Marshall Space Flight Center
In-House Earned Value System (EVS)

Presented By Donnie Smith
JE Sverdrup
October 15, 2004

Contact information: e-mail address donnie.smith@msfc.nasa.gov phone 256-544-6917

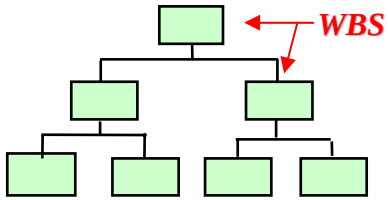
MSFC In-House Earned Value Sys (EVS)

Background:

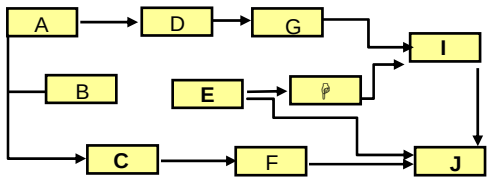
- **Designed for In-house MSFC projects**
- **Approach is kept simple yet practical**
- **Primary Tools include MS Project and Excel (Visual Basic)**
- **Implementation process:**
  - *Create WBS*
  - *Build schedule*
  - *Load resources into EVS*
  - *Perform monthly updates; import actuals from the accounting system (IFM), enter accomplished work via the Technical Performance Measurement (TPM) worksheet*

