

Leveraging Earned Value Management: What to count, and what counts when assessing project progress.

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Is your project on time? On budget? Do you really know? Developing accurate progress assessments is difficult as projects grow in size and complexity. Fortunately, the proven project management practice of calculating progress based upon original cost and schedule goals provides a consistent, logical, method for tracking and reporting cost and schedule status.

Introduction

“So, how’s it going?”

Whether you hear it in the hallway or in your regularly scheduled project review meeting, you’ve got a handful of stakeholders who want to know the latest news on your project. There are usually a variety of topics they want to hear about, but there are two questions that always get asked: “Will it be on time?” “Will it be on budget?”

There is another question they all have too, but may not be asking: “Do you really *know* how it’s going?”

Earned value is the proven project measurement method that answers all three questions.

Data Is Better Than Intuition

Why is this so important? Because many project managers don’t ever really know the truth about their cost and schedule performance until the project is almost over. For most of the project it can ‘feel’ good, and team members can be

upbeat in their assessments of whether they’ll meet their individual deadlines. But relying on the intuition of the project manager or team can lead to disaster, because as human beings our ‘gut feelings’ are subject to too many variables. That’s why your management and customer may be wondering if you really know the truth about your project’s cost and schedule status.

A Simple Example Makes It Clear

Now don’t get defensive. Put yourself in their shoes for a moment. Let’s take a simple example to see how this looks from an customer or owner’s standpoint. Imagine that you’ve got a lot of work to do to make your backyard beautiful and you are just too busy with work and family to do it yourself. So after laying out your design and getting bids, you engage a reputable landscaping firm.

The work consists of putting in a new lawn, pouring a concrete patio and building some raised beds for your garden. The bid was broken down in this way:

Landscape Project

Lawn	\$4000
Raised beds	\$4000
Patio	\$4000

The work is scheduled to be completed in 6 weeks, and you have agreed to progress payments of \$2000 per week. After two weeks a lot of dirt has been moved around and lumber has been delivered. The landscaper asks for a second \$2000 payment. You are nervous about the actual progress, but the landscaper promises you that things are going well, that the dirt movement will enable progress on the lawn, patio and beds the next week. The lumber will



be used to build forms and make the raised beds. “Oh yes, the work is easily 1/3 complete.”

The bid of \$12,000 had seemed to make sense. Breaking down the job into the primary products made it easy to understand and to compare this bid with other bids. But 1/3 of the way through the budget and schedule all you’ve got is a hollow feeling in your gut. What could have been done differently to give you more confidence that the project is 1/3 complete?

The answer is a technique known as earned value analysis (also called EVMS for earned value management systems). Earned value has been used for decades by project owners to ensure that progress payments have been earned – thus the name earned value analysis.

Breaking It Down: Three Steps to Earned Value Analysis

Earned value has a reputation for being complex, but it doesn’t have to be. We can apply the principles to our landscaping problem. The problem we face on this project is our concern that we aren’t getting our money’s worth for our progress payments. We don’t want to find out at the end of six weeks and six payments that the job still isn’t done. A detailed work breakdown structure and schedule will help us solve the problem.

Step One: Begin with a Detailed Plan

A work breakdown structure (WBS) decomposes an entire project into a *list of tasks*. Figure 1 shows twelve tasks for our landscape example. (Note that these are finite tasks, each with a beginning and end.) Further, once the landscaper has created this WBS we assign specific costs to each task. These estimated costs are seen under the column ‘Planned.’ Notice that in Figure 1 there is also a schedule associated with the tasks. This detailed plan will be our basis for gauging the performance of our landscaper.

Step Two: Capture Actual Progress During the Project

The landscaper has asked for weekly progress payments, so it makes sense that we can ask for weekly progress reports. The example in Figure 1 shows the actual costs incurred and progress after the first two weeks of the project. The columns labeled ‘Actual’ show the actual cost of labor and materials for work completed so far.

Step Three: Calculate Progress

On a small landscape project you intuitively know the answer to ‘how is it going?’ when you see the planned and actual costs. On larger projects (the kind your customer is worrying about) it is not intuitive. That’s where the earned value calculations provide a better understanding of both cost and schedule progress. Using our example, we’ll first assess

our cost performance, and then analyze the schedule progress.

