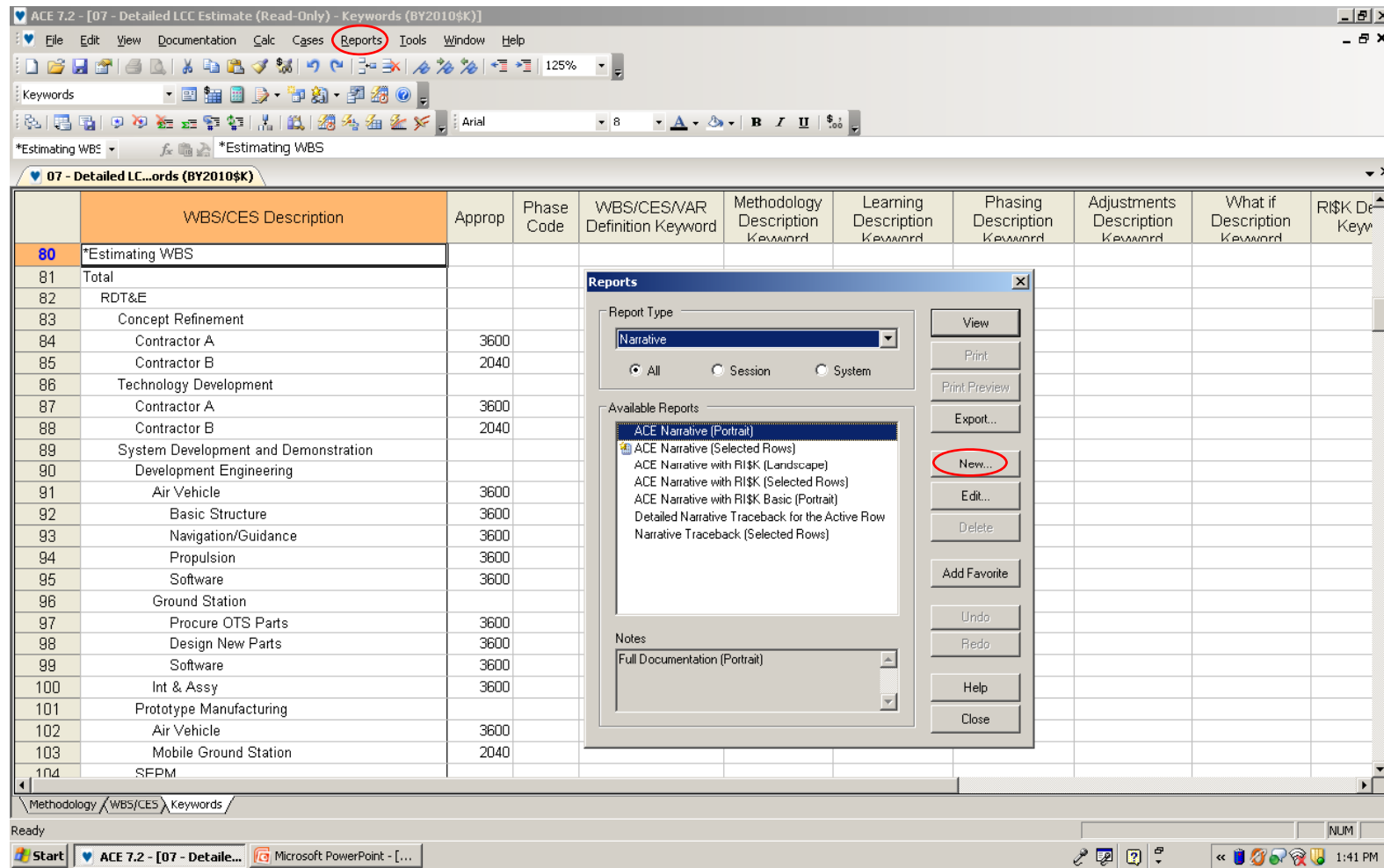


The screenshot shows the 'Documentation' tab in the ACE 7.2 software. The table below represents the data visible in the 'WBS/CES Description' column and its associated values.

WBS/CES Description	Approp	Phase Code	WBS/CES/VAR Definition Keyword	Methodology Description Keyword	Learning Description Keyword	Phasing Description Keyword	Adjustments Description Keyword	What if Description Keyword	RISK De
*Estimating WBS									
81 Total				1					
82 RDT&E									
83 Concept Refinement									
84 Contractor A	3600								
85 Contractor B	2040								
86 Technology Development									
87 Contractor A	3600								
88 Contractor B	2040								
89 System Development and Demonstration									
90 Development Engineering									
91 Air Vehicle	3600								
92 Basic Structure	3600								
93 Navigation/Guidance	3600				12				
94 Propulsion	3600								
95 Software	3600								
96 Ground Station									
97 Procure OTS Parts	3600								
98 Design New Parts	3600								
99 Software	3600								
100 Int & Assy	3600								
101 Prototype Manufacturing									
102 Air Vehicle	3600								
103 Mobile Ground Station	2040								
104 SFPM									

* Our assumption is that you have a complete estimate and have rolled the cost up into a WBS

