CLEARED
For Open Publication
Oct 20, 2021
Department of Defense
OFFICE OF PREPUBLICATION AND SECURITY REVIEW

SLIDES ONLY
NO SCRIPT PROVIDED

From Reports to Data:

The twin evolution of FlexFile & IPMDAR

John McGahan

CAPE/CADE Technical Director
AAP EVM-CR Program Manager

Technical Manager / Chief Scientist
SPSG - Tecolote Research, Inc.

Agenda

- CSDR and FlexFile Data Overview
- EVMS Background and EV Data Overview
- FlexFile & IPMDAR Comparison

CSDR & FlexFile

Data Overview

CSDR Process Overview

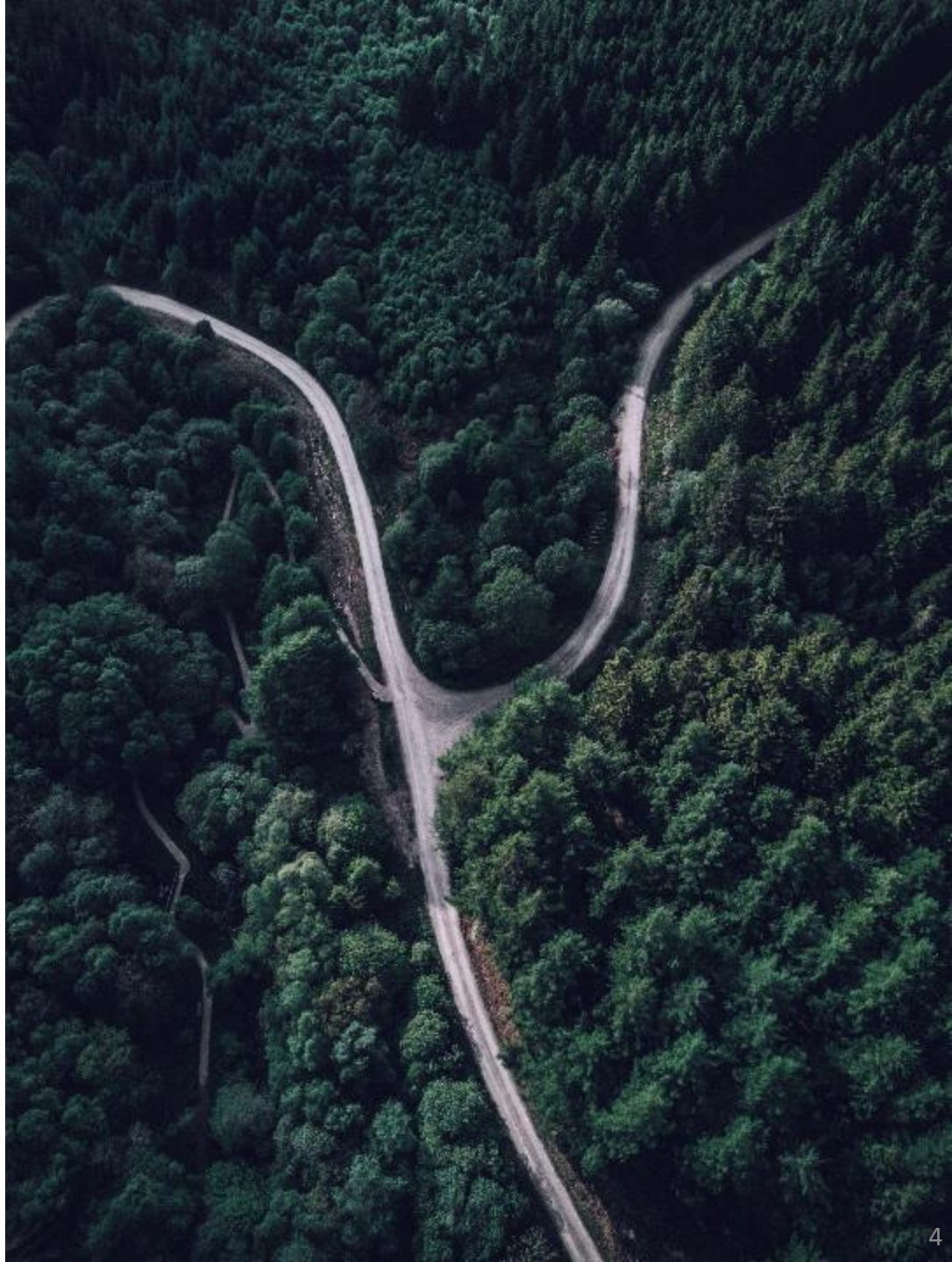
CSDR Reporting requirement on large contracts for major programs

- Typically annual reporting or just end of contract
- Reporting requirement (WBS/frequency) defined by CSDR Plan
- Flow down requirement for direct reporting by major subcontractors (with CAPE approved Plan)
- Not limited by contract type (e.g., Cost Plus, FFP, etc.)

Major Components Of CSDR

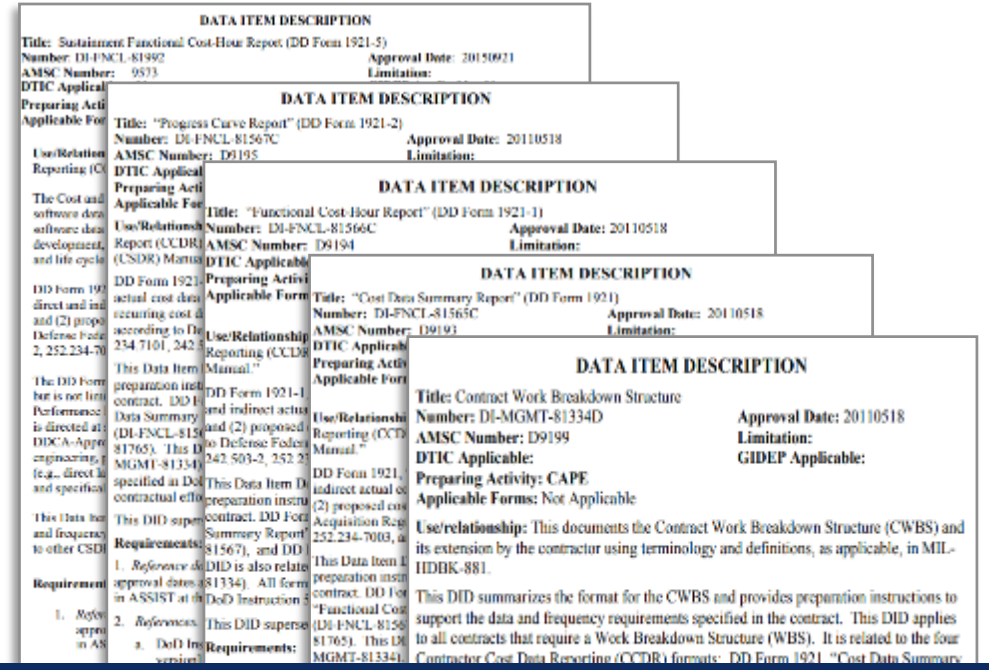
- **CCDR**: Contract Cost Data Report
  - **1921** (Cost Data Summary Report): By approved WBS
  - **1921-1** / **1921-5** (Functional Cost Hours Report / Sustainment): For selected WBS items
  - **1921-2** (Progress Curve Report): For selected WBS Items
  - **1921-3** (Business Unit Data Report): By contractor business unit
- **SRDR**: Software Resource Data Report
  - Development: For total S/W and by Release / CSCI
  - Maintenance: For total S/W and by Year or Release
  - NOTE: Format requirement is based on approved XML-Schema

1921-1/-5 and 1921-2 provide lower level detail for selected WBS elements.



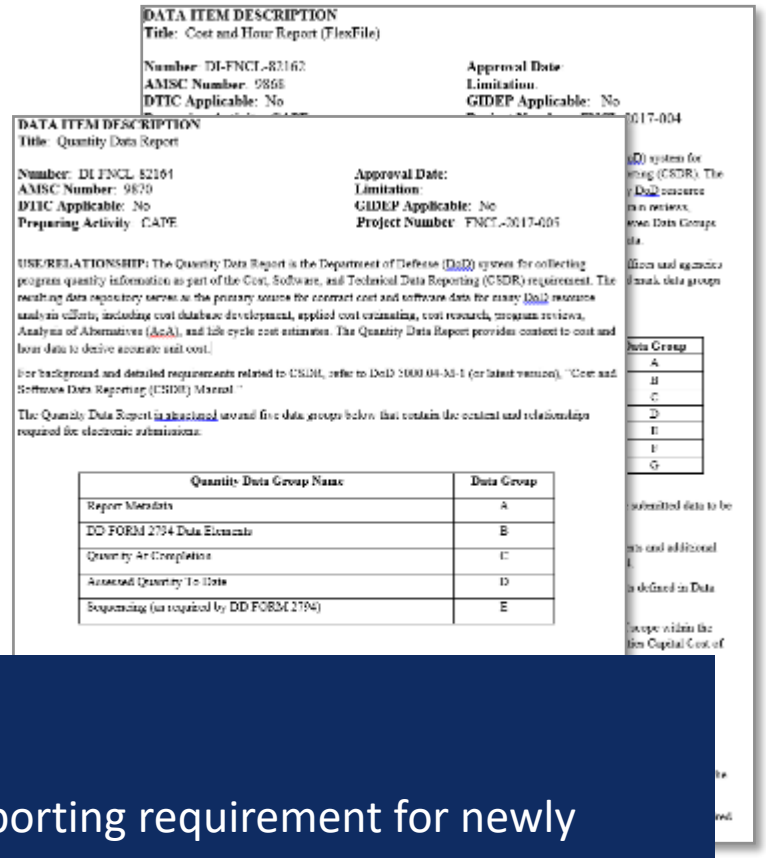
Transitioning From Legacy 1921 Reports To FlexFiles

Legacy DIDs



From five DIDs to two

FlexFiles/Quantity Report



Implementation

- FlexFile / Quantity Reports replace DD 1921 Series as the default required cost reporting requirement for newly approved CSDR plans
- Some tailoring of DID requirements may be proposed by CWIPT (e.g. time-phasing for periods longer than a month)
- If there is context-specific rationale, e.g. the reporting contractor and effort being performed make it unlikely the additional insight provided will be utilized, then the CWIPT may propose to use the DD 1921 series.

