

Slide deck: CARD Train the Trainer 25May Draft.pptx

**Slide 1. AFCAA CEM TABULAR CARD TRAIN THE TRAINER (TITLE SLIDE)**

Welcome to the “Train the Trainer” presentation for the tabular Cost Analysis Requirements Description (CARD). Participants will receive instruction on how to populate Air Force Cost Analysis Agency (AFCAA) Cost Estimating Modeling (CEM) tabular CARD tables. Tabular CARD introduces a reporting structure that will improve data capture and analytic capabilities.

**Slide 2. CARTOON**

To begin with something light...

We sincerely believe that tabular CARD is something new that will make things roll more smoothly for you (especially down the road with annual CARD updates). We do not think tabular CARD is another rock in your already heavy workload.

**Slide 3. OUTLINE**

First, we will cover tabular CARD background and a few basic items.

Second, general features of the tabular CARD that occur across several types of tables will be presented.

Third,

(Specific instructions and examples for populating each tabular CARD table will be covered in an optional extended session.)

**Slide 4. TABULAR CARD BASICS (BREAKER SLIDE)**

Let's discuss a few basic items including tabular CARD background.

**Slide 5. CARD BACKGROUND**

The Office of Cost Assessment and Program Evaluation (CAPE) is engaged in several efficiency initiatives including updating the guidelines for the preparation and maintenance of the CARD. Converting to standard tabular reporting by commodity class will decrease the amount of effort required of program offices to complete the CARD and establishing annual CARD updates will capture changes in the acquisition program and improve the ability to develop and defend credible budgets.

Updated CARD guidance will be released on June 1<sup>st</sup> of this year. Programs will be instructed to comply with the updated instruction by March 1<sup>st</sup> of 2017. Programs reaching major milestones before this date have the option to utilize the new instruction. Acquisition Category (ACAT) I

programs will be required to submit annual updates to their CARD using the new instruction starting in Fiscal Year 2018 (FY18).

References that accompany this training include the Cost Analysis Guidance and Procedures Instruction (5000.73) dated June 9<sup>th</sup>, 2015, the Interim Guideline for the Preparation and Maintenance of the Cost Analysis Requirements Description (CARD) dated June 18<sup>th</sup>, 2015, and the Guideline for the Preparation and Maintenance of the Cost Analysis Requirements Description dated April 22<sup>nd</sup>, 2016 (draft working papers).

**Slide 6. CARD BACKGROUND (cont'd)**

Commodity class CARD tables will be made available on the CADE website in conjunction with the release of the updated guidance on June 1<sup>st</sup>, 2016. Tables will feature a Work Breakdown Structure (WBS) that are Mil Std 881C product extensions which will also align with standard Cost and Software Data Reporting (CSDR) requirements and parameters defined to align with the future Technical Data Report (1921-T). When populated and updated, tables will provide the technical, programmatic, and operational characteristics necessary to develop and maintain acquisition program cost estimates. The new CARD tables serve several objectives. Not only do they serve legacy use as data required to estimate costs at a sufficient level of detail for developing Independent Cost Estimates (ICEs) required to support program and milestone reviews. They also will serve as a record of program evolution. Tables are designed to support future automation via a database and to be used for analytics.

**Slide 7. CARD TABLES**

There are many types of CARD tables provided, each of which meets a specific estimating need. Along with general program context, tabular CARD was designed to capture descriptions of the system, quantity profiles, manpower requirements, Operating and Support (O&S) data, and other detailed information.

The Prime Mission Product (PMP) is described in terms of hardware and software via a table for each. The content of these tables support cost estimating via parametric methods. Content of these tables also support analogy selection and scaling. Program quantity is essential to estimating via any quantity calculation such as cost improvement curves. The Quantity table is time phased for time phasing the costs by year. The quantity per ship set of each configured end item is enabled via the Configuration table. The Manpower table (which is also time-phased) supports staff-loading estimating methodologies. Cost drivers for common elements (sometimes referred to a below the line elements) are accommodated via the Nonhardware Technical Table.