■ **Step 2: Generate a Narrative Report using the Reports tab**

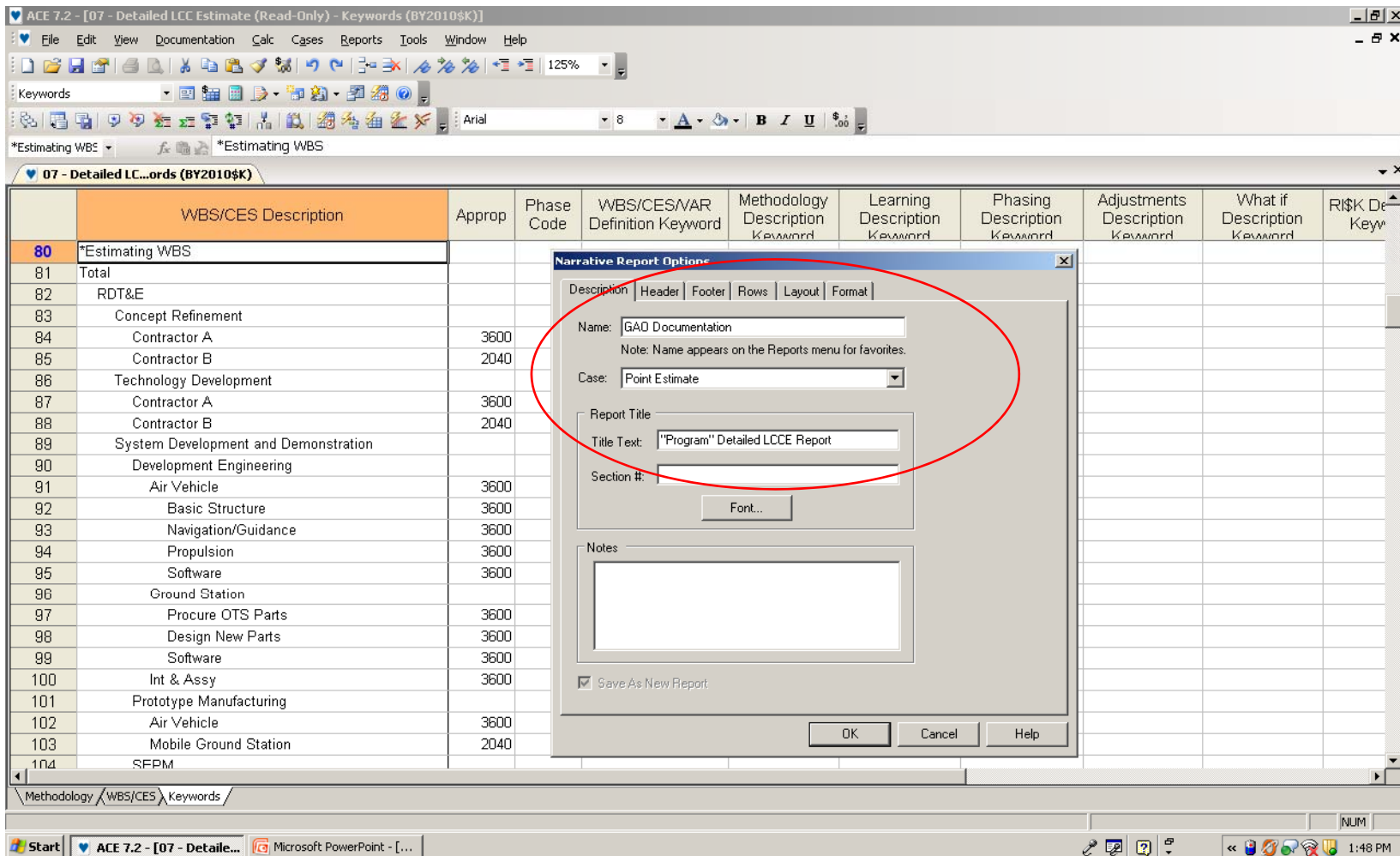


The screenshot shows the ACE 7.2 software interface. The main window displays a table with columns: WBS/CES Description, Approp, Phase Code, WBS/CES/VAR Definition Keyword, Methodology Description Keyword, Learning Description Keyword, Phasing Description Keyword, Adjustments Description Keyword, What if Description Keyword, and RISK Description Keyword. The table contains data for various WBS items, including 'Estimating WBS', 'Total', 'RDT&E', 'Concept Refinement', 'Contractor A', 'Contractor B', 'Technology Development', 'System Development and Demonstration', 'Development Engineering', 'Air Vehicle', 'Basic Structure', 'Navigation/Guidance', 'Propulsion', 'Software', 'Ground Station', 'Procure OTS Parts', 'Design New Parts', 'Software', 'Int & Assy', 'Prototype Manufacturing', 'Air Vehicle', 'Mobile Ground Station', and 'SFPM'.

A 'Reports' dialog box is open over the table. The 'Report Type' dropdown is set to 'Narrative'. The 'Available Reports' list includes: ACE Narrative (Portrait), ACE Narrative (Selected Rows), ACE Narrative with RISK (Landscape), ACE Narrative with RISK (Selected Rows), ACE Narrative with RISK Basic (Portrait), Detailed Narrative Traceback for the Active Row, and Narrative Traceback (Selected Rows). The 'New...' button in the dialog is circled in red.

