

**CMS Earned Value
Management
Self-paced Orientation**

Syllabus

- Earned Value Management History
- EVM – What Is It ?
- Basic EVM Metrics
- When Can EVM Best Be Used ?
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 - Reporting

Earned Value History - 1

- Since the 1890s, industrial engineers have compared physical factory output to:
 - Actual costs to determine cost variance
 - Planned physical output to assess schedule variance
- Starting in 1957, the U.S. Navy, then the Air Force, then the entire Department of Defense, adopted schedule, then cost, performance measures for projects and contracts
- In 1967, DoD Instruction 7000.2, “Performance Measurement for Selected Acquisitions,” imposed 35 Cost/Schedule Control Systems Criteria (C/SCSC) on the defense industry

Earned Value History - 2

- In 1995, The National Defense Industry Association (NDIA) took on the task of reviewing / rewriting the 35 criteria to make them more compatible with private industry practices
- In 1996, DoD accepted the NDIA's 32 guidelines
- In 1998, the 32 guidelines were incorporated into ANSI/GEIA Standard GEIA-EIA-748
- Since then, many federal agencies have adopted ANSI Standard 748 as their reference for EVMS'
- In 2004, the NDIA "Intent Guide" was published to expand on Section 2 of ANSI Standard 748

Earned Value Management: What Is It?

- An integrated method for monitoring cost, schedule, and performance, in which
- Work is planned, scheduled, and budgeted in time-phased increments to yield a baseline, and
- Performance is measured against the baseline
- It provides timely, traceable contract performance data to support decision-making
- It answers the question, “What did we get for what we spent?”

EVM: A Project Management Tool

- Uses Cost And Schedule Data
 - To Compare Performance To Baselines
 - For Trend Analysis, Forecasting, History
 - By Total Project, Work Breakdown Structure, Or Organizational Breakdown Structure
- Does Not Replace
 - The Critical Path Method
 - Risk Management
 - Quality Management

Basic EVM Metrics - 1

BCWS Budgeted Cost of Work Scheduled
Value of work planned to be accomplished by now
= PLANNED VALUE