What's a FF/Q?

FF (FlexFile)

- **Time-phased actual cost/hours data** (to date) by "account code" (think control account/charge code) delineated by the contractor's functional categories
  - Mapped to the WBS as defined in the approved CSDR plan
  - Tagged recurring/non-recurring
  - Tagged by standard functional category (summary or detailed)
  - Tagged by CLIN, End Item, Order/Lot (as applicable)
  - Unit cost/sub-lot tagging for touch-labor categories (as required)
- **Estimate At Complete cost/hours** (recurring/non recurring)
  - Only for selected WBS elements, as identified in the plan

Q (Quantity Data)

- Much the same requirement as 1921 **quantity data**
- Since the quantity data tends to be human-typed, it was separated from the cost file in hopes of making it easier to export cost data in FF format
- Essentially requires *To Date* and *At Complete* quantities by the WBS defined in the plan

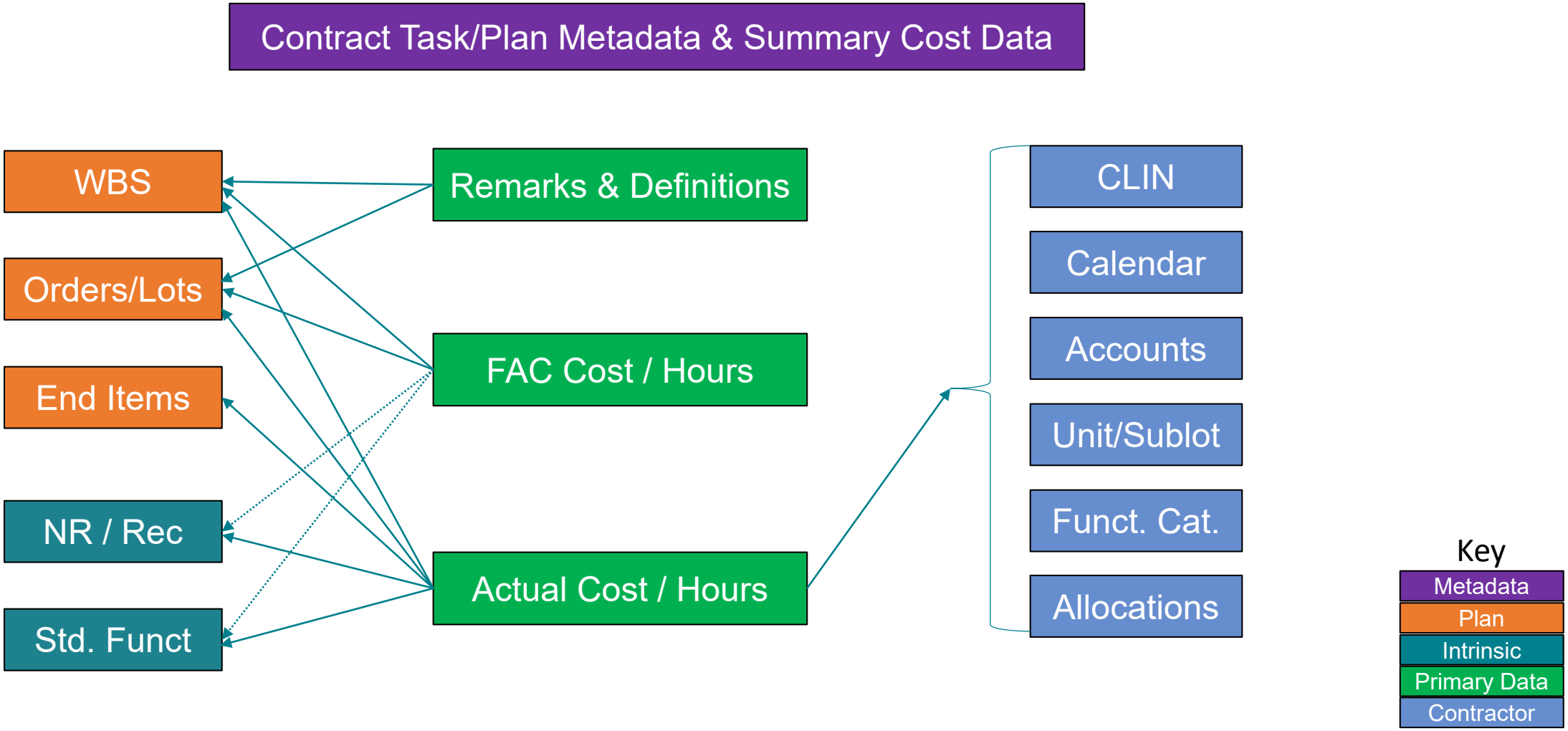
A FlexFile is Account-Level Data By CSDR Plan

- But… What Is It?
  - A collection of JSON encoded data tables
  - A generic database model for CCDR DID
- Key Components
  - **Metadata / Contract/Task Level**
  - **Plan-Based Structures**
  - **Contractor-Defined Structure**
  - **Detailed Data**
    - Actual Cost/Hours
    - Forecast At Complete (FAC) Cost/Hours
    - Quantities
    - Remarks & Definitions

FlexFile Data Tables	QTY Data Tables
Report Configuration	Report Metadata
Report Metadata	Orders or Lots
Orders or Lots	End Items
CLINs	Work Breakdown Structure
End Items	Quantities At Completion
Work Breakdown Structure	Quantities To Date
Accounts	Production Sequence
Functional Categories	Summary Remarks
Functional Overhead Categories	WBS Element Remarks
Units or Sublots	
Reporting Calendar	
Summary Cost Data	
Actual Cost-Hour Data	
FAC Cost-Hour Data	
Allocation Methods	
Allocation Components	
Summary Remarks	
WBS Element Remarks	
WBS Dictionary Definitions	
Cost-Hour Tag Definitions	

Defined in FlexFile File Format Specification (FFS) Documents

Structured Like a Database



Flat Cost/Hours Table with Structured Plan-Based & Contractor-Defined "Tags"

What's a FF/Q: Time-phased **Actuals**, **FAC**s, and **Quantities**

Actual Cost-Hour Data

Order or Lot ID	CLIN ID	End Item ID	WBS Element ID	Account ID	Nonrecurring or Recurring ID	Functional Category ID	Functional Overhead Category ID	Standard Category ID	Detailed Standard Category ID	Unit or Sublot ID	Allocation Method ID	Reporting Period ID	Tag1	Tag2	Tag25	Value (Dollars)	Value (Hours)
1	CLIN1	Var-A	1.1.1	FKWF-QPRF-FT	NONRECURRIN	DirEngLab1	OverheadCategory1	DIRECT_ENGINEERING_LABOR				1	JVXR	WQC	FKCYJT.SQMDPH.YR	9,519	118
1	CLIN1	Var-A	1.1.1	FKWF-QPRF-FT	NONRECURRIN	DirEngLab1	OverheadCategory1	DIRECT_ENGINEERING_LABOR				2	JVXR	WQC	FKCYJT.SQMDPH.YR	12,730	188
1	CLIN1	Var-A	1.1.1	FKWF-QPRF-FT	NONRECURRIN	DirEngLab1	OverheadCategory1	DIRECT_ENGINEERING_LABOR				3	JVXR	WQC	FKCYJT.SQMDPH.YR	12,661	161
1	CLIN1	Var-A	1.1.1	FKWF-QPRF-FT	NONRECURRIN	DirEngLab1	OverheadCategory1	DIRECT_ENGINEERING_LABOR				4	JVXR	WQC	FKCYJT.SQMDPH.YR	9,517	116
1	CLIN1	Var-A	1.1.1	FKWF-QPRF-FT	NONRECURRIN	DirEngLab1	OverheadCategory1	DIRECT_ENGINEERING_LABOR				5	JVXR	WQC	FKCYJT.SQMDPH.YR	10,708	140
1	CLIN1	Var-A	1.1.1	FKWF-QPRF-FT	NONRECURRIN	DirEngLab1	OverheadCategory1	DIRECT_ENGINEERING_LABOR				6	JVXR	WQC	FKCYJT.SQMDPH.YR	9,845	135
1	CLIN1	Var-A	1.1.1	FKWF-QPRF-FT	NONRECURRIN	DirEngLab1	OverheadCategory1	DIRECT_ENGINEERING_LABOR				7	JVXR	WQC	FKCYJT.SQMDPH.YR	12,752	178
1	CLIN1	Var-A	1.1.1	FKWF-QPRF-FT	NONRECURRIN	DirEngLab1	OverheadCategory1	DIRECT_ENGINEERING_LABOR				8	JVXR	WQC	FKCYJT.SQMDPH.YR	10,986	140
1	CLIN1	Var-A	1.1.1	FKWF-QPRF-FT	NONRECURRIN	DirEngLab1	OverheadCategory1	DIRECT_ENGINEERING_LABOR				9	JVXR	WQC	FKCYJT.SQMDPH.YR	9,903	124
1	CLIN1	Var-A	1.1.1	FKWF-QPRF-FT	NONRECURRIN	DirEngLab1	OverheadCategory1	DIRECT_ENGINEERING_LABOR				10	JVXR	WQC	FKCYJT.SQMDPH.YR	10,506	133
1	CLIN1	Var-A	1.1.1	FKWF-QPRF-FT	NONRECURRIN	DirEngLab1											
1	CLIN1	Var-A	1.1.1	FKWF-QPRF-FT	NONRECURRIN	DirEngLab1											
1	CLIN1	Var-A	1.1.1	FKWF-QPRF-FT	NONRECURRIN	DirEngLab1											
1	CLIN1	Var-A	1.1.1	FKWF-QPRF-FT	RECURRING	DirEngLab1											
1	CLIN1	Var-A	1.1.1	FKWF-QPRF-FT	RECURRING	DirEngLab1											
1	CLIN1	Var-A	1.1.1	FKWF-QPRF-FT	RECURRING	DirEngLab1											