	WBS/CES Description	Approp	Phase Code	WBS/CES/VAR Definition Keyword	Methodology Description Keyword	Learning Description Keyword	Phasing Description Keyword	Adjustments Description Keyword	What if Description Keyword	RISK Description Keyword
80	*Estimating WBS									
81	Total									
82	RDT&E									
83	Concept Refinement									
84	Contractor A	3600								
85	Contractor B	2040								
86	Technology Development									
87	Contractor A	3600								
88	Contractor B	2040								
89	System Development and Demonstration									
90	Development Engineering									
91	Air Vehicle	3600								
92	Basic Structure	3600								
93	Navigation/Guidance	3600								
94	Propulsion	3600								
95	Software	3600								
96	Ground Station									
97	Procure OTS Parts	3600								
98	Design New Parts	3600								
99	Software	3600								
100	Int & Assy	3600								
101	Prototype Manufacturing									
102	Air Vehicle	3600								
103	Mobile Ground Station	2040								
104	SFPM									

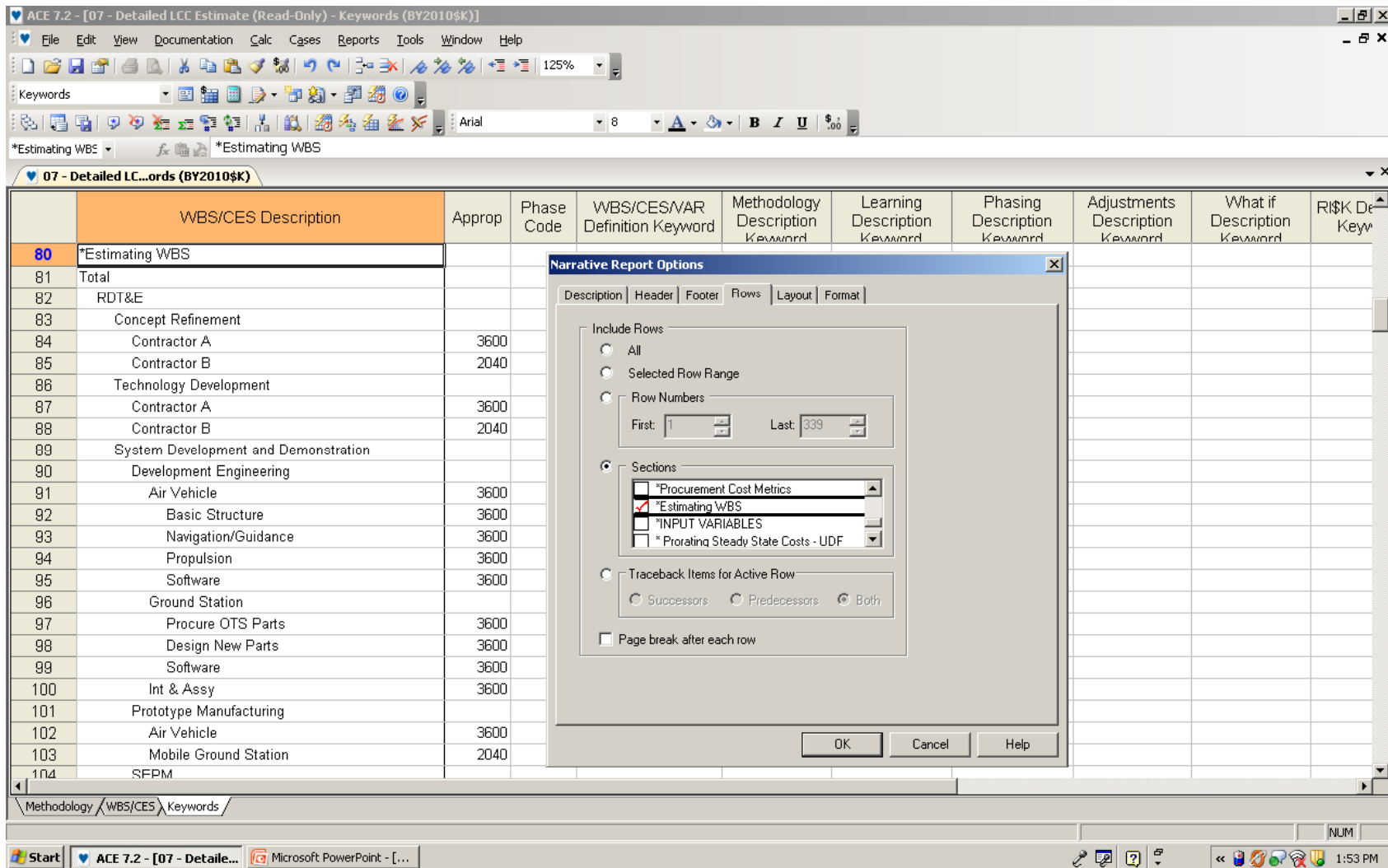
- Step 3: Name the Narrative Report and select the appropriate Case, i.e., Point Estimate. Give the Narrative Report a title, i.e., Detailed LCCE Report



The screenshot shows the 'Narrative Report Options' dialog box in the ACE 7.2 software. The dialog box is overlaid on a spreadsheet showing a WBS/CES structure. The 'Name' field is set to 'GAO Documentation' and the 'Case' dropdown is set to 'Point Estimate'. The 'Report Title' field is set to 'Program Detailed LCCE Report'. The 'Section #' field is empty. The 'Save As New Report' checkbox is checked. The dialog box has tabs for Description, Header, Footer, Rows, Layout, and Format. The 'Description' tab is selected. The 'Notes' section is empty. The 'Font...' button is visible. The 'OK', 'Cancel', and 'Help' buttons are at the bottom of the dialog box.