Three detailed tables are provided for situations encountered by certain commodities at mature program stages. For detailed parts methodologies such as priced bills of materials are accommodated with a detailed Parts table. For methodologies that require line replaceable unit detail, a detailed LRU table is provided. Often a program CARD lists government furnished

equipment and a version of the Parts table for GFE is provided. For operating and support phase constants an O&S table is provided. These constants provide essential information which, along with the two time-phased tables for Quantity and Manpower, supports O&S cost estimating methods. Many parameters from other tables such as the PMP table and LRU table will also likely be used in O&S estimating. A separate table for Software Maintenance is provided. The two software tables (for Development and Maintenance) are aligned with elements of the SRDR.

Tables are also provided for other essential cost estimating needs. The Program table provides program, subprogram, and designation naming as well as top-level linkage to DAMIR and DCARC metadata. The Milestone table provides dates necessary to compute schedule segment durations and to support estimate time-phasing. The Roles table provides distinction of responsibilities between contractor(s) and Government. The Budget Plan table provides a reference point for affordability analysis – comparing the estimating outcomes of the program as described in this CARD against some known budget values. The WBS/CRS Definitions table provides WBS element descriptions.

#### **Slide 8. CARD WORKBOOK OVERVIEW**

Tabular Card tables exist today as Microsoft Excel workbooks. Excel is being used at this point in time given its wide availability and analyst familiarity. Excel simply provides a readily usable straightforward row and column format. Each table is an Excel worksheet with a color-coded tab. Tables that are commodity-specific are colored green. Tables common to any commodity are colored red.

The top rows of each sheet contain table header information. The table proper begins with a yellow-shaded row giving a name for each column. The left-most column(s) name each row. Most of the tables give you great latitude in row-naming which is described in table-by-table instructions.

Tabular CARDS will soon transition to a web-based Cost Assessment and Data Enterprise (CADE) database to maximize configuration control and contribute to analytic capabilities in the future. In the meantime, working with Excel workbooks is the medium for tabular CARD.

#### **Slide 9. LEVEL OF DETAIL BY PHASE**

While commodity-specific CARD tables provide an ample starting point for CARD creation, each program is different and tailoring the CARD tables is fully expected. Tailoring is not only available (for most tables) it is indeed encouraged. Work with your service cost agency analyst and your CAPE analyst as you tailor your tabular CARD so that everyone's estimating needs are accommodated.

Program maturity drives the level of detail available (and expected) for a tabular CARD. For example, acquisition programs at Milestone A generally have a lack of program definition and data, precluding the completion of the tables. Acknowledge these gaps and uncertainty within the program and work with the CAPE analyst / Service Cost Agency analyst to tailor the CARD to reflect them while still capturing assumptions that will mitigate the gap for cost estimating purposes. The CARD users (cost analysts) should not be forced to define acquisition programs.

The tables may appear daunting upon first look but do not be discouraged. Rather than regarding each cell of each table as a requirement – view each as opportunity to describe your program. Given the requirement for annual CARD updates, subsequent CARDS will see an increase in the amount of program definition and data available for populating the tables as the program matures.

#### **Slide 10. Unknowns, Uncertainty, NAs, and TBDs**

While a lack of detail is fully expected for early program CARDS, there are guidelines that will aid each subsequent update.

It is acceptable to populate cells / fields of parameters that are not used by the acquisition program with NA for Not Applicable. When doing so hide the row. If the parameter is expected to be used to describe the program but the values are unknown at this time, it is acceptable to populate the cell / field with TBD for To Be Determined. The use of TBD should be minimized, however; CARD reviews will assess TBDs for appropriateness and mitigate them if required for cost estimating purposes.

In general you do not want to delete rows. As it will be easier in subsequent updates to unhide a row rather than insert a new row.

In general you do not want to leave a cell blank. As it will appear to be an item not-yet-examined and is waiting to be filled for this version of your CARD.

Again, work with the CAPE analyst / Service Cost Agency analyst to ensure everyone's needs are met.

#### **Slide 11. MARKINGS AND SECURITY**

It is important that CARD adhere to what their program requires and IAW their program security classification guide (SCG) and their organization's practices.