Template Info | Actual Cost-Hour Data

Forecast At Completion Cost-Hour Data

Order or Lot ID	WBS Element	Nonrecurring or Recurring ID	Standard Category ID	Detailed Standard Category	Value (Dollars)	Value (Hours)
1	1.0	NONRECURRING	DIRECT_ENGINEERING_LABOR		2,489,103,994	33,155,009
1	1.0	NONRECURRING	ENGINEERING_LABOR_OVERHEAD		248,902,638	
1	1.0	NONRECURRING	DIRECT_MANUFACTURING_TOUCH_LABOR		510,990,528	6,838,028
1	1.0	NONRECURRING	DIRECT_MANUFACTURING_OTHER_LABOR		484,641,611	6,471,926
1	1.0	NONRECURRING	MANUFACTURING_OPERATIONS_LABOR_OVERHEAD		99,564,657	
1	1.0	NONRECURRING	DIRECT_MAINTENANCE_TOUCH_LABOR		0	0
1	1.0	NONRECURRING	DIRECT_MAINTENANCE_OTHER_LABOR		0	0
1	1.0	NONRECURRING	MAINTENANCE_OPERATIONS_LABOR_OVERHEAD		0	
1	1.0	NONRECURRING	OTHER_DIRECT_COSTS		49,784,686	
1	1.0	NONRECURRING	OTHER_OVERHEAD		4,978,120	
1	1.0	NONRECURRING	DIRECT_MATERIALS		497,852,103	
1	1.0	NONRECURRING	MATERIAL_OVERHEAD		49,779,787	
1	1.0	NONRECURRING	GENERAL_AND_ADMINISTRATIVE		497,778,757	
1	1.0	NONRECURRING	FACILITIES_CAPITAL_COST_OF_MONEY		49,778,234	
1	1.0	RECURRING	DIRECT_ENGINEERING_LABOR		2,502,828,430	33,357,531
1	1.0	RECURRING	ENGINEERING_LABOR_OVERHEAD		250,290,604	
1	1.0	RECURRING	DIRECT_MANUFACTURING_TOUCH_LABOR		513,209,219	6,788,246

The DATA in a FF/Q:

- Time-phased Cost/Hours by "account"
  - Order/Lot
  - Tagged by approved WBS
  - N/R, Functional Categories, etc.
- FAC Values for selected WBS elements
- With ToDate/AtCmplt QTY by WBS

What's a FF/Q: Data with a **Structure**

Plus extra tables to define the data:

- The Plan Defines:
  - Some of the Metadata
  - WBS
  - Orders or Lots
  - End Items
- Contractors Provide:
  - List of their Account Codes
  - Their Own Functional Categories
  - Reporting Calendar Structure

Work Breakdown Structure

Level	ID	Name	Parent ID
1	1.0	Space System	
2	1.1	SEIT/PM and Other Common Elements	1.0
2	1.2	Space Vehicle	1.0
3	1.2.1	Space Vehicle Software Release 1	1.2
4	1.2.1.1	Space Vehicle Software Release 1 CSCI 1	1.2.1
4	1.2.1.2	Space Vehicle Software Release 1 CSCI 2	1.2.1
4	1.2.1.3	Space Vehicle Software Release 1 CSCI 3	1.2.1
3	1.2.2	Space Vehicle Software Release 2	1.2
4	1.2.2.1	Space Vehicle Software Release 2 CSCI 1	1.2.2
4	1.2.2.2	Space Vehicle Software Release 2 CSCI 3	1.2.2
3	1.2.3	Space Vehicle Software Release 3	1.2
4	1.2.3.1	Space Vehicle Software Release 3 CSCI 2	1.2.3
4	1.2.3.2	Space Vehicle Software Release 3 CSCI 3	1.2.3
3	1.2.4	Space Vehicle Software Release 4	1.2
4	1.2.4.1	Space Vehicle Software Release 4 CSCI 1	1.2.4
4	1.2.4.2	Space Vehicle Software Release 4 CSCI 3	1.2.4
4	1.2.4.3	Space Vehicle Software Release 4 CSCI 4	1.2.4

Accounts

ID	Name
FKWF-QPRF-FTNL	1.1-REC-DIR_ENG_LAB
YHQB-ZTBM-JJJW	1.1-REC-ENG_OH
PYNS-DRBR-SJZZ	1.1-REC-DIR_MAN_TOUCH_LAB
FBQR-VVSQ-QLHV	1.1-REC-DIR_MAN_OTH_LAB
PRLB-DWKY-YXKD	1.1-REC-MAN_LAB_OH
BVVK-JVDR-XLDJ	1.1-REC-OTH_DIR_COST
KKFK-XSWR-QRLM	1.1-REC-OTH_OH
PVFX-QNDG-NSSJ	1.1-REC-DIR_MAT_COST
XMBY-YQYH-RMWK	1.1-REC-MAT_OH
QJFK-WVJM-RWBD	1.1-NR-DIR_ENG_LAB
JTPH-SCHJ-QYXY	1.1-NR-ENG_OH
KJTQ-DTVD-FCFK	1.1-NR-DIR_MAN_TOUCH_LAB
BWNN-DHWR-NCVV	1.1-NR-DIR_MAN_OTH_LAB
FQGW-BXNN-FFVJ	1.1-NR-MAN_LAB_OH
LBPX-GZNL-JLFC	1.1-NR-OTH_DIR_COST
NMBC-BTXP-NYFF	1.1-NR-OTH_OH
ZMNZ-HHYV-VCQV	1.1-NR-DIR_MAT_COST
VLFX-LYKB-GKMX	1.1-NR-MAT_OH

Reporting Calendar

ID	Start Date	End Date
1	1/1/2016	1/31/2016
2	2/1/2016	2/29/2016
3	3/1/2016	3/31/2016
4	4/1/2016	4/30/2016

Functional Categories

ID	Name
DIR_ENG_LAB	DIR_ENG_LAB
ENG_OH	ENG_OH
DIR_MAN_TOUCH_LAB	DIR_MAN_TOUCH_LAB
DIR_MAN_OTH_LAB	DIR_MAN_OTH_LAB
MAN_LAB_OH	MAN_LAB_OH
OTH_DIR_COST	OTH_DIR_COST
OTH_OH	OTH_OH
DIR_MAT_COST	DIR_MAT_COST
MAT_OH	MAT_OH

Orders or Lots

ID	Name	Phase or Milestone ID
Lot 1	Lot 1	
Lot 2	Lot 2	
Lot 3	Lot 3	
Lot 4	Lot 4	
Lot 5	Lot 5	

Consuming FF Data: Actuals in Pivot Tables

Actual To Date (Dollars)	Column Labels		
Row Labels	NONRECURRING	RECURRING	Grand Total
1.1.1	44,084,899	43,281,271	87,366,170
1.1.2	100,757,360	102,118,177	202,875,537
1.1.3	292,405,228	294,021,112	586,426,340
1.1.4.1	2,221,741,968	2,337,488,097	4,559,230,065
1.1.4.2	3,576,383,128	3,572,470,383	7,148,853,511
1.1.4.3	44,711,562	44,956,665	89,668,227
1.1.4.4	1,976,734,628	1,859,022,663	3,835,757,291
1.1.4.5	214,364,440	209,747,295	424,111,735
1.1.4.6	976,470,018	992,425,991	1,968,896,009
1.1.5.1	31,251,519	32,904,070	64,155,589
1.1.5.2	52,188,393	54,636,426	106,824,819
1.1.5.3	59,286,909	59,405,463	118,692,372
1.1.5.4	140,680,799	141,678,395	282,359,194
1.1.5.5	49,579,948	50,445,362	100,025,310
1.1.5.6	323,272,503	329,011,995	652,284,498
1.2	133,355,674	127,722,937	261,078,611
1.3.1	1,039,243,795	928,388,113	1,967,631,908
1.3.2	172,522,418	168,112,630	340,635,048
1.3.3	61,120,435	64,146,706	125,267,141
1.4	841,462,234	754,716,610	1,596,178,844
1.5	253,910,346	260,072,209	513,982,555
Grand Total	**12,605,528,204**	**12,426,772,570**	**25,032,300,774**