	WBS/CES Description	Approp	Phase Code	WBS/CES/VAR Definition Keyword	Methodology Description Keyword	Learning Description Keyword	Phasing Description Keyword	Adjustments Description Keyword	What if Description Keyword	RISK De Key
80	*Estimating WBS									
81	Total									
82	RDT&E									
83	Concept Refinement									
84	Contractor A	3600								
85	Contractor B	2040								
86	Technology Development									
87	Contractor A	3600								
88	Contractor B	2040								
89	System Development and Demonstration									
90	Development Engineering									
91	Air Vehicle	3600								
92	Basic Structure	3600								
93	Navigation/Guidance	3600								
94	Propulsion	3600								
95	Software	3600								
96	Ground Station									
97	Procure OTS Parts	3600								
98	Design New Parts	3600								
99	Software	3600								
100	Int & Assy	3600								
101	Prototype Manufacturing									
102	Air Vehicle	3600								
103	Mobile Ground Station	2040								
104	SEPM									

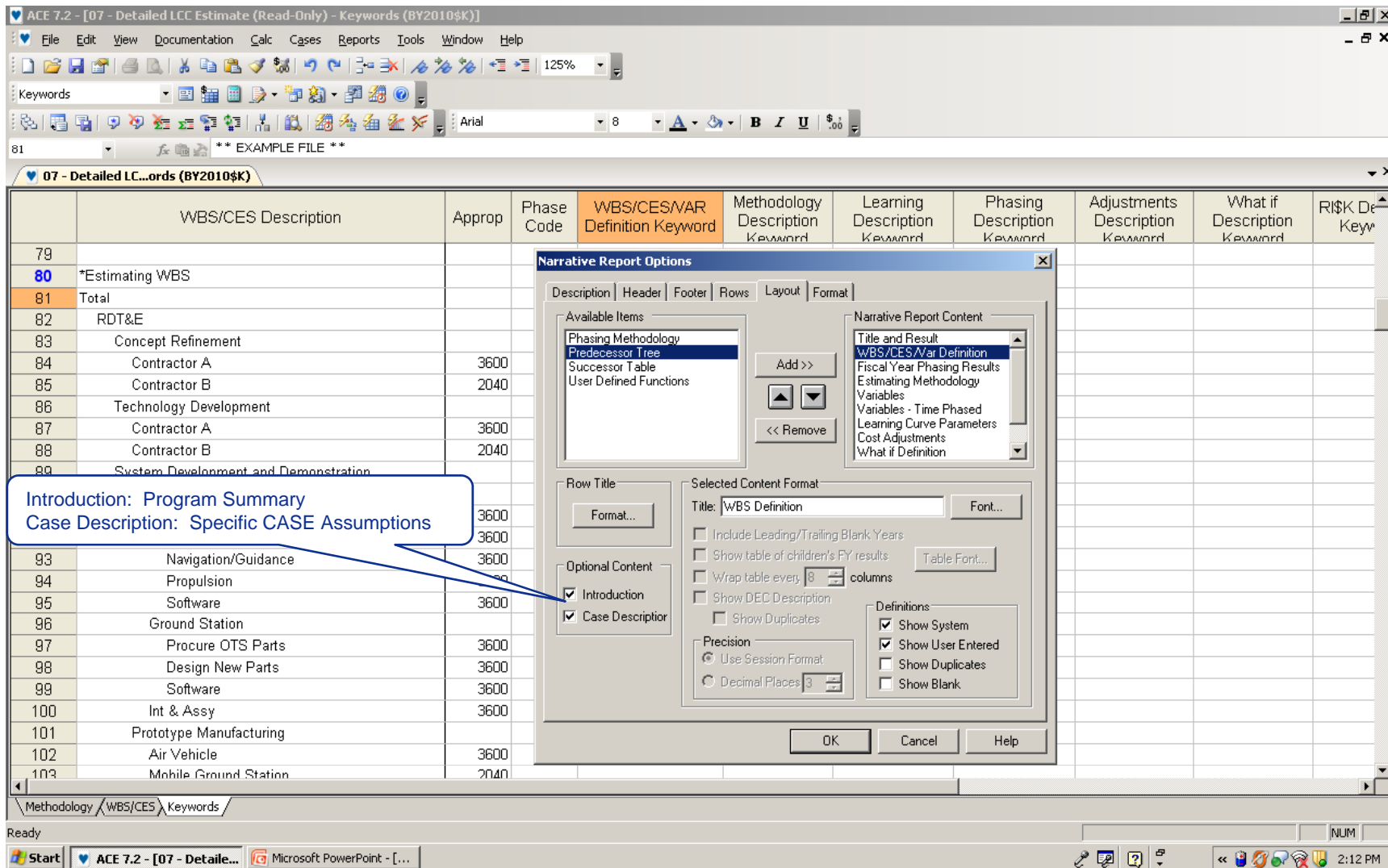
■ **Step 4: Select Row Range**



The screenshot shows the ACE 7.2 software interface. The main window displays a table titled '07 - Detailed LCC Estimate (Read-Only) - Keywords (BY2010\$K)'. The table has columns for WBS/CES Description, Approp, Phase Code, WBS/CES/MAR Definition Keyword, Methodology Description Keyword, Learning Description Keyword, Phasing Description Keyword, Adjustments Description Keyword, What if Description Keyword, and RISK Description Keyword. Row 80 is highlighted in orange and contains '*Estimating WBS'. A 'Narrative Report Options' dialog box is open over the table, with the 'Rows' tab selected. The 'Include Rows' section has 'Selected Row Range' selected, with 'First' set to 1 and 'Last' set to 339. The 'Sections' section has '*Estimating WBS' selected. The 'Traceback Items for Active Row' section has 'Both' selected. The 'Page break after each row' checkbox is unchecked. The dialog box has 'OK', 'Cancel', and 'Help' buttons.

	WBS/CES Description	Approp	Phase Code	WBS/CES/MAR Definition Keyword	Methodology Description Keyword	Learning Description Keyword	Phasing Description Keyword	Adjustments Description Keyword	What if Description Keyword	RISK Description Keyword
80	*Estimating WBS									
81	Total									
82	RDT&E									
83	Concept Refinement									
84	Contractor A	3600								
85	Contractor B	2040								
86	Technology Development									
87	Contractor A	3600								
88	Contractor B	2040								
89	System Development and Demonstration									
90	Development Engineering									
91	Air Vehicle	3600								
92	Basic Structure	3600								
93	Navigation/Guidance	3600								
94	Propulsion	3600								
95	Software	3600								
96	Ground Station									
97	Procure OTS Parts	3600								
98	Design New Parts	3600								
99	Software	3600								
100	Int & Assy	3600								
101	Prototype Manufacturing									
102	Air Vehicle	3600								
103	Mobile Ground Station	2040								
104	SFPM									

Step 5: Edit Layout



Narrative Report Options

Description | Header | Footer | Rows | **Layout** | Format

Available Items:

- Phasing Methodology
- Predecessor Tree
- Successor Table
- User Defined Functions

Narrative Report Content:

- Title and Result
- WBS/CES/Var Definition
- Fiscal Year Phasing Results
- Estimating Methodology
- Variables
- Variables - Time Phased
- Learning Curve Parameters
- Cost Adjustments
- What if Definition

Optional Content:

- Introduction
- Case Description

Selected Content Format:

Title: WBS Definition

Include Leading/Trailing Blank Years

Show table of children's FY results

Wrap table every 8 columns

Show DEC Description

Show Duplicates

Definitions:

- Show System
- Show User Entered
- Show Duplicates
- Show Blank

Precision:

