

You Don't Have Time for Earned Value Management? Try EVM The Easy Way

Do you cringe when someone brings up the subject of Earned Value Management (EVM)? Do you see yourself drowning in torrents of obscure data, generated by some space-age software that has run amok? And what about all that alphabet soup? What the heck are BCWS, SPI, and FAC?

If you talk to the experts, they can provide tons (literally) of instruction and advice. For instance, the highly recognized text by EVM guru Quentin Fleming, is crammed with 560 pages of really good stuff on "Cost/Schedule Control Systems Criteria" (the DOD version of EVM). Later, the Project Management Institute (PMI) published a downsized discussion on "Earned Value Project Management", still inviting the reader to digest 140 pages.

More recently, PMI has recognized the immense importance of EVM and has published an Exposure Draft for an EVM Practice Standard. It is merely 36 pages in length. For a change of pace, if you are bored by technical treatment of PM topics, you can read my own short story on EVM. It's down to 15 pages of easy, novel-style reading. You'll find the story among the list of my papers on this website. Look for *The Education of Justin Thyme - Project Manager* under the Earned Value category. Finally, you can get into the detailed application of Earned Value Analysis (EVA) techniques by reading my four-part series on *Measuring the Value of Work Accomplishment*, also under the Earned Value header.

EVM Made Easy

I have to admit that I am a real believer in EVM. While I fully understand the intricacies and power of EVM, I can also sympathize with the novice PM practitioner who feels overwhelmed by the seemingly complicated EVM concepts. I also have found, through actual field experience, that the concepts of EVM can be effectively applied in virtually every project situation, from very complex to the absurdly simple.

There are two things that you should know about learning and using EVM. First, there are just a few basic concepts, which can be learned in an hour or less. Second, you can use and benefit from EVM without applying the entire set of capabilities.

Of course, throwing hundreds of pages of technical material at the novice PM practitioner is no way to get these points across -- the message being that the basic application of EVA is an easy and practical way to monitor and evaluate project performance. So we offer, here, a stripped-down version of an Earned Value Analysis (EVA) primer.

If you can afford 20 minutes to review this five-page paper, you will understand the basics of EVA and how it can be easily applied to your projects.

The entire EVA practice essentially consists of about six key measurement values. We actually use these values in the planning and tracking of a project, even though we often don't give them names or structure. So bear with me while I define these basic values.

Establishing a Baseline

If we are going to evaluate project performance, by measuring cost and schedule variance, then we have to have a baseline to measure against. So the first two values show up in the project plan, before we track progress. First, there is the **BAC (Budget at Completion)** which is a value that we assign to a task or any part of the project. The most common budgets are based on cost. But in place of an actual dollar value, it can also be a labor value (such as planned hours), or any other value that would provide a weight factor for the task. For example, if you are tracking spent time rather than actual money expenditures, you can set the BAC values based on the labor estimates for the tasks.

The second plan value is the **BCWS (Budgeted Cost of Work Scheduled)**. The BCWS is the weighted value of the task at a specific point of time during its planned execution. For instance, if a task having a budget of \$5000 is scheduled to be executed between 2/15 and 3/15, the BCWS on 3/1 would be \$2500 (50% of the BAC). The BCWS on 3/15 is \$5000. We'll use the BCWS to determine the Schedule Variance.

Note: The PMI Exposure Draft for EVM offers alternative (more sensible) terms for three basic EVA nomenclature items. One of these is BCWS, for which they offer the alternative, PV (Planned Value).

Calculating Earned Value

The next two values are created when we track the project. Both of these are periodic values. That is, they relate to a specific date during the life of the project (as does the BCWS). The key component of the entire EVA process is the **BCWP (Budgeted Cost of Work Performed)**. Does this term confuse you? Then why don't you call it "**Earned Value**" (**EV**), which is what it is (and what is offered as an alternative in the PMI EVM Practice Standard).