PivotTable

Choose fields to add

- OrderOrLot_ID
- OrderOrLot_Nam
- CLIN_ID
- CLIN_Name
- EndItem_ID
- EndItem_Name
- **WBSElement_ID**
- WBSElement_Na
- WBSElement_Lev
- WBSElement_ID_
- WBSElement_Na
- WBSElement_ID_
- WBSElement_Na

Drag fields betwee

FILTERS

Actuals By CLIN/End Item

Actual To Date (Dollars)	Column Labels		
Row Labels	NONRECURRING	RECURRING	Grand Total
CLIN 1	**4,983,155,115**	**5,010,693,625**	**9,993,848,740**
Variant A	2,497,021,739	2,499,480,176	4,996,501,915
Variant B	2,486,133,376	2,511,213,449	4,997,346,825
CLIN 2	**5,124,875,709**	**4,891,529,619**	**10,016,405,328**
Variant A	2,532,796,593	2,476,183,592	5,008,980,185
Variant B	2,592,079,116	2,415,346,027	5,007,425,143
CLIN 3	**2,497,497,380**	**2,524,549,326**	**5,022,046,706**
Variant A	1,256,671,890	1,257,162,395	2,513,834,285
Variant B	1,240,825,490	1,267,386,931	2,508,212,421
Grand Total	**12,605,528,204**	**12,426,772,570**	**25,032,300,774**

Contractor Categories nested in Standard Categories

NonrecurringOrRecurring_ID	RECURRING
Row Labels	Actual To Date (Dollars)
DIRECT_ENGINEERING_LABOR	**6,207,404,106**
Direct Engineering Labor (1)	1,241,140,137
Direct Engineering Labor (2)	1,241,213,842
Direct Engineering Labor (3)	1,241,999,794
Direct Engineering Labor (4)	1,241,165,702
Direct Engineering Labor (5)	1,241,884,631
DIRECT_MANUFACTURING_OTHER_LABOR	**1,221,971,052**
DIRECT_MANUFACTURING_TOUCH_LABOR	**1,261,312,135**
DIRECT_MATERIALS	**1,241,153,706**
ENGINEERING_LABOR_OVERHEAD	**620,637,316**
FACILITIES_CAPITAL_COST_OF_MONEY	**124,120,188**
GENERAL_AND_ADMINISTRATIVE	**1,241,131,429**
MANUFACTURING_OPERATIONS_LABOR_OVERHEAD	**248,224,616**
MATERIAL_OVERHEAD	**124,187,398**
OTHER_DIRECT_COSTS	**124,217,158**
OTHER_OVERHEAD	**12,413,466**
Grand Total	**12,426,772,570**

Consuming FF Data: But What About the EACs and Quantities?

Quantities

EACs

Summary (1921) Data

Report ID	Form	Form Version	WBS Element Concatenation	TD Qty	TD NR Cost $K	TD Rec Cost $K	TD Tot Cost $K	AC Qty	AC NR Cost $K	AC Rec Cost $K	AC Tot Cost $K
23014	FlexFile	2019	1.0 TOTAL	1	18246.76	88018.23	106264.9	2	79676.76	26372.69	106049.45
23014	FlexFile	2019	1.1 Subsystem 1.1	1	24905.03	62208.79	87113.8	2	66260.24	30808.67	97068.91
23014	FlexFile	2019	1.1.1 Subsystem 1.1.1	1	35440.81	97330.31	132771.1	2	509.26	38554.59	39063.85
16401	1921	2007 / 2011	1.0 Airborne and Maritime/Fixed Stat	5	28256.97	97998.59	126255.5	10	56806.55	12335.50	69142.05
16401	1921	2007 / 2011	1.1 AMF Joint Tactical Radio System	5	51510.00	17638.97	69148.9	10	78867.36	55746.79	134614.16
16401	1921	2007 / 2011	1.1.1 Subsystem 1 (JTR)	5	37495.26	78824.80	116320.0	10	83121.91	4007.38	87129.29
16401	1921	2007 / 2011	1.1.1.1 Development Stations	5	17627.28	24693.34	42320.6	10	4385.61	78004.03	82389.64

Functional Cost-Hour (1921-1) Data

Report ID	Form	Form Version	WBS Element Concatenation	Std Functional Category	Std Functional Element	Unit of Measure	TD NR	TD Rec	TD Tot	AC NR	AC Rec	AC Tot
23014	FlexFile	2019	1.0 TOTAL	Engineering	DIRECT ENGINEERING LABOR	Hours (k)	55.15	57.52	112.67	97.15	17.56	114.71
23014	FlexFile	2019	1.0 TOTAL	Engineering	ENGINEERING LABOR OVERHEAD	TY $K	97228.62	34659.28	131887.90	76634.81	13308.69	89943.50
23014	FlexFile	2019	1.0 TOTAL	Manufacturing	DIRECT MANUFACTURING TOUCH LABOR	TY $K	26996.32	87126.73	114123.06	70371.36	76291.47	146662.83
23014	FlexFile	2019	1.0 TOTAL	Manufacturing	DIRECT MANUFACTURING OTHER LABOR	Hours (k)	75.53	87.88	163.41	19.69	17.27	36.96
23014	FlexFile	2019	1.0 TOTAL	Manufacturing	MANUFACTURING OPERATIONS LABOR OVER	TY $K	11876.29	67511.92	79388.21	63659.50	44453.23	108112.73
23014	FlexFile	2019	1.0 TOTAL	Maintenance	DIRECT MAINTENANCE TOUCH LABOR	TY $K	35225.76	68084.98	103310.74	29164.25	53526.29	82690.54
23014	FlexFile	2019	1.0 TOTAL	Maintenance	DIRECT MAINTENANCE OTHER LABOR	Hours (k)	21.92	90.13	112.05	12.23	17.92	30.15

Unit Cost (1921-2) Data

Report ID	Form	Form Version	WBS Element Concatenation	Unit/Sublot	Model/Series	First Unit	Last Unit	Concurrent Units	Unit Status	Std Functional Category	Std Functional Element	Unit of Measure	Value
23014	FlexFile	2019	1.0 Space System	B1	Var-B	1	1	N/A	N/A	Manufacturing	Direct Manufacturing Touch Labor	Hours (k)	40
23014	FlexFile	2019	1.0 Space System	B1	Var-B	1	1	N/A	N/A	Manufacturing	Direct Manufacturing Touch Labor	TY $K	4343.23
23014	FlexFile	2019	1.0 Space System	B1	Var-B	1	1	N/A	N/A	Maintenance	Direct Maintenance Touch Labor	Hours (k)	9
23014	FlexFile	2019	1.0 Space System	B1	Var-B	1	1	N/A	N/A	Maintenance	Direct Maintenance Touch Labor	TY $K	203.00
16401	1921-2	2007 / 2011	1.0 Airborne and Maritime/Fixed S	A1	13540030	1	30	42	Completed	N/A	N/A	Weight	169 kg
16401	1921-2	2007 / 2011	1.0 Airborne and Maritime/Fixed S	A1	13540030	1	30	42	Completed	N/A	N/A	Speed	2000 hp
16401	1921-2	2007 / 2011	1.0 Airborne and Maritime/Fixed S	A1	13540030	1	30	42	Completed	N/A	N/A	Power	1.21 gigawatts
16401	1921-2	2007 / 2011	1.0 Airborne and Maritime/Fixed S	A1	13540030	1	30	42	Completed	Engineering	Direct Engineering Labor Hours	Hours (k)	72.45
16401	1921-2	2007 / 2011	1.0 Airborne and Maritime/Fixed S	A1	13540030	1	30	42	Completed	Engineering	Direct Engineering Labor Dollars	TY $K	62701.42
16401	1921-2	2007 / 2011	1.0 Airborne and Maritime/Fixed S	A1	13540030	1	30	42	Completed	Engineering	Engineering Overhead Dollars	TY $K	81092.24
16401	1921-2	2007 / 2011	1.0 Airborne and Maritime/Fixed S	A1	13540030	1	30	42	Completed	Manufacturing Operations	Direct Tooling Labor Hours	Hours (k)	39.16
16401	1921-2	2007 / 2011	1.0 Airborne and Maritime/Fixed S	A1	13540030	1	30	42	Completed	Manufacturing Operations	Direct Tooling Labor Dollars	TY $K	3775.97

IPMDAR:

An Analogous Data Journey

The EVM Policy Evolution

ADA • IPM

Pre-PARCA: CPR and IMS (and VARs)

- Separate (disconnected) deliverables
- CPR (Format 1-4) is a printable report format (and EDI 839)
- IMS is a native tool format (or a printed image of a GANTT)

