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estimate

estimate • analyze • plan • control

Adventures in Using Contractor Cost Data Reports for Wheeled and Tracked Vehicles Analysis

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Purpose

- The purpose of this discussion is to:
  - Inform analysts of the multiple different cost reports that we explored in our analysis of ground vehicle systems
  - Explain how we selected the best data for our analysis
  - Discuss how to avoid common pitfalls in using select cost reports

Outline

- Introduction
- Form Tutorial
- Common Pitfalls and Recommendations
- Conclusions

Data Collection Example

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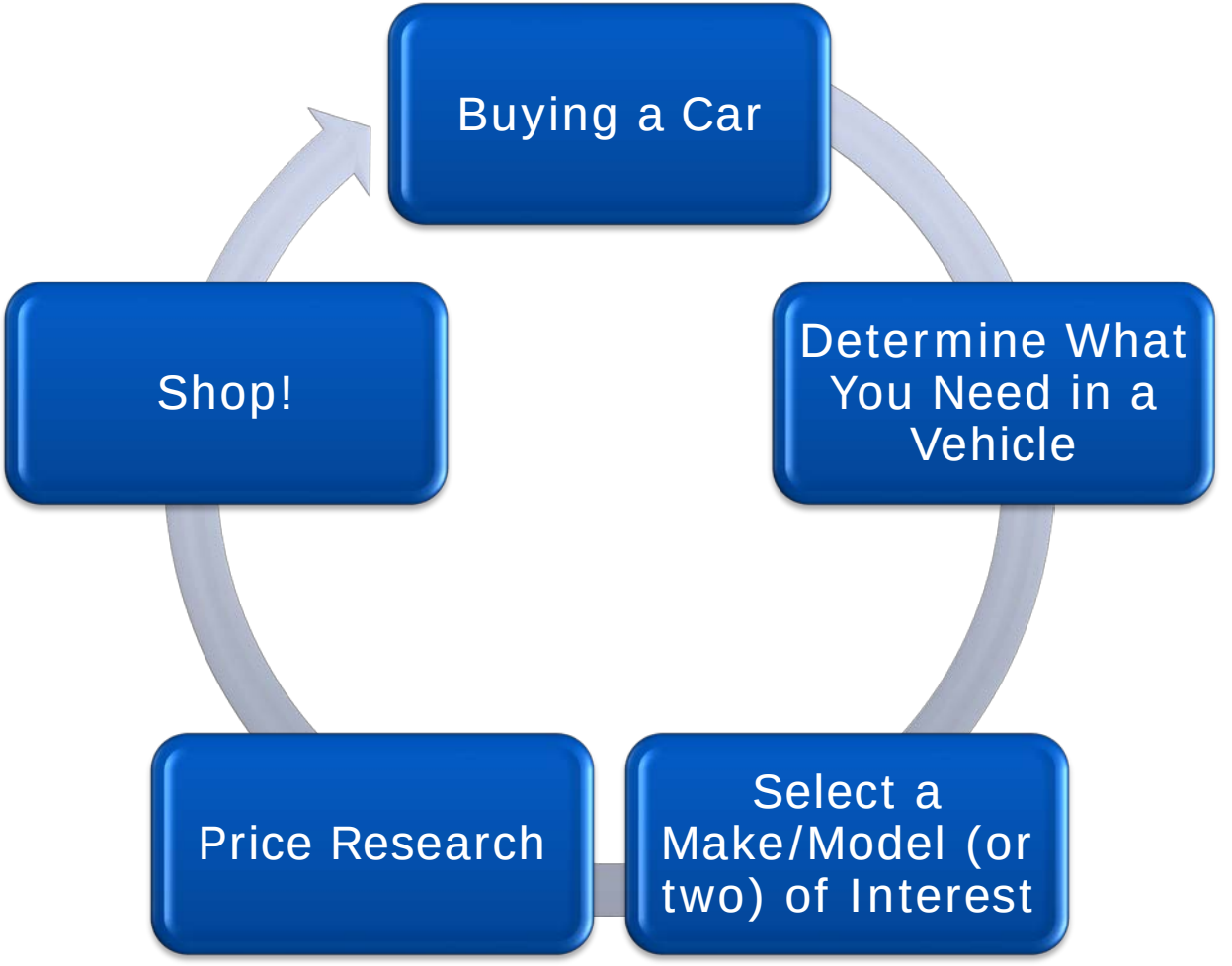
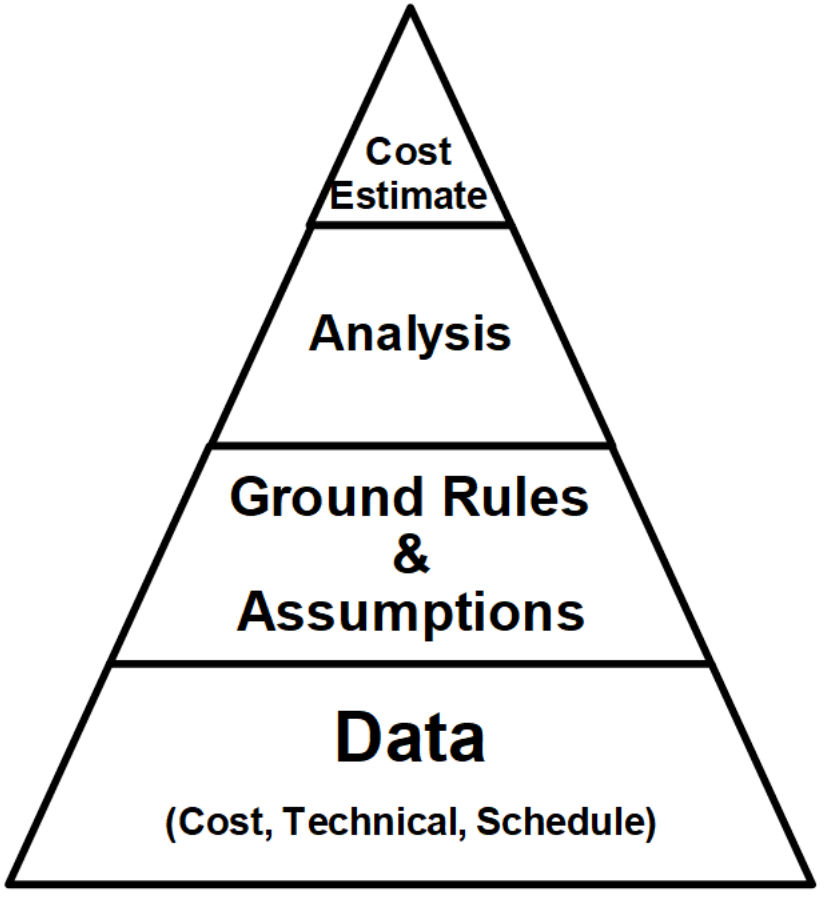


