



SYSTEMS MANAGEMENT STANDARD

EIA-748™

REV. E

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Superseding EIA-748D

Earned Value Management Systems

RATIONALE

Per SAE process for maintenance of standards, this revision to the earned value management standard has been updated to ensure it remains current and relevant. Revision “E” includes an updated set of guidelines to reflect current business requirements and availability of commercial off-the-shelf software designed to support earned value management, performance metrics, and analysis. Since the inception of this standard, there have been minimal text updates to the original set of 32 guidelines. In response to industry and government requests to update the guidelines, an industry and government working group was formed to update the guidelines. The updated guideline text in Section 2, EVMS Guidelines, reflects numerous working sessions with industry and government stakeholders to arrive at an agreed upon set of updated guidelines. Selected guideline text was edited or rewritten for clarity or to more accurately reflect the intent of the guideline. In some instances, guidelines were combined. Others were eliminated where other business management systems are more appropriate (identifying unit and lot costs) or reconciliation is no longer manually performed. Section 2.3, previously titled “Accounting Considerations” has been changed to read “Progress Assessment and Data Collection.” Guideline 14 in this section is new. It was specifically added to clearly articulate that the schedule should be statused and physical process assessed to determine budget earned. Calculating earned value for material was merged into this new guideline. The result is a set of revised 27 guidelines, a reduction of five guidelines.

A few additions and edits were made in 2.6, Common Terminology. There are minimal changes in Section 3.

FOREWORD

The earned value management system (EVMS) guidelines incorporate best business practices to provide strong benefits for program enterprise planning and control. The processes include integration of program scope, schedule, and cost objectives; the establishment of a baseline plan for accomplishment of program objectives; and the use of earned value for performance measurement during the execution of a program. The system provides a sound basis for problem identification, corrective actions, and management replanning as may be required.

Different organizations must have the flexibility to establish and apply an integrated management system that suits their management style and business environment. First and foremost, the system must meet the organization’s needs and good business practices. Therefore, the guidelines in this document are purposely high level and goal oriented, as they are intended to state the qualities and operational considerations of an integrated program management system using earned value analysis methods without mandating detail system characteristics.

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1. SCOPE

An Earned Value Management System (EVMS) integrates the work scope of a program with the schedule and cost elements for optimum program planning and control. The primary purpose of the system is to support integrated program management. The system is owned by the organization and is governed by the organization's policies and procedures. The principles of an EVMS are:

- Plan all work scope for the program to completion.
- Break down the program work scope into finite pieces that are 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 accomplishments are measured. Control changes to the baseline.
- Use actual costs 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 estimate at completion based on performance to date and the remaining work to be performed.
- Use the EVMS information in the organization's management processes.

The essence of earned value management is that a target planned value (i.e., budget) is established for each scheduled element of work at a level of detail appropriate for the degree of risk for the technical, schedule, and cost or uncertainty associated with the program. As these elements of work are completed, their target planned values are "earned." As such, work progress is quantified, and the earned value becomes a representation of accomplishment against which to measure what was spent to perform the work and what was scheduled.

Schedule variances, which cannot be seen in a stand-alone budget versus actual cost tracking system, are isolated and quantified, and the cost variances are true cost variances that are not distorted by schedule performance. This provides for early identification of performance trends and variances from the management plan and allows management decision-making while there is adequate time to implement effective corrective actions. Without earned value, one can only compare planned expenditures with how much has been spent, which does not provide an objective indication of how much of the planned work was actually accomplished.

For the benefits of earned value to be fully realized, comprehensive planning at the outset, which includes a thorough risk and opportunity analysis, combined with the establishment and disciplined maintenance of a baseline for performance measurement are required. This combination of comprehensive planning, baseline maintenance, and earned value analysis yields earlier and better visibility into program performance than is provided by non-integrated methods of planning and control. This enhances overall program management value through decisions based on the use of EVMS information.

The intent is to provide management information using the organization's resources and a properly scaled EVMS application that achieves the program requirements and is compliant with the EVMS principles. EVMS scalability is viewed as a spectrum employing the principles of EVMS as fundamental to all programs and the EVMS guidelines (see Section 2) as applicable to large, complex, or high-risk programs. This scalability allows any program, regardless of size and complexity, to realize the benefits of earned value management.

