

AD-A256 230



Copy

15

of 38 copies

2

IDA DOCUMENT D-1074

A USER'S GUIDE FOR THE FUNCTIONAL ECONOMIC ANALYSIS MODEL  
(VERSION 2.2A)

Thomas P. Frazier, *Project Leader*  
John J. Cloos  
Matthew S. Goldberg  
Philip M. Lurie  
Alec W. Salerno  
Sally Williams  
Kathryn L. Wilson

March 1992



*Prepared for*

Office of the Assistant Secretary of Defense  
(Command, Control, Communications and Intelligence)

92-27050



Approved for public release: distribution unlimited.



INSTITUTE FOR DEFENSE ANALYSES  
1801 N. Beauregard Street, Alexandria, Virginia 22311-1772

## **DEFINITIONS**

IDA publishes the following documents to report the results of its work.

### **Reports**

Reports are the most authoritative and most carefully considered products IDA publishes. They normally embody results of major projects which (a) have a direct bearing on decisions affecting major programs, (b) address issues of significant concern to the Executive Branch, the Congress and/or the public, or (c) address issues that have significant economic implications. IDA Reports are reviewed by outside panels of experts to ensure their high quality and relevance to the problems studied, and they are released by the President of IDA.

### **Group Reports**

Group Reports record the findings and results of IDA established working groups and panels composed of senior individuals addressing major issues which otherwise would be the subject of an IDA Report. IDA Group Reports are reviewed by the senior individuals responsible for the project and others as selected by IDA to ensure their high quality and relevance to the problems studied, and are released by the President of IDA.

### **Papers**

Papers, also authoritative and carefully considered products of IDA, address studies that are narrower in scope than those covered in Reports. IDA Papers are reviewed to ensure that they meet the high standards expected of refereed papers in professional journals or formal Agency reports.

### **Documents**

IDA Documents are used for the convenience of the sponsors or the analysts (a) to record substantive work done in quick reaction studies, (b) to record the proceedings of conferences and meetings, (c) to make available preliminary and tentative results of analyses, (d) to record data developed in the course of an investigation, or (e) to forward information that is essentially unanalyzed and unevaluated. The review of IDA Documents is suited to their content and intended use.

The work reported in this document was conducted under contract MDA 903 89 C 0003 for the Department of Defense. The publication of this IDA document does not indicate endorsement by the Department of Defense, nor should the contents be construed as reflecting the official position of that Agency.

**UNCLASSIFIED**

<b>REPORT DOCUMENTATION PAGE</b>			<i>Form Approved</i> OMB No. 0704-0188	
Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188), Washington, DC 20503.				
1. AGENCY USE ONLY (Leave blank)		2. REPORT DATE March 1992	3. REPORT TYPE AND DATES COVERED Final Report, Apr 1991 - Feb 1992	
4. TITLE AND SUBTITLE A User's Guide for the Functional Economic Analysis Model (Version 2.2A)			5. FUNDING NUMBERS  C-MDA-903-89C-0003 T-J7-832	
6. AUTHOR(S) Thomas P. Frazier, John J. Cloos, Matthew S. Goldberg, Alec W. Salerno, Kathryn L. Wilson, Sally Williams, Philip M. Lurie				
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Institute for Defense Analyses 1801 N. Beauregard Street Alexandria, VA 22311-1772			8. PERFORMING ORGANIZATION REPORT NUMBER  IDA-D-1074	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) Director Defense Information Room 3E240, The Pentagon Washington, DC 20301			10. SPONSORING/MONITORING AGENCY REPORT NUMBER	
11. SUPPLEMENTARY NOTES				
12A. DISTRIBUTION/AVAILABILITY STATEMENT  Approved for public release; distribution unlimited.			12B. DISTRIBUTION CODE	
13. ABSTRACT (Maximum 200 words)  The Functional Economic Analysis Model (FEAM) was developed by IDA for use by DoD information managers when analyzing alternatives for saving costs when preparing business cases. The model is used to enter costs and get information on a series of alternatives to a budget baseline representing total current and planned DoD expenditures for a given function. Using the supplied information, the model performs a Risk-Adjusted, Discounted Cash Flow (RADCF) analysis, and presents the results in graphical and tabular form. This document is a user's guide for the FEAM. It gives step-by-step instructions for installing the model, entering and editing data, and analyzing the results. Included in the appendices are an explanation of the calculation used for the RADCF analysis and definitions of the cost breakdown structure for the model.				
14. SUBJECT TERMS Functional Economic Analysis Model (FEAM), Cost Models, Cost Estimates, User Manuals			15. NUMBER OF PAGES 45	
			16. PRICE CODE	
17. SECURITY CLASSIFICATION OF REPORT Unclassified	18. SECURITY CLASSIFICATION OF THIS PAGE Unclassified	19. SECURITY CLASSIFICATION OF ABSTRACT Unclassified	20. LIMITATION OF ABSTRACT SAR	

IDA DOCUMENT D-1074

A USER'S GUIDE FOR THE FUNCTIONAL ECONOMIC ANALYSIS MODEL  
(VERSION 2.2A)

Thomas P. Frazier, *Project Leader*  
John J. Cloos  
Matthew S. Goldberg  
Philip M. Lurie  
Alec W. Salerno  
Sally Williams  
Kathryn L. Wilson

March 1992

Approved for public release; distribution unlimited



INSTITUTE FOR DEFENSE ANALYSES

Contract MDA 903 89 C 003  
Task T-J7-832

## PREFACE

This document was prepared by the Institute for Defense Analyses (IDA) for the Office of the Assistant Secretary of Defense (Command, Control, Communications and Intelligence), under contract MDA 903 89 C 0003, Task Order T-J7-832, issued 3 February 1992. The objective of this task was to derive a methodology for estimating baseline costs of different functional areas within DoD.

This work was reviewed within IDA by Michael C. Frieders and Terri J. Walsh. Captain Sally Williams, one of the authors of this document, is on active duty with the United States Air Force.

The model was developed in a rapid prototype process. It is undergoing continual revision and refinement. If you need assistance or have suggestions, please feel free to call or send a message:

Telephone: (703) 845-6780

Electronic mail: feam\_help@ida.org

<b>Accession For</b>	
NTIS GRA&I	<input checked="" type="checkbox"/>
DTIC TAB	<input type="checkbox"/>
Unannounced	<input type="checkbox"/>
Justification	
By _____	
Distribution/	
Availability Codes*	
Dist	Avail and/or Special
A-1	

DTIC QUALITY INSPECTED 1

## CONTENTS

Preface.....	iii
I. Getting Started .....	1
A. Introduction.....	1
B. Installing the Model .....	2
C. Overview of the Model .....	5
II. Manipulating the Data .....	9
A. Entering Data.....	9
B. Editing Data .....	10
C. Analyzing Data.....	11
III. The Screens .....	13
A. Level 1 - The Summary Screen .....	13
B. Level 2 - The Operations/Management and Support Screen.....	15
C. Level 3 - The Cost Breakout Screen.....	16
D. Level 4 - The Data Sheet Screen .....	18
Appendix A. Risk Adjustment Calculation.....	A-1
Appendix B. Cost Structure Outline and Definitions.....	B-1
Abbreviations.....	Abb-1

## FIGURES

1. Choosing File/Run.....	3
2. Entering the Command Line.....	3
3. Installing Feam on the Macintosh .....	4
4. Title Screen .....	4
5. Menu Structure .....	6
6. The Summary Screen.....	13
7. Choosing a Breakout Screen .....	14
8. Baseline Ops/Mgmt & Sup Screen .....	15
9. Alternative Screen.....	16
10. Cost Breakout Screen.....	17
11. Alternative Breakout Screen.....	17
12. Baseline Data Sheet Screen.....	18
13. Alternative Data Sheet Screen.....	19
A-1. Edit Parameters .....	A-2

## I. GETTING STARTED

This section describes how to install the model, how to enter data into the model, and introduces the user to the model by briefly discussing how data is entered, analyzed, and displayed.

### A. INTRODUCTION

The Functional Economic Analysis Model (FEAM) is intended to support analyses of potential cost-saving alternatives for Department of Defense (DoD) information management, and to aid functional managers in presenting their "business case."<sup>1</sup> The model is designed to allow the user to enter costs and get information for a series of alternatives to a budget baseline. The baseline represents total current and planned DoD expenditures for a given function. A current base representing pre-Defense Management Review (DMR) and force-reduction levels is also presented. The model takes the user-supplied information and performs a Risk-Adjusted, Discounted Cash Flow (RADCF) analysis for each alternative. The results are presented in a series of graphs and tables.<sup>2</sup>

The remainder of this section gives a brief overview of how to start and use the model. The rest of the manual consists of detailed information on the model, including a discussion of the form of the cost data needed to run the model.

Section II guides the user through entering, editing, and analyzing the data. Information about discount and inflation rates is presented in this section.

Section III presents the four types of computer screens that the user will encounter. The Summary screen depicts the total costs and savings by function. The Alternative screen depicts the savings for a particular alternative. The Cost Breakout screen depicts costs broken out by major types of expenses. Last, the Data Sheet screen serves as the vehicle for the user to input data into the model.

---

<sup>1</sup> The user should consult the DoD policy on business case analysis for specific guidance on the scope and content of a "business case."

<sup>2</sup> This analysis is based on chapters 8 and 9 of *The Business Value of Computers*, Paul A. Straussman, New Canaan, CT: The Information Economics Press, 1990.

Appendix A deals with the risk adjustment computation carried out by the model during the simulation process. An outline of cost elements used in the model and the definitions of the cost elements are presented in Appendix B.

The following conventions are used throughout this document:

- Menu names and options are denoted in boldface (e.g., **File menu**)
- Key strokes are denoted by < > signs (e.g., <Return> key).