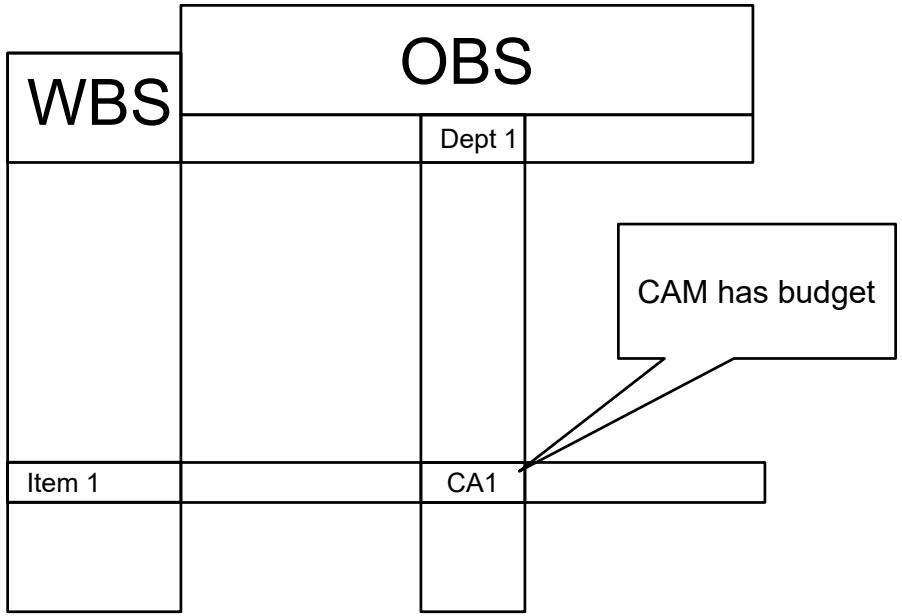
PARCA (2012): IPMR Combines CPR and IMS (and VARs)

- Recognition that cost and schedule are connected/integrated
- Adopted UNCEFACT XML Schema for all formats
- Formats 1-4 mostly untouched (EDI839 to XML); plus printable reports
- Introduced Format 6: XML snapshot of IMS (plus native)
- Introduced (misunderstood) Format 7: Time-phased Format 1 [YEARLY]

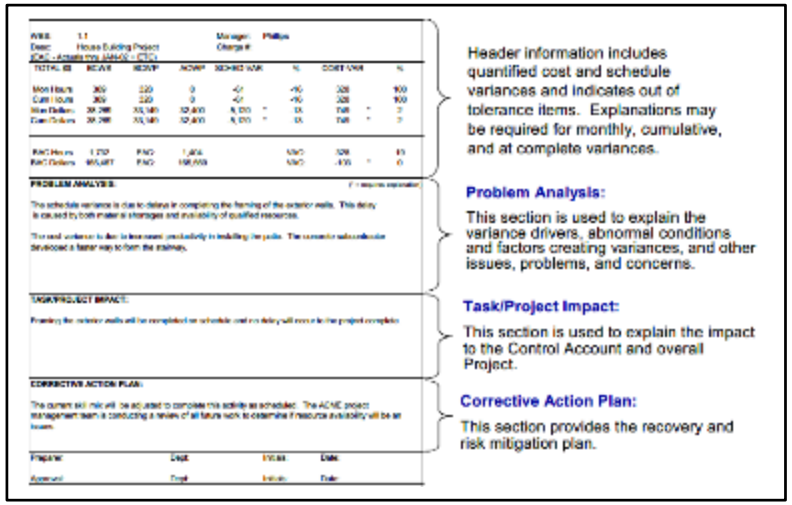
AAP (2020): IPMDAR (EVMS Data, Not Printable Reports)

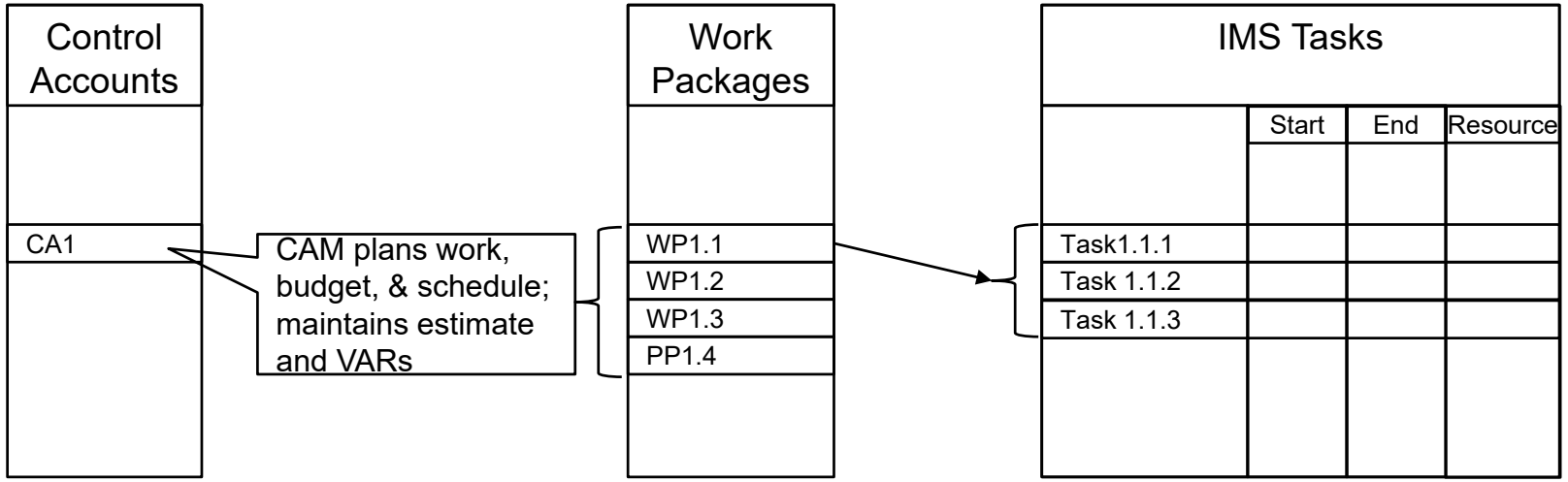
- Corrects technical defects with cost/schedule integration
- JSON encoding replaces XML
  - Format 6 mostly untouched (replaced with IPMDAR SPD)
  - Replace Formats 1-4, 7 with data more closely aligned to contractor EVMS (no requirement for printable reports)
- Reframed concept of VARs to facilitate conversation (what is needed by Govt)

Introduction: Parts of an EVMS



VARs (Current Execution vs Plan)





EVMS WBS Reality

ADA • IPM

- EVMS WBS maybe down to low levels
  - Total
    - Prime Mission Product
      - Airframe
        - Fuselage
        - Wing
        - Empennage
- However: Due to nature of EVMS software, the “WBS” may be a mix of different objects
  - Could include OBS items (links to CAs)
  - Could include WPs and/or IMS tasks
  - Could include other objects/activities
- EVMS itself imposes some limits to flexibility

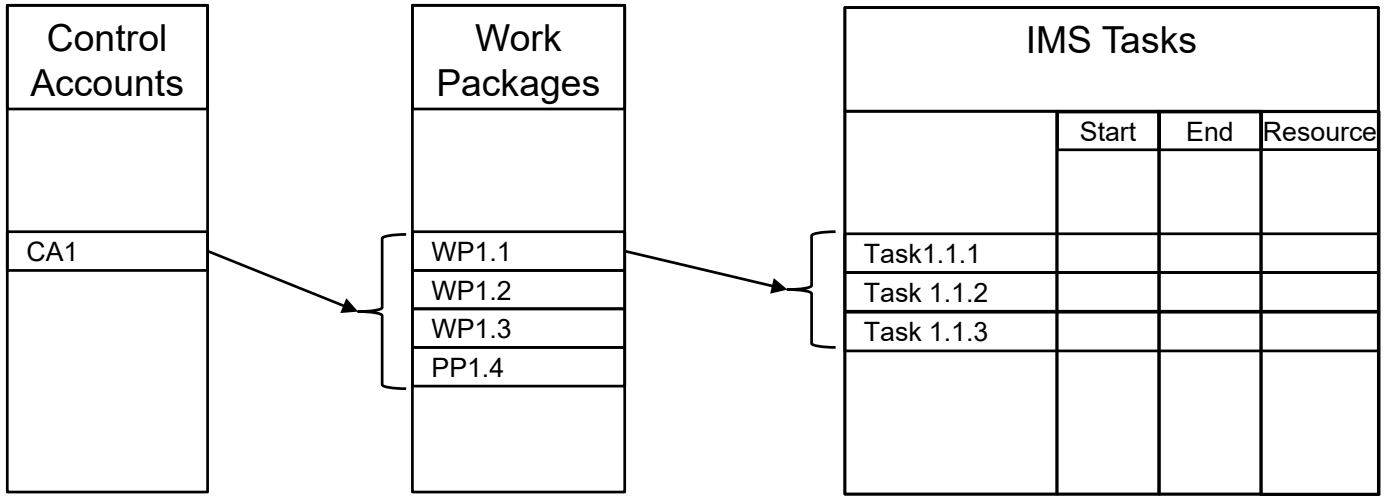
Introduction: Project Planning & Creating the Baseline