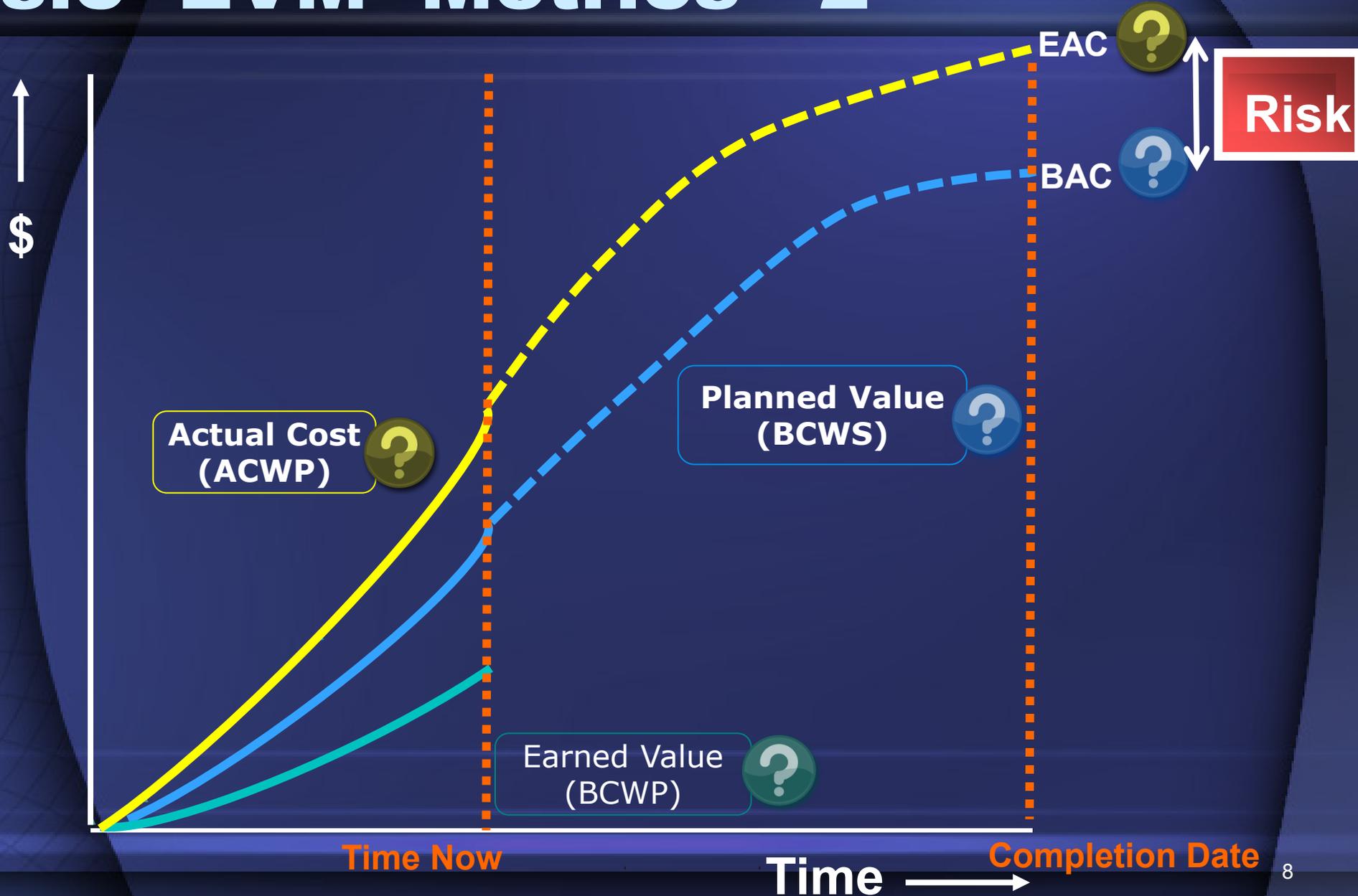
BCWP Budgeted Cost for Work Performed
Value of work accomplished to date
= EARNED VALUE

ACWP Actual Cost of Work Performed
Cost of work accomplished to date
= ACTUAL COST

BAC Budget At Completion = the budget

EAC Estimate At Completion

Basic EVM Metrics - 2



Cost Variance = $BCWP - ACWP$
Schedule Variance = $BCWP - BCWS$

 Please click on question mark buttons for the definitions of these metrics.

Key Performance Metrics

- **CV% - Cost Variance Percentage** - The relationship of the earned value to the actual cost of the work done to now, as a percentage $[(BCWP - ACWP) \div BCWP]$
- **SV% - Schedule Variance Percentage** - The relationship of the cost of work actually done to the cost of the work planned to be done $[(BCWP - BCWS) \div BCWS]$
- **VAC% - Variance at Completion Percentage** – How far off are the projected completion costs from the budget. $[100 * (VAC / BAC)]$ where VAC is $BAC - EAC$.

These three metrics are monitored by HHS.
OMB's Federal IT Dashboard monitors its own versions of CV% and SV% calculations.

What Does This Mean ?

- From 40 Years Of DoD Experience:
 - Can accurately statistically forecast final cost (EAC) as early as 15% of the way into a project ¹
 - Once a project is 15% or more complete, the overrun at completion will not be less than the current overrun ²...but you can keep it from getting worse
 - Once a project is 20% complete, the cumulative cost performance index does not vary from its current value by more than 10% ³
 - Bottom Line: **Use EVM to identify small problems early, before they become large problems !**

¹ "A-12 Administrative Inquiry" memorandum by Chester Paul Beach, Jr. (Washington DC: Office of the Under Secretary of Defense for Acquisitions, November 28, 1990)

² Figure 4.2, *Earned Value Project Management* by Quentin W. Fleming and Joel M. Koppelman (Newton Square PA: Project Management Institute, 2005), pp. 40-41

³ "Cost Performance Index Stability" by Major David S. Christensen, Ph.D., and Captain Scott R. Heise (*National Contract Management Association Journal*, 25:7-15, 1993),

When Can EVM Best Be Used ?