## B. INSTALLING THE MODEL

The FEAM runs on the IBM PC<sup>TM</sup> and compatibles and the Apple Macintosh<sup>TM</sup>. The user should be familiar with pull-down menus, dialog boxes, and use of the mouse to make selections. The model will require the following:

Minimum	Recommended
Microsoft Excel 3.0 <sup>TM</sup>	-----
A mouse	-----
2 MB of RAM	4 MB of RAM
20 MB hard disk	40 MB or higher hard disk
2.5 MB free space	3.5 MB or more free space
-----	Math co-processor
<u>IBM compatibles</u>	
Microsoft Windows 3.0 <sup>TM</sup>	-----
EGA display	VGA or higher display
<u>Macintosh</u>	
Multifinder <sup>TM</sup>	-----
(Note: do not run FEAM under Finder <sup>TM</sup> )	

To install the model on the IBM PC and compatibles, take the following steps:

1. Enter Microsoft Windows.
2. Insert the FEAM disk in drive A or B.
3. Pull down the **File** menu and choose the **Run...** option (Figure 1).
4. In the command line, type "a:\setup" or "b:\setup", depending on whether you have placed the disk in drive A or B (Figure 2). The Setup routine will lead you through installation of the FEAM.



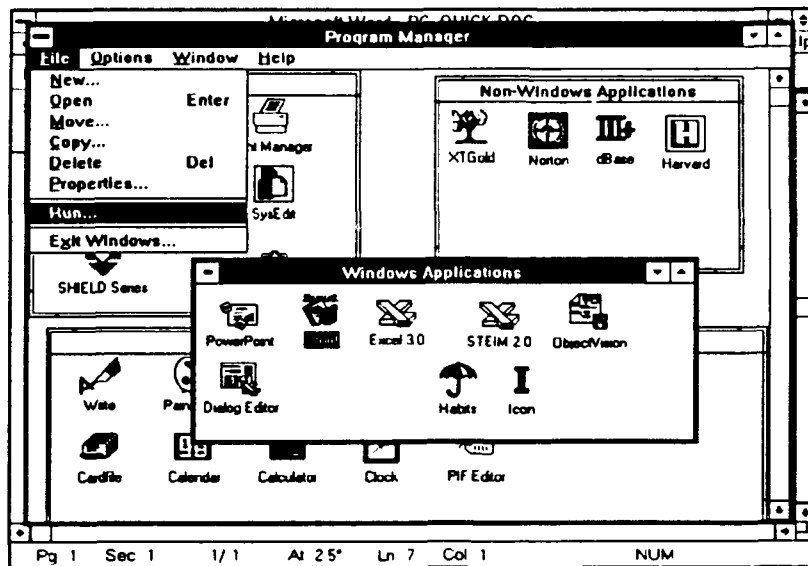


Figure 1. Choosing File/Run

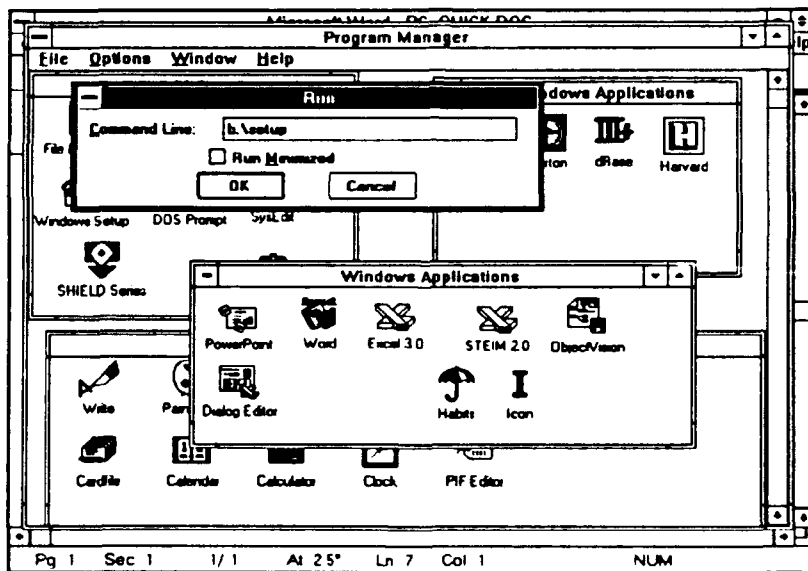


Figure 2. Entering the Command Line

For the Apple Macintosh, take the following steps:

1. Copy the compressed version of the FEAM, labeled "FEAM Ver. 2.2a (Compressed)", from the FEAM disk to your hard disk.
2. Double-click on the file "FEAM Ver. 2.2a (Compressed)" on your hard disk. The installation program will prompt you to select a location for the file, and then copy the model to a folder called "FEAM Ver. 2.2a." Figure 3 shows an example of the Macintosh installation screen.

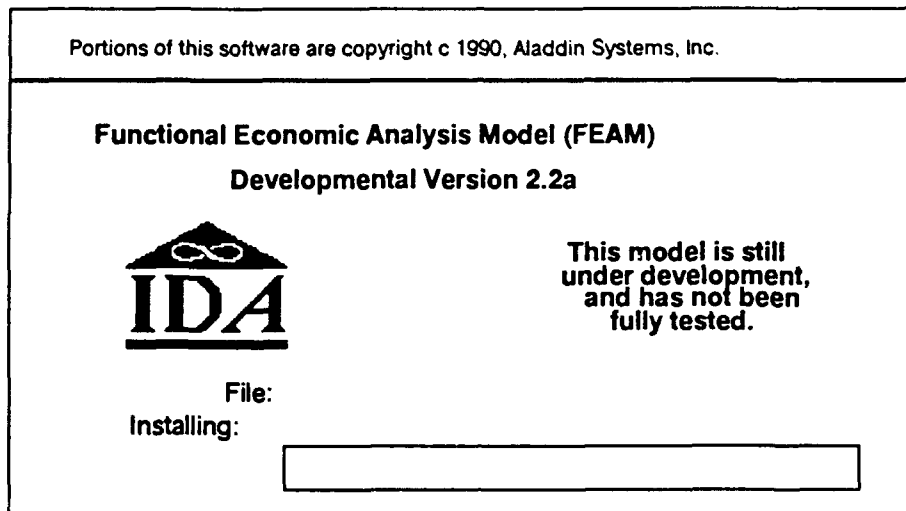


Figure 3. Installing FEAM on the Macintosh

Once the model is installed, make sure Excel is not already open and enter the model by double clicking on the FEAM icon (PC compatibles) or the file "bus\_case.xlm", and the title screen will appear, as shown in Figure 4. If you wish to open Excel first, you may start the FEAM by choosing the "bus\_case.xlm" file from the Open option of the File menu.

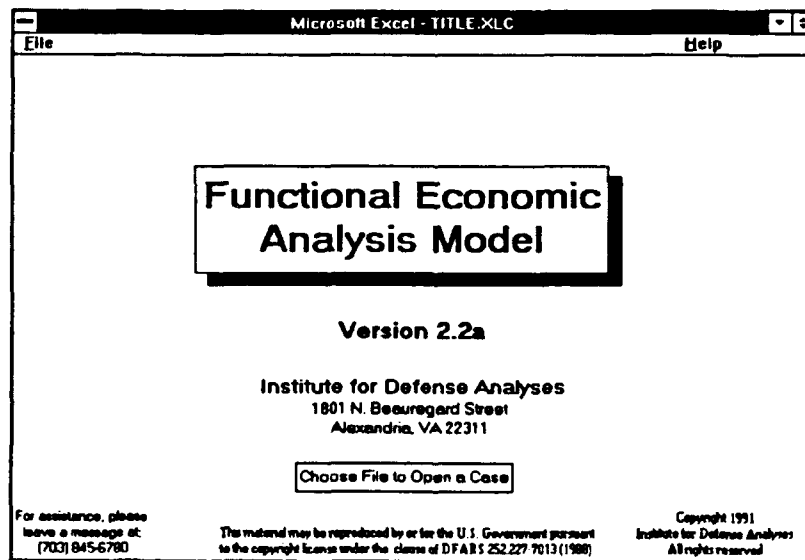


Figure 4. Title Screen

### C. OVERVIEW OF THE MODEL

This section briefly describes the use of the model. Figure 5 shows the entire menu structure, which is broken into four levels. The levels are described below.