EVM Basics

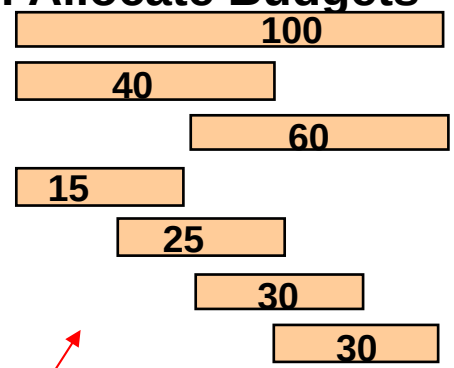
1. Define Tech. Scope



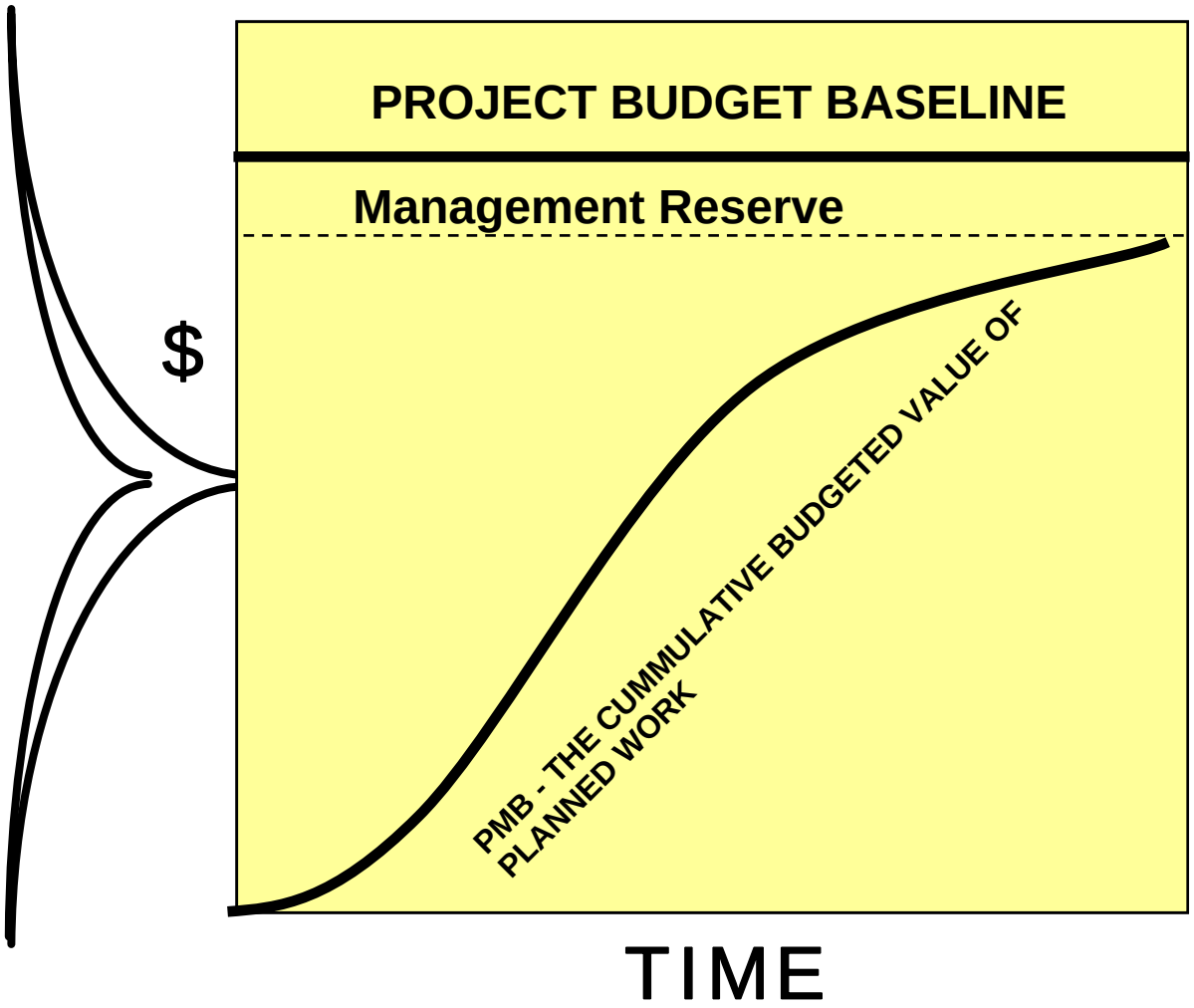
2. Schedule The Work



3. Allocate Budgets



Identify Control Accounts (CA) & Work Packages (WP) @ Meaningful Levels



MSFC In-House Earned Value Sys (EVS)

Process:

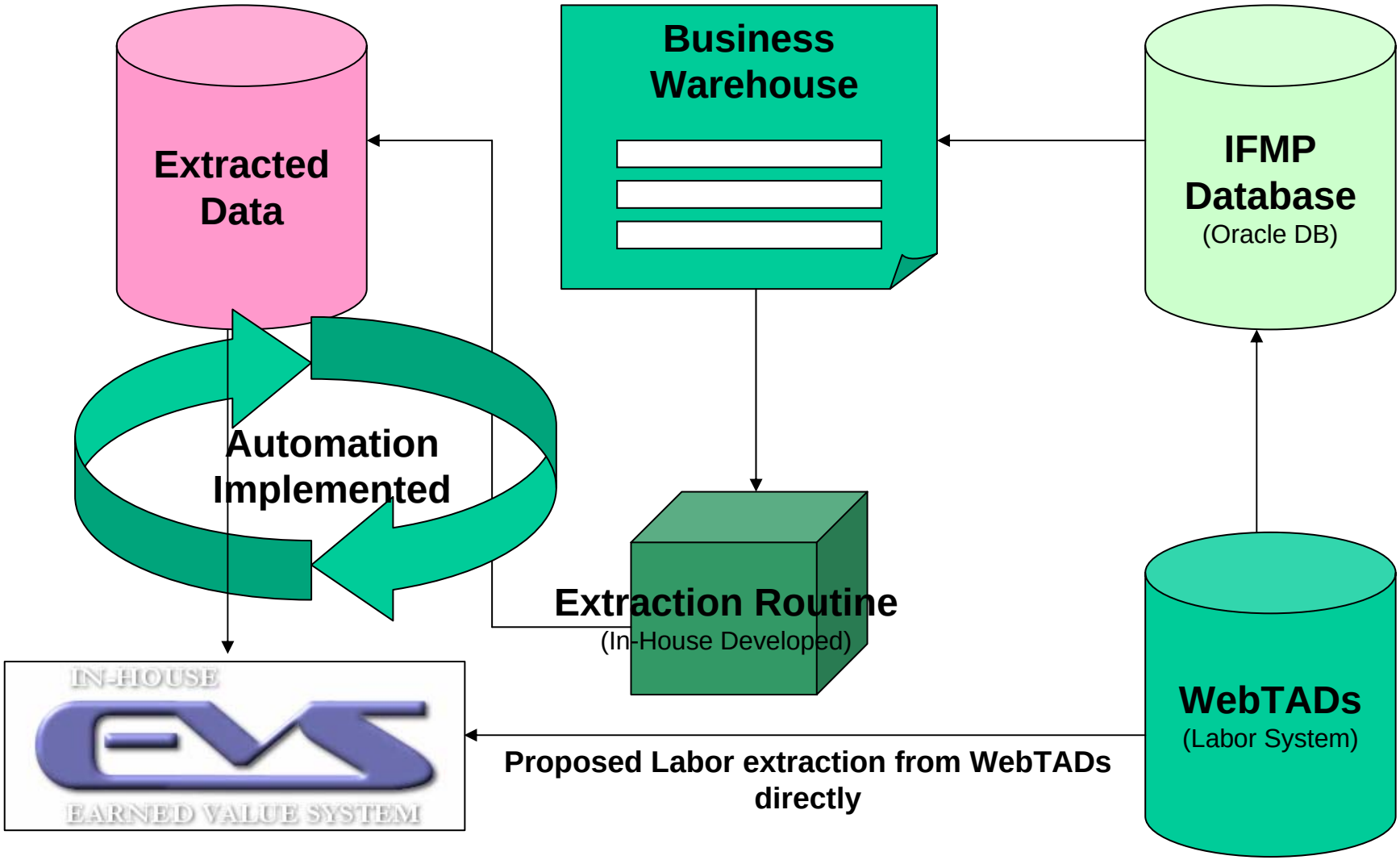
- **Determine reporting levels and align the technical and financial WBS**
- **Develop the project schedule (MS Project)**
- **WP Start and Finish dates are imported from MS Project into EVS and used to establish the PMB timeframe**
- **Resources are loaded in EVS (Excel) at the WP level**
  - *Civil Service labor hours*
  - *Non-labor dollars (support contractors, material, travel, etc)*
- **Performance and Actuals are collected at the CA & WP**
  - *Actuals are imported from IFM at the CA level*
  - *Percent complete is loaded into EVS at the WP level from the TPM worksheet*