- **Projects Need To Have:**
 - Clearly defined objectives
 - A clearly perceived plan to achieve goals
 - Formalized management structure and processes
 - Cost and time constraints

Requirements: OMB - 1

“...Agencies...must:

- “Institute performance measures and management processes monitoring and comparing actual performance to planned results. Agencies must use a performance-based acquisition management or earned value management system, based on the ANSI/EIA Standard 748, to obtain timely information regarding the progress of capital investments. **The system must also measure progress towards milestones** in an independently verifiable basis, in terms of cost, capability of the investment to meet specified requirements, timeliness, and quality. ...”

Requirements: OMB - 2

“**Major** investment means a system or acquisition requiring special management attention

- Because of its importance to the mission or function of the agency, a component of the agency or another organization;
- Is for financial management and obligates more than \$500,000 annually;
- Has significant program or policy implications;
- Has high executive visibility;
- Has high development, operating, or maintenance costs;
- Is funded through other than direct appropriations;
- Or is defined as major by the agency’s capital planning and investment control process

• “Systems not considered ‘major’ are ‘non-major.’ “

Requirements: OMB - 3

- “...Agencies are expected to achieve, on average, **90 percent** of the cost, schedule and performance goals for major acquisitions.
- “Agency Heads must review major acquisitions not achieving **90 percent** of the goals to determine whether there is continuing need and what corrective action, including termination, should be taken;”
- Hence, the HHS requirement for a corrective action plan when CV% or SV% exceeds 10%

Requirements: The HHSAR - 1

- Section 334.201(a): “For acquisitions for development designated as **major** in accordance with both OMB Circular A-11 and HHS policy on major acquisitions; for acquisitions that involve **substantial development, modification or enhancement**; or for acquisitions that involve **significant upgrade** of operational or steady state systems or programs, use of an Earned Value Management System (EVMS) is required”
- Section 352.234-2(b) “If the offeror proposes to use a system that currently does **not** meet the requirements of paragraph (a) of this provision, **the offeror shall submit a comprehensive plan for compliance** with the guidelines.”
 - The contractor uses the EVMS it has; reports on progress

Policy: The HHSAR - 2

- Section 334.201, Policy
 - Cost Reimbursement, FPIF contracts \geq \$10 M
 - EVM **System** must comply with all 32 guidelines of ANSI Standard 748
 - FFP, LOE, T&M, Labor Hour contracts \geq \$10 M
 - EVM System must comply **only** with the Schedule guidelines of ANSI Standard 748
 - Including option years
- Section 334.203: Standard contract clauses must be used

Requirements: The HHSAR - 3

- Section 334.201(d): “(c) When full EVM is required on a prime contract, it **applies to subcontracts** issued there under *[sic]* ... However, if the prime contract requires the use of only partial EVM, any **subcontracts** to which EVM is made applicable, because of dollar value, contract type or subject matter, shall require only partial EVM.”
- Section 334.202(a): “An **IBR** normally should be conducted as a post-award activity.”
- Section 352.234-2(b)(3) “The **Contracting Officer** will review the offeror’s EVMS implementation plan prior to contract award.”
- Section 352.234-3a: “The Contractor shall submit EVM **reports** in accordance with the requirements of this contract.”

