The Continual Pursuit of the One True Software Resources Data Reporting (SRDR) Database

ICEAA Conference, SW Track Wednesday, June 10th, 2015, 1:15 p.m. UDT Remmie Arnold, Peter Braxton, Kristen Wingrove, Technomics



Abstract

Last year the authors presented an in-process review of an MS Access database being developed for the Office of the Deputy Assistant Secretary of the Army for Cost and Economics (ODASA-CE). The purpose of the database was to provide a queryable, sortable source of Software Resource Data Reports (SRDRs), collected by the Defense Cost and Resource Center (DCARC) on Major Defense Acquisition Programs (MDAPs). The presentation focused on highlighting I) the importance of SRDRs as a source of software sizing, effort, cost, and schedule data to support estimating; and 2) challenges associated with data collection, normalization, and analysis.

The authors set out to build just such a database. This paper demonstrates the conclusion of the first part of their journey, and the success in bringing to fruition a living artifact that can be of tremendous utility to the defense software estimating community.

More specifically, this paper will demonstrate the ability for one database to store the raw source data in its original form at an atomic level, exactly as submitted by WBS element and reporting event. This database allows evaluations, interpretations, and annotations of the data, including appropriate pairing of Initial and Final reports; mapping of SLOC to standard categories for the purposes of determining ESLOC; normalization of software activities to a standard set of activities; and storage of previous assessments, such as those of the aforementioned experts. The audience will be exposed to flexible queries for quick, reliable access to the desired data to support analysis, as well as the DCARC record of submitted and expected SRDRs in order to track missing past data and anticipate future data.

The demonstration will also incorporate efforts made by such luminaries in the field as Dr. Wilson Rosa and Mr. Mike Popp to excerpt and summarize the "good" data from SRDRs and make them available to the community. Such summaries typically involve subjective interpretations of the raw data, and by their nature are snapshots in time and may not distinguish between final data and those for which updates are expected.

As the journey for a unified database cannot conclude with one department of one service, the paper will spend time on the collaborative efforts of the SRDR Working Group, the continual improvements to the database, and how best to make it available to the broader community.



Outline

- Where we were: Multiple data sources, each with their own limitations
 - Defense Cost and Resource Center (DCARC) SRDRs
 - Popp/Rosa data and evaluations
 - Difficulty in mapping between DCARC data and Popp/Rosa data and evaluations
- Where we are: Single Relational Database
 - Stats on database population
- How we are getting there:
 - Database overview
 - Challenges
 - Future goals

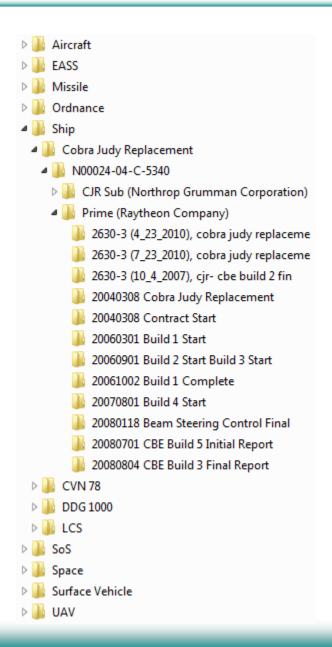
Where we were...

- DCARC: Defense Automated Cost Information Management System (DACIMS) provides a central repository, but is not a database
 - Authoritative source
 - Non-normalized (not "analysis ready")
 - Inconsistent content and format of reports
 - Abandonment of DD 2630
 - Evolving Data Item Description (DID)
 - Not easily searchable/retrievable
- Popp/Rosa Database:
 - Mike Popp (NAVAIR/Omnitec) has done a yeoman's job of compiling SRDR data as a shareable Flat File (spreadsheet)
 - Further annotated by Dr. Wilson Rosa (then-AFCAA)
 - Non-authoritative source
 - Normalized (analysis ready, maybe?)
- Difficulty in mapping between sources



DACIMS is a Repository

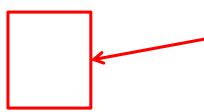
- SRDRs are stored in a file structure tantamount to the one seen on the right
- Manually have to retrieve SRDRs one at a time
- No convenient way to search/filter SRDRs based on data needs