MSFC In-House Earned Value Sys (EVS)

Satisfies the seven management principles contained in ANSI/EIA 748:

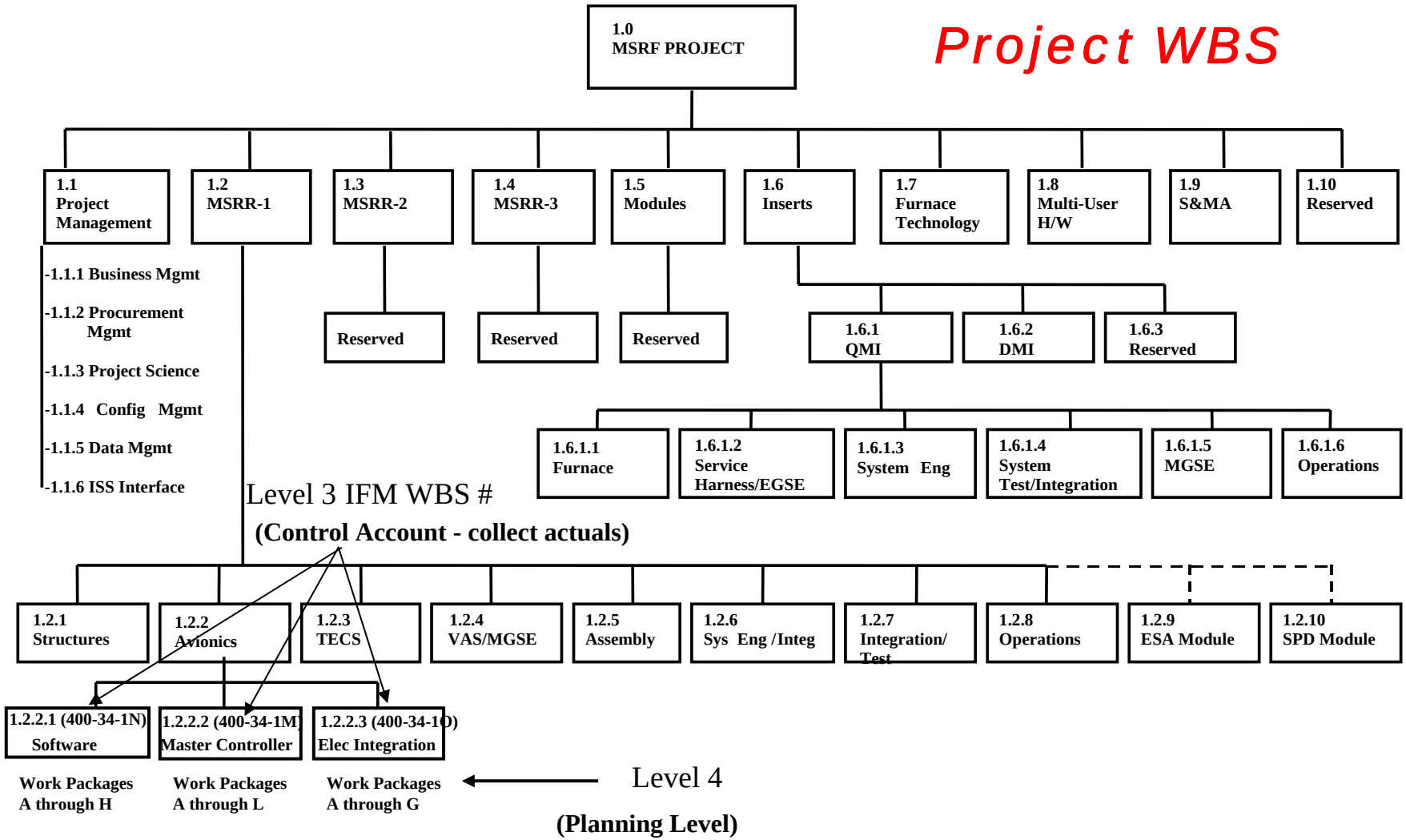
- *Plan all work scope to completion.*
- *Breakdown the work scope into finite pieces that can be assigned to a responsible person or organization for control of technical schedule and cost objectives.*
- *Integrate program work scope, schedule, and cost objectives into a performance measurement baseline plan against which accomplishment can be measured. Control changes to baseline.*
- *Use actual cost incurred and recorded in accomplishing the work performed.*
- *Objectively assess accomplishments at the work performance level.*
- *Analyze significant variances from the plan, forecast impacts, and prepare an EAC based on performance to date & remaining work.*
- *Incorporate EVM in the decision making & review process.*

