Earned Value Lite: Making Earned Value Management Work for Every Project
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Executive Overview
The criteria for earned value management, or EVM—a technique for measuring project progress in an objective manner—were developed for major systems acquisitions. They tend to be overly prescriptive for smaller projects, which discourages many organizations and individuals from adopting them. Now, however, organizations and individuals can adopt a formula—often called *earned value lite*—that distills the formal criteria of earned value management into 10 fundamental steps that constitute a simplified form of EVM.

Introduction
When people hear the term *earned value management*, or *EVM*, they tend to associate it with the American National Standards Institute and Electronic Industries Alliance standard on earned value management systems (ANSI/EIA-74), which requires organizations to comply with 32 precise criteria. However, by implementing just 10 of these criteria, organizations can reap the rewards of EVM without being overwhelmed by complexity. This white paper describes these 10 criteria.
Earned Value for the Masses

Earned value management—a technique for measuring project progress in an objective manner—was born in 1965, when a group of U.S. Air Force acquisition managers came up with a list of criteria they could use to oversee work being performed for them by private industry. Since then private industry has embraced the concept—which combines measurements of scope, schedule, and cost—to identify project problems early, take corrective action, and direct planning activities to achieve project objectives. Forty years later, companies are still applying earned value management criteria.

However, because the criteria were developed for major system acquisitions, they tend to be overly prescriptive for smaller projects, discouraging many organizations and individuals from adopting them.

It has become increasingly clear that the fundamentals of EVM need to be captured for such organizations without being overly prescriptive—in other words, the formal requirements need to be scaled back to meet the needs of even the smallest software projects. Oracle has achieved a “simple” form of earned value management, one that works for all projects—not just major, complex systems—by distilling the formal criteria of earned value management into 10 fundamental steps that constitute a simplified form of earned value management often called earned value lite. Each of these steps refers to a specific earned value management system (EVMS and/or ANSI/EIA 748 Standard) criterion—which is cited after each step’s description in the following sections.

Step 1: Define the Project’s Scope

Defining a project’s scope, its objectives and deliverables, is an essential component of the earned value method of project management. By defining the work that needs to be completed, you ensure that project teams know where they are at all times and when a project is complete. But to accurately define that work, the project’s scope must also be 100 percent defined. Although true for any project, this is particularly critical for projects in which you intend to measure earned value performance.

Because earned value focuses on the authorized work that’s been completed plus management’s official authorized budget for that work, project status is often reported as being 12 percent
complete or 55 percent complete, and so on. But if you haven't defined what constitutes 100 percent of the project, you can't measure the percentage of completion.

How, though, can you define a new job when specific details are often necessarily missing? Although there are no absolute answers, one of the most useful tools available to project managers is the work breakdown structure (WBS). Serving much the same role as an organization chart does for executives, the WBS enables project managers to define a new endeavor by laying out all of the assumed work within the framework and then decomposing each element into measurable work packages. And because the WBS provides a reasonable portrayal of the new project, project teams can use it to take the next critical steps in the project planning process, including performing “make or buy” analyses; assessing risk; and scheduling, estimating, and (ultimately) authorizing budgets for proceeding.

Reference: EVM Criterion 1

Define the authorized work elements for the program. A WBS tailored for effective internal management control is commonly used in this process.1

Step 1 Deliverables

- WBS diagram
- WBS dictionary
- WBS index/coding
- List of project objectives
- List of project deliverables
- List of project specifications

Step 2: Determine Who Will Perform the Defined Work

One of the most important parts of any project is determining who will perform the defined work. Experienced workers generally work better and faster than inexperienced people, but they also cost more. In many projects, however, an experienced workforce represents a good investment. In cases where a project team’s own organization may lack experience in certain project areas, the team must hire another organization or individual to perform the tasks. Called

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1 The criteria numbers shown relate to the sequence of the listed criteria in both the U.S. Department of Defense’s Earned Value Management System and the ANSI/EIA-748-1998 standard.
“make or buy” decisions, these choices represent an essential extension of the scope definition process.