Popp/Rosa Database

 Popp and Rosa database provides much needed evaluation of SRDRs stored in DACIMS



Popp Evaluation: SLOC Represents Build 2 only, but hours are cumulative, 2630-3 for Build 2 adds all previous SLOC into the base



SRDRWG Vision

 "One OSD-hosted, central, user-friendly, authoritative, real-time software cost database and tool"

> - Ms. Ranae Woods AFCAA, Chair Aviation CIPT, May 2014

- OSD-hosted = integrated with CADE
- Central = configuration-controlled, mutually accessible annotations
- User-friendly = queries from relational database, producing "analysis-ready" results
- Authoritative = "community-approved" data traceable back to original submissions
- Real-time = up to date with latest submissions

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Consistent with OSD CAPE vision for CSDR overhaul

Having Our Cake...

- Unified Software Database is for:
 - The <u>ODASA-CE Client</u>, built with their data (Army) and models in mind, but the Community* can leverage both the functionality and content of the database (e.g., OSD CAPE for CADE)
 - The <u>Community</u>, built with a broad (and ever-broadening) perspective, and ODASA-CE can directly benefit from their involvement
- Unified Software Database is:
 - A database proper, to store, relate, and annotate primary source information
 - A <u>data analysis tool</u>, primarily via automated queries to extract and export data in the desired format
- Unified Software Database contains:
 - <u>SRDR data</u>, the official DoD software data source
 - Non-SRDR data, as collected by ODASA-CE/Technomics
- Unified Software Database is:

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- <u>Backward-looking</u>, capturing legacy data in various formats and annotations thereof
- Forward-looking, enabling improved data collection in the future



Unified SW Database Vision

• A single *relational* Access database that contains:

- Raw source data (fully traceable)
- Data at the level at which it is reported (WBS element, "atomic level")
- Both "initial" and "final" instances of a reporting event
- DCARC CSDR Plan information for reporting events that are still missing or expected in the future
- Assumptions and context about the data that facilitate analysis (e.g., Pairing ID)
- Evaluations of the quality of the data (e.g., knowing that counting rules are not provided in the data dictionary)
- New database provides the ability to:
 - Quickly query data at both the lowest level and summary-levels in order to track progress in obtaining missing data
 - Use the level of data most appropriate for the analysis (e.g., contract vs. plan vs. event)
 - Tag and store "Roll-ups" of data
 - Tag and store Initial/Final pairings of data points
 - Interface with and "feed" multiple workbooks that serve different analytic purposes (without touching or modifying the original data)
 - "Save" queries and dashboards that allow analyst to quickly access often-used sets of data



Unified SW Database Strengths

- Preserve atomic raw un-normalized SRDR data
- Relational database

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- Data integrity, flexible queries, etc.
- Enables "crowd-sourcing" community-best version of SRDR database (under aegis of CADE?)
 - Quality assessments, annotations, etc.
- More efficient data ingest
 - $XML \rightarrow DCARC \rightarrow SWDB$
 - Accommodates DID changes, known and unknown
- More rigorous access control and DB exports
 - Full-context versions where NDAs exist
 - Anonymized version (only valuable if you trust the source)

Disclaimer

I. I only code/program out of necessity

2. This database is a proof of concept and not a final product



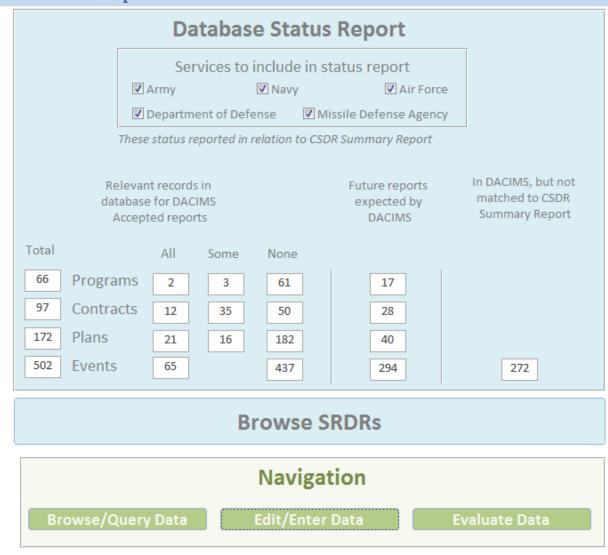
Demo Back-Up



"Home Page"