IFMP Data Extraction Architecture



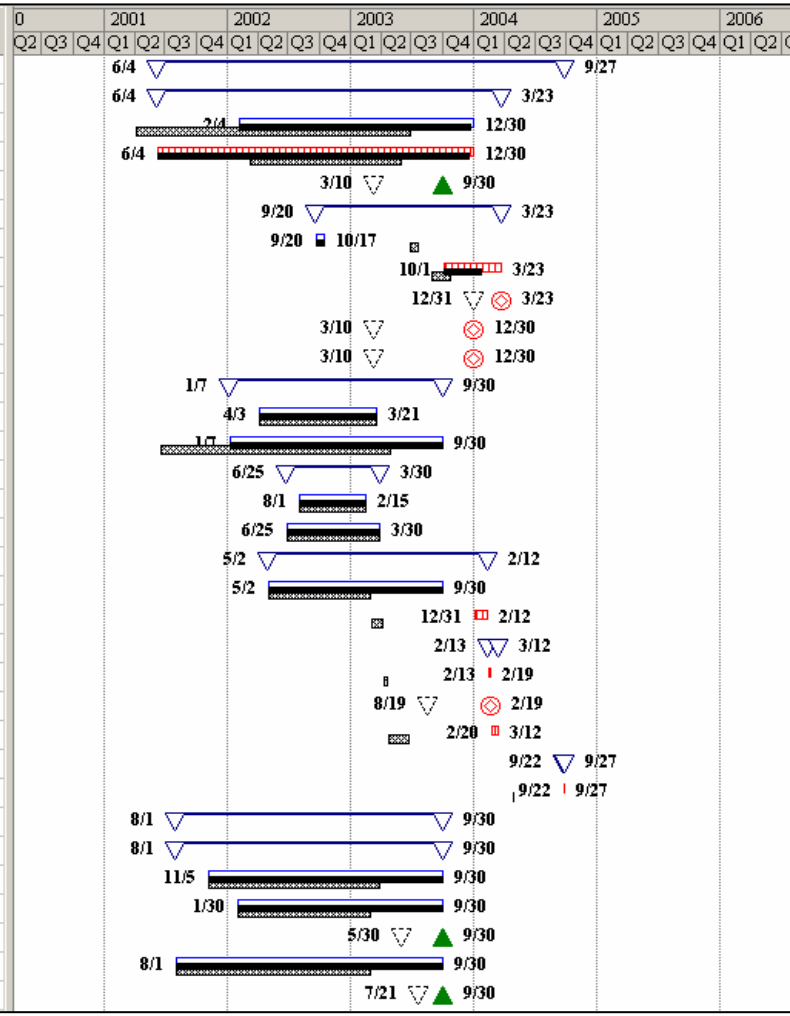
MSFC In-House Earned Value Sys (EVS) Overview