ADA • IPM

Plan Work
- WPs
- Work Authorization

Plan Resources & Schedule
- Tasks and Schedule
- Resources
- EVT

Budget to CAs



Time-Phased Budgeted Cost Work Scheduled (BCWS), Dollars & Hours, By Element Of Cost

Baseline Budget & Schedule, e.g. Performance Management Baseline (PMB)

IPMDAR Is A Data Snapshot of the EVMS

ADA • IPM

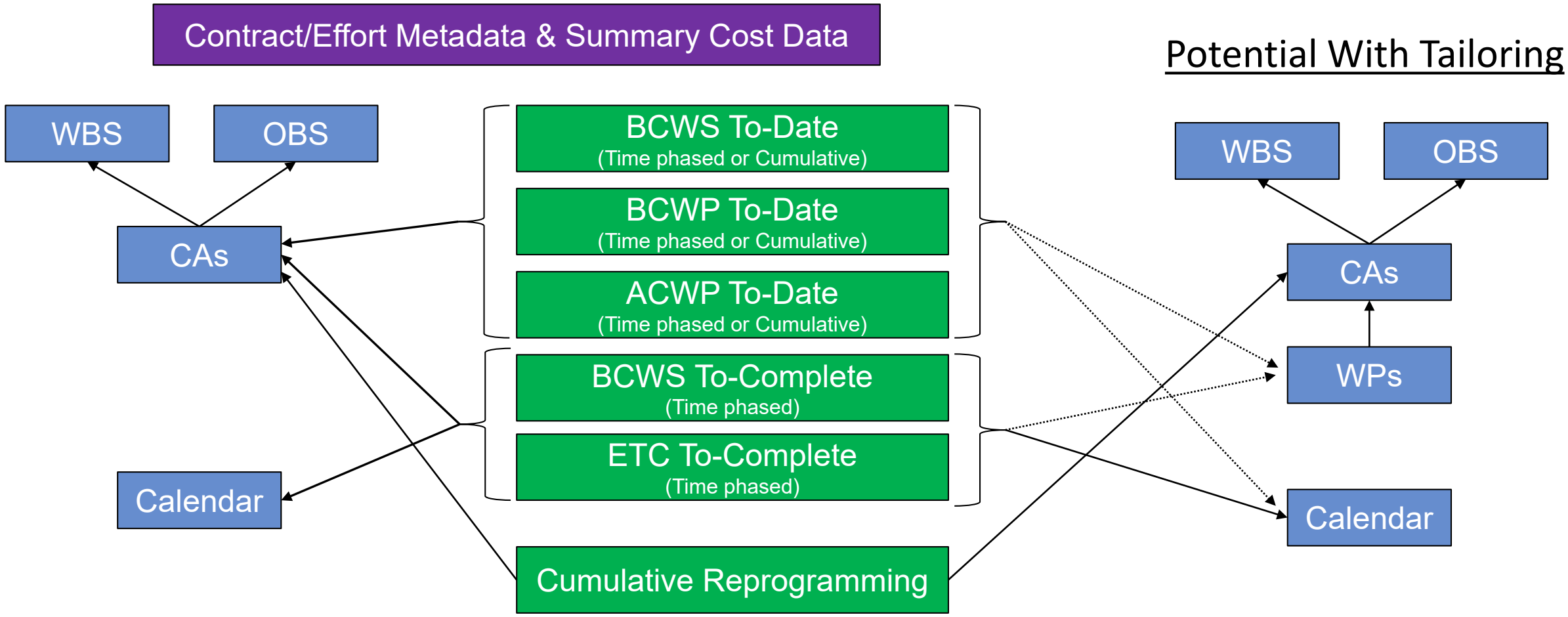
- But… What Is It?
  - A collection of JSON encoded data tables
  - A generic database model of an EVMS
- Key Components
  - **Metadata / Contract Level**
  - **Structures (cost & schedule)**
  - **Detailed Data**
    - To Date
    - To Complete
    - Cumulative Reprogramming
    - Schedule Dates & Durations
    - Task Relationships
    - Resource Utilization

CPD Data Tables	SPD Data Tables
Dataset Configuration	Dataset Metadata
Dataset Metadata	Source Software Metadata
Source Software Metadata	Project Schedule Data
Contract Data	Proj. Custom Field Definitions
Summary Performance	Proj. Custom Field Values
Custom Summary Performance	Calendars
Summary Indirect (To Date)	Calendar Workshifts
Summary Indirect (To Complete)	Calendar Exceptions
Subcontractors	Tasks
Work Breakdown Structure	Task Schedule Data
Org. Breakdown Structure	Task Custom Field Definitions
Control Accounts	Task Custom Field Values
CA Custom Field Definitions	Task Constraints
CA Custom Field Values	Task Relationships
Work Packages	Task Outline Structure
WP Custom Field Definitions	Resources
WP Custom Field Values	Res. Custom Field Definitions
Reporting Calendar	Res. Custom Field Values
BCWS (To Date)	Resource Assignments
BCWP (To Date)	
ACWP (To Date)	
BCWS (To Complete)	
EST (To Complete)	
Reprogramming Adjustments	

Defined in IPMDAR File Format Specification (FFS) Documents

IPMDAR CPD Structured Like The EVMS

ADA • IPM



Default Requirement: CA Level Data, To-Date Cumulative

Example Pivot Table Applications

ADA • IPM

Sum of BCWS_AtCompleti	Column Labels						
	Department 1	Department 2	Department 3	Department 4	Department 5	Department 6	Department 7
Subsystem 1.1.1.1	$ 463,531,251	$ 493,798,214	$ 492,274,403	$ 288,094,804	$ 375,837,163	$ 370,245,647	$ 991,964,798
Subsystem 1.1.1.2	$ 740,584,355	$ 393,128,465	$ 677,529,702	$ 270,830,128	$ 784,933,168	$ 795,549,681	$ 252,786,040
Subsystem 1.1.2.1	$ 609,170,702	$ 274,729,718	$ 488,359,338	$ 270,210,682	$ 581,109,921	$ 466,380,337	$ 522,373,871
Subsystem 1.1.2.2	$ 177,812,934	$ 423,233,743	$ 362,819,878	$ 849,451,563	$ 501,419,224	$ 379,079,857	$ 406,142,501
Subsystem 1.1.2.3	$ 410,371,788	$ 523,029,947	$ 452,998,317	$ 377,466,809	$ 328,863,325	$ 235,467,492	$ 923,113,111
Subsystem 1.1.2.4	$ 522,076,604	$ 454,362,781	$ 175,907,369	$ 473,630,465	$ 558,561,723	$ 413,016,470	$ 166,851,143
Subsystem 1.1.2.5	$ 539,655,757	$ 394,045,301	$ 509,395,843	$ 331,496,346	$ 646,577,038	$ 819,286,564	$ 477,433,874
Subsystem 1.2	$ -	$ -	$ -	$ -	$ -	$ 834,063,998	$ -
Subsystem 1.3	$ -	$ -	$ -	$ -	$ -	$ 1,467,312,182	$ -
Subsystem 1.4.1	$ 437,352,599	$ 432,023,442	$ 334,812,915	$ 575,681,148	$ 216,216,501	$ 153,033,942	$ 423,485,864
Subsystem 1.4.2	$ 202,968,810	$ 454,918,557	$ 417,564,548	$ 607,359,728	$ 212,830,613	$ 488,901,526	$ 927,636,838

Budget at Complete by control account

ControlAccount_ManagerName	Mr. Data	
Sum of BCWS_ToComplete_Dollars	Column Labels	
Row Labels	Department 2	Grand Total
Subsystem 1.4.5.1	1080353740	1080353740
Subsystem 1.4.5.2	666617008	666617008
Subsystem 1.5.1	593246143	593246143
Subsystem 1.5.2	313315512	313315512
Subsystem 1.5.3	695773483	695773483
Grand Total	**3349305886**	**3349305886**

CAM budget

Side-by-side dollars / hours

	BCWS (cum) Dollars	BCWS (cum) Hours
⊞ **Summary: Cost of Money**	**203,967,852**	**0**
⊞ **Summary: General & Administrative**	**2,036,738,911**	**0**
⊟ **TOTAL**	**18,234,130,330**	**69,876,865**
⊟ **Subsystem 1.1**	**6,391,836,527**	**24,417,208**
Subsystem 1.1.1	3,096,810,147	12,160,830
Subsystem 1.1.2	3,295,026,380	12,256,378
⊞ **Subsystem 1.2**	**265,007,114**	**1,040,467**
⊞ **Subsystem 1.3**	**467,397,659**	**1,855,008**
⊟ **Subsystem 1.4**	**5,642,698,219**	**21,274,715**
Subsystem 1.4.1	637,229,877	2,387,638
Subsystem 1.4.2	1,129,820,555	4,182,659
Subsystem 1.4.3	371,897,253	1,490,751
Subsystem 1.4.4	1,293,674,528	4,657,760

Separating the Data from Printable Formats Enables Utilization of Modern Tools

Example Pivot Table Applications

ADA • IPM

Element of Cost by Control Account (Hours/Dollars)

ControlAccount_ManagerName (All)