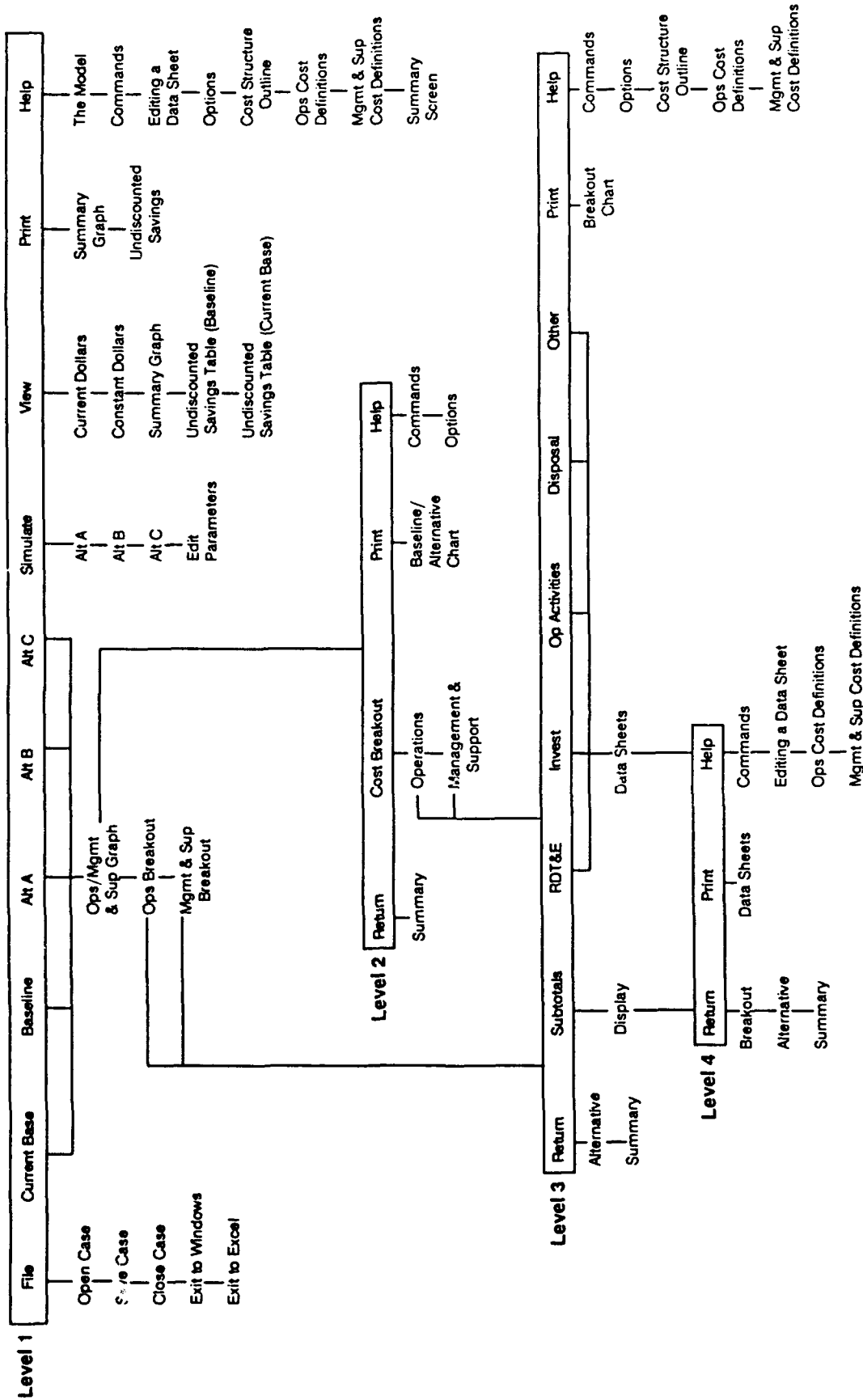
Level 1 has 10 menus available: **File, Current Base, Baseline, Alt A, Alt B, Alt C, Simulate, View, Print, and Help.** The **File** menu allows you to open a new case, save a case, close a case, and exit to either Excel or Windows (Desktop on the Macintosh). When you first run the FEAM, two cases are available under **Open Case**: "demo2.cim" and "initial2.cim". The case "demo2.cim" shows an example where all the data have been filled in. The case "initial2.cim" has blank data fields for you to fill. After filling in the data, you can choose the **Save Case** option to save the case. The file name can be only eight characters long. The ".cim" extension should not be added; this will be done by the program. Never save a file as "initial2" or the blank data sheet will be written over.

The **Current Base, Baseline,** or one of the three **Alternative** menus lead you through the lower levels where you can enter or view data and disaggregated graphs. Under these menus, you may choose the **Ops/Mgmt & Sup Graph** option to go to Level 2, or either the **Ops Breakout** option or the **Mgmt & Sup Breakout** option to go directly to Level 3.

The **Current Base** is defined as the planned DoD expenditures for a given function before and unaffected by DMR and force level reductions. In effect, **Current Base** reflects the expected costs of doing business in the absence of DMR and force reduction decisions. **Current Base** can also be viewed as the "business as usual" or "status quo" posture. It has been incorporated into the model because it represents a very significant point of departure for understanding the extent and nature of cost reductions due to subsequent management initiatives to improve the business processes.

**Baseline** represents total current and planned DoD expenditures for a given function (e.g., contract payments, civilian personnel). This is after the force reduction, and in most cases, after DMR. The **Alternatives** are the potential cost savings as envisioned by the functional managers.

Figure 5. Menu Structure



The **Simulate** menu allows you to apply the RADCF procedure to any one of the Alternatives. You can choose the **Edit Parameters** option, where the discount rate and the number of simulations can be changed. Once data have been entered and the RADCF simulation has been run, the Summary screen shows a total cost and savings graph. A table showing undiscounted savings by Alternative is also available by using the **View** menu. The **View** menu allows you to toggle between current and constant dollars and view undiscounted savings by Alternative from both the Current Base and the Baseline. The Level 1 screen shows either the Summary graph or one of the discounted savings tables.

The **Print** and **Help** menus are available on every level. The **Print** menu lets you print the graphs or data sheets available at a particular level. The **Help** menu on the first level provides help that will be useful at all levels. Help at the other levels refers specifically to those levels.

Level 2 has two purposes: displaying the Operations/Management & Support graph and accessing the other levels of data-entry tables. The Current Base and Baseline graphs show total baseline costs broken out by operations and management and support. The Alternative graphs display the differences between total operations and total management and support costs from the Baseline over time. The **Cost Breakout** menu takes you to the data-entry levels. The **Return** menu allows you to return to the first level.

The Level 3 screens show a graphical display of the cost element breakout. The Baseline cost element breakout graph represents total cost element spending over time. The Operations breakout and Management & Support breakout screens show the differences in cost element spending from the Baseline over time. It is at this level that you choose a life-cycle phase for data entry. The menu choices for data entry are **RDT&E** (Research, Development, Test, and Evaluation), **Invest** (Investment), **Op Activities** (Operational Activities), **Disposal**, and **Other**. The **Subtotals** menu allows you to view the cost element totals. No data are entered under this choice. The **Return** menu permits you to return to Level 1 or 2.

Level 4 is where you input data. For the Current Base and Baseline, a single entry is required. For the Alternatives, both a high and a low entry are required. The highs and lows may be the same, or may be zero. The subtotals cost element screen is for viewing and cannot be changed. The **Return** menu allows you to return to Level 1, 2, or 3.

## II. MANIPULATING DATA

This section explains how to enter and edit data, and how to analyze the results.

### A. ENTERING DATA

The steps for data entry are summarized below.

- From the title screen of the model, pull down the **File** menu and select the **Open Case** option.
- Double-click on the file "initial2.cim". A message will appear that suggests first-time users choose the **Baseline** menu item.
- Pull down the **Baseline** menu and select the **Ops Breakout** option. This allows you to bypass the **Alternative** graph level (Level 2) and go directly to Level 3, where the life-cycle phase is chosen.
- Pull down the **RDT&E** menu item and select the **Data Sheet** option. This brings you to Level 4 where all cost data are entered.
- Enter the cost data for the **RDT&E** phase. All cells must contain a number, even if that number is zero. For the **Alternatives**, the "high" and low" may be the same.
- Pull down the **Return** menu and select the **Breakout** option to get back to the life-cycle phase position.
- Choose another life-cycle phase and enter data as for **RDT&E**. Repeat for each life-cycle phase.
- Choose the **Summary** option from the **Return** menu. This will take you back to Level 1.
- Pull down the **Baseline** menu and select the **Mgmt & Sup Breakout** option and repeat the steps for entering data for each life-cycle phase.
- After all data for the **Baseline** have been entered, pull down the **Return** menu and select the **Summary** option.

- Select an Alternative (A, B, or C) and enter data as for the Baseline. Room is provided for three Alternatives, although only one is needed to run a simulation. If you need more than three Alternatives, create a new case. If you plan to run many Alternatives on the same Baseline data, make a template after entering your Baseline data, and before entering the Alternative data. To do this, enter the Baseline data only, and save the file under a different name (e.g., "base1"). When you open a case, bring up your template instead of "initial2.cim".
- When all the data are entered, pull down the **Return** menu and select the **Summary** option. You may now run the simulation by choosing one of the options under the **Simulate** menu.
- To save your work, pull down the **File** menu and select the **Save Case** option. Enter a file name with no more than 8 characters. Do not enter an extension; the extension ".cim" will be automatically attached. All data for the Baseline and up to three Alternatives can be entered into one file.

## **B. EDITING DATA**

Once you are in a data sheet, use the arrow keys or the mouse to move the cross hairs to the position to be edited. A rectangular box will appear at the position to be edited. Type in the desired value and press the <Return> key. All values are in millions of current-year dollars. Below are definitions for the high and low values and what to do when the cost is known with certainty.

- **High** - The high estimate represents the cost that is exceeded by the actual cost only 2.5 times out of 100.
- **Low** - The low estimate represents the cost that exceeds the actual cost only 2.5 times out of 100.
- **Certainty** - If you know with certainty the cost, then make the high and low values the same.

For the simulation to execute correctly, all cells must contain a non-negative numeric value. Do not run the simulation with blank cells; enter zeroes where appropriate.

### C. ANALYZING DATA

Once you have entered the data, the model can analyze the data using the Risk-Adjusted, Discounted Cash Flow (RADCF) analysis. The results are shown as graphs and a table. To implement the analysis, choose one of the options under the **Simulate** menu at the top level. Each Alternative must be simulated separately. The simulation process takes between 50 seconds and 20 minutes on a computer with a math co-processor. Without the math co-processor, it will take much longer.

Changes to the discount rate and the number of simulations can be made by selecting the **Edit Parameters** option from the **Simulate** menu. For final analysis, 500 simulations are recommended; however, 100 simulations can be used for an intermediate analysis. Running time for 100 simulations is significantly shorter than for 500 simulations.

After selecting the Alternative to simulate, you will be asked for the residual value, the expected useful life of the Alternative beyond the six-year planning period incorporated into the model. To calculate the residual, the model takes the net savings for the last year of the planning period (year 6) and computes the present value of the stream for the selected number of additional years.

The RADCF calculation uses the "high" and "low" estimates entered under the Alternatives to generate a distribution of possible values for each cost element. The model then estimates the cost for each year in each cost category based on a value from that distribution, subtracts it from the corresponding Baseline, and sums all those values to generate a total savings estimate. This process is repeated 500 times. The model then reports the average of these estimates to give an expected savings, as well as a "best" and "worst" case to give a feel for the distribution of these savings. A complete discussion of the simulation methodology is presented in Appendix A.