Project WBS



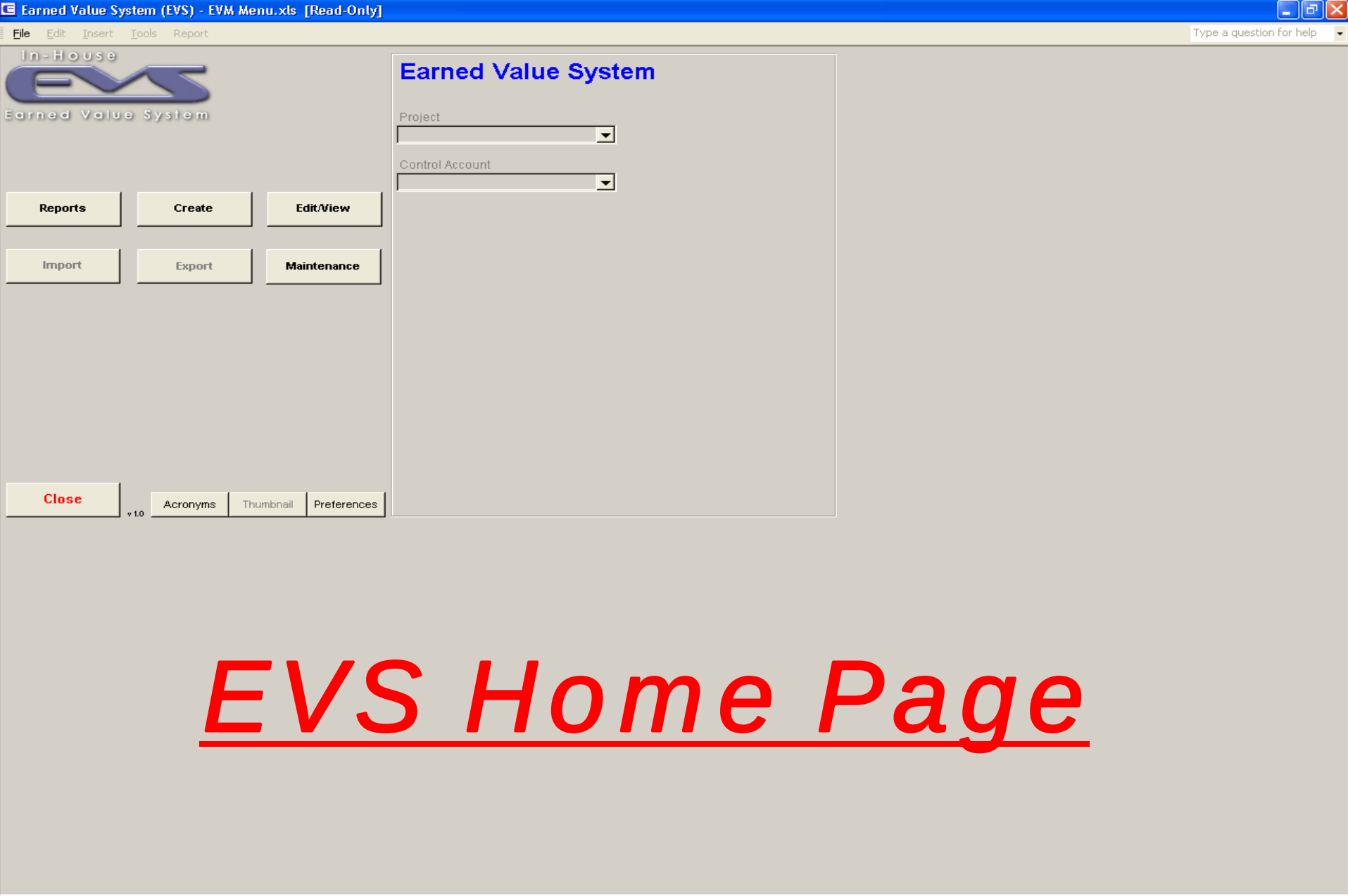
EVS Interface to Project Schedule

ID#	EVS-ID (UPN#)	WP#	WBS	Name	% Comp	Start	Finish	Responsible
271	**400-34-1N**		**1.2.2.1**	**SOFTWARE**	**98%**	**6/4/01**	**9/27/04**	**ED14**
272	**400-34-1N**	**A**	**1.2.2.1.1**	**Documentation**	**96%**	**6/4/01**	**3/23/04**	**ED14**
273			1.2.2.1.1.1	As-Built Software Design Specification	99%	2/4/02	12/30/03	ED14
274			1.2.2.1.1.2	ISS-MSRR SW ICD	99%	6/4/01	12/30/03	ED14
275			1.2.2.1.1.3	Del SW Build Incremental VDD	100%	9/30/03	9/30/03	ED14
276			**1.2.2.1.1.4**	**Simulation Documents**	**70%**	**9/20/02**	**3/23/04**	**ED14**
277			1.2.2.1.1.4.1	EMUT User Manual Update	100%	9/20/02	10/17/02	ED14
278			1.2.2.1.1.4.2	EMUT As-Built Design Document	65%	10/1/03	3/23/04	ED14
279			1.2.2.1.1.4.3	EMUT As-Built Doc Complete	0%	3/23/04	3/23/04	ED14
280	**400-34-1N**	**B**	**1.2.2.1.2**	**Operational Deliveries**	**0%**	**12/30/03**	**12/30/03**	**ED14**
281			1.2.2.1.2.1	SW Build Delivery	0%	12/30/03	12/30/03	ED14
282	**400-34-1N**	**C**	**1.2.2.1.3**	**Software Dev & Implementation**	**100%**	**1/7/02**	**9/30/03**	**ED14**
283			1.2.2.1.3.1	MCTS Periodic Support	100%	4/3/02	3/21/03	ED14
284			1.2.2.1.3.2	Integration & Functional Test	100%	1/7/02	9/30/03	ED14
285	**400-34-1N**	**D**	**1.2.2.1.4**	**SW Test Procedures Dev**	**100%**	**6/25/02**	**3/30/03**	**ED14**
286			1.2.2.1.4.1	Dev Modes of Operation	100%	8/1/02	2/15/03	ED14
287			1.2.2.1.4.2	Dev Data Test Procedures	100%	6/25/02	3/30/03	ED14
288	**400-34-1N**	**E**	**1.2.2.1.5**	**Software Verification**	**93%**	**5/2/02**	**2/12/04**	**ED14**
289			1.2.2.1.5.1	Dry Run Test Procedures	100%	5/2/02	9/30/03	ED14
290			1.2.2.1.5.2	System Test	0%	12/31/03	2/12/04	ED14
291	**400-34-1N**	**F**	**1.2.2.1.6**	**Formal Quality Test**	**0%**	**2/13/04**	**3/12/04**	**ED14**
292			1.2.2.1.6.1	Test Readiness Review (TRR) Prep	0%	2/13/04	2/19/04	ED14
293			1.2.2.1.6.2	TRR Complete	0%	2/19/04	2/19/04	ED14
294			1.2.2.1.6.3	Formal Quality Test	0%	2/20/04	3/12/04	ED14
295	**400-34-1N**	**G**	**1.2.2.1.7**	**Load & Test Software**	**0%**	**9/22/04**	**9/27/04**	**ED14**
296			1.2.2.1.7.1	Load & Test SW on MC, Transfer to M	0%	9/22/04	9/27/04	ED14
297	**400-34-1N**	**H**	**1.2.2.1.8**	**ENHANCED MC UNIT TESTER (EMUT)**	**99%**	**8/1/01**	**9/30/03**	**ED14**
298			**1.2.2.1.8**	**EMUT Simulation Support for SDSF**	**100%**	**8/1/01**	**9/30/03**	**ED14**
299			1.2.2.1.8.1	Support Flight SW Dev Unit Dry F	100%	11/5/01	9/30/03	ED14
300			1.2.2.1.8.2	Develop S/W for post test data ana	100%	1/30/02	9/30/03	ED14
301			1.2.2.1.8.3	Post test data analysis S/W availabl	100%	9/30/03	9/30/03	ED14
302			1.2.2.1.8.4	EMUT Verification w/MC Dev Ur	100%	8/1/01	9/30/03	ED14
303			1.2.2.1.8.5	EMUT SW Build Delivery	100%	9/30/03	9/30/03	ED14