CARD tables containing sensitive data and must be marked accordingly: Unclassified (UC), for official use only (FOUO), Classified (C), etc. Refer to the program SCG to identify the classification of technical parameters before populating the CARD template, and determine how classified parameters need to be handled. Tables that contain sensitive contractor parameters

should be marked “Contains Contractor Proprietary Data.” Always adhere to the organization’s security policies and procedures.

- **Classified programs cannot be put into CAPE but rather are retained in a separate architecture**

CADE/DCARC will not accept classified information.

## **Slide 12. TABLE FEATURES (BREAKER SLIDE)**

Now that we have covered the general overview, now we’ll jump into general table features

## **Slide 13. PARAMETER NAME, VALUE, AND UNITS**

Tables are constructed of columns and rows. Rows are pre-populated with parameters by commodity WBS. Each parameter row has a name and unit of measure associated with it. Tables will need to be populated with the parameter value, the source of that value, and any notes that further amplify or clarify the rows contents. A drop-down choice list is used to denote the value pedigree: whether the parameter is a planned value or an actual value.

## **Slide 14. PRE-POPULATED PARAMETER COLUMNS**

Tables contain a number of pre-populated columns. Descriptions of the parameter are found in the Definition column. Future database connectivity and search capabilities transcending programs are supported by the VocabularyID column. The Repeatability column identifies when it is useful and appropriate to copy and paste a row in order to capture multiple entries of the same parameter, e.g. Material Mix. Some fields have discrete allowable value and contain a drop-down menu for added convenience. These range from simple Yes/No choice lists to full choice lists of potential choices.

When tailoring and adding new parameters, add information for these columns and unit of measure as well. When doing so write “New” in the VocabID column.

## **Slide 15. UNCERTAINTY**

Parameters value columns are usually populated with a single value. If instead it is desirable to capture a range of values, hidden columns for low, high, and margin may be expanded that provide the capability to capture those inputs. The Low and High columns simply bound a potential value and not intended to serve as confidence level bounds typically used in formal cost risk and uncertainty analysis. (However if you wish to express confidence levels do so in the Notes columns.) Unit of measure should be the same all parameter value columns.

You can also use the margin field to express value inputs.

**Slide 16. SLIDE 16 DESIGN SPECIFICATIONS**

Design Specification columns may also be unhidden and populated with Objective and Threshold values using the same unit of measure as the parameter value. These columns are typically for use at the parent level.

Threshold and Objective inputs need to be in the same unit of measure as the input value.

**Slide 17. MULTIPLE POINTS of VIEW**

While the tables are presented here (and when Excel is open) as though one primary point of view (typically the program of record) is contained, there are additional (hidden) columns to accommodate multiple points of view. Unhide and populate columns to capture parameters for not only the program position, but also for example an independent review team's position. This feature may also be used to express the Government's opinion and the contract's opinion, of in the case of pre-millstone A or B when multiple competing contractor's point of view may be represented. Note the columns are only used when applicable and otherwise remain hidden.

There are other paths to representing difference points of view. Entirely separate workbooks can be used as well. This may be especially useful if not all potential uses of the CARD have permission to see both points of view. It may also be the WBS differs so much that it is too awkward to show both in a single table. Also, if the alternate POV only pertains to a few parameters simply copy that row and parenthetically name it as an alternate POV.

**Slide 18. REPEATABLE ROWS**

Select rows are pre-populated with a "Y" in the Repeatable column. These rows will contain either "1...n" or "1...n Specify" after the parameter name. Copy and paste these rows to capture as many instances of the parameter as needed, providing each new row with a unique descriptive name.

**Slide 19. UNITS QUALIFIER**

Unit Qualifier becomes useful when name, value and unit of measure do not adequately capture the characteristics of the parameter. Examples: when a single WBS element contains a repeated parameter, Unit Qualifier distinguishes each row; when the Unit of Measure is defined as "Quantity," Unit Qualifier captures the type; when the Unit of Measure is defined as "List," Unit Qualifier illuminates atypical choice selections. When a choice list ends in "Other" and you select Other, you should describe what "other" means in the context of the existing choice list.