Introduction - 1

- Data drives the strength of the cost estimate
- Most of our time is spent on developing techniques and honing tools, but more important than these is the quality of quantity of data



(Source: C. Smart, MDA Cost Estimating and Analysis Handbook, 2012)

Introduction - 2

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- Office of Deputy Assistant Secretary of the Army – Cost and Economics (DASA-CE) Wheeled and Tracked Vehicle (WTV) analysis
  - Maintaining and updating the Automated Cost Database
  - Conducting cost and statistical analysis
    - Below-the-line Factor Analysis
    - Learning and Discount Rate Analysis
    - Overhead Studies
    - Development of Modeling Tools

- In order to conduct these analyses, Galorath needed insight into:
  - Recurring and Non-Recurring costs and labor hours
  - Costs down to WBS level 3
  - Material and labor overhead

Introduction - 3

- To decide which sources we should use in our analysis, we did the following:
  - Determine what questions need to be answered in the analysis
  - Understand the processes producing the output
  - Determine the data sources that will best answer your questions
  - Determine the causal elements by testing assumptions
  - Determine the availability of data

Form Tutorial - 1

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- There are numerous sources of cost data that an estimator might use to conduct analysis
- For WTV, cost reports from the Cost Assessment Data Enterprise (CADE) were the primary sources of data
  - CADE seeks to provide comprehensive data availability and automate common data visualization methods to help depict each program's unique story
  - Contractor Cost Data Report (CCDR) + Software Resources Data Report (SRDR) = Cost and Software Data Reporting (CSDR)
    - CSDR is the Department of Defense (DoD) system for collecting actual costs, software data and related business data
    - It is the primary source for contract cost and software data for most DoD resource analysis efforts

Form Tutorial - 2

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- For WTV, cost reports from the CADE were the primary sources of data (continued)
  - All CSDR requirements can be found in Department of Defense Instruction (DoDI) 5000.02, “Operation of the Defense Acquisition System”
  - CCDR Requirements:
    - All major contracts and subcontracts, regardless of contract type, for Acquisition Category (ACAT) I and IA programs and pre-Major Defense Acquisition Program (MDAP) and pre-Major Automated Information System (MAIS) programs subsequent to Milestone A approval
    - Reporting is continued even if a program has been downgraded from an ACAT I or IA, unless waived by the Director of CAPE

Form Tutorial - 3

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- For WTV, cost reports from the CADE were the primary sources of data (continued)
  - CCDR Requirements (continued):
    - The CCDR requirement on high-risk or high-technical-interest contracts priced between $20 million and $50 million is left to the discretion of the DoD Program Manager and/or the Deputy Director, Cost Assessment (DDCA)
    - Not required under the following conditions, provided the DoD Program Manager requests and obtains approval for a reporting waiver from the DDCA: procurement of commercial systems or procurement of non-commercial systems bought under competitively awarded firm fixed-price (FFP) contracts, as long as competitive conditions continue to exist
    - National Defense Authorization Act (NDAA) of 2017 added the additional requirement for each acquisition program in an amount greater than $100 million, in consultation with the cost estimating component of the relevant military department or defense Agency