The IFM WBS# (UPN#) is maintained in the MS Project Field Text 29
The WP# is maintained in Text 27
The Person/Org responsible is maintained in Text 30

Required for Integration of Cost & Schedule within EVS



EVS Home Page

Earned Value System (EVS) - MSRR-1 SOFTWARE CAWP.xls

File Edit Tools Insert Attachments Report

Type a question for help

Baseline & Current Schedule from MS Project

In-House EVS Earned Value System

Update

B Start	B Finish
6/4/2001	9/27/2004
C Start	**C Finish**
6/4/2001	9/27/2004

Control Account View

CA ID 400-34-1N | CA Manager D. King | CA WBS 1.2.2.1 | CA F Center

CA CWC | CA Fund | CA Order | CA Fun POC

Description SOFTWARE | CA C Center

Tech WBS

EV Performance @ CA Level

	% Scheduled	% Earned	% Spent	BAC	EAC	MGR EAC
Hrs:	96.0%	78.5%	91.7%	47,616	58,308	
($):	98.5%	75.8%	89.9%	$604,500	$881,043	

Resource/Activity	As-Of Cum Dec-03	Total (BAC)	Jun-01	Jul-01	Aug-01	Sep-01	Total-FY01	Oct-01	Nov-01	Dec-01	Jan-02	Feb-02
Labor Scheduled Cum →												
Percent Complete Cum →	78.5%		Monthly →	0.7%	0.7%	0.4%	1.0%		1.0%	1.0%	1.0%	0.1%	0.1%
Budgeted FTEs Average (BCWS)	9.29	28.87		3.00	3.00	3.00	3.00	3.00	4.00	4.00	4.00	9.00	9.00
Budgeted Hours (BCWS)	45,726.00	47,616.00		462.00	438.00	462.00	669.00	2,031.00	608.00	552.00	432.00	1,242.00	1,314.00
Earned Hours (BCWP)	37,378.56			333.31	333.31	190.46	476.16	1,333.25	476.16	476.16	476.16	47.62	47.62
Actual Hours (ACWP)	43,675.00			320.00	320.00	320.00	480.00	1,440.00	320.00	320.00	320.00	1,440.00	1,440.00
Budgeted Dollars (BCWS)	$0			0	0	0	0	$0	0	0	0	0	0
Earned Dollars (BCWP)	$0			0	0	0	0	$0	0	0	0	0	0
Actual Dollars (ACWP)	$0							$0					

Labor Actuals IFM (BW)

Other Direct Costs

Percent Complete Cum → 75.8% Monthly →

			0.2%	0.2%	0.2%	0.3%		0.2%	0.3%	0.1%	0.1%	1.0%

Support Contractors

Budgeted Dollars (BCWS)	$545,500	$554,500		3,000	3,000	3,000	3,000	$12,000	3,000	3,000	3,000	10,000	10,000
Earned Dollars (BCWP)	$420,311			1,109	1,109	1,109	1,664	$4,991	1,109	1,664	555	555	5,545
Actual Dollars (ACWP)	$543,560			2,820	2,773	5,545	2,773	$13,911	2,773	5,545	3,000	10,000	9,500

Other Direct Costs from IFM (BW)

Travel

Percent Complete Cum → 0.0% Monthly →

Budgeted Dollars (BCWS)	$0	$0		0	0	0	0	$0	0	0	0	0	0
Earned Dollars (BCWP)	$0			0	0	0	0	$0	0	0	0	0	0
Actual Dollars (ACWP)	$0							$0					

Material

Percent Complete Cum → 0.0% Monthly →

Budgeted Dollars (BCWS)	$50,000	$50,000		0	0	0	0	$0	0	0	0	0	0
Earned Dollars (BCWP)	$0			0	0	0	0	$0	0	0	0	0	0
Actual Dollars (ACWP)	$0							$0					

Other

Percent Complete Cum → 0.0% Monthly →

Budgeted Dollars (BCWS)	$0	$0		0	0	0	0	$0	0	0	0	0	0

ControlAccount | WP1 | WP2 | WP3 | WP4 | WP5 | WP6 | WP7 | WP8 | Total ($) | Total ($) by Contractor | Cost vs Schedule ($) | Complete vs Spent