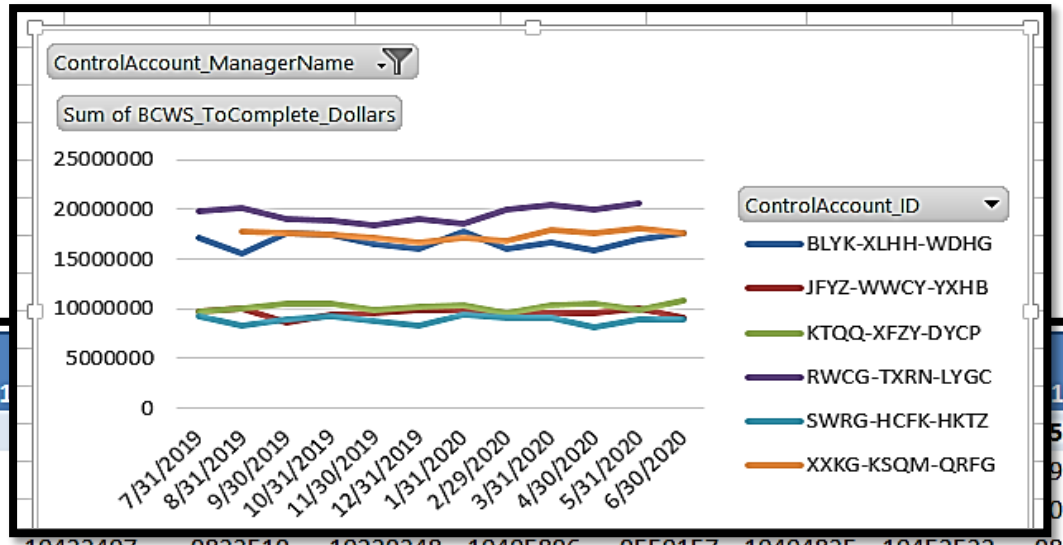
Row Labels	BCWS Hours ToDate	BCWS ToDate $	BCWS ToDate Lab $	BCWS ToDate Mat $	BCWS ToDate ODC $	BCWS ToDate Sub $	BCWS Hours ToCmpt	BCWS ToCmpt $
Summary: Cost of Money	**0**	**$203,967,852**	**$0**	**$0**	**$0**	**$0**	**0**	**$749,604,890**
Summary: General & Administrative	**0**	**$2,036,738,911**	**$0**	**$0**	**$0**	**$0**	**0**	**$7,472,884,900**
TOTAL	**69876865**	**$18,234,130,330**	**$7,251,267,995**	**$4,572,743,060**	**$1,831,293,797**	**$4,578,825,478**	**253136716**	**$66,597,493,961**
Subsystem 1.1	**24417208**	**$6,391,836,527**	**$2,544,102,246**	**$1,594,156,919**	**$641,717,039**	**$1,611,860,323**	**110099392**	**$29,046,083,821**
Subsystem 1.1.1	12160830	$3,096,810,147	$1,228,923,142	$774,562,387	$309,662,078	$783,662,540	28391211	$7,673,568,976
Subsystem 1.1.2	12256378	$3,295,026,380	$1,315,179,104	$819,594,532	$332,054,961	$828,197,783	81708181	$21,372,514,845
Subsystem 1.2	**1040467**	**$265,007,114**	**$104,115,541**	**$67,676,296**	**$25,685,658**	**$67,529,619**	**2238544**	**$569,056,884**
(blank)	1040467	$265,007,114	$104,115,541	$67,676,296	$25,685,658	$67,529,619	2238544	$569,056,884
Subsystem 1.3	**1855008**	**$467,397,659**	**$195,806,670**	**$115,572,447**	**$44,238,411**	**$111,780,131**	**3771757**	**$999,914,523**
(blank)	1855008	$467,397,659	$195,806,670	$115,572,447	$44,238,411	$111,780,131	3771757	$999,914,523
Subsystem 1.4	**21274715**	**$5,642,698,219**	**$2,214,134,722**	**$1,423,372,422**	**$571,093,753**	**$1,434,097,322**	**88951915**	**$23,169,473,948**
Subsystem 1.4.1	2387638	$637,229,877	$254,972,824	$163,571,149	$64,472,038	$154,213,866	11699958	$3,016,392,692
Subsystem 1.4.2	4182659	$1,129,820,555	$443,994,690	$284,927,080	$111,925,918	$288,972,867	16485389	$4,163,820,272
Subsystem 1.4.3	1490751	$371,897,253	$144,736,375	$90,400,269	$39,192,858	$97,567,751	12638031	$3,218,258,010
Subsystem 1.4.4	4657760	$1,293,674,528	$488,296,318	$332,485,939	$130,775,818	$342,116,453	17226071	$4,580,337,413
Subsystem 1.4.5	8555907	$2,210,076,006	$882,134,515	$551,987,985	$224,727,121	$551,226,385	30902466	$8,190,665,561
Subsystem 1.5	**19172227**	**$4,956,190,979**	**$1,983,395,612**	**$1,242,147,946**	**$502,878,519**	**$1,227,768,902**	**43892533**	**$11,720,337,780**

Separating the Data from Printable Formats Enables Utilization of Modern Tools

Example Pivot Table Applications

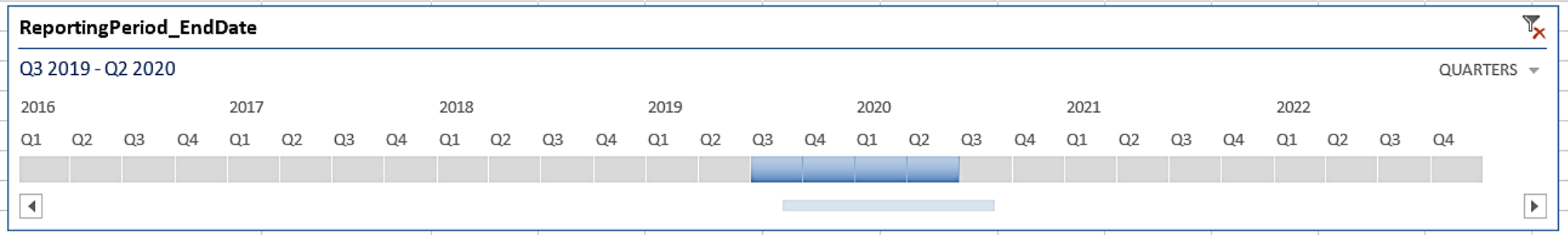
ADA • IPM

CAM Forecast (Dollars)



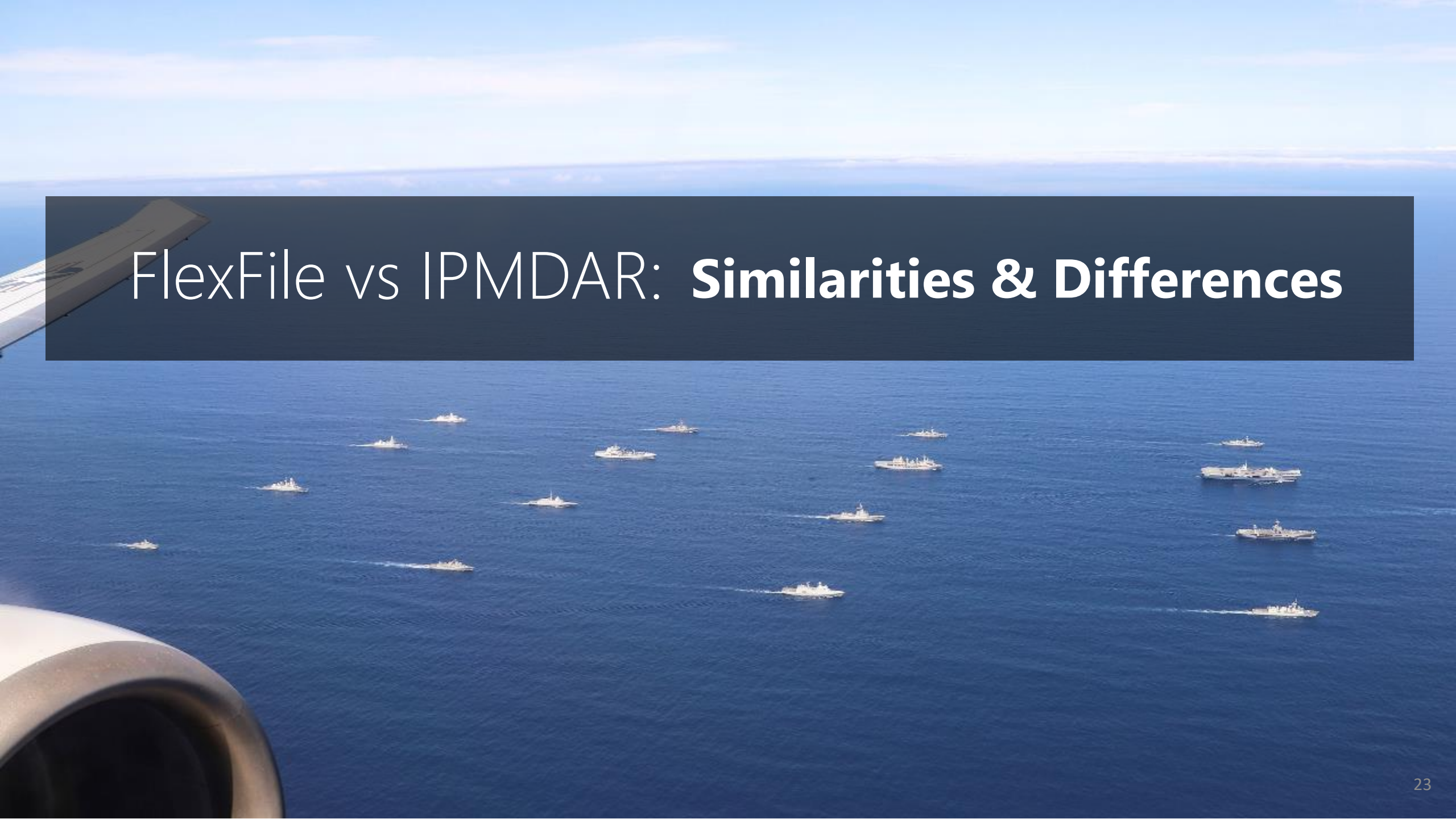
Time-Phased Future Forecast by CAM (Dollars)