Computation of BCWP couldn't be more elementary. It is the percent complete of a task times the BAC. If on 3/1, our \$5000 task is declared to be 40% complete, then the BCWP (earned value) is \$2000. How simple can it get? $BCWP = \%C \times BAC$. $40\% \times \$5000 = \2000 . Stating this once more, **the earned value is the percent complete times the budget.**

If you're using spent hours, instead of costs, the process is the same. If the BAC is 200 hours, and the percent complete is 40%, then the EV is 80 hours.

The second tracking item is actual cost. In EVA-land we call this **ACWP (Actual Cost of Work Performed)**. If, as of 3/1, our subject task has accumulated \$2400 in costs, then the ACWP is \$2400. Still simple, right? (*The PMI Exposure Draft reduces this to AC, or Actual Cost.*)

The Four Basic Measurements

Reviewing what we have learned thus far, there are four basic measurements. As part of the plan, we have the item budget (BAC), and the planned value of the work to be performed at a specified time (BCWS or PV).

As part of the tracking, we add the earned value (BCWP or EV) and the actual cost to date (ACWP or AC). With these measurements, we can evaluate project performance using variance and trend analysis. **It all comes down to Cost Variance and Schedule Variance**

Measuring Cost Performance (CV and CPI)

For cost performance evaluation, we need only two pieces of data, the earned value and the actual cost. We use this data to compute the cost variance. The **CV (Cost Variance)** is the earned value minus the actual cost. In EVA lingo, $CV = BCWP - ACWP$ (or $EV - AC$). Using our example, it is $2000 - 2400 = -400$.

Again, although we use the term “cost”, it also works with labor hours (or any other weight factor). If the AC is 96 hours and the EV is 80 hours, the CV is -16 .

It is actually more useful to express this variance as a fraction. The **CPI (Cost Performance Index)** is the BCWP divided by the ACWP (EV / AC), or $2000 / 2400 = 0.8333$. We are looking for a CPI that is 1.000 or greater, so this 0.8333 signifies sub-par cost performance. We spent \$2400 to do \$2000 worth of work (or 96 hours to do 80 hours of work).

Measuring Schedule Performance (SV and SPI)

The process is similar for computing the schedule variance. The **SV (Schedule Variance)** is the earned value minus the planned value. In EVA terms, $SV = BCWP - BCWS$ (or $EV - PV$). Using our example, it is $2000 - 2500 = -500$.

Again, the more useful expression is the **SPI (Schedule Performance Index)**, which is BCWP divided by BCWS (EV / PV). Here, our SPI is $2000 / 2500 = 0.800$. Looking at the SPI, we can easily see that we are behind schedule. The SPI indicates that we are executing the work at a rate of 80% of the planned rate.

That’s essentially all that there is to this whole EVA mystique. For review, we have:

BAC (Budget at Completion)	The budget
BCWS (Budgeted Cost of Work Scheduled) (a.k.a. PV)	Planned accomplishment (at any point in time)
BCWP (Budgeted Cost of Work Performed) (a.k.a. EV)	Earned value or accomplishment value (at any point of time)
ACWP (Actual Cost of Work Performed) (a.k.a. AC)	Actual cost to date
SV (Schedule Variance)	Difference between planned accomplishment and EV
CV (Cost Variance)	Difference between actual cost and EV
SPI (Schedule Performance Index)	Earned value divided by planned value
CPI (Cost Performance Index)	Earned value divided by actual cost

You Do Not Have to do Both CV and SV

Let's make it even simpler. Let's say that you are not tracking actual costs or actual hours. Obviously, you cannot compute the cost variance. But that doesn't stop you from tracking the progress and computing the schedule variance. All that you need is a plan, as represented by the BAC and BCWS, and the periodic tracking of the percent complete, expressed as the BCWP. With these data, you can determine the SV and the SPI.