Industry Standard Vocabulary Increases Value

The terms and formulas listed below have been in use for decades, and are public domain. More recently, the Project Management Institute has suggested revising some of this terminology. Many of the firms that use the rigor of earned value analysis are government contractors that use the traditional definitions endorsed by the National Defense Industry Association (NDIA). The definitions below include both, with the PMI definition provided in italics. These standards have enabled software developers to integrate earned value analysis in many popular project management software applications.

Assess Cost Performance

Are we on track to spend more or less than our budget? The following terms and formulas will help us answer that question.

Budgeted Cost of Work Performed (BCWP)/Earned Value (EV): The amount we had planned to spend on the work that has been accomplished to date. In our example, we have accomplished tasks 1, 2, 4, 6, 9, and 10. The original estimate for those tasks was 8000. So the BCWP at two weeks into the project is 8000. This is also known as the *earned value* – in other words, “what value has been earned so far?”

Actual Cost of Work Performed (ACWP)/Actual Cost (AC): The amount we’ve actually spent. The progress reports show the landscaper has spent a total of 8200 to date.

Cost Variance (CV): The difference between what we’d planned to spend and what we’ve actually spent on the work that has been performed so far. $CV = BCWP - ACWP$.
Example: $CV = 8000 - 8200$

Cost Variance Percent (CV%): This calculates the percent over or under your budget the project is to date. Divide the Cost Variance by the Budgeted Cost of Work Performed. $(CV\% = CV / BCWP)$. If this figure is negative, that is bad news. The project is over budget. In the example, the project is currently 2.5% over budget.
Example: $CV\% = -200 / 8000$

Analyze Schedule Progress

Getting an accurate understanding of schedule progress has traditionally been even more difficult than assessing cost performance. For instance, if a project is behind schedule, we want to know how far behind. If a project has one task behind by a week, that is clearly better than having five tasks behind by a week, but how do we accurately communicate that to our stakeholders? The formulas below allow us to use cost to accurately measure schedule progress.

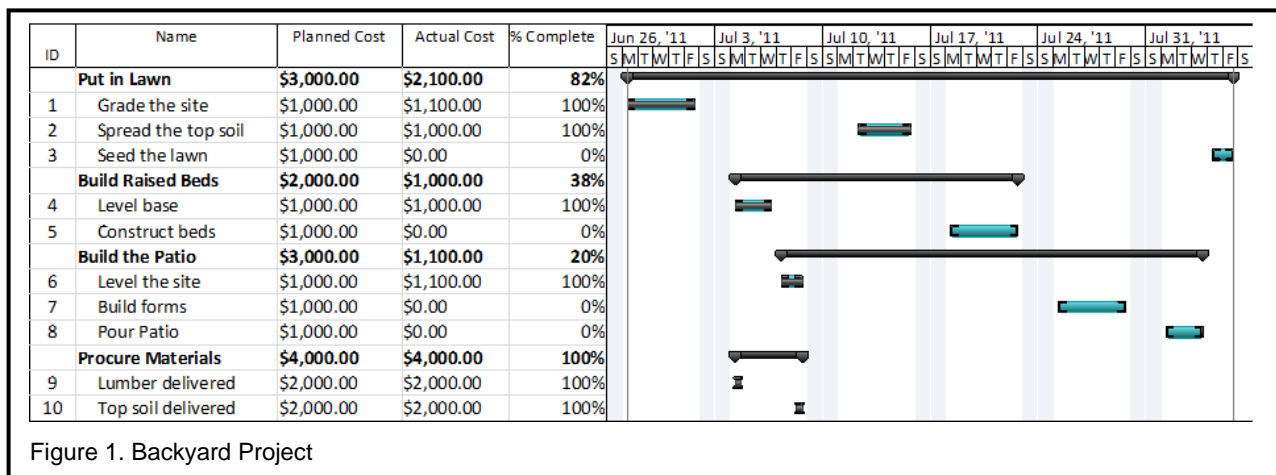


Figure 1. Backyard Project

Budgeted Cost of Work Performed (BCWP) Earned Value (EV): We used this in our cost analysis above. It is the amount we had expected to spend on the work that has been accomplished to date.

Budgeted Cost of Work Scheduled (BCWS)/Planned Value (PV): This is the amount we had expected to spend to date. In the example, the original schedule called for accomplishment of tasks 1, 4, 6, 9, and 10 within the first two weeks. The budgeted (planned) cost of that work was 7000.