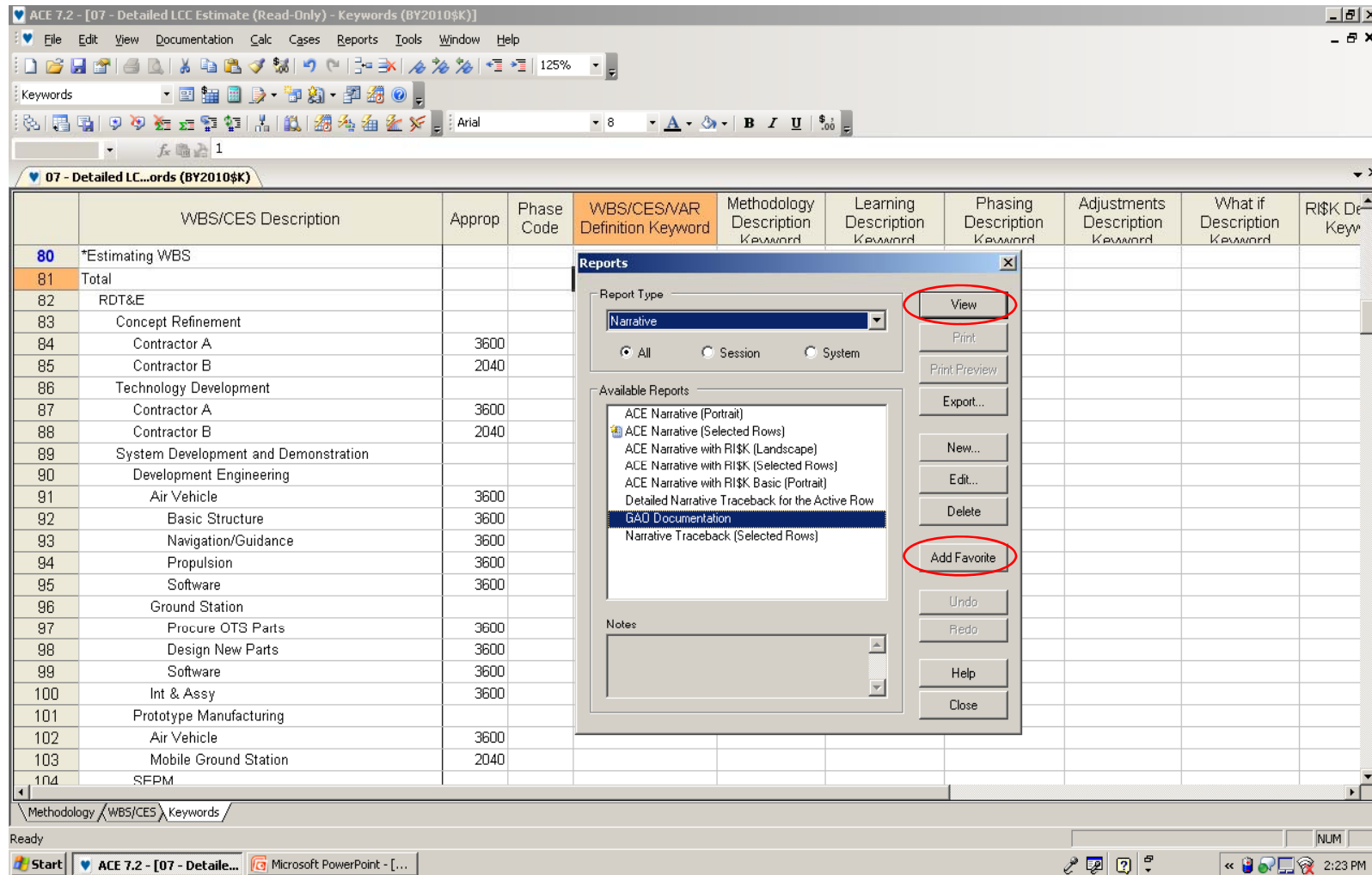
Use Session Format

Decimal Places: 3

Buttons: OK, Cancel, Help

	WBS/CES Description	Approp	Phase Code	WBS/CES/Var Definition Keyword	Methodology Description Keyword	Learning Description Keyword	Phasing Description Keyword	Adjustments Description Keyword	What if Description Keyword	RISK De Key
79										
80	*Estimating WBS									
81	Total									
82	RDT&E									
83	Concept Refinement									
84	Contractor A	3600								
85	Contractor B	2040								
86	Technology Development									