Form Tutorial - 5

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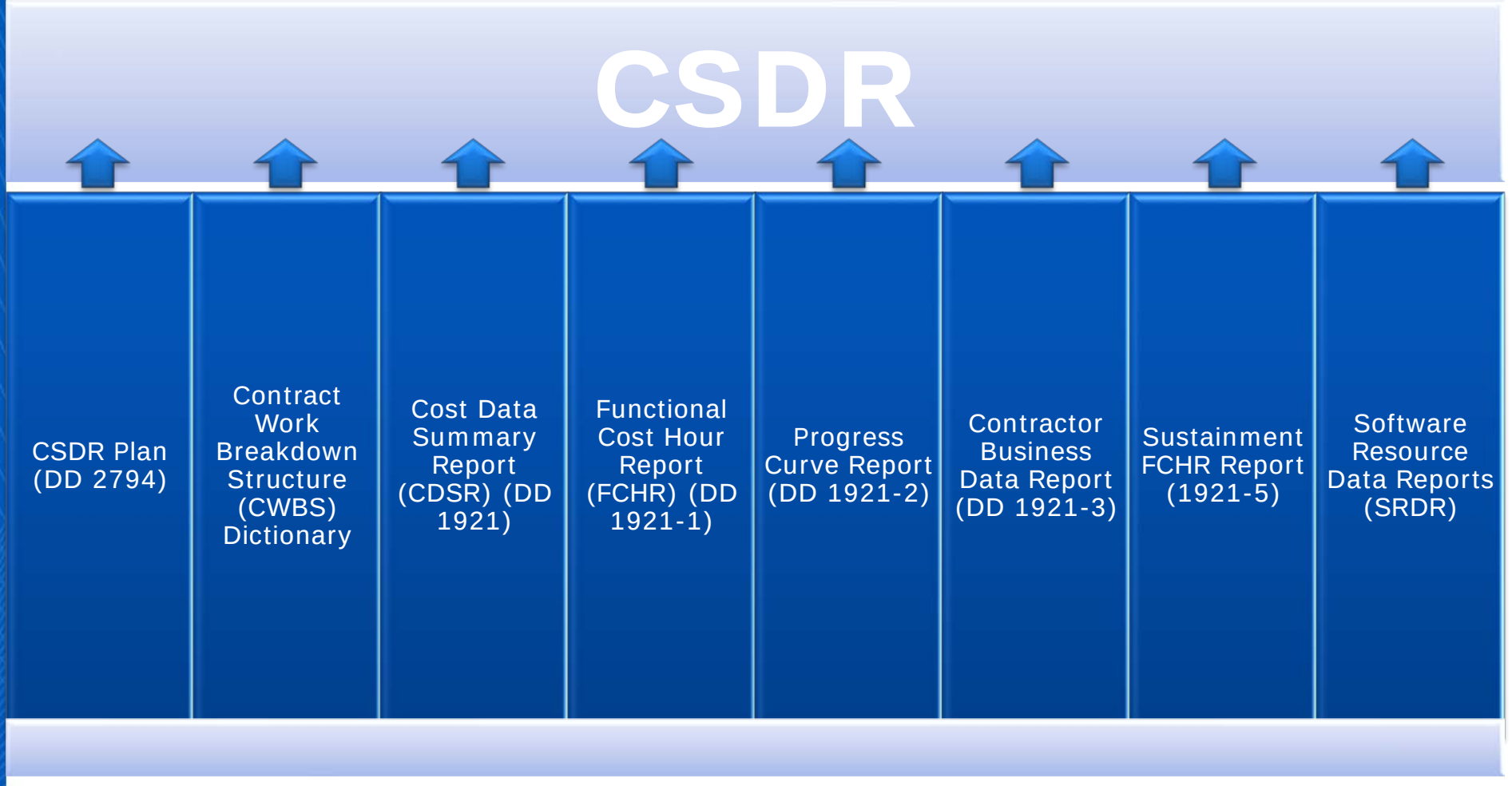

- All CSDR forms and their Data Item Descriptions (DIDs) can be found at http://cade.osd.mil/policy/dids

1921 Form Tutorial - 1

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COST DATA SUMMARY REPORT

Form Approved
OMB No. 0704-0188

The public reporting burden for this collection of information is estimated to average 8 hours 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 the burden, to Department of Defense, Washington Headquarters Services, Executive Services Directorate (0704-0188). Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.

PLEASE DO NOT RETURN YOUR COMPLETED FORM TO THE ABOVE ORGANIZATION.

1. MAJOR PROGRAM a. NAME: b. PHASE/MILESTONE ☐ Pre-A ☐ B ☐ C-PRP ☐ A ☐ C-LRIP ☐ OS	2. PRIME MISSION PRODUCT	3. REPORTING ORGANIZATION TYPE ☐ PRIME / ASSOCIATE CONTRACTOR ☐ DIRECT-REPORTING SUBCONTRACTOR ☐ GOVERNMENT	4. NAME/ADDRESS (Include ZIP Code) a. PERFORMING ORGANIZATION b. DIVISION		5. APPROVED PLAN NUMBER
6. CUSTOMER (Direct-reporting subcontractor use only)	7. CONTRACT TYPE	8. CONTRACT PRICE	9. CONTRACT CEILING	10. TYPE ACTION a. CONTRACT NO.: b. LATEST MODIFICATION: c. SOLICITATION NO.: d. NAME: e. TASK ORDER/DELIVERY ORDER/LOT NO.:	
11. PERIOD OF PERFORMANCE a. START DATE (YYYYMMDD) b. END DATE (YYYYMMDD)	12. APPROPRIATION ☐ RDT&E ☐ PROCUREMENT ☐ O&M	13. REPORT CYCLE ☐ INITIAL ☐ INTERIM ☐ FINAL	14. SUBMISSION NUMBER	15. RESUBMISSION NUMBER	16. REPORT AS OF (YYYYMMDD)
17. NAME (Last, First, Middle Initial)	18. DEPARTMENT	19. TELEPHONE NUMBER (Include Area Code)	20. EMAIL ADDRESS		21. DATE PREPARED (YYYYMMDD)