Schedule Variance (SV): Here's where we measure schedule progress with dollars. Subtracting BCWS from BCWP tells whether you've accomplished more or less to date than you had expected. ($SV = BCWP - BCWS$) If the amount is negative, you are behind schedule. (As with the cost analysis, whenever the variance produces a negative number that is bad news.) Example: $SV = 8000 - 7000$

Schedule Variance Percent (SV%): How far ahead or behind schedule are you?
 $SV\% = SV / BCWS$. According to this calculation our landscaper happens to be 14% ahead of schedule. Example: $SV\% = 1000 / 7000$

Other Calculations

Using these basic terms and formulas it is possible to re-forecast the project completion date and the actual cost of the project. The sources at the end of this article provide additional formulas that provide different insights on the project.

Advantages of Earned Value Analysis

Why do we need this special form of project accounting? As the example shows, these calculations enable project managers and project owners a much more accurate view of project performance while it is still early in the project. That is important, because it is only BEFORE the money is spent that we have an opportunity to change our approach to the project. Here are two other advantages:

- Cost performance is not a cash flow comparison. Understanding a project's cash flow does matter, but it does not often provide an accurate understanding of cost performance. Comparing the amount of money expected to be spent during the first three months of a project to the money actually spent isn't meaningful if the project is either behind or ahead of schedule.
- Schedule analysis recognizes ahead of schedule performance. On projects with a lot of concurrent activities we find that some tasks are getting performed well ahead of schedule, even as others are performed late. The larger the project, the more likely this will happen (and therefore the more difficult it is to accurately understand schedule status). By comparing the total value of work accomplished (BCWP) with the value we had expected to achieve to date (BCWS) we see whether the overall project is ahead or behind.

The correct way to structure the WBS is to make each task finite, with a specific, measurable outcome.

The Most Common Earned Value Mistakes

We've used a simple example to demonstrate earned value analysis. Putting it to work on large projects is obviously going to be a little trickier. But you can be aware of two common mistakes that have tripped up many, many organizations in the past. Both mistakes are derived from the way the WBS is structured.

The correct way to structure the WBS is to make each task finite, with a specific, measurable outcome. That way a task can be started and completed. Sounds simple, right?

Here's the first mistake: set up your project with 'level of effort' planning. That means rather than having discrete tasks, you just create a category, such as 'design' or 'engineering' and allocate a certain number of people to it over a fixed period of time. In our landscape example this would be the equivalent of just saying 'labor' rather than having tasks on the WBS. Without discrete tasks we cannot see what work has actually been performed. So the only math we have available is cash flow. For our landscape example it would be like saying, "We said we'd have 3 people working for six weeks and so far we've had 3 people working for the first 2 weeks. So we are on budget and it's anybody's guess about schedule."

The second mistake is having tasks on the WBS that are so large that we can only guess partial completion from week to week. This typically happens on a large project where tasks are broken down, but aren't broken down far enough. If we report progress on a weekly basis, but people are working on tasks that are many weeks long, then at each status meeting they are

really only guessing their progress. That's the same problem we started with. When tracking schedule status the only thing we really know is whether the task is started and whether it is complete. In between those two points we are just guessing. Breaking our tasks down into smaller pieces solves this problem.

"So how's it going?"

Using our earned value analysis we see that the landscaper is sufficiently on target to justify our progress payments. Whether you have a cost-plus contract or a fixed price, whether your customer is in-house or external, the analysis we've performed provides an accurate view of progress for both cost and schedule.

Accurate status won't ensure projects are on time or on budget, but you will get an earlier warning when you have a problem. That can mean more time to solve the problem and probably more options for solving it. Finally, when you are asked the status questions you'll have the answers, and both you and your answers will have credibility.

Summary

When a complex project is under way it can be difficult to assess whether it is progressing on schedule and on budget. That can be true of small projects as well. Building a detailed plan provides a basis for calculating the cost and schedule performance of a project at any time, as long as accurate performance information is available. Earned value analysis provides a proven approach to calculating both cost and schedule performance.

Need some assistance?

If your team could use some help building plans, capturing actual performance information, or developing meaningful project reports, why not ask Eric Verzuh for help? He's available at 866-417-2290 and Eric.Verzuh@VersatileCompany.com.

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Eric Verzuh is the author of [*The Fast Forward MBA in Project Management*](#), ranked by Amazon.com as the #1 selling project management handbook. He is the founder and President of The Versatile Company, a project management training and consulting firm.