Policy: HHS IT CPIC (Capital Planning & Investment Control)

- HHS OCIO Policy for Information Technology Investment Performance Baseline Management, December 22, 2010 (HHS-OCIO-2010-0007)
 - “All HHS Major and Tactical IT investments and their associated IT projects throughout their entire lifecycles” (§3)
 - “All HHS Supporting IT investments with budget year costs equal to or greater than \$1M...” (§3)
 - **Monthly** cost & schedule reporting (§4.2.9.1)
 - **IBR** at the end of the EPLC Planning Phase for each IT project comprising the investment (§4.2.11)
 - **Annual Operational Analysis** for O&M (§4.4.1)

Reporting: Cost - Use The IPMR

- Monthly
- Integrated Program Management Report (IPMR) - *Formerly known as Contract Performance Report (CPR)*
 - Minimum is Format 1 and Formats 5-6
 - DD Form 2734/1 through 2734/4 and Formats 5-7
 - http://quicksearch.dla.mil/basic_profile.cfm?ident_number=278901&method=basic
 - Data Item Description DI-MGMT-81861
 - What data goes in each item of each format
 - http://www.acq.osd.mil/pm/currentpolicy/cpr_cfsr/CPR%20Final%2030-05.pdf

Integrated Program Management Reports

- DD Form 2734/1 through 2734/4 and Formats 5-7, June 20, 2012
- IPMR DID (Data Item Description) DI-MGMT-81861, 20120620
- Formats 1 and 5-6 Mandatory

CLASSIFICATION (When Filled In)													
CONTRACT PERFORMANCE REPORT FORMAT 1 - WORK BREAKDOWN STRUCTURE													
										DOLLARS			
The public reporting burden for this collection of information is estimated to average 3.1 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing this collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing the burden, to Department of Defense, Washington Headquarters Services, Directorate for Information Operations and Reports (0704-0188), 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Project Collection (0704-0188), Washington, DC 20503. PLEASE DO NOT RETURN YOUR FORM TO THE ISSUING OFFICE. (0704-0188)													
1. CONTRACTOR			2. CONTRACT			3. PROGRAM							
a. NAME			a. NAME			a. NAME							
b. LOCATION (Address and ZIP Code)			b. NUMBER			b. PHASE							
			c. TYPE			d. SHARE RATIO		c. EVMS ACCEPTANCE					
								YES (YYYYMMDD)					
5. CONTRACT DATA													
a. QUANTITY	b. NEGOTIATED COST	c. ESTIMATED COST OF AUTHORIZED UNPRICED WORK		d. TARGET PROFIT/FEE	e. TARGET PRICE	f. ESTIMATED PRICE	g. CONTRACT CEILING						
6. ESTIMATED COST AT COMPLETION						7. AUTHORIZED CONTRACTOR REPRESENTATIVE							
MANAGEMENT ESTIMATE AT COMPLETION (1)			CONTRACT BUDGET BASE (2)		VARIANCE (3)								
a. BEST CASE					a. NAME (Last, First, Middle Initial)								
b. WORST CASE					c. SIGNATURE								
c. MOST LIKELY					d. DATE SIGNED (YYYYMMDD)								
8. PERFORMANCE DATA													
ITEM (1)	CURRENT PERIOD					CUMULATIVE TO DATE					AT COMPLETION		
	BUDGETED COST		ACTUAL COST	VARIANCE		BUDGETED COST		ACTUAL COST	VARIANCE		BUDGETED	ESTIMATED	VARIANCE
	WORK SCHEDULED (2)	WORK PERFORMED (3)	WORK PERFORMED (4)	SCHEDULE (5)	COST (6)	WORK SCHEDULED (7)	WORK PERFORMED (8)	WORK PERFORMED (9)	SCHEDULE (10)	COST (11)	(14)	(15)	(16)
a. WORK BREAKDOWN STRUCTURE (WBS) Hierarchy											BAC		
1.0 The Project											BAC		
1.1 Project Management											BAC		
1.2 High-level One											BAC		
1.2.1 This											BAC		
1.2.2 That											BAC		
1.2.3 The Other											BAC		
1.3 High-level Two											BAC		
1.4 High-level Three											BAC		
b. COST OF MONEY											BAC		
c. GENERAL AND ADMINISTRATIVE											BAC		
d. UNDISTRIBUTED BUDGET											BAC		
e. SUB TOTAL (PERFORMANCE MEASUREMENT BASELINE)											BAC		
f. MANAGEMENT RESERVE											BAC		
g. TOTAL											BAC		
9. RECONCILIATION TO CONTRACT BUDGET BASE											BAC		
a. VARIANCE ADJUSTMENT											BAC		
b. TOTAL CONTRACT VARIANCE											BAC		
DD FORM 2734/1, MAR 05											BAC		
CLASSIFICATION (When Filled In)											BAC		