WBS ELEMENT CODE	WBS REPORTING ELEMENTS	NUMBER OF UNITS TO DATE	COSTS INCURRED TO DATE (Thousands of U.S. Dollars)			NUMBER OF UNITS AT COMPLETION	COSTS INCURRED AT COMPLETION (Thousands of U.S. Dollars)		
			NONRECURRING	RECURRING	TOTAL		NONRECURRING	RECURRING	TOTAL
A	B	C	D	E	F	G	H	I	J

22. REMARKS

1921 Form Tutorial - 2

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2. Program / End Item

1b. Life-cycle phase

12. Appropriation(s)

5. Traces back to CSDR Plan

COST DATA SUMMARY REPORT

Form Approved OMB No. 0704-0188

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b. PHASE/MILESTONE: ☐ Pre-A ☐ B ☐ C-FRP ☐ A ☐ C-LRIP ☐ O&S			☐ PRIME / ASSOCIATE CONTRACTOR ☐ DIRECT-REPORTING SUBCONTRACTOR ☐ GOVERNMENT	a. PERFORMING ORGANIZATION	b. DIVISION	

6. CUSTOMER (Direct reporting subcontractor use only)	7. CONTRACT TYPE	8. CONTRACT PRICE	9. CONTRACT CEILING	10. TYPE ACTION			
				a. CONTRACT NO.:	c. SOLICITATION NO.:	e. TASK ORDER/DELIVERY ORDER/LOT NO.:	
				b. LATEST MODIFICATIO	d. NAME:		

11. PERIOD OF PERFORMANCE	12. APPROPRIATION	13. REPORT CYCLE	14. SUBMISSION NUMBER	15. RESUBMISSION NUMBER	16. REPORT AS OF (YYYYMMDD)
a. START DATE (YYYYMMDD):	☐ RDT&E ☐ PROCUREMENT ☐ O&M	☐ INITIAL ☐ INTERIM ☐ FINAL			
b. END DATE (YYYYMMDD):					

17. NAME (Last, First, Middle Initial)	18. DEPARTMENT	19. TELEPHONE NUMBER (Include Area Code)	20. EMAIL ADDRESS	21. DATE PREPARED (YYYYMMDD)

WBS ELEMENT CODE	WBS REPORTING ELEMENTS	NUMBER OF UNITS TO DATE	COSTS INCURRED TO DATE (thousands of U.S. Dollars)			NUMBER OF UNITS AT COMPLETION	COSTS INCURRED AT COMPLETION (thousands of U.S. Dollars)		
			NONRECURRING	RECURRING	TOTAL		NONRECURRING	RECURRING	TOTAL
A	B	C	D	E	F	G	H	I	J
		#	NR$K	R$K	T$K	#	NR$K	R$K	T$K

WBS Description

Units to date

Costs to date

Planned units at completion

Estimated costs at complete

1921 Form Tutorial - 3

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COST DATA SUMMARY REPORT

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PLEASE DO NOT RETURN YOUR COMPLETED FORM TO THE ABOVE ORGANIZATION.