87	Contractor A	3600								
88	Contractor B	2040								
89	System Development and Demonstration									
90		3600								
91		3600								
92		3600								
93	Navigation/Guidance	3600								
94	Propulsion									
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98	Design New Parts	3600								
99	Software	3600								
100	Int & Assy	3600								
101	Prototype Manufacturing									
102	Air Vehicle	3600								
103	Mobile Ground Station	2040								

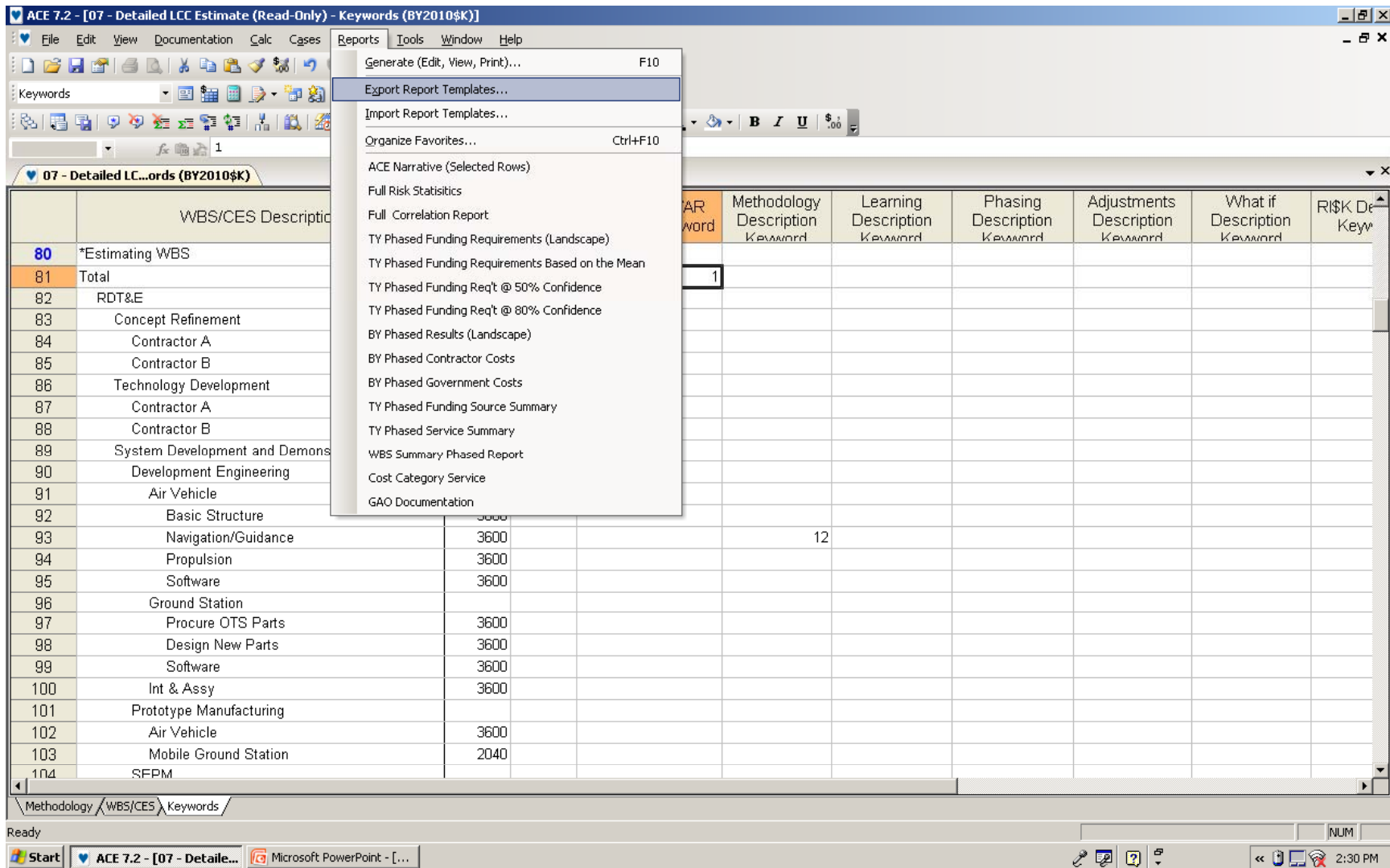
■ **Step 6: View and Add Report to Favorites**