Sum of BCWS_ToComplete_Dollars Column Labels / Row Labels	7/31/2019	8/31/2019	9/30/2019	1							1/2020	6/30/2020
Mr. La Forge	**65703951**	**82112263**	**82314881**								**530409**	**63963078**
BLYK-XLHH-WDHG	17100249	15537669	17564130								918761	17584618
JFYZ-WWCY-YXHB	9742614	10087615	8628042								052177	9051194
KTQQ-XFZY-DYCP	9761042	10084179	10477115	10433407	9833519	10229348	10405896	9550157	10404835	10452532	9840909	10807356
RWCG-TXRN-LYGC	19789771	20219645	19074222	18843001	18478330	19034744	18589912	19981323	20472894	19996580	20692924	
SWRG-HCFK-HKTZ	9310275	8363573	8966176	9270872	8746552	8295459	9420865	9097952	9154239	8072280	8971198	8926297
XXKG-KSQM-QRFG		17819582	17605196	17496413	17122514	16662802	17203042	16811810	17918022	17648282	18054440	17593613



Separating the Data from Printable Formats Enables Utilization of Modern Tools

FlexFile vs IPMDAR: **Similarities & Differences**



Compare/Contrast Observations

Different Purpose / Focus

- CSDR: Actual cost/hours on “completed” contracts, used for estimating future programs
  - Necessitates greater reporting detail and “standardization” across programs/contracts
  - Government-defined Reporting WBS ensures we collect standardized data for future need
    - Recurring/Non-Recurring, Standard Functional Categories, Unit Cost Reporting
    - Focused data collect on contract boundaries for end items (E.g. milestones, order/lots)
- EV: Current and planned cost/hours and schedule data for monthly monitoring/managing contract execution (and risk and future plan) on active programs/contracts/tasks

Technical Similarities

- Comparable encoding technology (zipped collection of JSON “relational” tables)
- Shared table structures for comparable data (e.g. definition for encoding a WBS)
- Hours and Dollars

Major Technical Differences

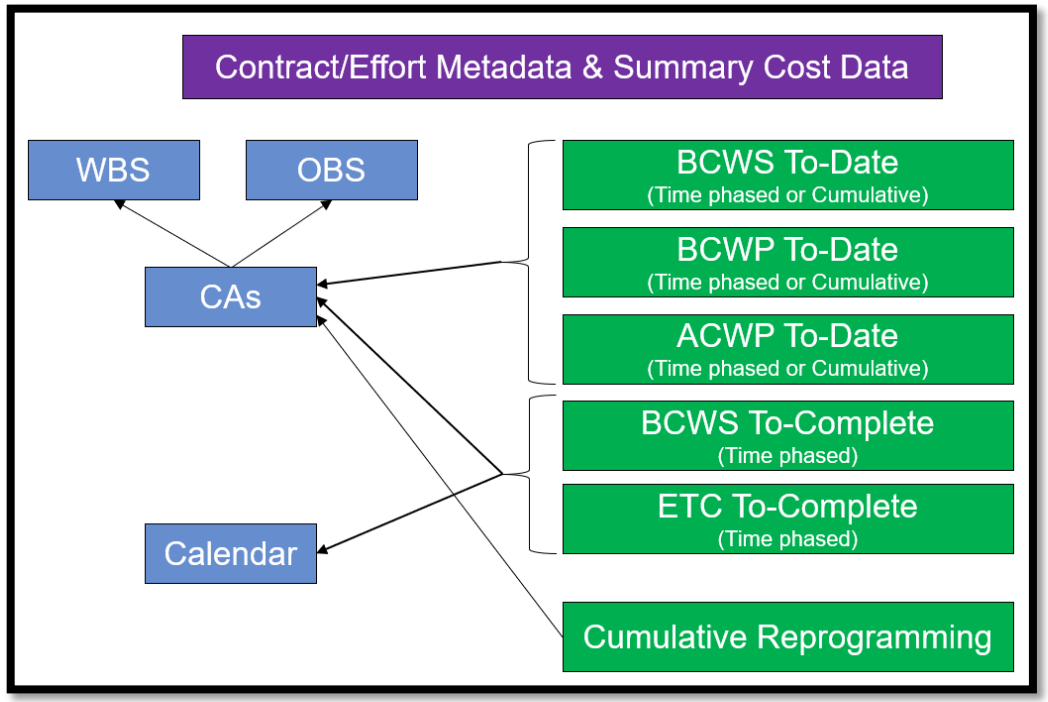
- Data requirements
- Content
- Structure

Different Purpose/Focus Leads To:

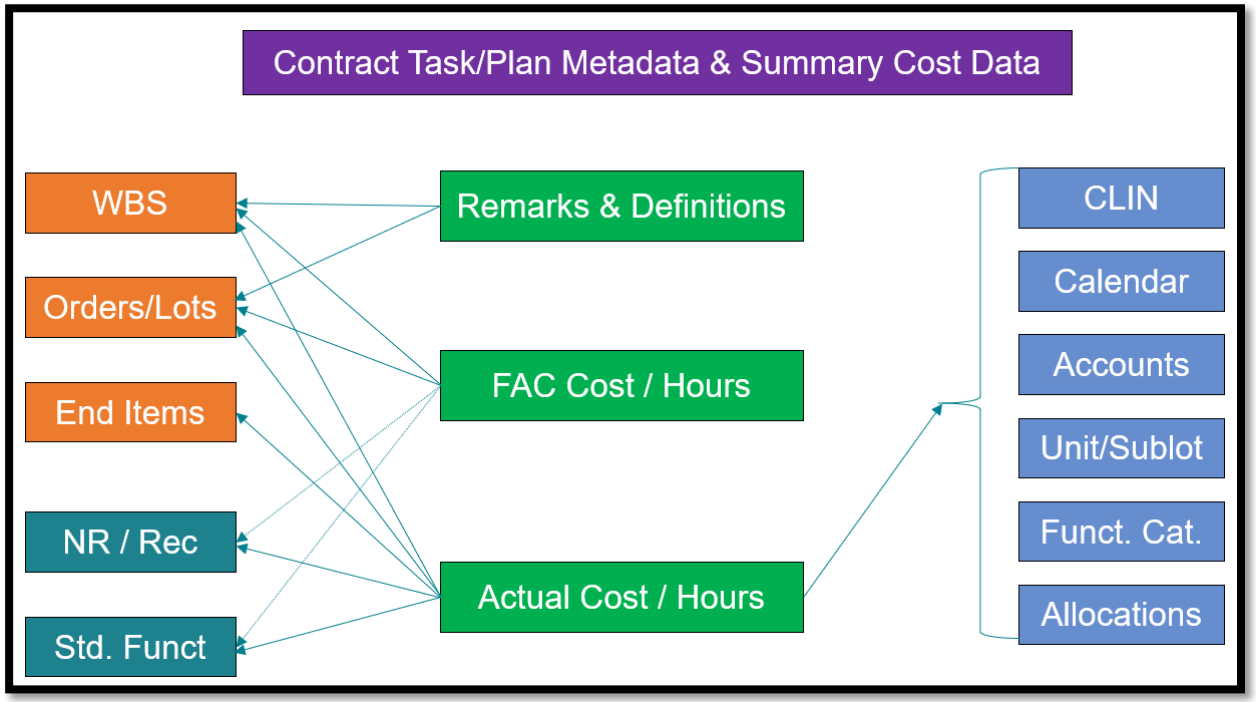
- **Major Data Requirement Differences**
  - Policy Applicability: EV Mostly For Cost Plus / High Execution Risk Efforts
  - Contractual Reporting Level: EV Tasks/Efforts vs. CSDR-Plan Defined Submissions
  - Cost/Quantity vs. Cost/Schedule
  - Recurring/Non-Rec. & Functional Categories vs. EV EOC
- **Major Data Collection Structure Differences**
  - CCDR (and FF) Data Linked To Plan (WBS, Order/Lot, End Items)
  - EV more closely aligned to funding actions
- **Major Structural Differences**

Major Structural Differences

IPMDAR: **EVMS-Based Representation**



FlexFile: **Flattened, Tagged Data Representation**



Different Purpose/Focus Of Data, Different Data Structures

FlexFile and IPMDAR **Resources**

Implementation

IPMDAR: Jen Horner
(253) 564-1979 x4910

FlexFile:
Charlotte Tarr (571) 372-4137
April Morgan (571) 372-4271

Technical Details

John McGahan
(253) 564-1979 x4902