The graphs can be viewed in either current or constant dollars. Four different deflators are used for converting "then" or current-year dollars into constant-year dollars for the eight cost elements as follows:

<u>Cost Element</u>	<u>Deflator</u>
Civilian labor	TOA-Civilian pay
Military labor	TOA-Total Pay and Allowances
Information Technology	Provided by DDI
Facilities	TOA-Total Non-pay
Material	TOA-Total Non-pay
Other	TOA-Total Non-pay
General Installation Support	TOA-Total Non-pay
Headquarters Support	TOA-Total Non-pay

The Total Obligational Authority (TOA) deflators are taken from Table 5-5 of the *National Defense Budget Estimates for FY 1992* prepared by the DoD Comptroller. The Director of DoD Information (DDI) has elected to provide a separate rate for the Information Technology category because of its unique declining cost behavior in recent years. The deflators are as follows:

<u>Cost Element</u>	<u>1992</u>	<u>1993</u>	<u>1994</u>	<u>1995</u>	<u>1996</u>	<u>1997</u>
Total Non-pay	1.0000	1.0357	1.0721	1.1089	1.1468	1.1860
Information Technology	1.0000	0.8800	0.7740	0.6810	0.6000	0.5280
Civilian Labor	1.0000	1.0459	1.0908	1.1356	1.1810	1.2282
Total Pay and Allowances	1.0000	1.0449	1.0892	1.1333	1.1784	1.2250

The expected RADCF appears on the Summary and Alternative graphs. The "best" and "worst" case RADCFs are shown on the Summary graph. Undiscounted savings are available under the View menu at Level 1.

The results may be printed as graphs or tables. A Print menu is found at each level, and can be used to print only those tables and graphs displayed at that level.

### III. THE SCREENS

This section provides a summary of the main screens and their functions. All the graphs require that the data for the Current Baseline, Baseline, and at least one Alternative be filled in.

#### A. LEVEL 1 - THE SUMMARY SCREEN

The Summary screen is viewed from Level 1 and is shown in Figure 6. If you are at a different level, Level 1 can be reached by choosing the Summary option from the Return menu.

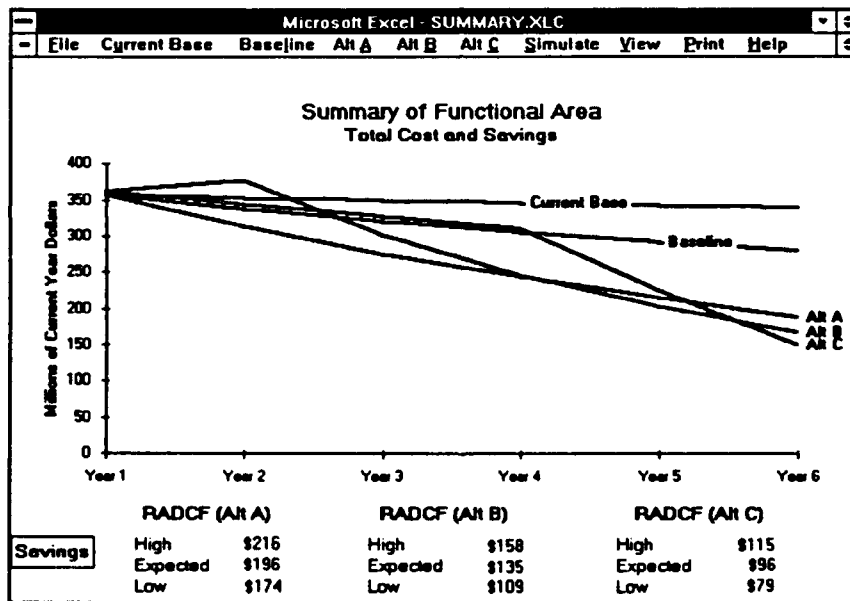


Figure 6. The Summary Screen

The Summary screen shows the total undiscounted costs associated with the Current Baseline, Baseline, and each Alternative. There is a Summary screen for current-year dollars and a Summary screen for constant-year dollars. You may toggle between these screens using the options in the View menu. At the bottom of each screen, three RADCF values for each Alternative are displayed. The RADCF represents the cumulative present value of cost savings of each Alternative. The expected RADCF is the average RADCF created by the simulation process, which

incorporates risk into the RADCF values. The high and low RADCFs represent the "best" and "worst" cases, respectively. For more information on the risk adjustment calculation, see Appendix A.

The menu choices at the Summary screen include **Current Base**, **Baseline**, and the three **Alternatives**, which take you to the **Operations/Management & Support breakout (Level 2)** or the **Cost Element breakout (Level 3)**. Also from this screen, you may open and save files, print the Summary graph and undiscounted savings tables for both **Current Base** and **Baseline**, invoke the simulation routine for a particular **Alternative**, and exit the model. Help at this level includes information on commands, cost structure, and cost element descriptions, as well as information about the Summary screen.

There are three options under the pull-down menus for **Current Base**, **Baseline**, and each **Alternative**, as shown in Figure 7. The first option, **Ops/Mgmt & Sup Graph**, allows you to display the **Baseline total costs**, broken out by total operations costs and total management and support costs. When this option is selected from one of the **Alternative** menus (**Alt A**, **Alt B**, or **Alt C**), the cost savings are displayed for the selected **Alternative**, broken out by operations and management and support costs. These savings represent the differences from the **Baseline**.

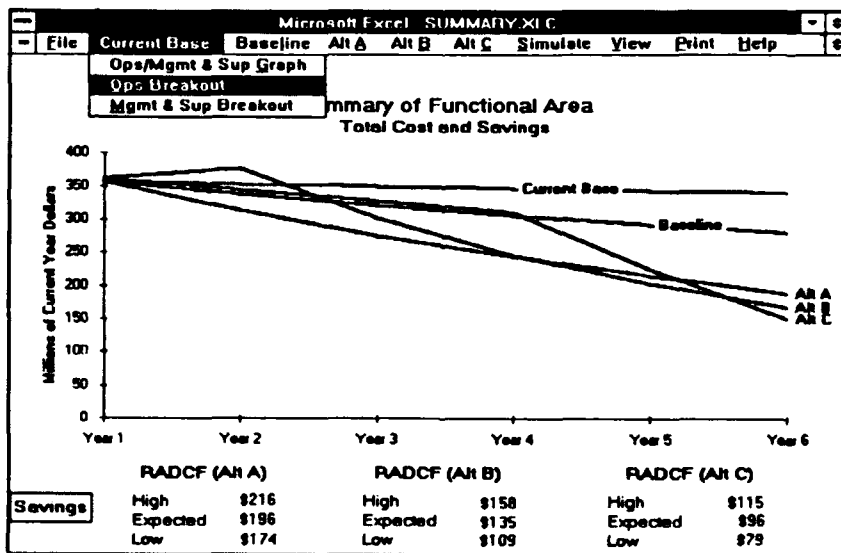


Figure 7. Choosing a Breakout Screen

The second option, **Ops Breakout**, displays total operations costs for the Current Base or Baseline broken out by major types of expenses, or, in the case of the Alternatives, the cost savings for operations by major types of expenses.

The third option, **Mgmt & Sup Breakout**, mirrors the **Ops Breakout** option for the management and support side. From the breakout selections, you can access the data sheets on Level 4.

## B. LEVEL 2 - THE OPERATIONS/MANAGEMENT AND SUPPORT SCREEN

The Level 2 screen displays total undiscounted baseline costs by operations and management and support, or total undiscounted alternative savings by the same categories. A ratio of operations to management and support is also shown as the tooth-to-tail ratio, and is read off the right axis. By selecting the **Ops/Mgmt & Sup Graph** option from the Baseline menu, a graph similar to Figure 8 is displayed.

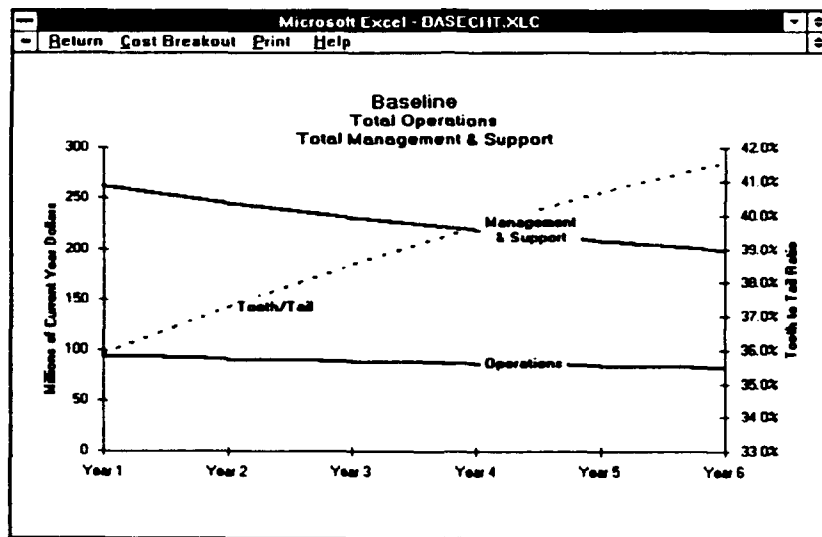


Figure 8. Baseline Ops/Mgmt & Sup Graph

At this point you can return to the Summary graph by choosing the **Return** menu and **Summary** option or break out the costs in more detail.

If instead you select one of the Alternative menus and the **Ops/Mgmt & Sup Graph** option, a graph similar to the one in Figure 9 is displayed. The tooth-to-tail ratio is also displayed on the Alternative screen. The expected RADCF is displayed at the bottom of the screen.

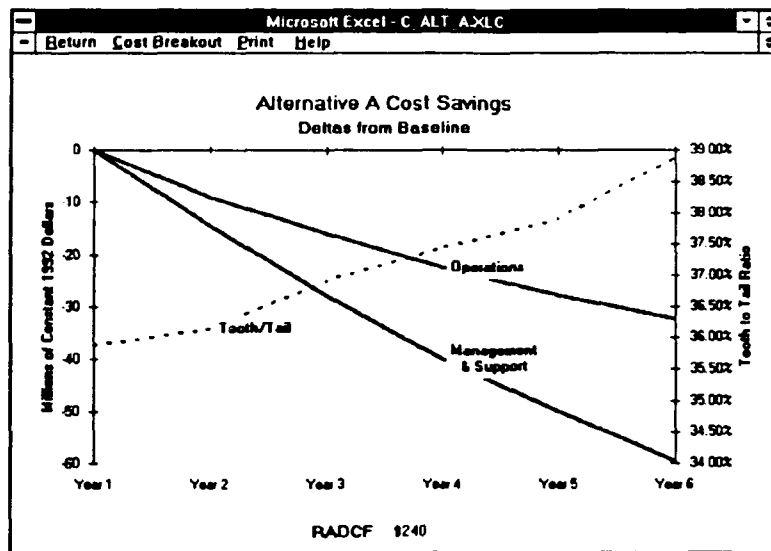


Figure 9. Alternative Screen

At this point you can return to the Summary graph by choosing the **Return** menu item and the **Summary** option or break out the cost savings further.