The screenshot shows the ACE 7.2 software interface. A 'Reports' dialog box is open, displaying a list of available reports. The 'View' button and the 'Add Favorite' button are circled in red. The background shows a data table with columns for WBS/CES Description, Approp, Phase Code, WBS/CES/AR Definition Keyword, Methodology Description Keyword, Learning Description Keyword, Phasing Description Keyword, Adjustments Description Keyword, What if Description Keyword, and RISK Description Keyword.

	WBS/CES Description	Approp	Phase Code	WBS/CES/AR Definition Keyword	Methodology Description Keyword	Learning Description Keyword	Phasing Description Keyword	Adjustments Description Keyword	What if Description Keyword	RISK Description Keyword
80	*Estimating WBS									
81	Total									
82	RDT&E									
83	Concept Refinement									
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94	Propulsion	3600								
95	Software	3600								
96	Ground Station									
97	Procure OTS Parts	3600								
98	Design New Parts	3600								
99	Software	3600								
100	Int & Assy	3600								
101	Prototype Manufacturing									
102	Air Vehicle	3600								
103	Mobile Ground Station	2040								
104	SFPM									

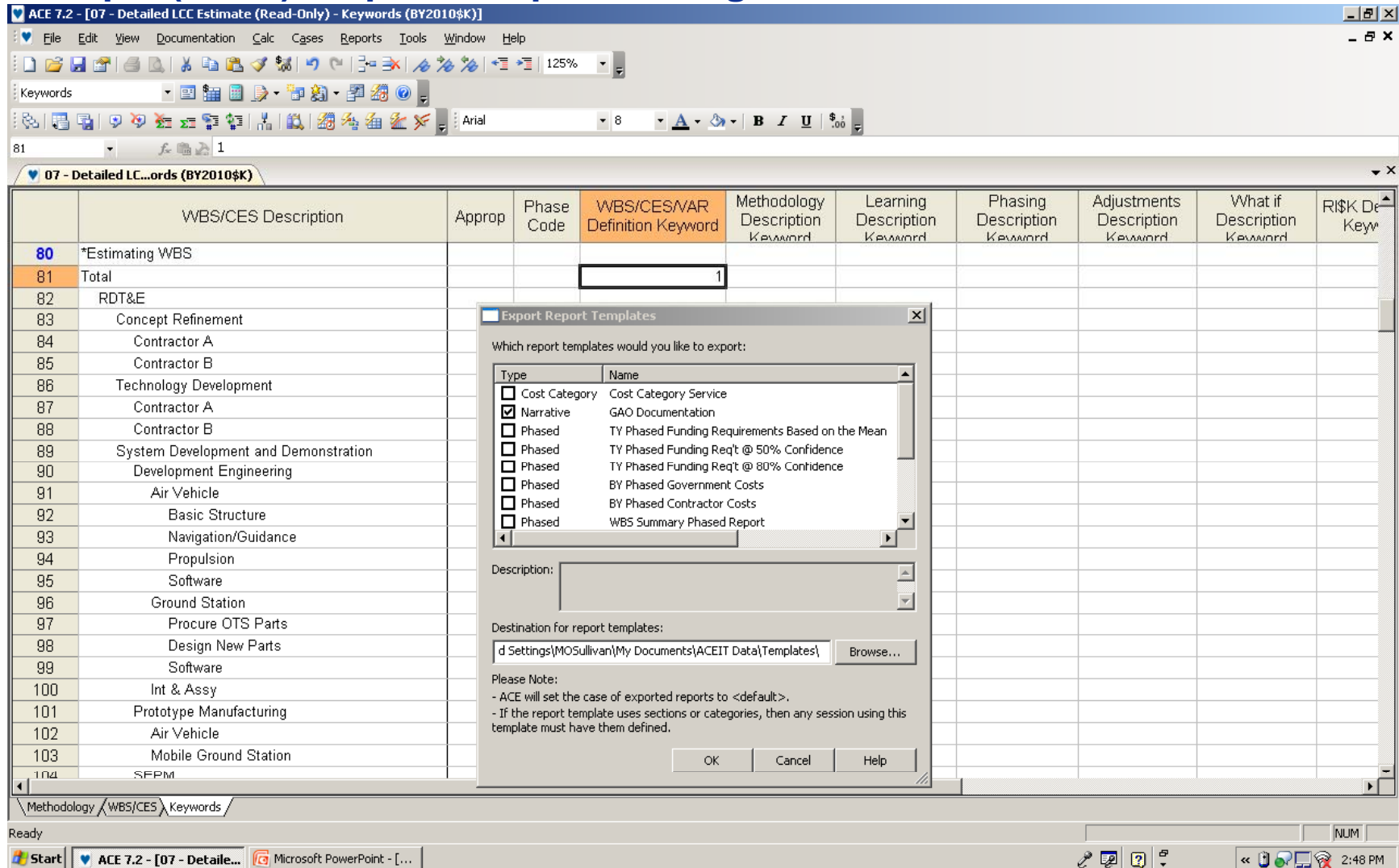
Step 7: Export Template to Organizer



The screenshot shows the ACEIT 7.2 interface with the 'Reports' menu open. The 'Export Report Templates...' option is highlighted. The background displays a table with columns for 'Methodology Description Keyword', 'Learning Description Keyword', 'Phasing Description Keyword', 'Adjustments Description Keyword', 'What if Description Keyword', and 'RISK Description Keyword'. The table contains data for various WBS/CES items, including 'Basic Structure', 'Navigation/Guidance', 'Propulsion', 'Software', 'Ground Station', 'Procure OTS Parts', 'Design New Parts', 'Software', 'Int & Assy', 'Prototype Manufacturing', 'Air Vehicle', and 'Mobile Ground Station'.

WBS/CES Description	Methodology Description Keyword	Learning Description Keyword	Phasing Description Keyword	Adjustments Description Keyword	What if Description Keyword	RISK Description Keyword
80 *Estimating WBS						
81 Total						
82 RDT&E						
83 Concept Refinement						
84 Contractor A						
85 Contractor B						
86 Technology Development						
87 Contractor A						
88 Contractor B						
89 System Development and Demonstrations						
90 Development Engineering						
91 Air Vehicle						
92 Basic Structure						
93 Navigation/Guidance						12
94 Propulsion						
95 Software						
96 Ground Station						
97 Procure OTS Parts						3600
98 Design New Parts						3600
99 Software						3600
100 Int & Assy						3600
101 Prototype Manufacturing						
102 Air Vehicle						3600
103 Mobile Ground Station						2040
104 SFPM						

Step 7 (Cont.): Export Template to Organizer



The screenshot shows the ACEIT 7.2 interface with a table of WBS/CES items and an open dialog box for exporting report templates.