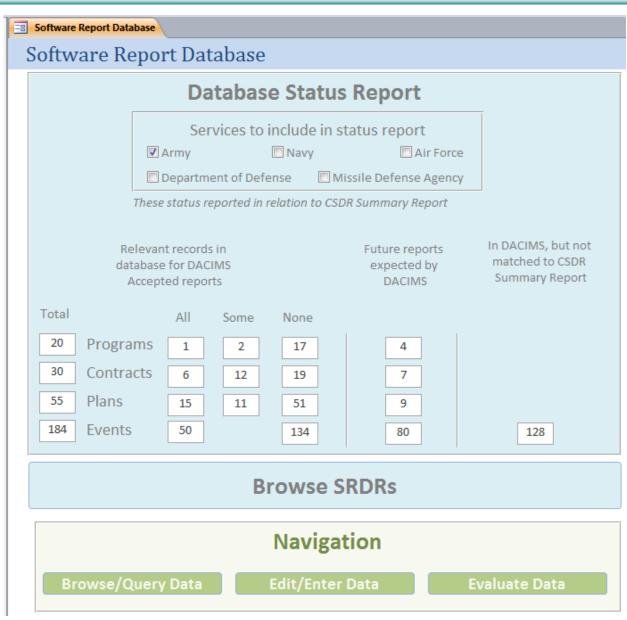
Software Report Database

Software Report Database





"Army Only"





Browse SRDRs

Services	Air Force Army Department of Defense Missile Defense Agency Navy	Selecting none is the same as selecting all	DACIMs or Popp Data Set:
Programs	B-2 Radar Modernization Program C-130J Cargo Aircraft Program Family of Beyond Line-of-Sight T Mission Planning System Multi-Platform Radar Technolog	erminals	
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SRDR View – Section 3.1 (Bottom)

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Original View

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Organize 🔻 🗶 Open 🔻 Print Burn	New folder					i = 🗸 🗍 🔞
☆ Favorites	Name	Date modified	Туре	Size		
🧮 Desktop	🕙 2630-2.xls	9/20/2013 2:58 PM	Microsoft Excel 97	104 KB		
🐌 Downloads	SRDR Dictionary.doc	9/20/2013 2:58 PM	Microsoft Word 9	398 KB		
Recent Places	🔁 Validation Memo.pdf	9/20/2013 2:58 PM	Adobe Acrobat D	37 KB		
🧊 Libraries						
Documents						
Music						
Pictures						
📑 Videos						
🖳 Computer						
Local Disk (C:)						
<pre>rarnold.v2 (\\DH4J39R1\PROFILES) (L:)</pre>						
ARCHIVE (\\DH4J39R1.TECHNOMICS.NET) (N:)						
PUBLIC (\\DH4J39R1.TECHNOMICS.NET) (0:)						
rarnold (\\DH4J39R1\Private) (P:)						
🙀 ARCHIVE (\\D78BYMS1) (U:)						
Service (\\D78BYMS1) (V:)						
a samsung-sm-g900v						