**Slide 20. TABLE TAILORABILITY**

In general, do not add columns to the CARD tables in the Microsoft Excel workbook. Rows may be inserted or copy /pasted as needed to adequately describe the acquisition program. Each table section of the brief contains the specifics regarding tailorability.

**Slide 21. DESCRIBING YOUR PROGRAM IN TABLES (BREAKER SLIDE)**

The next section describes an overall strategy for CARD table population.

**Slide 22. COST DRVIERS DESCRIBED IN TABLES**

As mentioned many of the tables are organized by WBS. Cost drivers vary by WBS and while most of the PMP hardware cost drivers are in the PMP Technical Table, the total cost driver picture may lie in several tables. This is due to the uniqueness of certain WBS elements, their row and column shape, sheet repeatability, and due to the interest of segregating commodity-specific tables and common generic tables.

The next series of charts discuss individual topics/tables.

**Slide 23. DESCRIBING YOUR PMP IN TABLES - HARDWARE**

Size, weight, power, heritage – recognized cost drivers for hardware are contained in the PMP Technical Table. Each commodity workbook contains that commodity's cost drivers by that commodity's WBS. Table needs to be populated with the parameter value, the source of that value, and any notes that further amplify or clarify the rows contents. A drop-down choice list is used to denote the value pedigree: whether the parameter is a planned value or an actual value.

**Slide 24. QUANTITY DESCRIBED IN TABLES**

Software is an integral part of all systems today, and exists at many levels within the system. Each software element of the WBS requires entries on the Software Development Table. Note rows and columns are transposed as unique attributes in each SW release and CSCI are described in columns. Insert columns as needed and label the columns as appropriate. Note cell shading. White cells underneath Release column pertain to Release-level parameters only. White cells underneath CSCI column pertain to CSCI only. If you do not have CSCI-level data, then leave only one CSCI column pair and populate that column for the release. And name the column approximately.

A Software Resources Data Report (SRDR) may be required from the development vendor if the cost of any delivered SW end item indentured to a weapon system exceeds \$20 million. However, SW items developed for lower level sub-systems or components may not cost enough

to require an SRDR. Additionally, prior to MS B, the CARD likely includes planning data for a reference system or for an analogous system, as opposed to actual data for the system to be developed during MS B. The SW Development template allows the program to provide the reference system or analogous system SW technical data in the CARD to support early cost estimates. Additionally, as the actual system is developed, this template allows the program to collect technical data for SW items that do not meet the threshold for an SRDR.

**Slide 25. QUANTITY DESCRIBED IN TABLES**

The work breakdown of the system on the PMP HW Technical Table includes rows for embedded SW items, with a summary of the technical data fields for a SW end item from the SW Development Table. These fields can be used as an initial location for pre- MS B reference system or analogous system data, or as the final technical data for very small SW end items rather than using a SW Development Table. However, all SW items from the PMP HW Technical Table should have a corresponding SW Development Table to capture the actual data for the SW being developed on-contract.

**Slide 26. DETAIL DESCRIBED IN TABLES**

The Quantity table is time phased for time phasing the costs by year. This is typically for the primary end items (top-level WBS elements).

The quantity per ship set of each configured end item is enabled via the Configuration table. This is typically at the child-level WBS elements.

Manpower (headcount quantity) is enabled time phased as well.

**Slide 27. QUANTITIES AND O&S TABLE**

Development, procurement, deployment, sustainment, and disposal quantity requirements are captured in the Quantities and O&S Time-Phased table to support quantity-based calculations in program cost estimates. Sample quantity categories are pre-populated in the first column of the table and the header row is reserved for fiscal year of the quantity requirement.

Populate the Item Name column with Prime Mission Product (PMP) End Items and other items usually described as a series of values (sorties, users, transactions, etc.). Populate the header row with the fiscal year values in which the quantities are required. Depict the entire quantity stream and avoid Prior To or To-Complete columns. Use the drop-down menu in the Estimate or Actual row to identify quantities as planned or actual. Additional columns are provided to capture Long Lead Requirements, Unit of Measure, and quantity source.

