A Common Sense Approach to Earned Value

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Most project managers see Earned Value (EV) as something required for the PMP exam and really only applicable to large government projects. The derivation uses obscure cost graphs, and just thinking in terms of cost is confusing. For example: six people for six months is something all PMs can understand; $600K, which is the total cost at $100/hr, has no intuitive meaning. By converting time and resources to dollars, much vital information is lost. Thus, because they don’t fully understand it, EV is not a standard tool in their toolbox.

This is unfortunate because EV is in fact very useful and easy to use. To see this we’ll look at what I call a common sense approach to EV, which is easier to understand than the dollars and cents approach typically used.

Let’s look at a simple example

Assume we have a project with 8 tasks, where each task is planned to take one week and there is one resource assigned to do all of the tasks. As planned, it should take 8 weeks. Now suppose, at the end of the second week, our resource has been working full time but has only completed 60% of task 2. We can show this status graphically:

![Timeline for Scenario 1](image)

Note the three parameters that are required to give us an accurate picture of where we are:

- **Planned Progress** is our original plan.
- **Actual Work** is the amount of work performed by our resource.
- **Actual Progress** measures where we are according to our original plan. It links the actuals to the plan.

Since we have completed Task 1, which was planned to be 5 days, and 60% of Task 2, also a 5 day task, we can calculate our three values:

- Planned Progress = 10 days
- Actual Work = 10 days
- Actual Progress = 8 days

Two things should be evident from the graph and from these numbers:

1. Productivity is less than what was assumed when the schedule was put together; and
2. Progress is less than originally planned

To quantify this we can define two parameters that gage productivity and progress:

\[
\text{Relative Productivity} = \frac{\text{Actual Progress}}{\text{Actual Work}}
\]
Relative Progress = \frac{Actual Progress}{Planned Progress}

Based on our tracking data to date, these are:

Relative Productivity 80%
Relative Progress 80%,

The data is telling us that productivity is 80% of what was planned. What this implies is that to finish the project will require 25% more effort, and, if no additional resources are applied, the project will take 25%, or 2 weeks longer. So, realizing that our original estimate was just that – an estimate, we can see how to use actual project data to recalibrate our original estimates.

These numbers are extremely useful, and are the focus of this paper, but before we blindly update our estimates we should look at this data as a red flag telling us that **unless we do something different**, our project will take 25% longer to finish. Before telling your stakeholders or your management the bad news, you should work with your team to see if you can improve productivity.

So after you understand what you can do, then you can either use the predictions or modify them based on new understanding.

**But the Real Work is More Complex Than That**

Let’s next consider a more complex situation where our resource has only been able to work 80% of what was originally planned, essentially 4 days per week. At the end of week 2 she has completed Task 1 and 30% of Task 2. Our new timeline would look like this:

![Figure 2: Timeline for Scenario 2](image)

Here we can update our parameters:

Planned Progress 10 days,
Actual Work 8 days
Actual Progress 6.5 days
Relative Productivity 81%
Relative Progress 65%,

In this case, both the reduced productivity and the reduced availability impact Relative Progress. Now the project will take about 50% longer than planned. (To be precise, the inverse of 65% is 1.54, but these are rarely precision calculations, so I would round this to 1.5 which is 50% longer.)
My Scheduling Software Can’t Do This: EV to the Rescue!

The two simple calculations, Relative Productivity and Relative Progress, provide quite a bit of useful information, but are not provided by standard scheduling software. However, Microsoft Project, and I’m sure many other scheduling tools, provide EV calculations; and two of the EV parameters are equivalent to Relative Productivity and Relative Progress. To understand this we have to briefly discuss costs.

Project managers are more comfortable dealing with work, but given an hourly rate work can be converted to cost. In fact, we can present the three cost parameters that EV monitors – Planned Value, Earned Value and Actual Cost – directly in terms of our three work parameters:

\[
\begin{align*}
\text{Planned Value ($)} &= \text{Planned Progress (hrs)} \times \text{Rate ($/hr)} \\
\text{Earned Value ($)} &= \text{Actual Progress (hrs)} \times \text{Rate ($/hr)} \\
\text{Actual Cost ($)} &= \text{Actual Work (hrs)} \times \text{Rate ($/hr)}
\end{align*}
\]

Here units are associated with each parameter.

With these three parameters, EV defines two very useful ratios – the Cost Performance Index (CPI) and the Schedule Performance Index (SPI):

\[
\begin{align*}
\text{CPI} &= \frac{\text{Earned Value}}{\text{Actual Cost}} \\
\text{SPI} &= \frac{\text{Earned Value}}{\text{Planned Value}}
\end{align*}
\]

But, when we take the ratios the ($/hr) will cancel out, so we can say:

\[
\begin{align*}
\text{CPI} &= \text{Relative Productivity} \\
\text{SPI} &= \text{Relative Progress}
\end{align*}
\]

Therefore, if we’re using a scheduling tool that performs the EV calculations, we have the information we need.

To use Earned Value, it is important to do three things:

1. Assign an hourly rate to each resource
2. Baseline the project
3. Track actual start, actual work and remaining work for each task – don’t just fill in % complete

The baseline is essential as it represents our original plan; also, any assessment is meaningless if we do not accurately track our schedule.

When to do EV analysis?

Large government programs have a cadre of professionals to generate the monthly EV reports. However, reviewing the EV data at just a few critical points in your project can provide tremendous insight with minimum work. I first look at EV data when I’m about 25% done with my project. EV is about statistics, and by then the statistics that describe your project are established. So your numbers are meaningful. In addition, you still have time to do something about them if there is a problem.

Project level numbers are useful but these can be difficult to interpret because there are multiple resources with different productivity and availability. So I like to look at CPI and SPI for individuals and also for deliverables. Then I can see where my major problem areas are. If you built your schedule from a WBS, it should be organized by deliverable. Your scheduling software should then roll up the data for each deliverable. In Microsoft Project you can also group by resource and then the EV calculations will roll up to the resource level.
So the next time you hear “Earned Value” don’t think PMP exam or useless drudgery. Rather think:”Wow, this stuff is really useful! And it’s so easy.”

Vincent McGevna has over 25 years of engineering project management experience, managing cross-functional engineering and manufacturing teams developing software, electronics and mechanical hardware for the semiconductor, aerospace, telecommunications, nuclear power, and TV industries.

Vince has been using Microsoft Project for almost 20 years, and is an expert in the use of Project as a planning tool.

The Schedule Centered Planning approach evolved while Vince was managing many challenging projects. It is not radically new, but it is unique since it focuses on the fact that a properly created schedule must reflect all other aspects of planning. During this time, his use of Microsoft Project evolved and expanded to make it a useful, stand-alone project management tool.

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