## Browse Popp/Rosa Data

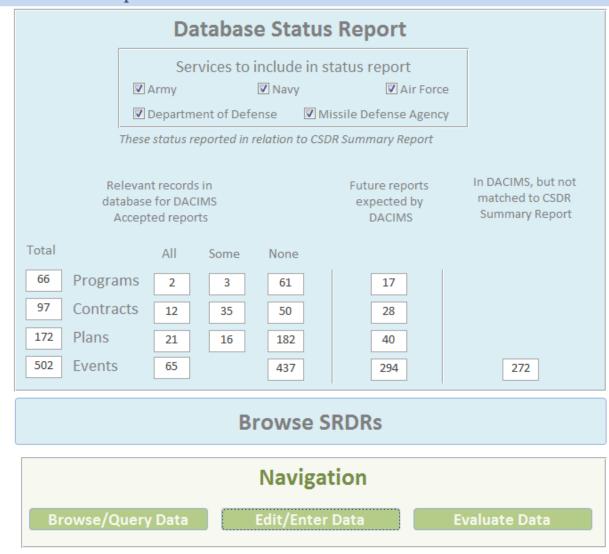
Software Re	port Database 😑 Search SRDRs		
Hi	gh-Level Search		
Services	Air Force Army Department of Defense Missile Defense Agency Navy	Selecting none is the same as selecting all.	DACIMs or Popp Data Set: Popp/Rosa
Programs	B-2 Radar Modernization Program C-130J Cargo Aircraft Program Family of Beyond Line-of-Sight To Mission Planning System Multi-Platform Radar Technology	erminals	
Contracts	F08635-02-D-0035 F08635-03-C-0059 F42620-01-D-0058-SC29 FA8720-04-D-0002 FA8720-04-D-0003 FA8720-04-D-0004 FA8720-04-D-0005 FA8720-04-D-0006	CSDR Plan Numbers	AF-04-C-C15-(R)
Reporting Events	Cycle Complete Delivery Order Award		to Original

Technomics

# "Home Page"

#### Software Report Database

#### Software Report Database





## Browse/Query Data

Software Report Database Software Report Database	uery				
Choose the records you would li	ke to see:				
Army Navy	Air Force	🗷 Departi	ment of Defense	🗷 Missile Defense Ag	gency
Total Effort Hours Between:	And:		MUST include co Effort H	omplete data for: lours	
Total Size (Total SLOC) Between:	And:		DACIMs or Popp	Data Set:	
Roll-up Level Reporting Ev ONLY Include: All Reports	ent 🔹	Run Quer	у		



## Browse/Query Data Options

-==	Software Report	Database == frm	Query				
	Choose the re	cords you would	like to see:				
	🗷 Army	🔲 Navy	Air Force	🔲 Depart	ment of Defense	🔲 Missile Defense Ag	ency
	Total Effort I Between:	Hours	And:		MUST include of Effort F	omplete data for: Hours	
	Total Size (To Between:	otal SLOC)	And:		DACIMs or Popp Popp/Rosa	o Data Set: ▼	
	Roll-up Level ONLY Include:	Reporting E Initial/Final	vent 🔹	Run Quer	ry		



#### Browse/Query Data Example

Software Report	: Database 😑 frm	Query 🔁 QueryResult	1			
Choose the re	cords you would	ike to see:				
🔽 Army	🗖 Navy	Air Force	🔲 Depar	tment of Defense	🔲 Missile Defense A	gency
Total Effort Between:	Hours 50000	And: 60000		MUST include of Effort H	omplete data for: lours	
Total Size (T Between:	otal SLOC)	And:		DACIMs or Popp	Data Set:	
Roll-up Level ONLY Include:	WBS/CSCI All Reports	▼ ▼	Run Que	гу		



# Query Results

Major Program Name	<ul> <li>Reporting Event Description</li> </ul>	WBS Element Code 🛛 🗸	WBS Reporting Element 🔹	Report Type 👻
Army Program 10	Contract Initial Estimate	1.1.5	WBS Reporting Element 1.1.5	1
Army Program 11	Contract Initial Estimate	1.1.7	WBS Reporting Element 1.1.7	1
Army Program 11	Contract Initial Estimate	1.1.12	WBS Reporting Element 1.1.12	1
Army Program 11	Contract Initial Estimate	1.1.13	WBS Reporting Element 1.1.13	1
Army Program 28	Contract Initial Estimate	1.0	WBS Reporting Element 1.0	1
Army Program 28	Contract Initial Estimate	1.5	WBS Reporting Element 1.5	1
Army Program 22	Contract Final Estimate	1.1.5.5	WBS Reporting Element 1.1.5.5	2
Army Program 22	Contract Final Estimate	1.1.5.7	WBS Reporting Element 1.1.5.7	2
Army Program 22	Contract Final Estimate	1.1.5.13	WBS Reporting Element 1.1.5.13	2
Army Program 32	Contract Initial Estimate	1.1.24	WBS Reporting Element 1.1.24	1
Army Program 32	Contract Final Estimate	1	WBS Reporting Element 1	2
Army Program 33	Contract Final Estimate	1.1.3.1.2	WBS Reporting Element 1.1.3.1.2	2
Army Program 32	Contract Final Estimate	1.1.3.2.4	WBS Reporting Element 1.1.3.2.4	2
Army Program 14	Contract Initial Estimate	1.1.5.2.2	WBS Reporting Element 1.1.5.2.2	1