### C. LEVEL 3 - THE COST BREAKOUT SCREEN

If you are following the Current Base or Baseline path and select the **Operations** option from the **Cost Breakout** menu, a graph similar to Figure 10 is displayed. This graph depicts total operations costs broken out by six cost elements: Civilian Labor, Military Labor, Information Technology, Facilities, Materiel, and Other. If you select the **Management & Support** option from the **Cost Breakout** menu, these six cost element categories plus General Installation Support and Headquarters Support costs are broken out.

From this level, you can return to the previous levels by using the **Return** menu, or you can select a life-cycle phase and examine or enter the actual cost data in the data sheets. You can also examine the total cost data by selecting the **Subtotals** menu. The values in the subtotal sheet are for viewing only and cannot be changed.

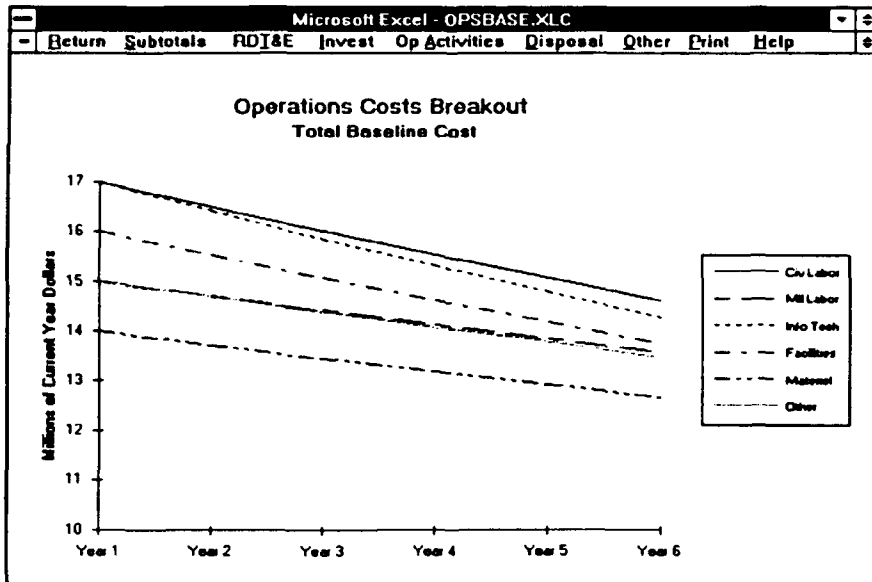


Figure 10. Cost Breakout Screen

If you are following an Alternative path and select the Cost Breakout menu item and the Operations option, a graph similar to Figure 11 is displayed. This screen depicts operations cost savings broken out by the cost elements. Similarly, if you select the Management & Support option, the management and support cost savings are broken out.

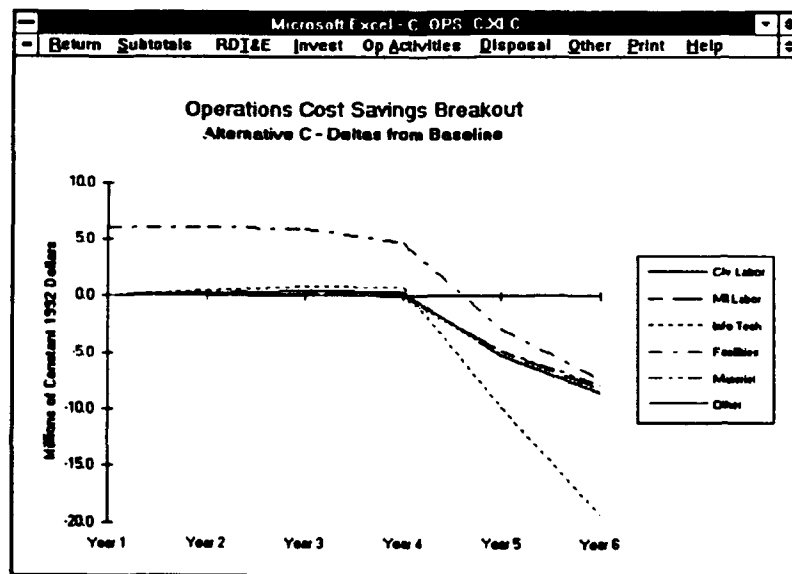


Figure 11. Alternative Breakout Screen

From this screen, you can return to the previous screens by using the **Return** menu, or you can select a life-cycle phase and examine or enter the actual cost data in the data sheets. Again, you can examine the total cost data by cost element by selecting the **Subtotals** menu.

#### D. LEVEL 4 - THE DATA SHEET SCREEN

Level 4 is where you enter data. The first data sheet, shown in Figure 12, is for the Baseline RDT&E costs. The second data sheet, shown in Figure 13, is for RDT&E costs for an Alternative. The only difference between these screens is that high and low values are entered for an Alternative. The values that make up the Baseline and each Alternative are entered in the data sheets. Each cell must have a numeric value in it, even if that value is zero. The high and low entries may have the same value. All data should be rounded to two decimal places. Once the values are entered, the Alternatives can be processed by the simulation routine from the Summary screen.

A. Baseline Operations Cost Data Sheets						
A1 RDT&E Phase						
(Millions of Current Year Dollars)						
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
A1.1 Civilian Labor	3.00	2.91	2.82	2.74	2.66	2.58
A1.2 Military Labor	1.00	0.98	0.96	0.94	0.92	0.90
A1.3 Information Technology	2.00	1.94	1.88	1.83	1.77	1.72
A1.4 Facilities	1.00	0.97	0.94	0.91	0.89	0.86
A1.5 Materiel	5.00	4.90	4.80	4.71	4.61	4.52
A1.6 Other	4.00	3.92	3.84	3.76	3.69	3.62

Figure 12. Baseline Data Sheet Screen

The **Help** menu at the Data Sheet level includes information on the cost element structure and cost element definitions.

Microsoft Excel - TEMP.XLS							
Return Print Help							
A. Operations Cost Data Sheets, Alternative A							
A1 RDT&E Phase							
(Millions of Current Year Dollars)							
		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
A1.1 Civilian Labor	High	3.00	2.70	2.43	2.19	1.97	1.77
	Low	3.00	2.65	2.17	1.84	1.57	1.33
A1.2 Military Labor	High	1.00	0.90	0.81	0.73	0.66	0.59
	Low	1.00	0.85	0.72	0.61	0.52	0.44
A1.3 Information Technology	High	2.00	1.80	1.62	1.46	1.31	1.18
	Low	2.00	1.70	1.45	1.23	1.04	0.89
A1.4 Facilities	High	1.00	0.90	0.81	0.73	0.66	0.59
	Low	1.00	0.85	0.72	0.61	0.52	0.44
A1.5 Materiel	High	5.00	4.50	4.05	3.65	3.28	2.95
	Low	5.00	4.25	3.61	3.07	2.61	2.22
A1.6 Other	High	4.00	3.60	3.24	2.92	2.62	2.36
	Low	4.00	3.40	2.89	2.46	2.09	1.77

Figure 13. Alternative Data Sheet Screen



**APPENDIX A**

**RISK ADJUSTMENT CALCULATION**

## APPENDIX A RISK ADJUSTMENT CALCULATION

In order to explicitly account for the risks of any given Alternative, a simulation routine has been incorporated into the model. The simulation is performed by selecting the **Simulate** menu at Level 1 and choosing one of the Alternatives (Alt A, Alt B, or Alt C).

The simulation routine works in the following manner:

Each cost element is specified under the Baseline (B) and under the Alternative (A). If the cost is incurred in year  $t$ , the discounted cost saving is

$NPV = \frac{B - A}{(1+r)^t}$ , where  $r$  is the discount rate. Note that we adopt an "end-of-year"

discounting convention, so that even savings that accrue in the first year (currently FY 1992) are discounted. The savings are summed over all cost elements and all years. An example is shown below, with a discount rate of 10 percent.

	<u>Year 1</u>	<u>Year 2</u>	<u>Year 3</u>
Baseline	200	180	160
Alternative	190	150	110

$$NPV = \frac{B_1 - A_1}{(1+r)^1} + \frac{B_2 - A_2}{(1+r)^2} + \frac{B_3 - A_3}{(1+r)^3}$$

$$NPV = \frac{10}{1.10} + \frac{30}{1.21} + \frac{50}{1.33}$$

$$NPV = 71.5$$

By default, the model employs a real discount rate of 10 percent per year (0.10). However, the user may alter this parameter by choosing the **Edit Parameters** option from the **Simulate** menu at Level 1. Be certain to enter the discount rate as a decimal (Figure A-1).