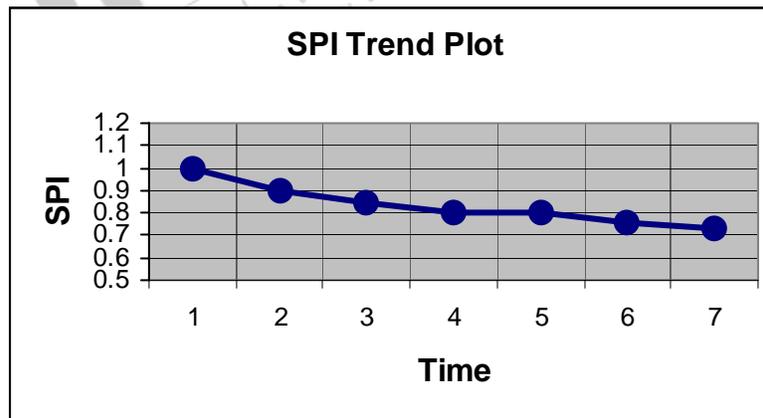
A similar option applies to cost. You don't even have to have a baseline plan to process cost variances. What you must have is (1) a budget (or weight factor), (2) a measurement of percent complete (which is used to determine the BCWP [BCWP = %C x budget]), and (3) the actual cost (ACWP). You just need to compare what you spent to the value of what you accomplished.

A Common Cost Measurement Mistake

There is a common mistake made in traditional cost performance analysis (non-EVA) where the actual cost is compared to the planned cost. This is fundamentally wrong. Just look at our example above. Following this flawed practice, the accountants might report that the cost performance is favorable (spent \$2400 against the plan of \$2500). However, only \$2000 of work has actually been accomplished. The ugly truth is that the item is both behind schedule and over budget. Without earned value, there is no valid performance analysis.

Trends are the Most Revealing

A report of a negative CV or SV should easily get our attention but may not always be a matter of great concern. What should sound the alarm is a continuing negative value or a CV or SV that is moving in the wrong direction. That's why I like to use the CPI and SPI. I plot these values against a time line. If the values are below "1.0" and fail to move back to this "par" value, then corrective action is indicated (or we acknowledge that the targets won't be met).



Summarize to Any Level

While the data can be collected at the task level of detail, analysis is usually performed a higher level. This is why it is so important to be able to summarize the data. We usually use a Work Breakdown Structure (WBS) to define the summarization hierarchy.

In the practical application of EVA, we roll-up the data to a reasonably higher level of detail. Then, when there are areas of unsatisfactory SV or CV, we can drill-down to the details of the suspect area to pinpoint the cause.

Segregate by Any Classification

The WBS and other task coding can also be used to segregate the data by any interest area. For instance, we can evaluate performance by location, performing craft, responsible manager, or any other classification that has been defined to the system.

As explained above, we can roll-up by classification, and then drill-down in the poorly performing areas. This supports a management-by-exception approach. By identifying areas that are outside of the performance targets, we can focus on finding causes and correcting such non-performing areas. This permits us to apply our resources where they will do the most good.

EVM: The Easy Way

That's it for a quickie overview of Earned Value. Just these few measurements, processed within a structured and consistent policy, can deliver significant benefits, even in a limited application of EVA capabilities.

Almost all CPM software has this EVA capability built in. You enter the basic planning and tracking data and all calculations and reporting are already programmed and available. If you are already entering such data, the EVA process takes no further effort.

Now that you are excited about EVM, I invite you to read more from the many sources, including those referenced at the start of this paper. You are also invited to discover more pragmatic approaches to Earned Value Analysis, which are covered in greater detail in my book, "Practical Project Management, Tips, Tricks, and Tools", John Wiley & Sons, 2002.

Postscript

There is a growing interest, recently, in Project Portfolio Management (see series of white papers on this website). A key component of PPM is improved management of the project pipeline. That is, we strive to review the performance of active projects against several criteria with the objective of possibly terminating those projects that no longer support the conditions upon which approval was granted. A virtually essential capability for such performance reviews is the process of Earned Value Analysis. The ability to monitor schedule and cost variances, in a consistent, structured manner, provides key data for performance review and removes personal biases from the evaluation.

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