	SumOfSRDREntry_Effort_Prime -	Number of Software Requireme 👻	Number of External Interface Re 👻	Peak Staff 👻	New -	Modified $\bullet$	Reused 👻	Carryover 👻	Auto 👻	Total 👻	ESLOC -
L	56952	2 53	15	8	20209	2236				22445	21908.36
L	54690	3900	840	42	20000	15700	120000	120000	147915	303615	69648.6
2	59019	235	51	31	48459		149423	149423		197882	88056.095
L	52305	5		125	46423	33058	103049	103049		182530	98855.065
-	55137	7		125							0
L	54944	L 22		8	169023	258288	1683954			2111265	735791.76
2	54523	843	0	32	230556		1401367			1631923	538856.74
		Army Program 2 0	Contract Initial Estimate 1.0			WBS Reportin	g Element 1.0		1		
		Army Program 2	Contract Final Estimate 1.1.11	L		WBS Reportin	g Element 1.1	.11	2		
		Army Program 2 0	Contract Initial Estimate 1.1.2			WBS Reportin	g Element 1.1	.2	1		

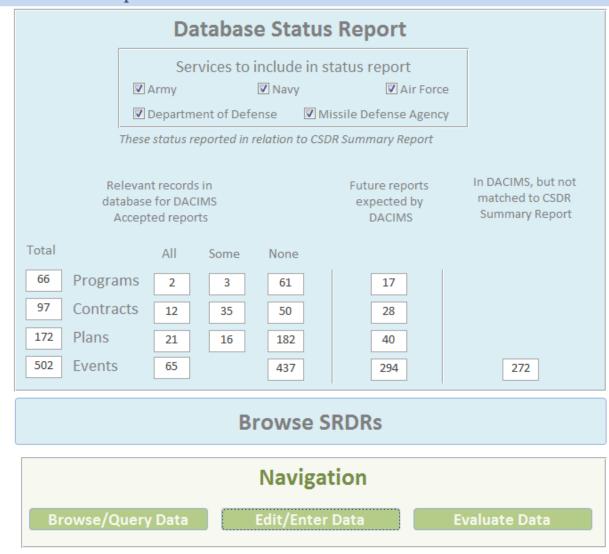
Army Program 9 Army Program 9	Contract Initial Estimate	are nc	ot actuals!	
Army Program 9	Contract Initial Estimate			
Army Program 9	Contract Initial Estimate		, gonorat	
Army Program 9	Contract Initial Estimate	rando	mly generat	ed and
Army Program 9	Contract Initial Estimate			
Army Program 9	Contract Initial Estimate			
Army Program 9	Contract Initial Estimate	νισια	IIIIEI. Dala I	
Army Program 9	Contract Initial Estimate	Dicola	imer: Data h	hae hoon
Army Program 9	Contract Initial Estimate			_
Army Program 9	Contract Initial Estimate	1.9.5.5	WBS Reporting Flement 1.9.5.5	1
Army Program 9	Contract Initial Estimate	1.8.5.2.1	WBS Reporting Element 1.8.5.2.1	1
Army Program 9	Contract Initial Estimate	1.8.5.2.1	WBS Reporting Element 1.8.5.2.1	1
Army Program 9	Contract Initial Estimate	1.8.5.2.1	WBS Reporting Element 1.8.5.2.1	1
Army Program 9	Contract Initial Estimate	1.8.5.2.1	WBS Reporting Element 1.8.5.2.1	1
Army Program 9	Contract Initial Estimate	1.7.5.2.6	WBS Reporting Element 1.7.5.2.6	1
Army Program 9	Contract Initial Estimate	1.1.5.2	WBS Reporting Element 1.1.5.2	1