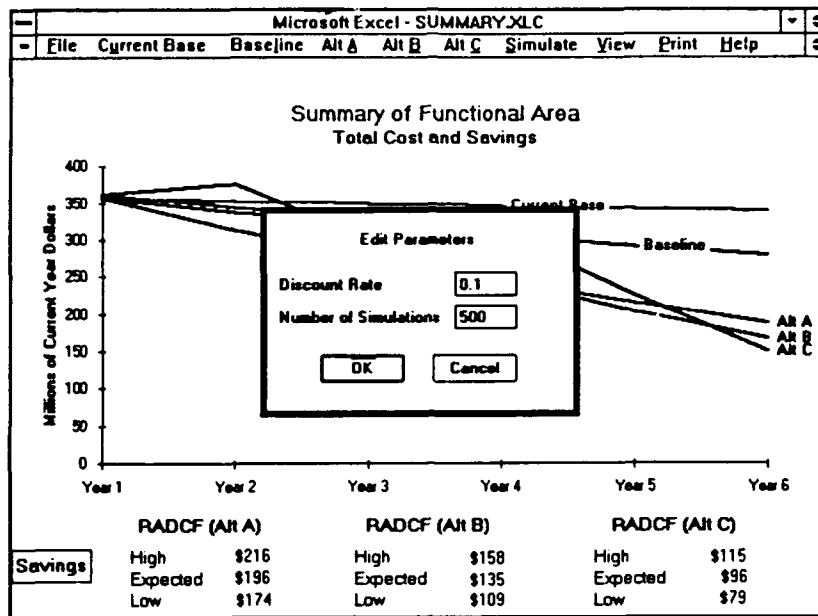


Figure A-1. Edit Parameters

Ordinarily, cost elements are tracked for six years. However, the user has the option of specifying a "residual value." Under this option, all costs for the sixth year are repeated for as many additional years as the user specifies (up to 20 additional years), as illustrated below for a residual value of 2.

$$NPV = \frac{B_1 - A_1}{(1+r)^1} + \frac{B_2 - A_2}{(1+r)^2} + \frac{B_3 - A_3}{(1+r)^3} + \frac{B_4 - A_4}{(1+r)^4} + \frac{B_5 - A_5}{(1+r)^5} + \frac{B_6 - A_6}{(1+r)^6} + \frac{B_6 - A_6}{(1+r)^7} + \frac{B_6 - A_6}{(1+r)^8}$$

The cost elements under the Alternative are simulated to reflect risk. In the data screens, each cost element is entered as both a "low" value (L) and a "high" value (H). These values are chosen so that a cost below L occurs only 2.5 percent of the time, and similarly for a cost above H.

The Alternative cost elements are simulated from a lognormal distribution. That is, the natural logarithm of cost is assumed to have a normal distribution. The lognormal distribution, which applies to the cost element itself, has the property of being skewed to the right, so that extreme costs due to programming errors, schedule delays, etc., are accommodated.

On the logarithmic scale, the mean (denoted  $m$ ) of the normal distribution is estimated as the midpoint of the logs of the high and low values,  $m = \frac{(\log H + \log L)}{2}$ .

We also use the fact that 95 percent of a normal distribution lies within  $\pm 2$  standard deviations (denoted  $s$ ) of the mean. Hence  $\log H - \log L = 4s$ , or  $s = \frac{(\log H - \log L)}{4}$  and the variance  $v = s^2$ . On the logarithmic scale, the low and high cost inputs may be interpreted as a band lying  $\pm 2$  standard deviations from the "best guess."

By default, the Alternative is simulated 100 times. Within each simulation, every cost element is drawn from its respective lognormal distribution. Then the discounted sums of savings from the Baseline are computed. The result is 100 discounted sums. By choosing Edit Parameters under the Simulate menu, the user may alter the number of simulations to any number between 1 and 500. We do not recommend that the number be reduced below 100. We recommend that 100 simulations be performed during the early, exploratory stages of analysis. However, 100 simulations may still embody considerable statistical "noise." Therefore, we recommend that 500 simulations be performed for the final analysis.

The output screens report the mean of the 100 (or more) simulations. To reflect the risk of an Alternative, we also report the 2.5 and 97.5 percentiles from the distribution of cost differences. The 2.5 percentile is the value that lies above only 2.5 percent of the simulated cost differences. This value represents the "worst case." The 97.5 percentile is the value that lies above 97.5 percent of the simulated cost differences, or below only 2.5 percent of them. This value represents the "best case."

**APPENDIX B**

**COST STRUCTURE OUTLINE AND DEFINITIONS**

## APPENDIX B

### COST STRUCTURE OUTLINE AND DEFINITIONS

For the results of the model to be useful, the cost data must be entered in a consistent fashion across all functional areas. This involves using a cost breakdown structure that incorporates the major phases and expense types that are important to life cycle costing. The first subsection of the appendix shows an outline of the cost structure. The second subsection lists detailed definitions for each cost element.

#### COST STRUCTURE

The cost structure includes three levels of indenture. Each item at the third level should be entered by year, and by high and low estimate where appropriate. Functional managers may choose to maintain these data in a less aggregated form for their own purposes.

##### A. Operations Costs

###### A1. RDT&E Phase

- A1.1 Civilian Labor
- A1.2 Military Labor
- A1.3 Information Technology
- A1.4 Facilities
- A1.5 Materiel
- A1.6 Other

###### A2. Investment Phase

- A2.1 Civilian Labor
- A2.2 Military Labor
- A2.3 Information Technology
- A2.4 Facilities
- A2.5 Materiel
- A2.6 Other

- A3. Operational Activities
  - A3.1 Civilian Labor
  - A3.2 Military Labor
  - A3.3 Information Technology
  - A3.4 Facilities
  - A3.5 Materiel
  - A3.6 Other
- A4. Disposal
  - A4.1 Civilian Labor
  - A4.2 Military Labor
  - A4.3 Information Technology
  - A4.4 Facilities
  - A4.5 Materiel
  - A4.6 Other
- A5. Other Unique Phases (as required)
  - A5.1 Civilian Labor
  - A5.2 Military Labor
  - A5.3 Information Technology
  - A5.4 Facilities
  - A5.5 Materiel
  - A5.6 Other

**B. Management & Support Costs**

- B1. RDT&E Phase
  - B1.1 Civilian Labor
  - B1.2 Military Labor
  - B1.3 Information Technology
  - B1.4 Facilities
  - B1.5 Materiel
  - B1.6 Other
  - B1.7 General Installation Support (General and Administrative)
  - B1.8 Headquarters Support

- B2. Investment Phase**
  - B2.1 Civilian Labor**
  - B2.2 Military Labor**
  - B2.3 Information Technology**
  - B2.4 Facilities**
  - B2.5 Materiel**
  - B2.6 Other**
  - B2.7 General Installation Support (General and Administrative)**
  - B2.8 Headquarters Support**
- B3. Operational Activities Phase**
  - B3.1 Civilian Labor**
  - B3.2 Military Labor**
  - B3.3 Information Technology**
  - B3.4 Facilities**
  - B3.5 Materiel**
  - B3.6 Other**
  - B3.7 General Installation Support (General and Administrative)**
  - B3.8 Headquarters Support**
- B4. Disposal Phase**
  - B4.1 Civilian Labor**
  - B4.2 Military Labor**
  - B4.3 Information Technology**
  - B4.4 Facilities**
  - B4.5 Materiel**
  - B4.6 Other**
  - B4.7 General Installation Support (General and Administrative)**
  - B4.8 Headquarters Support**
- B5. Other Unique Phases (as required)**
  - B5.1 Civilian Labor**
  - B5.2 Military Labor**
  - B5.3 Information Technology**
  - B5.4 Facilities**
  - B5.5 Materiel**
  - B5.6 Other**
  - B5.7 General Installation Support (General and Administrative)**
  - B5.8 Headquarters Support**



## **COST DEFINITIONS**

This section provides cost definitions for the cost structure shown in section A. The taxonomy is summarized here in the Coding Structure sub-section, and further explanation is provided in the Coding Detail sub-section.

### **1. Coding Structure**

The first three levels of this structure are required by the model, further detail may be of value to the functional areas.

#### **Position 1: Primary Subdivision of Costs**

A (Operations Costs) or B (Management and Support) refers largely to the distinction between direct (Operations) and indirect (Management & Support) costs.

#### **Position 2: Phase of Work**

1 (RDT&E), 2 (Investment), 3 (Operational Activities), 4 (Disposal), 5 (Other). The phases represent a summary description of the general kinds of activities being performed to produce output. The costs of each phase can be funded by several different appropriations.

#### **Position 3: Major Cost Elements**

Identifies the major types or kinds of resources being used to produce output by Operations and Management & Support as follows:

Operations Costs: 1 (Civilian Labor), 2 (Military Labor), 3 (Information Technology), 4 (Facilities), 5 (Materiel), 6 (Other);

Management & Support Costs: 1 (Civilian Labor), 2 (Military Labor), 3 (Information Technology), 4 (Facilities), 5 Materiel), 6 (Other), 7 (General Installation Support - General and Administrative), 8 (Headquarter's Support of Installations).

#### **Positions 4-6: Breakout of Major Cost Elements**

Breakout is provided by category and source of funding (appropriations and program elements).

## **2. Coding Detail**

**A. Operations Costs.** Represents costs of essential functional activities that are directly related to the primary output(s) of an organizational unit for its intended customers.

**A1. Research, Development, Test and Evaluation (RDT&E) Phase.** Includes all direct costs involved in research, development, test and evaluation of a new system or a major modification for eventual production and use in operational activities.

**A1.1 Civilian labor.** Includes the total civilian pay cost, both gross pay and all personnel benefits (e.g., retirement, health insurance, etc.) for all personnel directly involved ("hands on") in producing the primary outputs of an organization. These costs exclude all personnel costs for supervision and management.

**A1.2 Military labor.** Includes the total of all officer and enlisted pay, including allowances and retirement, for all personnel directly involved ("hands on") in producing the primary outputs of an organization. These costs exclude all personnel costs for supervision and management.

**A1.3 Information technology.** Represents the cost of hardware (including peripheral equipment), software, and related telecommunications equipment purchased from commercial sources that can be specifically and directly identified to a primary output. The costs of assets already purchased will only be included when they are already being used or are planned to be sold or used on another project. Non-cash charges such as depreciation and amortization are excluded.

**A1.4 Facilities.** Consists of all costs involved in owning, leasing and operating a facility that can be directly and solely identified to a specific primary output. It would include costs for construction (including modification) if purchased, leasing costs if rented, appropriate utility charges, and repair and maintenance services (including land-related). The costs of assets already purchased will only be included when they are already being used or are planned to be sold or used on another project. Non-cash charges such as depreciation are excluded.

**A1.5 Materiel.** Includes all costs for purchases of office furniture, equipment (non-computer), supplies, including printing, and postage that can be directly identified to a primary output. The costs of assets already purchased will only be included when they are

already being used or are planned to be sold or used on another project. Non-cash charges such as depreciation are excluded.