1. MAJOR PROGRAM	a. NAME:				
b. PHASE/MILESTONE: ☐ Pre-A ☐ A ☐ B ☐ C-LRIP ☐ C-FRP ☐ OBS	2. PRIME MISSION PRODUCT	3. REPORTING ORGANIZATION TYPE: ☐ PRIME / ASSOCIATE CONTRACTOR ☐ DIRECT-REPORTING SUBCONTRACTOR ☐ GOVERNMENT	4. NAME/ADDRESS (Include ZIP Code) a. PERFORMING ORGANIZATION	b. DIVISION	5. APPROVED PLAN NUMBER
6. CUSTOMER (Direct-reporting subcontractor use only)	7. CONTRACT TYPE	8. CONTRACT PRICE	9. CONTRACT CEILING	10. TYPE ACTION a. CONTRACT NO.: b. LATEST MODIFICATION:	c. SOLICITATION NO.: d. NAME: e. TASK ORDER/DELIVERY ORDER/LOT NO.:
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WBS ELEMENT CODE	WBS REPORTING ELEMENTS	NUMBER OF UNITS TO DATE	COSTS INCURRED TO DATE (Thousands of U.S. Dollars)			NUMBER OF UNITS AT COMPLETION	COSTS INCURRED AT COMPLETION (Thousands of U.S. Dollars)		
			NONRECURRING	RECURRING	TOTAL		NONRECURRING	RECURRING	TOTAL
A	B	C	D	E	F	G	H	I	J

Overhead costs are listed last

22. REMARKS

The Remarks section of each report often includes a wealth of detail and context – do not ignore!

1921-1 Form Tutorial

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FUNCTIONAL DATA ELEMENTS	COSTS AND HOURS INCURRED TO DATE (thousands of U.S. Dollars or thousands of hours)			COSTS AND HOURS INCURRED AT C (thousands of U.S. Dollars or thousands		
	A. NONRECURRING	B. RECURRING	C. TOTAL	D. NONRECURRING	E. RECURRING	
ENGINEERING						
(1) DIRECT ENGINEERING LABOR HOURS						
(2) DIRECT ENGINEERING LABOR DOLLARS						
(3) ENGINEERING OVERHEAD DOLLARS						
(4) TOTAL ENGINEERING DOLLARS						
MANUFACTURING OPERATIONS						
(5) DIRECT TOOLING LABOR HOURS						
(6) DIRECT TOOLING LABOR DOLLARS						
(7) DIRECT TOOLING & EQUIPMENT DOLLARS						
(8) DIRECT QUALITY CONTROL LABOR HOURS						
(9) DIRECT QUALITY CONTROL LABOR DOLLARS						
(10) DIRECT MANUFACTURING LABOR HOURS						
(11) DIRECT MANUFACTURING LABOR DOLLARS						
(12) MANUFACTURING OPERATIONS OVERHEAD DOLLARS *(Including Tooling and Quality Control)*						
(13) TOTAL MANUFACTURING OPERATIONS DOLLARS *(Sum of rows 6, 7, 9, 11, and 12)*						
MATERIALS						
(14) RAW MATERIAL DOLLARS						
(15) PURCHASED PARTS DOLLARS						
(16) PURCHASED EQUIPMENT DOLLARS						
(17) MATERIAL HANDLING OVERHEAD DOLLARS						
(18) TOTAL DIRECT-REPORTING SUBCONTRACTOR DOLLARS						
(19) TOTAL MATERIAL DOLLARS						
OTHER COSTS						
(20) OTHER COSTS NOT SHOWN ELSEWHERE *(Specify in Remarks)*						
SUMMARY						
(21) TOTAL COST *(Direct and Overhead)*						

- Similar metadata to a CDSR, but the FCHR breaks out Engineering Labor, Tooling Labor, Quality Control Labor, Manufacturing Labor, Material, and Overhead for <u>each CWBS element</u>
  - There are also remarks for <u>each CWBS element</u>
  - This form is therefore more informative, but also more cumbersome