Project procurements (versus in-house work) create a “nonforgiving” legal arrangement, which means that normal contracts must be executed with a seller. If you commit to buy something that turns out to be not what you need or your project requirements change, such modifications will be accommodated—at a price. Sellers love changes in scope, because each change gives them an opportunity to “get well,” or benefit from a competitive bid. The earlier procured work is identified and responsibilities are assigned, the better the project team can manage such packages. Internal budgets, in contrast, can be executed more informally, and because everyone is on the same payroll, there’s some margin for slack. Procurements, on the other hand, must be done properly at the start—or the project will pay the price.

Whether project work is performed by the project’s own organization or procured from outside the company, progress must be measured and reported. The project team must be able to continuously measure earned value versus the actual costs of the work being performed.

Reference: EVM Criterion 2

Identify the program organizational structure, including the major subcontractors responsible for accomplishing the authorized work, and define the organizational elements in which work will be planned and controlled.

Step 2 Deliverables

- Responsibility assignment matrix
- “Make or buy” analysis
- List of procurements (bill of materials)

Step 3: Plan and Schedule Defined Work

The earned value project management technique can be thought of as simply a scheduling system with embedded budgets. The schedule reflects the authorized scope and time frame, and the budgeted amounts are earned for work as it is accomplished.

To employ earned value management, organizations need a formal scheduling system, the vehicle through which project scope and planned value are described and through which earned value can then be measured. The project schedule is vital to earned value, because it reflects a baseline “planned value” that everyone can follow. A simple Gantt or bar chart is sufficient to lay out an earned value approach.

On more-complex projects, constraints between tasks should be isolated to show which tasks are holding up other work. Typically, organizations employ some form of critical path methodology
(CPM) to accomplish this task. The critical (and near-critical) paths of projects must be aggressively managed with negative earned value schedule variances.

An earned value behind-schedule variance indicates that the project is falling behind its baseline plan. Any late tasks that fall on the critical path—or represent high-risk endeavors—must be aggressively managed to successful completion.

Reference: EVM Criterion 6

Schedule the authorized work in a manner that describes the sequence of work and identifies the significant task interdependencies needed to meet the requirements of the program.

Step 3 Deliverables

- List of project tasks
- Identification of constraints/interfaces
- Identification of critical paths
- Project master schedule
- List of major tracking milestones
- Project risk register

Step 4: Estimate Required Resources, and Authorize Budgets

After the project scope has been defined, planned, and scheduled, resource requirements (budgets) must be estimated for all defined tasks. Note that some projects follow the startup sequence of scope, schedule, and budget and others follow the sequence of scope, budget, and schedule. Software projects, because they are often driven by the availability of limited resources, will schedule the project based on personnel availability. Both ways are correct, as long as scope definition comes first.

For each defined WBS element, you must estimate the value of the resources required to complete the specified work, including changes. Management will then assess the requested resources and approve a value in the form of an authorized budget. Individual WBS budgets should never contain contingencies or management reserves. If they exist, reserves or contingencies must be isolated and owned by the project manager.

Remember: planned value represents the scheduled work plus the authorized budget, whereas earned value represents the completed authorized work plus the same authorized budget. Thus, to plan and then measure earned value, you need to schedule all defined tasks along with the authorized budget required to complete those tasks.

All authorized budgets must be achievable in order to have a viable project baseline.
Reference: EVM Criterion 9

Establish budgets for authorized work with identification of significant cost elements (labor, material, and so on) as needed for internal management and control of subcontractors.

Step 4 Deliverables

- Estimates for all work
- Management reserve budget
- Formal budgets for all authorized work

Step 5: Determine the Schedule Metrics Required to Convert Planned Value to Earned Value

To account for planned value when calculating earned value, you must establish measurable (verifiable) metrics within the baseline schedules to quantify authorized work and then measure that work’s completion. Specific milestones, or tasks, with weighted values must be measured as they are physically performed. Remember, earned value project management represents nothing more than managing a project with a resource-loaded schedule.