Complementary systems or methodologies such as systems engineering, cost estimating, manufacturing/enterprise resource planning (M/ERP), and Agile software development often interface with the EVMS. These complementary systems or methodologies deliver other functionality and value to the customer while earned value management provides a standardized method for measuring progress and contract reporting. The EVMS documentation should describe the system interfaces as well as the recurring control process to maintain data conformance and system compliance.

NOTE 1: In the context of this standard, a program is a group of related projects supporting a mission that is managed in a coordinated way to obtain benefits not obtained from managing them individually. As the management principles are the same to achieve success, the two terms, program and project, are used interchangeably in this standard.

NOTE 2: An objective of this standard is the planning and performance measurement of program work scope in a manner that enables efficient integrated program management. As the management principles of planning and performance measurement are detailed throughout this standard, the terms “effort,” “scope,” “work,” “work scope,” and “program work scope” are used interchangeably.

NOTE 3: In the context of this standard, “organization” is used as a generic term and may include but is not limited to: public and private corporations and companies, Federal government agencies, departments and activities, state and local government entities, Federally Funded Research and Development Centers (FFRDC) and similar organizations, educational institutions, and non-profit entities that are likely to be owners of earned value management systems.

2. EVMS GUIDELINES

This section provides basic guidelines for organizations to use in establishing and applying an integrated EVMS. These guidelines are expressed in fundamental terms and provide flexibility for each organization to optimize its system and be fully accountable for the effectiveness of its usage. The process discussions in Section 3 provide further information on application of these guidelines. The guidelines are grouped in five major categories as documented below. They are followed by a glossary of common terminology.

2.1 Organization

- a. Guideline 1. Define the authorized work elements for the program. A product-oriented work breakdown structure, tailored for effective internal management control, is commonly used in this process.
- b. Guideline 2. Identify the program organizational structure, including the major subcontractors, responsible for accomplishing the authorized work and define the organizational elements where work will be planned and controlled.
- c. Guideline 3. Integrate the program work breakdown structure and organizational structure to identify management control points where responsibility is assigned to specific work scope.
- d. Guideline 4. Provide for the integration of the scheduling, budgeting, work authorization, and cost accumulation processes with each other and, as appropriate, the program work breakdown structure and organizational structure to enable cost and performance measurement by elements of either or both structures.

2.2 Planning, Scheduling, and Budgeting

- a. Guideline 5. Identify, in the schedule, the physical products, milestones, technical performance goals, or other objective indicators that will be used to measure progress.
- b. Guideline 6. Schedule the authorized work in a manner that describes the sequence of work and identifies task interdependencies required to meet the requirements of the program.
- c. Guideline 7. Establish and maintain a time-phased budget baseline comprised of scope, schedule, and budget at the control account level. Budget for far-term efforts may be held in higher-level accounts until an appropriate time for allocation at the control account level. Initial budgets established for performance measurement are based on either internal management goals or the external customer-negotiated target cost, including estimates for authorized but undefinitized work.
- d. Guideline 8. Authorize control account scope, schedule, and budget comprised of elements of cost (labor, material, subcontractors, etc.) required to complete the effort.
- e. Guideline 9. Plan the authorized scope, schedule, and budget into work packages and/or planning packages. Determine budgets in terms of dollars, hours, or other measurable units such that the sum of all work package and planning package budgets equal the control account budget.

- f. Guideline 10. Establish objective performance measurement criteria for each work package consistent with the way work is expected to be accomplished. Only that effort which is not measurable is identified as level of effort.
- g. Guideline 11. Apply indirect rates, developed by the responsible organizations, to the program's direct resource budgets, at the applicable level, to determine the indirect budgets that support the establishment of the performance measurement baseline.
- h. Guideline 12. Identify any undistributed budget or management reserve.
- i. Guideline 13. Provide that the program target cost goal is reconciled with the sum of all internal program budgets and management reserve.

2.3 Progress Assessment and Data Collection

- a. Guideline 14. Using predefined performance measurement criteria, status the schedule and assess physical progress to determine budget earned. Earned value for material items may not be credited earlier than the actual receipt of the material nor later than the consumption of the item.
- b. Guideline 15. Collect actual costs (direct and indirect), by elements of cost, from a formal system controlled by the general books of account for comparison to corresponding budgets in the EVMS. Where actual costs are not available for comparison, estimated costs will be entered into the EVMS.
- c. Guideline 16. Account for all purchased material for which earned value has been calculated, including material residual to the program.