**A1.6 Other.** All other costs that can be specifically identified to a primary output such as project travel, specific job-related technical training, and transportation costs that are not covered by any of the other elements. All non-cash charges such as depreciation and amortization are excluded.

**A2. Investment Phase.** Includes all direct costs associated with the initial and new purchase of capital assets (real property and equipment) and non-recurring installation and start-up costs. The costs of assets already purchased will only be included when they are already being used or are planned to be sold or used on another project.

**A2.1 Civilian labor.** Includes the total civilian pay cost, both gross pay and all personnel benefits (e.g., retirement, health insurance, etc.) for all personnel directly involved ("hands on") in producing the primary outputs of an organization. These costs exclude all personnel costs for supervision and management.

**A2.2 Military labor.** Includes the total of all officer and enlisted pay, including allowances and retirement, for all personnel directly involved ("hands on") in producing the primary outputs of an organization. These costs exclude all personnel costs for supervision and management.

**A2.3 Information technology.** Represents the cost of hardware (including peripheral equipment), software, and related telecommunications equipment purchased from commercial sources that can be specifically and directly identified to a primary output. The costs of assets already purchased will only be included when they are already being used or are planned to be sold or used on another project. Non-cash charges such as depreciation and amortization are excluded.

**A2.4 Facilities.** Consists of all costs involved in owning, leasing, and operating a facility that can be directly and solely identified to a specific primary output. It would include costs for construction (including modification) if purchased, leasing costs if rented, appropriate utility charges, and repair and maintenance services (including land-related). The costs of assets already purchased will only be included when they are already being used or are planned to be sold or used on another project. Non-cash charges such as depreciation are excluded.

**A2.5 Materiel.** Includes all costs for purchases of office furniture, equipment (non-computer), supplies, including printing, and postage that can be directly identified to a primary output. The costs of assets already purchased will only be included when they are already being used or are planned to be sold or used on another project. Non-cash charges such as depreciation are excluded.

**A2.6 Other.** All other costs that can be specifically identified to a primary output such as project travel, specific job-related technical training, and transportation costs that are not covered by any of the other elements. All non-cash charges such as depreciation and amortization are excluded.

**A3. Operational Activities Phase.** Represents the recurring costs that can be directly identified to routinely producing primary functional outputs.

**A3.1 Civilian Labor.** Includes the total civilian pay cost, both gross pay and all personnel benefits (e.g., retirement, health insurance, etc.) for all personnel directly involved ("hands on") in producing the primary outputs of an organization. These costs exclude all personnel costs for supervision and management.

**A3.2 Military Labor.** Includes the total of all officer and enlisted pay, including allowances and retirement, for all personnel directly involved ("hands on") in producing the primary outputs of an organization. These costs exclude all personnel costs for supervision and management.

**A3.3 Information Technology.** Represents the cost of hardware (including peripheral equipment), software, and related telecommunications equipment purchased from commercial sources that can be specifically and directly identified to a primary output. This includes all maintenance and repair, minor modifications, and all replacement items (excluding initial purchase). The costs of assets already purchased will only be included when they are already being used or are planned to be sold or used on another project. Non-cash charges such as depreciation and amortization are excluded.

**A3.4 Facilities.** Consists of all costs involved in owning, leasing and operating a facility that can be directly and solely identified to a specific primary output. It would include costs for construction (including modification) if purchased, leasing costs if rented, appropriate utility charges, and repair and maintenance services (including land-related). The costs of assets already purchased will only be included when they are already being used or

are planned to be sold or used on another project. Non-cash charges such as depreciation are excluded.

**A3.5 Materiel.** Includes all costs for purchases of office furniture, equipment (non-computer), supplies, including printing, and postage that can be directly identified to a primary output. The costs of assets already purchased will only be included when they are already being used or are planned to be sold or used on another project. Non-cash charges such as depreciation are excluded.

**A3.6 Other.** All other costs that can be specifically identified to a primary output such as project travel, specific job-related technical training, and transportation costs that are not covered by any of the other elements. All non-cash charges such as depreciation and amortization are excluded.

**A4. Disposal Phase.** Represents the direct costs of disposing assets less the estimated salvage value or sales price.

**A4.1 Civilian labor.** Includes the total civilian pay cost, both gross pay and all personnel benefits (e.g., retirement, health insurance, etc.) for all personnel directly involved ("hands on") in producing the primary outputs of an organization. These costs exclude all personnel costs for supervision and management.

**A4.2 Military labor.** Includes the total of all officer and enlisted pay, including allowances and retirement, for all personnel directly involved ("hands on") in producing the primary outputs of an organization. These costs exclude all personnel costs for supervision and management.

**A4.3 Information Technology.** Represents the cost of hardware (including peripheral equipment), software, and related telecommunications equipment purchased from commercial sources that can be specifically and directly identified to a primary output. The costs of assets already purchased will only be included when they are already being used or are planned to be sold or used on another project. Non-cash charges such as depreciation and amortization are excluded.

**A4.4 Facilities.** Consists of all costs involved in owning, leasing and operating a facility that can be directly and solely identified to a specific primary output. It would include costs for construction (including modification) if purchased, leasing costs if rented, appropriate utility charges, and repair and maintenance services (including land-related). The costs of assets already

purchased will only be included when they are already being used or are planned to be sold or used on another project. Non-cash charges such as depreciation are excluded.

**A4.5 Materiel.** Includes all costs for purchases of office furniture, equipment (non-computer), supplies, including printing, and postage that can be directly identified to a primary output. The costs of assets already purchased will only be included when they are already being used or are planned to be sold or used on another project. Non-cash charges such as depreciation are excluded.

**A4.6 Other.** All other direct costs that can be specifically identified to a primary output such as project travel, specific job-related technical training, and transportation costs that are not covered by any of the other elements. All non-cash charges such as depreciation and amortization are excluded.

**A5. Other Unique Phases (as required).** Reserved for special or unique types of activities that do not generally fit any of the other phases and is of such significance to warrant separate accounting.

**B. Management & Support Costs.** Consists of all costs other than operational costs. Such costs are considered to be indirectly related to the primary output because they cannot be easily or economically identified to an output and typically support more than one primary output.

**B1. Research, Development, Test and Evaluation (RDT&E) Phase.** Includes all indirect costs involved in research, development, test and evaluation of a new system or a major modification for eventual production and use in operational activities.

**B1.1 Civilian labor.** Consists of the total civilian pay costs, both gross pay and benefits, for all management, supervision and administration for the functional unit. Represents supervision and management within the functional unit and the cost of all administrative activities (e.g., secretarial, general administration, etc.). Also includes the indirect costs for all activities performed within the basic organization (which the functional unit is a part of) at all levels (both installation and headquarters) to support the primary outputs of the particular functional unit.

**B1.2 Military labor.** Consists of the pay, including allowances and retirement, for all management, supervision and administration for the functional unit. Represents supervision and management within the functional unit and the cost of all administrative activities

(e.g., secretarial, general administration, etc.). Also includes the indirect costs for all activities performed within the basic organization (which the functional unit is a part of) at all levels (both installation and headquarters) to support the primary outputs of the particular functional unit.

**B1.3 Information Technology.** Represents the cost of hardware (including peripheral equipment), software, and related telecommunications equipment purchased from commercial sources that cannot be specifically and directly identified to a primary output. Such costs are incurred within the functional unit or the basic organization (which the functional unit is a part of) at all levels (both installation and headquarters). Normally these resources support two or more primary outputs and cannot be traced easily or economically to primary outputs. The costs of assets already purchased will only be included when they are already being used or are planned to be sold or used on another project. Non-cash charges such as depreciation and amortization are excluded.

**B1.4 Facilities.** Consists of all indirect costs involved in owning, leasing and operating a facility that cannot be directly and solely identified to a specific primary output. Such costs are incurred within the functional unit or the basic organization (which the functional unit is a part of) at all levels (both installation and headquarters). Normally these resources support two or more primary outputs and cannot be traced easily or economically to primary outputs. It would include costs for construction (including modification) if purchased, leasing costs if rented, appropriate utility charges, and repair and maintenance services (including land-related). The costs of assets already purchased will only be included when they are already being used or are planned to be sold or used on another project. Non-cash charges such as depreciation are excluded.

**B1.5 Materiel.** Includes all indirect costs for purchases of office furniture, equipment (non-computer), supplies including, printing, and postage that cannot be directly identified to a primary output. Such costs are incurred within the functional unit or the basic organization (which the functional unit is a part of) at all levels (both installation and headquarters). Normally these resources support two or more primary outputs and cannot be traced easily or economically to primary outputs. The costs of assets already purchased will only be included when they are already being used or are planned to be sold or used on another project. Non-cash charges such as depreciation are excluded.

**B1.6 Other.** Includes all indirect costs other than labor which support primary outputs such as general training, transportation, and travel. Such costs are incurred within the functional unit or the basic organization at all levels (both installation and headquarters) and cannot be readily classified within any of the other five cost elements. Non-cash charges such as depreciation are excluded.

**B1.7 General Installation Support (General and Administrative).** Includes all indirect costs for activities performed by installation organizations (other than the basic organization of the functional unit) in support of the functional unit. It includes all the major cost elements excluding information technology i.e. labor, facilities, materiel, and other. Non-cash charges such as depreciation and amortization are excluded.

**B1.8 Headquarters Support of Installations.** Represents the indirect costs of major and intermediate commands, Service headquarters, Office of Secretary of Defense, Joint Chiefs of Staff, other Defense agencies, and functional headquarters at both the Service and OSD levels.

**B2. Investment Phase.** Includes all indirect costs associated with the initial and new purchase of capital assets (real property and equipment) and non-recurring installation and start-up costs. The costs of assets already purchased will only be included when they are already being used or are planned to be sold or used on another project.

**B2.1 Civilian labor.** Consists of the total civilian pay costs, both gross pay and benefits, for all management, supervision and administration for the functional unit. Represents supervision and management within the functional unit and the cost of all administrative activities (e.g., secretarial, general administration, etc.). Also includes the indirect costs for all activities performed within the basic organization (which the functional unit is a part of) at all levels (both installation and headquarters) to support the primary outputs of the particular functional unit.