**Slide 28. CONFIGURATION TABLE**

This table identifies the composition of configured end items. Mapping subsystems/component quantity-next-higher-assemblies to end item quantities permits understanding of total quantity necessary for proper rate/learning curve analysis. Values entered will be the ship-set quantity per end item. The rows are WBS items which may be further divided into subsystem or specific parts if needed. The columns represent end-item configurations. Each named column should correspond to the end-items named in the Acquisition Quantities Time-Phased Table. The column names shown in the empty Table are examples only – customize columns to suit the program being described.

**Slide 29. TABLE-TO-TABLE THREADS**

The columns on the Configuration Table should match the rows on the time-phased Quantity Table. (Think: matrix math will provide the total quantity by child element.)

**Slide 30. TABLE-TO-TABLE THREADS 2**

Think ahead also to the WBS and how the cost, quantity, and technical data will tie together.

**Slide 31. MANPOWER TABLE**

Headcounts are captured in the Manpower Time-Phased table, supporting the staff-loading cost estimating methodology by providing inputs necessary to estimate program manpower cost estimates. Personnel categories are pre-populated for each section.

Depict the entire staffing stream and avoid Prior To or To-Complete columns. Use the drop-down menu in the Estimate or Actual row to identify quantities as planned or actual. It is recommended to calculate the staffing requirements using Full-Time Equivalent (FTE) as the Unit of Measure for the Manpower Time-Phased table. The Constant per System Value column can be populated when capture staffing requirements on a per system basis instead of time phasing them. Insert rows to capture contractor staffing if needed.

**Slide 32. DETAIL DESCRIBED IN TABLES**

Three detailed tables are provided for situations encountered by certain commodities at mature program stages. For methodologies that require line replaceable unit detail or any detail pertaining to removables, a detailed LRU table is provided.

For detailed parts methodologies such as priced bills of materials are accommodated with a detailed Parts table. This is typically useful for

Often a program CARD lists government furnished equipment and a version of the Parts table for GFE is provided. For operating and support phase constants an O&S table is provided. These constants provide essential information which, along with the two time-phased tables for Quantity and Manpower, supports O&S cost estimating methods. Many parameters from other tables such as the PMP table and LRU table will also likely be used in O&S estimating. A separate table for Software Maintenance is provided. The two software tables (for Development and Maintenance) are aligned with elements of the SRDR.

### **Slide 33. LRU TABLE**

This Table arrangement is suitable for any listing of Line Replaceable Units. This level of detail is necessary for bottom-up estimates, maintenance estimating, and performing component analysis. The table is oriented to show parts by row with part numbers/names in the sixth and seventh columns. Use the first two columns to show WBS elements as needed for organization. Use the next two columns to show WUC codes/names as needed for organization. Think of the first four columns as tags to the LRUs – the primary intent of the table is to provide a place to list information about the LRUs one row at a time. There is nothing to “roll-up” to WBS level – the WBS is here only for identification.

Use this table to further describe LORA information for each LRU.

Enter mean time between failures (combined). And if available, enter MTBF by Controllable and Induced.

Enter Condemnation Rate - scrap rate.

Enter Level of Repair (Organizational, Intermediate, or Depot) if LORA has taken place.

Finally enter who owns the support tail?: Cite if responsibility of supporting this item belongs to this program. If not cite the organization responsible.

### **Slide 34. PARTS TABLE**

This Table arrangement is suitable for any listing of parts or equipment such as Bill Of Material (BOM), a spares package, or support equipment at a given location. This level of detail is necessary for bottom-up estimates, maintenance estimating, and performing component analysis. The table is oriented to show parts by row with part names in the third column. Use the first two columns to show WBS elements as needed for organization.

This table will typically be used for select WBS elements that are largely COTS or catalogue-like information. This may be a fully priced bill of material with 100% of the element's content. Or it may just the highest cost items – say 80% of the cost. Or it may be all the parts past a

certain threshold – say everything \$1000 or higher. Usage of the Parts table will vary by program, commodity, and maturity.