Data in Green is entered into OPPM

ONE WAY TO GET ACTUAL PERCENT COMPLETE

$$(BCWS \times 100) \div BAC = \text{Planned \%}$$

$$(BCWP \times 100) \div BAC = \text{Actual \%}$$

AS-OF DATE

Integrated Master Schedule

Microsoft Project - .mpp

File Edit View Insert Format Tools Project Collaborate Window Help Adobe PDF

Tasks Resources Track Report

1

WBSID	Task Name	% Work Complete	Duration	Start	Finish
1	Overall Project	2%	442 days	Thu 1/9/03	
2	Product Development	2%	442 days	Thu 1/9/03	
3	Hardware	28%	44 days	Thu 1/9/03	
4	Establish Software Development & Integration Facility (SDIF) - All Stages	28%	44 days	Thu 1/9/03	
5	1.1.1.1.1 Establish basic office environment in Baltimore	100%	1 day	Thu 1/9/03	
6	1.1.1.1.2 Acquire Hardware and Software	29%	30 days	Fri 1/10/03	
7	1.1.1.1.3 Establish full office connectivity	69%	14 days	Thu 1/9/03	
8	1.1.1.1.4 Determine overall user access requirements to environment	69%	14 days	Thu 1/9/03	
9	1.1.1.1.5 Complete security and access setup	0%	14 days	Wed 1/29/03	
10	1.1.1.1.6 Implement technical support procedures	0%	30 days	Wed 1/29/03	
11	Software	2%	442 days	Thu 1/9/03	
12	COTS Software	100%	1 day	Thu 1/9/03	Thu 1/9/03
13	1.1.2.1.1 SDIF Software	100%	1 day	Thu 1/9/03	Thu 1/9/03
14	1.1.2.1.2 Operational Software	100%	1 day	Thu 1/9/03	Thu 1/9/03
15	1.1.2.1.3 Tools & Utilities	100%	1 day	Thu 1/9/03	Thu 1/9/03
16	Developed Software	2%	442 days	Thu 1/9/03	Fri 9/17/04
17	Requirements Analysis - Stage 1	2%	442 days	Thu 1/9/03	Fri 9/17/04
18	1.1.2.2.1.1 Stage 1 Kickoff	100%	0 days	Thu 1/9/03	Thu 1/9/03
19	Project Management - Stage 1	2%	442 days	Thu 1/9/03	Fri 9/17/04
20	Software Process Improvement	2%	442 days	Thu 1/9/03	Fri 9/17/04
21	1.1.2.2.1.2.1.1 Develop and Deliver the Software Process Improvement Plan (SPIP)	9%	112 days	Thu 1/9/03	Fri 6/13/03
22	1.1.2.2.1.2.1.2 Maintain the SPIP	0%	330 days	Mon 6/16/03	Fri 9/17/04
23	1.1.2.2.1.2.1.3 Develop and Maintain the Process Asset Library (PAL)	2%	442 days	Thu 1/9/03	Fri 9/17/04
24	1.1.2.2.1.2.1.4 Perform Process Gap Analysis and Impact Assessment	0%	40 days	Tue 7/1/03	Mon 8/25/03
25	1.1.2.2.1.2.1.5 Develop Process Improvement Action Plans	2%	442 days	Thu 1/9/03	Fri 9/17/04
26	1.1.2.2.1.2.1.6 Implement Process Action Improvement Plans	2%	442 days	Thu 1/9/03	Fri 9/17/04
27	1.1.2.2.1.2.1.7 Develop and Maintain Process Improvement Log	2%	442 days	Thu 1/9/03	Fri 9/17/04
28	1.1.2.2.1.2.1.8 Collect and Report Process Improvement Metrics	2%	442 days	Thu 1/9/03	Fri 9/17/04
29	1.1.2.2.1.2.1.9 Conduct Follow-up Assessments to Verify Compliance	2%	442 days	Thu 1/9/03	Fri 9/17/04