Although various methods have been devised for measuring project performance, the most-respected ones use some type of discrete measurement. Specific milestones (representing points in time) are assigned values. When those milestones are achieved, the assigned budgeted values are earned. Tasks, too, are assigned values, which can then be measured as they are being completed, with a value being assigned to the completed work through the reporting period.

Reference: EVM Criterion 7

Identify physical products, milestones, technical performance goals, or other indicators that will be used to measure progress.

Step 5 Deliverable

- Metrics for measuring task performance
Step 6: Form a Performance Measurement Baseline, and Determine Control Account Plans

Earned value management requires the use of an integrated project baseline. This means that the defined work must include both the baseline schedule and the authorized budget, which are integrated within each of the specified work breakdown structure elements.

Project managers must also specify their points of management focus—which, in earned value management, are referred to as control account plans, or CAPs.2 Best thought of as subprojects, project teams, or project subdivisions, CAPs are placed at selected WBS elements. The sum of the CAPs constitutes the total project baseline, and the actual earned value performance measurement takes place within each of the specified CAPs. Total project performance is simply the sum of all the CAPs, which can be placed at any level of the WBS.

On some commercial contracts, the total project baseline may include indirect costs and even profits or fees, because the project baseline must include whatever executive management has authorized the project manager to accomplish.

Internal projects, in contrast, typically do not contain indirect costs or profits. Instead, their project baselines simply represent the sum of the defined CAPs (which often consist entirely of direct labor hours). As with commercial contracts, the authorized project baseline constitutes whatever management has decided it should be.

Step 6 Deliverable
- Subproject hierarchy

Reference: EVM Criterion 8

Establish and maintain a time-phased budget baseline, at the control account level, against which program performance can be measured. Initial budgets established for performance measurement will be based on either internal management goals or the external customer-negotiated target cost, including estimates for authorized but undefinitized work. Budget for long-term efforts may be held in higher-level accounts until an appropriate time for allocation at the control account level. On government contracts, if an over-target baseline is used for performance measurement reporting purposes, prior notification must be provided to the customer.

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Step 7: Record All Direct Costs by Project

This simply means that project managers must be kept abreast of how much money is being spent on their projects—a simple enough requirement, yet many organizations find it extremely challenging. The reason: many organizations have been functionally oriented for so long that they’ve lost the ability to focus on individual project performance. It is essential that direct costs be identified by project as the work progresses.

To employ earned value on a project, actual costs must align with authorized project budgets. Remember the rule: planned value represents the authorized work plus budget, which is then converted into completed work and the same budget to represent the earned value. Earned value must then be relatable to the actual costs to determine the cost efficiency factor, called the cost performance index (CPI), likely the single most important metric for any project employing earned value.

The trend in projects employing earned value is to measure performance weekly. It is important to note that this weekly measurement encompasses only internal direct labor hours, because on a weekly basis, the company labor tapes produce planned value, earned value, and actual hours for internal direct labor hours only. In contrast, direct labor dollars, indirect costs, purchased articles, travel, and so on are generally not available on a weekly basis. Thus, weekly performance measurement applies only to internal direct labor hours.

Reference: EVM Criterion 16

Record direct costs in a manner consistent with the budgets in a formal system controlled by the general books of account.

Step 7 Deliverables

- Accounting data for issuing monthly cost actual reports
- Accounting data for issuing weekly labor reports

Step 8: Continuously Monitor Earned Value Performance

The costs and schedules of projects employing earned value must be monitored against the authorized baseline for a project’s duration. Management must then focus its attention on exceptions to the baseline plan, particularly those that are greater than previously defined as acceptable. Earned value is thus a “management by exception” concept.

A negative earned value schedule variance simply refers to an instance in which the value of the work performed does not match the value of the work scheduled—that is, when the project is falling behind its scheduled work plan. When this occurs, the project team must assess the criticality of each behind-schedule task. If late tasks are found to be on the critical path or if the tasks carry a high risk to the project, team members must try to get the late tasks back on
schedule. However, additional project resources should not typically be spent on low-risk tasks or tasks that have positive critical path float.