1921-3 Form Tutorial - 1

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Contractor Business Metadata

4. Data Period - current and prior are actuals

CONTRACTOR BUSINESS DATA REPORT

Form Approved
OMB No. 0704-0188

1. CONTRACTOR NAME/ADDRESS (Include Zip Code)	2. FPR UNIT	3. IMPLEMENTING CONTRACT NUMBER	4. DATA PERIOD (X one)	5. FISCAL YEAR (YYYY)	6. DATES IN FISCAL YEAR (YYYYMMDD)
			Prior Year Current Year Future Year		Start Date: End Date:

7. PREPARER'S NAME (Last, First, Middle Initial)	8. DEPARTMENT	9. TELEPHONE NO. (Include Area Code)	10. EMAIL ADDRESS	11. DATE PREPARED (YYYYMMDD)

Overhead Accumulation, Distribution, and Application

SECTION A

DIRECT COST BY PROGRAM					DIRECT COST / HOURS / MANPOWER										
					Engineering			Manufacturing Operations			Materials	Other		
Program Name a	A/F	Contract Number b	Equivalent Units c	Buyer d	Workers e	Dollars f	Hours g	Workers h	Dollars i	Hours j	Dollars k	Workers l	Dollars m	Hours n
1.														
2.														
3.														
4.														
5.														
6.														
7.														
8.														
9.														
10.														
11. Other DoD Effort														
12. Other Government Effort														
13. Commercial Effort														
14. Total Direct Cost and Hours Base						$0.0	0.0		$0.0	0.0	$0.0		$0.0	0.0
a. Total Direct Workers					0			0				0		

Programs

Eng W $ H

Manuf Operations W $ H

ODC W $ H

Section A lists direct costs by program and other efforts

Materials column is $ only

1921-3 Form Tutorial - 2

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- Section B of the 1921-3 lists the Indirect costs by cost category and operation, not program

SECTION B	INDIRECT COST CATEGORY	INDIRECT: COST / HOURS / MANPOWER											
		Engineering			Manufacturing Operations			Materials	Other			G&A	
		Workers o	Dollars p	Hours q	Workers r	Dollars s	Hours t	Dollars u	Workers v	Dollars w	Hours x	Dollars y	Hours z
	15. Indirect Labor												
	16. Employee Benefits												
	17. Payroll Taxes												
	18. Employment												
	19. Communication/Travel												
	20. Production Related												
	21. Facilities-Building/Land												
	22. Facilities-Furniture/Equipment												
	23. Administration												
	24. Future Business												
	25. Other Miscellaneous												
	26. Credits												
	27. Total Indirect Cost and Hours		$0.0	0.0		$0.0	0.0	$0.0		$0.0	0.0		
	28. Total G&A Cost and Hours											$0.0	0.0
	29. Indirect/Direct Cost Rate		0.00%			0.00%		0.00%		0.00%			
	30. G&A Rate/(Direct + Indirect)											0.00%	

Adds G&A dollars and hours columns

- Again, in contrast to the 1921-3 forms, the 1921-1 forms show indirect costs by program

1921-3 Form Tutorial - 3

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- Page 2 of current year

CONTRACTOR BUSINESS DATA REPORT - PAGE 2

SECTION C	PRODUCTION CAPACITY	Current Year	Method of Calculating "FPR unit % of Full Production Capacity"
	FPR Unit % of Full Production Capacity	%	
	Number of Shifts		

Full Production Capacity

Method of calculating

SECTION D		Current Year																	
		1st Quarter				2nd Quarter				3rd Quarter				4th Quarter				Prior Year:	Year:	Year:
	DIRECT LABOR RATES (FUNCTIONAL CATEGORIES)	Workers a	Hours b	Basic Rate$ c	Effective Rate$ d	Workers a	Hours b	Basic Rate$ c	Effective Rate$ d	Workers a	Hours b	Basic Rate$ c	Effective Rate$ d	Workers a	Hours b	Basic Rate$ c	Effective Rate$ d	Basic Rate$ c	Basic Rate$ c	Basic Rate$ c
	1. Engineering - Direct Labor																			
	2. Manufacturing Operations - Direct Labor																			
	a. Tooling - Direct Labor																			
	b. Quality Control - Direct Labor																			
	c. Manufacturing - Direct Labor																			