2.4 Analysis and Management Reports

- a. Guideline 17. At least on a monthly basis, generate the following information for the control account and higher levels, as necessary for management control, using actual cost data from or reconcilable with the accounting system:
 - 1. Comparison of the amount of planned budget and the amount of budget earned for work accomplished. This comparison provides the schedule variance.
 - 2. Comparison of the amount of the budget earned and the actual (applied where appropriate) direct costs for the same work. This comparison provides the cost variance.
- b. Guideline 18. Identify and evaluate, at least monthly for each control account, the significant differences between both planned and actual schedule performance and planned and actual cost performance; and analyze and provide the reasons for the variances in the detail needed by program management.
- c. Guideline 19. Evaluate indirect cost variances and the impact of indirect cost performance on individual program performance.
- d. Guideline 20. Using the results of control account variance analysis and indirect performance evaluations, update the control account estimates at completion to reflect future resource requirements to complete the remaining authorized work and, by comparing to budgets, calculate the variance at completion.
- e. Guideline 21. Summarize, review, and evaluate the data elements and associated variances through the program work breakdown structure and/or organizational structure to support management needs and any customer reporting specified in the contract.
- f. Guideline 22. Implement managerial actions taken as the result of earned value information.
- g. Guideline 23. Develop a revised estimate of cost at completion for all authorized work based on performance to date, estimates of future resource requirements, and an evaluation of program risks and opportunities. Compare this estimate with the contract budget base to identify variances at completion to support internal management needs, applicable customer reporting, and funding requirements.

2.5 Revisions and Data Maintenance

- a. Guideline 24. Incorporate customer directed changes in a timely manner, documenting and reconciling the effects of such changes in scope, schedule, and budget. When incorporating a customer directed change prior to negotiation, plan the work based on the estimated value of the scope.
- b. Guideline 25. Document and reconcile changes to current scope, schedule, and budgets as a result of internal replanning.
- c. Guideline 26. Control retroactive changes to records pertaining to work performed that would change previously reported amounts for actual costs, earned value, or budgets. Adjustments are made only for correction of errors, routine accounting adjustments, or effects of customer or management directed changes, including implementation of a single point adjustment.
- d. Guideline 27. When necessary, propose, document, and establish a total program budget greater than the contract budget base (over-target baseline) and/or a total program schedule exceeding the contractual period of performance (over-target schedule) to support management of the remaining authorized work. Advance notification must be provided to the customer prior to implementation.

2.6 Common Terminology

ACTIVITY OR TASK: An element of work with an expected duration in the network schedule that is performed during the course of a project. Activities generally have expected resource requirements used to determine the budget for the work effort. One or more activities may relate to a work package.

ACTUAL COST OF WORK PERFORMED (ACWP): The costs actually incurred and recorded in the accounting system, with any adjustments for estimated costs made in the EVMS, for accomplishing the work performed within a given accounting period. Also referred to as actual cost.

ACTUAL COST (AC): See Actual Cost of Work Performed (ACWP).

ACTUAL DATE: The date on which a milestone or scheduled work task is completed.

APPORTIONED EFFORT (AE): Effort that by itself is not readily measured or divisible into discrete work packages but that is related in direct proportion to the planning and performance on other measured effort.

AUTHORIZED UNPRICED WORK (AUW): A contract scope change that has been directed by the customer's contracting officer but has not yet been fully negotiated/definitized. It includes a value, excluding fee or profit, typically associated with the authorized, unpriced change order.

AUTHORIZED WORK: Effort (work scope) on contract or assigned by management.

BUDGET AT COMPLETION (BAC): The total authorized budget for accomplishing work scope. At the program level, it is equal to the sum of all distributed budgets plus any undistributed budget. Management Reserve is not included. The Budget at Completion forms the Performance Measurement Baseline, as it is distributed and time-phased in accordance with program schedule requirements.

BUDGETED COST FOR WORK PERFORMED (BCWP): The value of completed work expressed in terms of the budget distributed to complete the work effort, i.e., earned value.

BUDGETED COST FOR WORK SCHEDULED (BCWS): The time-phased budget plan for work currently scheduled. Also referred to as the planned value.

CONTROL ACCOUNT (CA): A management control point at which budgets (resource plans) and actual costs are accumulated and compared to earned value for management control purposes. A control account is a natural management point for planning and control since it represents the work assigned to one responsible organizational element for one program work breakdown structure element.