	WBS/CES Description	Approp	Phase Code	WBS/CES/VAR Definition Keyword	Methodology Description Keyword	Learning Description Keyword	Phasing Description Keyword	Adjustments Description Keyword	What if Description Keyword	RISK Description Keyword
80	*Estimating WBS									
81	Total			1						
82	RDT&E									
83	Concept Refinement									
84	Contractor A									
85	Contractor B									
86	Technology Development									
87	Contractor A									
88	Contractor B									
89	System Development and Demonstration									
90	Development Engineering									
91	Air Vehicle									
92	Basic Structure									
93	Navigation/Guidance									
94	Propulsion									
95	Software									
96	Ground Station									
97	Procure OTS Parts									
98	Design New Parts									
99	Software									
100	Int & Assy									
101	Prototype Manufacturing									
102	Air Vehicle									
103	Mobile Ground Station									
104	SPPM									

Export Report Templates Dialog Box:

Which report templates would you like to export:

Type	Name
<input type="checkbox"/>	Cost Category Cost Category Service
<input checked="" type="checkbox"/>	Narrative GAO Documentation
<input type="checkbox"/>	Phased TY Phased Funding Requirements Based on the Mean
<input type="checkbox"/>	Phased TY Phased Funding Req't @ 50% Confidence
<input type="checkbox"/>	Phased TY Phased Funding Req't @ 80% Confidence
<input type="checkbox"/>	Phased BY Phased Government Costs
<input type="checkbox"/>	Phased BY Phased Contractor Costs
<input type="checkbox"/>	Phased WBS Summary Phased Report

Description:

Destination for report templates:

Please Note:
 - ACE will set the case of exported reports to <default>.
 - If the report template uses sections or categories, then any session using this template must have them defined.

GAO Best Practice Checklist

- **The documentation describes the cost estimating process, data sources, and methods step by step so that a cost analyst unfamiliar with the program could understand what was done and replicate it.**
 - Supporting data are adequate for easily updating the estimate to reflect actual costs or program changes and using them for future estimates.
 - The documentation describes the estimate with narrative and cost tables.
 - It contains an executive summary, introduction, and descriptions of methods, with data broken out by WBS cost elements, sensitivity analysis, risk and uncertainty analysis, management approval, and updates that reflect actual costs and changes.
 - Detail addresses best practices and the 12 steps of high-quality estimates.
 - The documentation is mathematically sensible and logical.
 - It discusses contingency reserves and how they were derived from risk and uncertainty analysis and the LCCE funding profile.

*GAO Cost Estimating and Assessment Guide, March 2009

- **ACEIT 7.2 Example Files**
 - **07- Detailed LCC Estimate**

* Example file does not include any actual program data

QUESTIONS