# "Home Page"

#### Software Report Database

#### Software Report Database





### Enter/Edit Data

RDR Entry Form	iD'	1722	Add Rec	ord		
	Record Previous R	ecord Next Record	Make N	ew Record fro	m Current	Add New CSDR
Unclassified	5	Fields in all capital let	ters exist on 201	1 SRDR form.	All others are av	vailable for legacy forms.
SECURITY CLASSIFICATION	_		CSDR PI	an Number		-
SOFT		DATA REPORTING: In about award and 60 days	LUCCU.	EVELOPER RE	PORT	
ction 3.1 Section 3.2 Section 3.3 Sec	tion 3.4 Section 3.5	Other	porting Event	Delivery Orde	r Award	
	Section 3.1 REPOR	T CONTEXT AND DEV	ELOPMENT OF	GANIZATION	4	
MAJOR PROGRAM & NAME: Mission	Planning System			b. PHASE/MI	LESTONE	
REPORTING ORGANIZATION TYPE PRIME/ASSOCIATE CONTRACTOR DIRECT-REPORTING SUBCONTRACTOR COVERNMENT	NAME/ADDR	a. REPORTING OR b. DIVISION:	GANIZATION:			
APPROVED PLAN NUMBER	5 CUSTOMER	1		60	NTRACT TYPE	L
WBS ELEMENT CODE 1.1.1.2	W85 REPC	RTING ELEMENT Fram	ework 1.4 Applic	ations Softwa	re	
TYPE ACTION II. CONTRACT NO.: PAB b LATEST MODIFICATIO		c. SOLICITATION NO d. NAME:			e. TASK ORDER	( / DELIVERY ORDER NO.
PERIOD OF PERFORMANCE a. START DATE: b. END DATE:	EIR	ROPRIATION DT&E rocurement I&M			7/20/2007	
	Revision	Date	DATE PREP	ARED		
NAME (Last, First, Middle Initial) DE	PARTMENT		TELEPHONE	Fax	EMAIL AD	DRESS

	ID +	SRDRID	+			
*	(New)		1722			
Recor	10 H - 1	- 8.87	-Kn	Filler-	Search	
	Level Correct					
58	IDREntryZ4 +	SRDREntry	15 +		SRDR FI	eld
•	(New)		1722			
Beicher	10.14 A	1.8.8	100	a Titler	Search	

# Disclaimer: Data has been randomly generated and are not actuals!



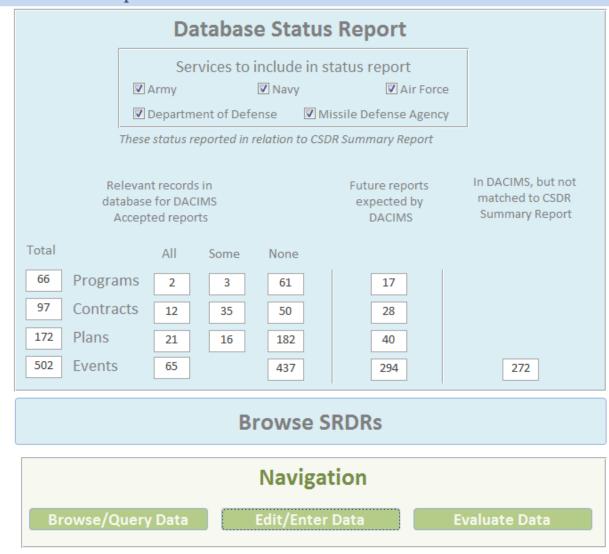
Software Report Database SRDRE	ntry				
RDR Entry Form	iD	(New)	Add Record		
the second s	Find Record Previous Re	cord Next Record	Make New Record from Current	Add New CSDR	
		Fields in all capital letters	exist on 2011 SRDR form. All others are av-		
SECURITY CLASSIFICATION			CSDR Plan Number		
5	OFTWARE RESOURCES D Due 60 days after car	ATA REPORTING:	etart of any release or build.		
tion 3.1 Section 3.2 Section 3.3	Section 3.4 Section 3.5	Other	ing Event	]	
1	Section 3.1 REPORT	CONTEXT AND DEVELO	PMENT ORGANIZATION		
MAJOR PROGRAM & NAME:			b. PHASE/MILESTONE		
REPORTING ORGANIZATION TYPE	(1) A set of the se	fomDECSDRs		तीयम	
PRIME/ASSOCIATE CONTRACTOR     DIRECT-REPORTING SUBCONTRA     GOVERNMENT		CSDRs			Close Form
APPROVED PLAN NUMBER	CUSTOMER	Bolded fields are requir	ed	Add CSDR	4 1 1 1
WB5 ELEMENT CODE	WBS REPC	CSDR Prefix (Contra	et)		
TYPE ACTION a. CONTRACT NO.:			Add New Contract an	d CSDR Prefix Refresh	CSDR Prefixes
b LATEST MODIFIC	11	Suffix w/o revision		Paratering Contract	
PERIOD OF PERFORMANCE	APP	Revision Number		THE WAY AND AN AND	1940
. START DATE:		CSDRRevisic +	RevisionNumber	revision number, add blank e •	CSDRFK +
2017/10/2017/2017	<b></b>	* (New)			
5. END DATE:	🔳 c				
	Revision				
NAME (Last, First, Middle Initial)	DEPARTMENT				
		Record: I4   1 of 1	+ + K Ma Filter Search		
	110				COORPS
Data Entry Remarks	-				[764=1]
1D • 5RDRID • * (New)		Record: H = 1 of 1 = H	Vinfiltered Search		
Record: H = 1 of 1 + H = 1					
ero Level Corrections					
SRDREntryZe · SRDREntry_IC · * (New)	SRDR Field	• Correctio	on - Remark	•	
Record H 1 of 1 H H H	hip hiller Search				
m H 4 4112 of 4112 + H + 🕷	Unfiltered Search				