Gantt Chart

Ready

EXT CAPS NUM SCRL OVR

Start CMSnet - Micros... 3 Microsoft Offi... ThreeLJS SlidesF... Students EVMOv... 04-CWFR_Stag... IBM 5:48 PM

ANOTHER PLACE TO FIND ACTUAL PERCENT COMPLETE

Reporting: Schedule

- Scheduling Software
 - Microsoft Project 2010 is CMS' standard
- Calendar
- Gantt Chart
- Units Complete Method
 - Equal increments may be appropriate, where the time periods' costs are similar
 - For O&M (operations and maintenance; “steady-state”) Phase activities only

Reporting:

Monthly PMT Data Entry

Oracle Primavera Portfolio Management

- For each **current Activity**
 - Total Costs Actual
 - Planned % Complete
 - Actual % Complete
 - Start Date Projected
 - Completion date Projected
- And, if the Activity just started or just ended:
 - Start Date Actual, or
 - Completion Date Actual

“Activities” In PMT - 1

- OPPM Activities should represent manageable chunks of the work, but not be so detailed as to make reporting onerous
 - OPPM is the tool for 1) justifying the investment for funding and, once approved and funded, 2) providing CMS senior management, HHS, and OMB with monthly snapshots of how well the investment is being managed . . . against the approved Plan in OPPM
 - OPPM usually is not the tool that investment teams use to daily manage their projects
- The Activities should be recognizable, easily identifiable chunks of work, so a new COR—five years from now—will know what the heck each one of them represents
- If an Activity represents work to be done by a single contractor, the Start Date Projected and Completion Date Projected should match those of the anticipated contract year, to aid “Actual % Complete” reporting

“Activities” In OPPM - 2

- If an Activity represents work to be done by multiple contractors, it should be split, so each contract is represented by a separate Activity, again to facilitate reporting
- If a contract is awarded "late," then—at the next re-baselining—change the Activity’s Start Date Projected and Completion Date Projected to match the actual contract date, to support reporting
- Once a “Total Costs Actual ” for an Activity has been reported to the IT Dashboard, OMB will not allow changes to its data
 - Do **NOT** select in the Send Actual Costs To Dashboard column a “yes,” unless you have received and approved the final invoice for the tasks associated with that Activity; **DO** select “No”
 - Otherwise, leave the Send Actual Costs To Dashboard field blank until all costs are accounted for, so you’ll be able to update the data

Reporting: OMB IT Dashboard

- HHS monthly extracts data from PMT, and sends the files to OMB on:
 - EVM
 - Other Performance Indicators
 - Contracts
 - HHS CIO Evaluation Ratings
 - GAO Reports
- OMB promotes updated version to production
- <http://www.itdashboard.gov> | HHS | CMS

Watch Lists

- HHS High Variance List based on DME Variances...and:
 - Cost or schedule variances $\geq \pm 10\%$
 - Corrective action plan required
 - Data ≥ 45 days old ("as of" date for EVM reporting),
 - Data not updated (date on which you are completing this report) ≥ 45 days old
 - Security and privacy factors
- OMB Management Watch List based on Total Variances

Summary: EVM Reporting Requirements

- OMB: Explain $\geq \pm 10\%$ variance
- HHSAR: **If major** IT development, then: Compliant EVMS, monthly report, IBR, [for O&M] annual operational analysis
- HHS CPIC: Monthly cost and schedule reporting...**all** IT projects
 - Update OPPM each month: EVM and other performance
 - Extracts monthly data to OMB for IT Dashboard
- CMS: Update OPPM by **10th of each month**
 - Total Costs Actual
 - Planned % Complete
 - Actual % Complete
 - Start Date Projected
 - Completion Date Projected
 - $\geq \pm 10\%$ variance requires corrective action plan
 - Zero variance requires statement