If tiered pricing is available/applicable, repeat the three stepladder columns as needed to convey completely. Tiered pricing is expressed in “stepladder” fashion with price dependent on a lot quantity range.

1. Stepladder Low Quantity: the step’s lower range of quantity
2. Stepladder High Quantity: the step’s upper range of quantity
3. Stepladder Price: the step’ unit price.

**Slide 35. GFE TABLE**

This Table arrangement is suitable for a listing of Government Furnished Equipment. This level of detail is necessary for identifying items that will incur no contract cost. The table is oriented to show parts by row with part names in the third column. Use the first two columns to show WBS elements as needed for organization.

**Slide 36. O&S TABLE**

This table covers operating and support parameters necessary to estimate the cost of maintenance and other O&S costs. It identifies how the system will be employed and organized.

This table is similar in structure to the other technical data tables. It is not time-phased. The essential parts time-phased parts of O&S are on the Quantity Table and the Manpower Table. This table is for static values or constants.

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**Slide 37. PROGRAM OVERVIEW**

Tables are also provided for other essential cost estimating needs. The Program table provides program, subprogram, and designation naming as well as top-level linkage to DAMIR and DCARC metadata. The Milestone table provides dates necessary to compute schedule segment durations and to support estimate time-phasing. The Roles table provides distinction of responsibilities between contractor(s) and Government. The Budget Plan table provides a reference point for affordability analysis – comparing the estimating outcomes of the program as

described in this CARD against some known budget values. The WBS/CRS Definitions table provides WBS element descriptions.

### **Slide 38. PROGRAM TABLE**

The Program table provides program, subprogram, and designation naming as well as top-level linkage to DAMIR and DCARC metadata.

### **Slide 39. MILESTONE TABLE**

The Milestone table provides dates necessary to compute schedule segment durations and to support estimate time-phasing.

A row is provided for each milestone and may be further tailored by inserting additional rows to convey additional program pertinent milestone dates. Enter complete dates, month, day, and four-digit year.

For additional columns to express alternative points of view, hit Ungroup button near the top of the spreadsheet. When expanded, take care to label each alternative design in the first column heading cell.

### **Slide 40. ACQUISITION TABLE**

High-level detail of contractor and government acquisition efforts is captured in the Acquisition table. Cost analysts use this data to discern how program cost estimates will be impacted by acquisition strategy, how work scope is allocated to contractors and government agencies, how program cost estimates will be impacted by contractor fee, etc. Acquisition phases appear in the first column of the table, and descriptive parameters of the acquisition effort appear in the header row.

Contract information is necessary to frame estimated contract costs and to subsequently link to contractor-submitted cost reports. The table is arranged with rows for each phase and parameters by column. The major columns Materiel Solution Analysis, Technology Maturation and Risk Reduction, Engineering and Manufacturing Development, Production and Deployment, Sustainment, and Disposal column headings shown are an example only for a hardware intensive developmental program. There may be tailored as needed for the program being described.

**Slide 41. ROLES TABLE**

The Roles table provides distinction of responsibilities between contractor(s) and Government.

This table identifies the primary suppliers and performers. For PMP elements, this is necessary to calculate contract loads by vendor tier. For non-PMP elements it is usefully for depicting relative participation by the Prime and the Government.

**Slide 42. BUDGET PLAN TABLE**

The Budget Plan table provides a reference point for affordability analysis – comparing the estimating outcomes of the program as described in this CARD against some known budget values.

**Slide 43. WBS/CRS DEFINITIONS TABLE**

The WBS/CRS Definitions table provides WBS element descriptions. Substantially self-explanatory.

**Slide 44. REPEATING TABLES IN A CARD WORKBOOK**

While many of the tables are needed only once per program or per CARD workbook. However, some may need to be replicated to address separable content. When doing so, rename the tab (sheet name).

Examples shown – largely self-explanatory.

**Slide 45. Closing Slide**

And provide Trainer contact info

**Slide 46. END**

In conclusion ...