**B2.2 Military labor.** Consists of the pay, including allowances and retirement, for all management, supervision and administration for the functional unit. Represents supervision and management within the functional unit and the cost of all administrative activities (e.g., secretarial, general administration, etc.). Also includes the indirect costs for all activities performed within the basic organization (which the functional unit is a part of) at all levels (both installation



and headquarters) to support the primary outputs of the particular functional unit.

**B2.3 Information Technology.** Represents the cost of hardware (including peripheral equipment), software, and related telecommunications equipment purchased from commercial sources that cannot be specifically and directly identified to a primary output. Such costs are incurred within the functional unit or the basic organization (which the functional unit is a part of) at all levels (both installation and headquarters). Normally these resources support two or more primary outputs and cannot be traced easily or economically to primary outputs. The costs of assets already purchased will only be included when they are already being used or are planned to be sold or used on another project. Non-cash charges such as depreciation and amortization are excluded.

**B2.4 Facilities.** Consists of all indirect costs involved in owning, leasing and operating a facility that cannot be directly and solely identified to a specific primary output. Such costs are incurred within the functional unit or the basic organization (which the functional unit is a part of) at all levels (both installation and headquarters). Normally these resources support two or more primary outputs and cannot be traced easily or economically to primary outputs. It would include costs for construction (including modification) if purchased, leasing costs if rented, appropriate utility charges, and repair and maintenance services (including land-related). The costs of assets already purchased will only be included when they are already being used or are planned to be sold or used on another project. Non-cash charges such as depreciation are excluded.

**B2.5 Materiel.** Includes all indirect costs for purchases of office furniture, equipment (non-computer), supplies including, printing, and postage that cannot be directly identified to a primary output. Such costs are incurred within the functional unit or the basic organization (which the functional unit is a part of) at all levels (both installation and headquarters). Normally these resources support two or more primary outputs and cannot be traced easily or economically to primary outputs. The costs of assets already purchased will only be included when they are already being used or are planned to be sold or used on another project. Non-cash charges such as depreciation are excluded.

**B2.6 Other.** Includes all indirect costs other than labor which support primary outputs such as general training, transportation, and travel. Such costs are incurred within the functional unit or the basic

organization at all levels (both installation and headquarters) and cannot be readily classified within any of the other five cost elements. Non-cash charges such as depreciation are excluded.

**B2.7 General Installation Support (General and Administrative).** Includes all indirect costs for activities performed by installation organizations (other than the basic organization of the functional unit) in support of the functional unit. It includes all the major cost elements excluding information technology i.e. labor, facilities, materiel, and other. Non-cash charges such as depreciation and amortization are excluded.

**B2.8 Headquarters Support of Installations.** Represents the indirect costs of major and intermediate commands, Service headquarters, Office of Secretary of Defense, Joint Chiefs of Staff, other Defense agencies, and functional headquarters at both the Service and OSD levels.

**B3. Operational Activities.** Represents the recurring indirect costs that can be directly identified to routinely producing primary functional outputs.

**B3.1 Civilian labor.** Consists of the total civilian pay costs, both gross pay and benefits, for all management, supervision and administration for the functional unit. Represents supervision and management within the functional unit and the cost of all administrative activities (e.g., secretarial, general administration, etc.). Also includes the indirect costs for all activities performed within the basic organization (which the functional unit is a part of) at all levels (both installation and headquarters) to support the primary outputs of the particular functional unit.

**B3.2 Military labor.** Consists of the pay, including allowances and retirement, for all management, supervision and administration for the functional unit. Represents supervision and management within the functional unit and the cost of all administrative activities (e.g., secretarial, general administration, etc.). Also includes the indirect costs for all activities performed within the basic organization (which the functional unit is a part of) at all levels (both installation and headquarters) to support the primary outputs of the particular functional unit.

**B3.3 Information Technology.** Represents the cost of hardware (including peripheral equipment), software, and related telecommunications equipment purchased from commercial sources that cannot be specifically and directly identified to a primary output.

This includes all maintenance and repair, minor modifications and all replacement items (excluding initial purchase). Such costs are incurred within the functional unit or the basic organization (which the functional unit is a part of) at all levels (both installation and headquarters). Normally these resources support two or more primary outputs and cannot be traced easily or economically to primary outputs. The costs of assets already purchased will only be included when they are already being used or are planned to be sold or used on another project. Non-cash charges such as depreciation and amortization are excluded.

**B3.4 Facilities.** Consists of all indirect costs involved in owning, leasing and operating a facility that cannot be directly and solely identified to a specific primary output. Such costs are incurred within the functional unit or the basic organization (which the functional unit is a part of) at all levels (both installation and headquarters). Normally these resources support two or more primary outputs and cannot be traced easily or economically to primary outputs. It would include costs for construction (including modification) if purchased, leasing costs if rented, appropriate utility charges, and repair and maintenance services (including land related). The costs of assets already purchased will only be included when they are already being used or are planned to be sold or used on another project. Non-cash charges such as depreciation are excluded.

**B3.5 Materiel.** Includes all indirect costs for purchases of office furniture, equipment (non-computer), supplies including, printing, and postage that cannot be directly identified to a primary output. Such costs are incurred within the functional unit or the basic organization (which the functional unit is a part of) at all levels (both installation and headquarters). Normally these resources support two or more primary outputs and cannot be traced easily or economically to primary outputs. The costs of assets already purchased will only be included when they are already being used or are planned to be sold or used on another project. Non-cash charges such as depreciation are excluded.

**B3.6 Other.** Includes all indirect costs other than labor which support primary outputs such as general training, transportation, and travel. Such costs are incurred within the functional unit or the basic organization at all levels (both installation and headquarters) and cannot be readily classified within any of the other five cost elements. Non-cash charges such as depreciation are excluded.

**B3.7 General Installation Support (General and Administrative).** Includes all indirect costs for activities performed by installation organizations (other than the basic organization of the functional unit) in support of the functional unit. It includes all the major cost elements excluding information technology i.e. labor, facilities, materiel, and other. Non-cash charges such as depreciation and amortization are excluded.

**B3.8 Headquarters Support of Installations.** Represents the indirect costs of major and intermediate commands, Service headquarters, Office of Secretary of Defense, Joint Chiefs of Staff, other Defense agencies, and functional headquarters at both the Service and OSD levels.

**B4. Disposal Phase.** Represents the indirect costs of disposing assets less the estimated salvage value or sales price.

**B4.1 Civilian labor.** Consists of the total civilian pay costs, both gross pay and benefits, for all management, supervision and administration for the functional unit. Represents supervision and management within the functional unit and the cost of all administrative activities (e.g., secretarial, general administration, etc.). Also includes the indirect costs for all activities performed within the basic organization (which the functional unit is a part of) at all levels (both installation and headquarters) to support the primary outputs of the particular functional unit.

**B4.2 Military labor.** Consists of the pay, including allowances and retirement, for all management, supervision and administration for the functional unit. Represents supervision and management within the functional unit and the cost of all administrative activities (e.g., secretarial, general administration, etc.). Also includes the indirect costs for all activities performed within the basic organization (which the functional unit is a part of) at all levels (both installation and headquarters) to support the primary outputs of the particular functional unit.

**B4.3 Information Technology.** Represents the cost of hardware (including peripheral equipment), software, and related telecommunications equipment purchased from commercial sources that cannot be specifically and directly identified to a primary output. Such costs are incurred within the functional unit or the basic organization (which the functional unit is a part of) at all levels (both installation and headquarters). Normally these resources support two or more primary outputs and cannot be traced easily or economically

to primary outputs. The costs of assets already purchased will only be included when they are already being used or are planned to be sold or used on another project. Non-cash charges such as depreciation and amortization are excluded.

**B4.4 Facilities.** Consists of all indirect costs involved in owning, leasing and operating a facility that cannot be directly and solely identified to a specific primary output. Such costs are incurred within the functional unit or the basic organization (which the functional unit is a part of) at all levels (both installation and headquarters). Normally these resources support two or more primary outputs and cannot be traced easily or economically to primary outputs. It would include costs for construction (including modification) if purchased, leasing costs if rented, appropriate utility charges, and repair and maintenance services (including land related). The costs of assets already purchased will only be included when they are already being used or are planned to be sold or used on another project. Non-cash charges such as depreciation are excluded.

**B4.5 Materiel.** Includes all indirect costs for purchases of office furniture, equipment (non-computer), supplies including, printing, and postage that cannot be directly identified to a primary output. Such costs are incurred within the functional unit or the basic organization (which the functional unit is a part of) at all levels (both installation and headquarters). Normally these resources support two or more primary outputs and cannot be traced easily or economically to primary outputs. The costs of assets already purchased will only be included when they are already being used or are planned to be sold or used on another project. Non-cash charges such as depreciation are excluded.

**B4.6 Other.** Includes all indirect costs other than labor which support primary outputs such as general training, transportation, and travel. Such costs are incurred within the functional unit or the basic organization at all levels (both installation and headquarters) and cannot be readily classified within any of the other five cost elements. Non-cash charges such as depreciation are excluded.

**B4.7 General Installation Support (General and Administrative).** Includes all indirect costs for activities performed by installation organizations (other than the basic organization of the functional unit) in support of the functional unit. It includes all the major cost elements excluding information technology i.e. labor, facilities, materiel, and other. Non-cash charges such as depreciation and amortization are excluded.

**B4.8 Headquarters Support of Installations.** Represents the indirect costs of major and intermediate commands, Service headquarters, Office of Secretary of Defense, Joint Chiefs of Staff, other Defense agencies, and functional headquarters at both the Service and OSD levels.

**B5. Other Unique Phases (as required).** Reserved for special or unique types of activities that do not generally fit any of the other phases and is of such significance to warrant separate accounting.

**ABBREVIATIONS**

## ABBREVIATIONS

DDI	Director of DoD Information
DMR	Defense Management Review
DoD	Department of Defense
FEAM	Functional Economic Analysis Model
IDA	Institute for Defense Analyses
RADCF	Risk-Adjusted, Discounted Cash Flow
RDT&E	Research, Development, Test and Evaluation
TOA	Total Obligational Authority