**Schedule Variance Example**

Let's examine an example of writing a document as part of a larger project. To keep the example simple, here are the document project characteristics:

* The document is to have 10 chapters of 10 pages each.
* Each chapter is expected to need two and a half days to complete.
* One person is the author.
* Each chapter has a budget of $5,000.
* The total schedule is five weeks (10 chapters at two and one-half days each).

As a refresher, remember the following:

* actual cost of work performed (ACWP or more recently AC)
* budgeted cost of work performed (BCWP or more recently EV)
* budgeted cost of work scheduled (BCWS or more recently PV)
* cost performance index (CPI)
* schedule performance index (SPI)

At the end of week two, the planned schedule calls for completion of four chapters. Achieving that target earns $20,000 (BCWS = PV = 4 x $5,000). If the author has only completed three chapters, however, the amount earned through actual performance is $15,000 (BCWP = EV = 3 x $5,000). So, at the end of week two, the schedule variance (in terms of dollars) is –$5,000 (BCWP – BCWS = EV - PV) = $15,000 – $20,000). This, without looking at the milestone schedule (Gantt chart), states that the author is $5,000 behind schedule—the equivalent of one chapter. This example points to the documentation requiring a schedule extension of 1-2/3 weeks.

BCWS over BCWP 5 5timesas originally scheduled

Formula 2.

If this sub-project is not on the critical path, then there might not be a scheduling problem. If the one and two-thirds weeks are not available, then the project manager needs to develop a recovery plan (e.g., overtime). There is more to consider, however. What is the cost variance? *Knowing where to look and what to look for puts you into a strong position to determine what really needs to be done and to make the right decisions.*

**Cost Variance Example 1**

Let's expand the example. To examine the cost variance, we need more information:

* The contract is "time and materials."
* The author charges $2,000 per day.
* The total amount of money budgeted for the documentation: 5 weeks at 5 days per week).

At the end of week two, the author has charged $20,000 (ACWP = AC= 10 days $2,000 per day). The customer budgeted $15,000 for the completion of the three chapters (BCWP = EV = 3 chapters $5,000 per chapter). The cost variance, consequently, is –$5,000 (BCWP – ACWP = EV -AC = $15,000 – $20,000) the equivalent of overrunning costs by one budgeted chapter. Continuing at the same pace will require a budget increase (cost overrun) of $16,667 for the documentation project:

Formula 3

Formula 4

Replacing the author will cost more schedule time as the new author learns about the requirements and material that go into the document. Perhaps the three chapters done so far have been more difficult than expected, but the remaining chapters are much easier. These are the issues for the project manager to explore and develop solutions. *Knowing where to look and what to look for puts you into a strong position to determine what really needs to be done and to make the right decisions.*

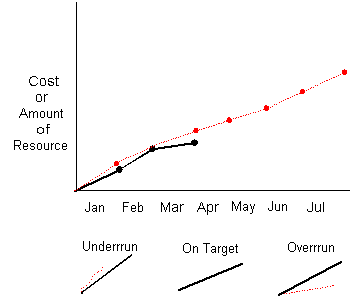
**Cost Variance Example 2**

Let's look at a different cost scenario. It's the same documentation and schedule performance except that the author has charged $15,000 for the three chapters (ACWP = AC = $5,000 for each of 3 chapters). The cost variance is zero (BCWP – ACWP = EV - AC = $15,000 – $15,000). There is no cost impact. The project manager probably does not have to do anything to address the cost. There still could be a schedule issue, however.

**Cost Variance Example 3**

Let's look at another cost scenario. It's the same documentation in schedule performance, except that the author has charged $10,000 for the three chapters (ACWP = AC = $10,000). The cost variance is $5,000 (BCWP – ACWP = EV - AC = $15,000 – $10,000). The project is under running by $5,000 at this point. The project manager might be able to release $16,667 back to the customer or enhance the profit for the project accordingly:

Formula 5

.

The project manager might want to check the original estimates for reality.

* Has there been a breakthrough in the documentation process?
* Does the documentation satisfy the contract requirements?

The important issue with these examples, as it will be with your projects, is identifying a problem area, assessing the impact, and deciding what to do - if anything. Another consideration is to expand the cost and schedule variance calculations to include all cost resources—not just labor.

**More on Cost and Schedule Variances**

Some companies and governmental agencies express cost variance as a positive figure (ACWP – BCWP = AC - EV), whereas others expresses it as a negative figure (BCWP – ACWP = EV - AC). It is essential that you are compatible with *your* customer's standard for calculating variances. Remember that BCWP (EV) refers to the *budgeted* cost of the work *actually* performed (money earned) and that ACWP (AC) refers to the amount of money actually spent (i.e., wages) to complete the work in a given period. In other words, a worker's wages might be higher than was actually budgeted—for example, a contract worker.

Some problems can't be detected at the aggregate level; conducting an earned-value analysis at the work package level is needed to truly evaluate the overall state of the project. It also helps to isolate where opportunities and problems are.

An approach that provides separate visibility of cost and schedule performance is to plot cost and schedule performance indexes. The ***cost performance index*** (CPI = BCWP/ACWP = EV/AC) shows a normalized relationship between budget and actual costs. The ***schedule performance index*** (SPI = BCWP/BCWS = EV/PV) shows a normalized relationship between actual and planned schedules. It is necessary to establish threshold levels for each index to trigger a more detailed inspection. For example, up to a 1 percent variance might be acceptable. A 1 percent to a 5 percent variance ought to signal that there are issues that need attention. Trends towards the threshold values also signal a need to examine more detailed tasks. A variance higher than 5 percent points to a disaster in the making.

The charts in figure 1 indicate that all is well during the first four weeks. Then something is showing up terribly amiss. The actual cost performance is plummeting compared with the expected costs. The schedule performance appears to be running well ahead of expectations. A general conclusion is that the work has been accelerated. This could cause a cash flow problem for the customer. This situation needs discussion with the customer to slow the project or reschedule to reflect the faster pace - and get the customer's concurrence with what you are doing.

**Figure 1—CPI and SPI**