Control Account **Work Packages** **Assorted Graphs**

Earned Value System (EVS) - MSRR-1 SOFTWARE CAWP.xls

File Edit Tools Insert Attachments Report

Type a question for help

In-House EVS Earned Value System

B Start	B Finish
6/4/2001	12/31/2003
C Start	**C Finish**
6/4/2001	3/23/2004

Work Package View

WP ID 400-34-1N-A **WP Manager** B. Simpson **WP WBS** 1.2.2.1.1

Description Documentation

Resources Loaded at Work Package level for Labor and other elements of cost

Resource/Activity	Cost Center	Skill Code	Total (BAC)	Jun-01	Jul-01	Aug-01	Sep-01	Total-FY01	Oct-01	Nov-01	Dec-01	Jan-02	Feb-02	Mar-02
			Hours Per Month →	154	146	154	223		152	138	108	138	146	230
Percent Complete		**Cum →**	**80.0%**	4.0%	2.0%	3.0%	2.0%		2.0%	2.0%	2.0%	2.0%	3.0%	3.0%
Labor (click here to add a row)														
Administrative Support		115	**4.00**	1.00	1.00	1.00	1.00	**1.00**	1.00	1.00	1.00	1.00	1.00	1.00
Software Engineering		82	**11.00**	2.00	2.00	2.00	2.00	**2.00**	3.00	3.00	3.00	3.00	3.00	3.00
Writer/Editor:		307-02	**3.08**					**0.00**						
			0.00					**0.00**						
			0.00					**0.00**						
Total FTEs			**18.08**	**3.00**	**3.00**	**3.00**	**3.00**	**3.00**	**4.00**	**4.00**	**4.00**	**4.00**	**4.00**	**4.00**
Total Labor Hours			**25,619.00**	**462.00**	**438.00**	**462.00**	**669.00**	**2,031.00**	**608.00**	**552.00**	**432.00**	**552.00**	**584.00**	**920.00**
Total Earned Hours			**20,495.20**	**1,024.76**	**512.38**	**768.57**	**512.38**	**2,818.09**	**512.38**	**512.38**	**512.38**	**512.38**	**768.57**	**768.57**
Total Labor Dollars														
Total Earned Dollars														
Other Direct Costs														
Percent Complete		**Cum →**	**80.0%**	4.0%	2.0%	3.0%	2.0%		2.0%	2.0%	2.0%	2.0%	3.0%	3.0%
Support Contractors (click here to add a row)														
DIS	ED20		102,000	3,000	3,000	3,000	3,000	**12,000**	3,000	3,000	3,000	3,000	3,000	3,000
			0					**0**						
			0					**0**						
			0					**0**						
			0					**0**						
Total Support Contractors Dollars			**$102,000**	**$3,000**	**$3,000**	**$3,000**	**$3,000**	**$12,000**	**$3,000**	**$3,000**	**$3,000**	**$3,000**	**$3,000**	**$3,000**
Total Earned Support Contractor Dollars			**$81,600**	**$4,080**	**$2,040**	**$3,060**	**$2,040**	**$11,220**	**$2,040**	**$2,040**	**$2,040**	**$2,040**	**$3,060**	**$3,060**
Percent Complete		**Cum →**	**0.0%**											
Travel (click here to add a row)														
			0					**0**						
			0					**0**						
			0					**0**						
			0					**0**						
			0					**0**						
Total Travel Dollars			**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
Total Earned Travel Dollars			**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
Percent Complete		**Cum →**	**0.0%**											
Contracts (click here to add a row)														
			0					**0**						
			0					**0**						
			0					**0**						

% Complete from TPM Worksheet

ControlAccount | WP1 | WP2 | WP3 | WP4 | WP5 | WP6 | WP7 | WP8 | Total ($) | Total ($) by Contractor | Cost vs Schedule ($) | Complete vs Spent

Work Package TPM / EV Worksheet

Work Package 400-34-1N-A
Associated Control Account 400-34-1N-A
Project WBS Element 1.2.2.1.1
Financial (IFMP) WBS 400-34-1N-A
Status Date December-03

Element _____
System _____
Subsystem _____
Component _____

Task Description	Weighted Value	Percent Complete	Earned	Baseline Start	Baseline Finish	Current Start	Current Finish	Actual Start	Actual Finish
As-Built Software Design Spec	40%	100%	40%	06/04/01	06/30/03			02/04/02	12/30/03
ISS-MSRR Software *ICD*	30%	100%	30%	03/01/02	12/30/03			06/04/01	12/30/03
SW Build Incremental VDD	5%	100%	5%	03/10/03	03/10/03			09/30/03	09/30/03
User Manual Update	5%	100%	5%	07/01/03	08/01/03			09/20/02	10/17/02
As-Built Design Document	10%	0%	0%	08/01/03	09/01/03		03/23/04	10/01/03	
As-Built Document Complete	10%	0%	0%	12/31/03	12/31/03	03/23/04	03/23/04		
	0%		0%						
	0%		0%						
	0%		0%						
	0%		0%						
	0%		0%						