Section D breaks down effective rates for each functional category

SECTION E		Prior Year	Current Year
	Total FPR Unit Revenue (Sales)		

Section E business unit revenue (sales)

SECTION F	Organizational Changes (For Each Year Reported)	Accounting Changes (For Each Year Reported)

Section F describes organizational and accounting changes

REMARKS

Again – all-important remarks!

Common Pitfalls and Recommendations - 1

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- Issue: Difficulty understanding the spending profile if the Period of Performance spans more than one year
  - Cost reports provide a start and end date for the PoP as well as a “Report As of Date”
  - Do the available reports provide the entire ‘cost picture’ of the task?
  - Challenging when attempting to understand how costs change over the years of the PoP
- Recommendations - 1
  - Research contracting strategy for each program to understand if several contracts or task orders were awarded to execute the work (e.g. one contract/task order for production activities, others for SEPM)
  - Develop a method for determining the fiscal year of the cost reports that is the most sensible and accurate
    - Use raw data (i.e. TY$) to calculate, then inflate based on the resulting profile

Common Pitfalls and Recommendations - 2

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- Recommendations - 2
  - Meet with Subject Matter Experts to gain insight into the specified program
  - Review cost reports for notes that may provide clarity on what activities occurred during the reporting period
  - Document where reporting gaps exist and determine the best methods to work around this absent data
    - Use of contract data
    - Extrapolation

Common Pitfalls and Recommendations - 3

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- Issue: Selecting between multiple reports to use for a task
  - Multiple reports may be available for a single task
    - A task is defined as the work performed for which the cost report was submitted under a contract
    - Again, ask yourself what questions are you attempting to answer?
    - For certain analyses, there is one appropriate selection
      - Learning Analysis using hours as the dependent variable requires the use of FCHRs
      - Below-the-Line Analysis allows the use of multiple forms
        - CDSRs
        - FCHRs
        - Cost Progress Reports (CPRs)
        - Contracts
        - Cost/Schedule Status Report (C/SSR)

Common Pitfalls and Recommendations - 4

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- Recommendations
  - Know the purpose of the analysis well!
  - Focus on selecting the most complete record
    - Calculating the Total Percent Spent for each cost record provides an indicator of the level of completion of the task
      - Actual Cost of Work Performed/Last Revised Estimate
    - Compare the cost reports to determine if more costs are included in one source over another
    - For older data, CDSRs are preferred over FCHRs due to the tendency of CDSRs to be more complete and reliable

Common Pitfalls and Recommendations - 5

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- Issue: Mapping Inconsistencies
  - Contractors are forced to map costs according the MIL-STD Work Breakdown Structure (WBS) and Army Cost Element Structure (CES)
    - Costs put into “Other” elements with little explanation of the purpose of the costs
- Recommendations
  - Review notes on original forms (if available) to understand what costs might be captured in the “Other” element
  - Discuss with the client the possibility of remapping costs to the appropriate elements
    - If there are Recurring costs mapped to an element such as Development Engineering, remapping costs may be in order
    - Multiple cost elements may need to be combined when trying to understand the complete picture of a program

Conclusions

- Effective cost estimation requires reliable sources of data
- Data sources should be selected based on the ability of the source to provide the information necessary to answer the questions posed by the client
- CADE is an excellent source of cost data for your analysis
- Knowing the best reports to use for your analysis can not only help to save time at the start of your analysis, but also ensure the most reliable and complete data is use in the analysis

Contact Information

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Questions