The single most important aspect of earned value management is the cost efficiency readings it provides. These readings are derived from the difference between the value of work earned and the costs incurred to accomplish that work. If an organization pours more money into a project than it receives in value from that project, an overrun condition will exist. Typically nonrecoverable, such overruns (which are expressed as a percentage value) tend to get worse unless the project team takes aggressive action to mitigate the condition.

It’s important to note, however, that the earned value cost efficiency rate typically stabilizes from the point when a project is 20 percent complete. The cost efficiency factor is thus an important metric for any project manager or portfolio executive to monitor.

Reference: EVM Criterion 22
At least monthly, generate the following information at the control account and other levels as necessary for management control, using actual cost data from, or reconcilable with, the accounting system:

1. Comparison of the amount of the planned budget and the amount of budget earned for work accomplished. This comparison provides the schedule variance (SV).
2. Comparison of the amount of the budget earned and the actual direct costs (applied where appropriate) for the same work. This comparison provides the cost variance (CV).

Step 8 Deliverables
- Ability to determine an SV and a schedule performance index (SPI)
- Ability to determine a CV and a cost efficiency factor

Step 9: Forecast the Final Required Costs, Based on Performance
One of the benefits of earned value management is that it gives organizations the ability to quickly and independently forecast the total funds required to complete a project—commonly referred to as the estimate at completion (EAC). By examining actual cost and schedule performance in the context of the baseline plan, project managers are able to accurately estimate the total funds required to complete a project within a finite range of values.

This is important, because management and/or customers often have preconceived notions of what final project costs should be or what they would like them to be. With earned value management, if the earned value statistical forecast of estimated final costs is greater than the project manager’s “official” estimate of costs, it will be clear to the project team that these professional “differences of opinion” need to be reconciled.
Actual performance results on any project, good or bad, are in effect “sunk costs.” Because such costs represent what the project has actually achieved in performance, any improvements to performance must come from future work—that is, they must result from tasks that lie ahead of the project’s status date. Earned value enables the project manager to accurately quantify the cost and schedule performance achieved to date. If the results are less than those desired, the project team can assume a more aggressive posture to influence the remaining work.

Because earned value management enables organizations to accurately quantify the value of the work completed to date on a project, it also enables them to quantify the value of the remaining work so that they can stay within project objectives. The most respected method of forecasting final cost results is to assume that the project will continue at its established cost efficiency rate—meaning it will get better or worse within a narrow, finite range.

Reference: EVM Criterion 27

Develop revised estimates of cost at completion, based on performance to date, commitment values for material, and estimates of future conditions. Compare this information with the performance measurement baseline to identify variances at completion important to company management and any applicable customer reporting requirements, including statements of funding requirements.

Step 9 Deliverable

- Ability to forecast a range of estimates at completion

Step 10: Approve or Reject All Changes, and Ensure That Approved Changes Are Incorporated into the Project Baseline in a Timely Manner

The project performance measurement baseline established at the start of the project is only as good as the management of all proposed changes to that baseline over the duration of the project. Performance baselines quickly become invalid if they fail to incorporate changes to the approved baseline when the work scope has been modified through additions or deletions.

All project change requests must be quickly addressed by either approval or rejection of them. In addition, all project managers should have the authority to disallow such changes. If the initial baseline is to remain valid, each and every change must be controlled. Do not underestimate the importance of this task: maintaining an approved baseline can be as challenging as defining the scope of a project at its onset.
Reference: EVM Criterion 28

Incorporate authorized changes in a timely manner, recording the effects of such changes in budgets and schedules. In the directed effort prior to negotiation of a change, base such revisions on the amount estimated and budgeted to the program organizations.

**Step 10 Deliverables**

- Project change control procedure
- Project change control log

**Conclusion**

Earned value project management doesn’t have to be difficult to understand or employ. By simply following the 10 simple steps described in this white paper—steps that can be applied to any project of any size, in any industry—any organization can derive the benefits of earned value management, proving once and for all that earned value truly is for the masses.

As was stated nicely by a gentleman from the United Kingdom a few years ago, “Whilst you can practice good project management without EVM, you cannot practice EVM effectively without good project management.”

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