TOTAL PERCENT	**100%**	**80%**
TOTAL HOURS	**25619**	**20495**
TOTAL DOLLARS	**$ 102,000**	**$ 81,600**

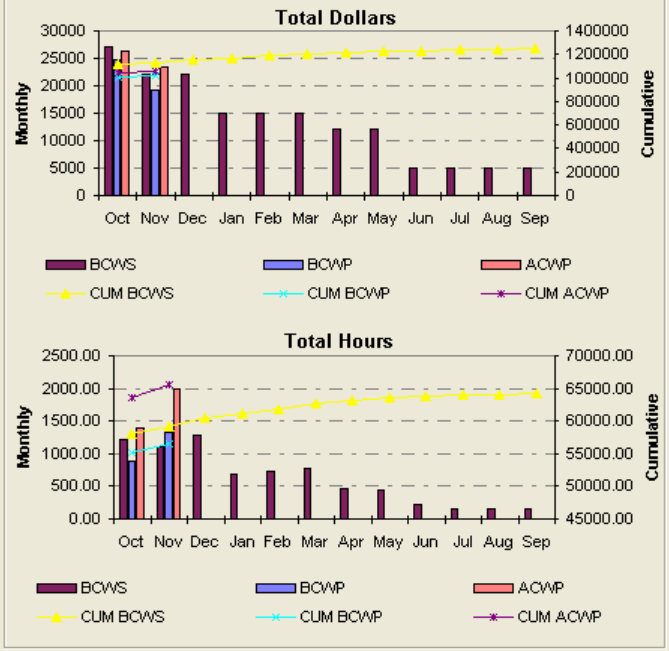
In-House EVS Earned Value System

	% Scheduled	% Earned	% Spent	BAC	EAC	CPI	SPI	MGR EAC
Hrs:	92.1%	88.0%	102.2%	64,236	75,007	0.86	0.96	
($):	91.1%	82.1%	85.2%	$1,246,500	$1,317,962	0.96	0.90	

Resource/Activity		Total (BAC)
Total Budgeted Hours (BCWS)	59181.50	64235.50
Total Budgeted Dollars (BCWS)	$1,135,500	$1,246,500
Total Earned Hours (BCWP)	56535.95	
Total Earned Dollars (BCWP)	$1,023,767	
Total Actual Hours (ACWP)	65648.00	
Total Actual Dollars (ACWP)	$1,061,754	
Management Reserve (MR)		
Support Services (ODIN)		
G & A Overhead Service Pools		
Total Project Cost	$1,135,500	$1,246,500

Main Menu | ELECTRICAL INTEGRATION | View

Project Summary

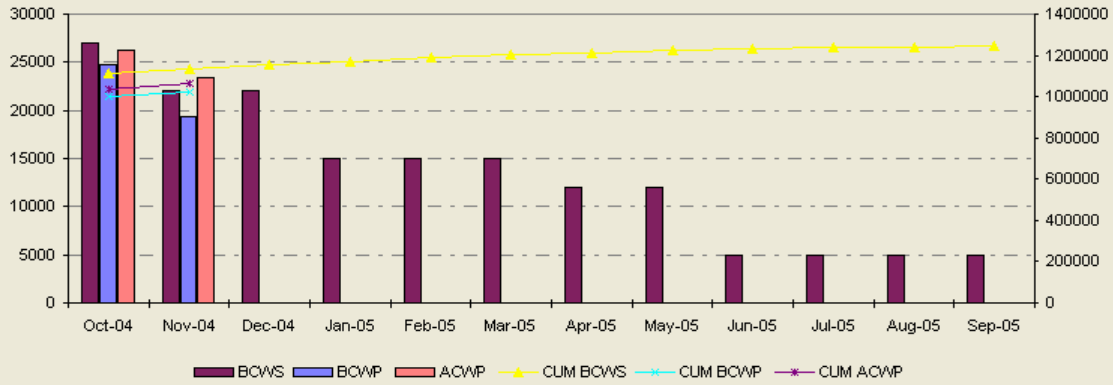


Earned Value System (EVS) - MSRR-1 Project Summary.xls

File Edit Tools Insert Attachments Report Type a question for help

In-House EVS Earned Value System

IN-HOUSE EARNED VALUE SYSTEM
PROJECT SUMMARY
TOTAL (FROM PROJECT START DOLLARS)



BCWS	27000	22000	22000	15000	15000	15000	12000	12000	5000	5000	5000	5000
BCWP	24677	19297										
ACWP	26199	23459										
CUM BCWS	1113500	1135500	1157500	1172500	1187500	1202500	1214500	1226500	1231500	1236500	1241500	1246500
CUM BCWP	1004470	1023767										
CUM ACWP	1038295	1061754										

***Note*: EVS provides 20 miscellaneous internal graphs with Numerous additional graphs and reports becoming available through interface to "wInsight" analysis tool.**

Project Summary | Project Information | Summary | **Total ($)** | Cost vs Schedule ($) | Complete vs Spent ($) | Efficiency ($) | Total (Hrs) | Cost

MSFC In-House Earned Value Sys (EVS)

Questions?