# "Home Page"

#### Software Report Database

#### Software Report Database





#### Evaluate Data

🔳 Software Report Database 📑 New Evalu	ation Form	
Reporting Event E	valuation	
Reporting Event Under Evaluation:		
Program		•
CSDR Plan Number		
Reporting Event Name		•
Reporting Event ID		
Report Type		
File Location		
		Go to Original File
Evaluator		
Evaluation Status	Data Dictionary Exists?	
Scope		•
Rollup	•	
Matching Reporting Event		•



#### Evaluate Data - Example

Software Report Database Software Report Database	ation Form	
Reporting Event E	valuation	
Reporting Event Under Evaluation:		
Program	C-130 Aircraft Avionics Modernization Program	•
CSDR Plan Number	AF-01-C-C1-(R1)	
Reporting Event Name	Contract Award -Initial Report	•
Reporting Event ID	1756	
Report Type	1	
File Location		
		Go to Original File
Evaluator Remmie Arnold		
Evaluation Status Completed	Data Dictionary Exists?	
Scope Represents entire SW e	effort for this CSDR Plan	•
Rollup Yes (If confirmed)	•	
Matching Reporting Event	Core Complete Final Report	•



#### Evaluate Data - Example

Software Report D	atabase 😑 frm	Query 🗐 QueryResult	E			
Choose the reco	ords you would	like to see:				
🗹 Army	🔽 Navy	Air Force	🔽 Depart	ment of Defense	🗷 Missile Defense A	gency
Total Effort Ho Between:	DURS	And:		MUST include of Effort H	omplete data for: lours	
Total Size (Tot Between:	tal SLOC)	And:		DACIMs or Popp Popp/Rosa	Data Set:	
Roll-up Level ONLY Include:	Reporting E Initial/Final	vent 💌 Paired Repor 💌	Run Quer	γ		

ſ	🗉 Software Report Database 🗐 frmQuery 🗊 QueryResult				
	Major Program Name	<ul> <li>Type Action: Contract No.</li> </ul>	Approved Plan Nt -	Reporting Event Description	👻 Report Type 👻 S
	C-130 Aircraft Avionics Modernization Program	F33657-01-C-0047	AF-01-C-C1-(R1)	Contract Award -Initial Report	1
	C-130 Aircraft Avionics Modernization Program	F33657-01-C-0047	AF-01-C-C1-(R1)	Core Complete Final Report	2



# Questions?

