

BEYOND EARNED VALUE: A Better Practice for Monitoring Project Performance

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Introduction

“**Earned Value**” (EV) has been around since the 1960’s as an effective Method for monitoring and managing project performance during implementation and because of its ability to assess *Time, Cost and Quality* in an integrated manner, EV is undoubtedly significantly superior to antecedent approaches. EVM adoption and utilization was slow at first but following endorsement by the international Project Management Institute (PMI®) as a “Best Practice” and inclusion in PMI’s Project Management Body of Knowledge “PMBOK® Guide,” demands to use EVM have escalated dramatically in recent years. Nevertheless many project managers and their stakeholders are still not using the Earned Value Method (EVM), and are reluctant to adopt it, or if using it are failing to obtain full benefit from EV analysis.

There are *three prime reasons* for this poor follow-through and under-utilization. First, many people (including users) are still simply *unclear what exactly EV is*. Second, they are often *confused by so many EVM indicators & cryptic equations*. Third, *EVM provides no guidance how to consistently integrate Earned Value indicator results for best effect*. Thus, with inadequate project status analysis, many inappropriate conclusions are drawn, flawed recommendations made, and undesirable outcomes continue to occur.

Earned Value is without a doubt the “Best Practice” for integrated monitoring of project implementation performance. Unfortunately, it is not very “user-friendly!” In preparing for PMI’s Project Management Professional (PMP) exam, Earned Value is one of the most difficult topics to tackle, and the biggest obstacle to overcome. However, the following three steps outline a quick & easy approach to understanding and using Earned Value.

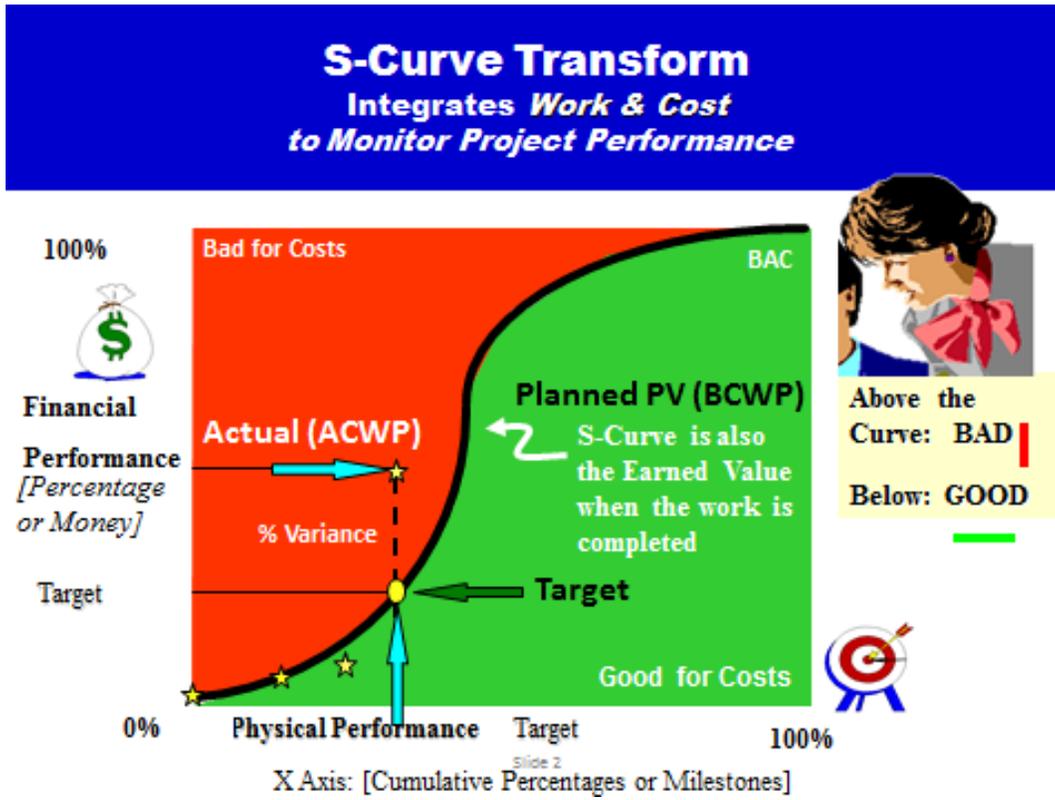
1 -- Understanding Earned Value (EV)

First, a clear definition of Earned Value, and what it is not. Earned Value is how much was originally budgeted to complete an activity (or milestone), *regardless of when it is (or was) actually completed* -- with the caveat that the “Value” is only “Earned” when the work is completed.¹ Earned Value is an indicator in monetary form, but Earned Value is NOT “Real” money.

A picture is worth a thousand words, as the Cost vs. Work “S-Curve” *Transform* chart in Figure 1 below clearly shows.

¹ NOTE: There are some applications of Earned Value -- particularly in the construction industry -- that equate Earned Value to the *Percentage of Work Completed*. However although such computations are easy to calculate, they tend to defeat the objective of obtaining a usable end product, or attaining an operational end objective.

Figure 1
The S-Curve Transform



The S-Curve above depicts the cumulative cost planned for the cumulative work – i.e. the Planned Value -- for each increment of work over the project life. At any point in time (as depicted by the stars) the cumulative incremental Actual Cost is shown. The Earned Value is the intersect of the cost and work on the curve for the cumulative amount of work completed (shown in Figure 1 above as the “Target”). The Planned Value for the time period can be read directly on the curve. **Thus the S-Curve Transform chart clearly shows exactly what Earned Value is.** Furthermore, the chart is useful for the entire life of the project.

2 – Key Indicator Identification, Classification, Prioritization and Performance Metric

There are Four (4) primary “Driver” Indicators in the Earned Value Method (EVM), from which the other sixteen (16) are derived:

- Three (3) Monetary Indices
- Five (5) Monetary Values
- Five (5) Percentages
- One (1) Scheduled Date, and
- Two (2) Estimated Project Completion Dates

... each with cryptic acronymic equations to compute the actual values – such as:

$$\begin{aligned} \text{Cost Variance } \$ (CV) &= EV - AC \\ \% \text{ Cost Variance} &= CV / EV \\ \text{Schedule Variance } \$ (SV) &= EV - PV \\ \% \text{ Schedule Variance } \$ &= SV / PV \dots \text{ to cite only a few.} \end{aligned}$$

While each EVM indicator is useful in its own right, attempting to assess the total impact of all sixteen -- and how best to use them -- can be bewildering.

Fortunately, only three of the four “Drivers” – *which we have already encountered* -- are the keys to understanding and utilizing “Earned Value Analysis” to assess current status:

1. *PV = Planned Value [Also known as the Budgeted Cost of Work Scheduled, BCWS or BS]* The amount originally Planned to be Spent for the Work originally Scheduled to be Done to Date
2. *AC = Actual Cost of Work Performed, ACWP or AP* The amount Actually Spent for the Work Actually Done to Date *Regardless Whether or Not it was Planned &/or Scheduled*
3. *EV = Earned Value [Also known as the Budgeted Cost of Work Performed, BCWP or BP]* The amount originally Planned to be Spent for the Work Actually Done to Date [i.e. PV: The Baseline Work Budget]

The Actual Cost and Earned Value can be ...

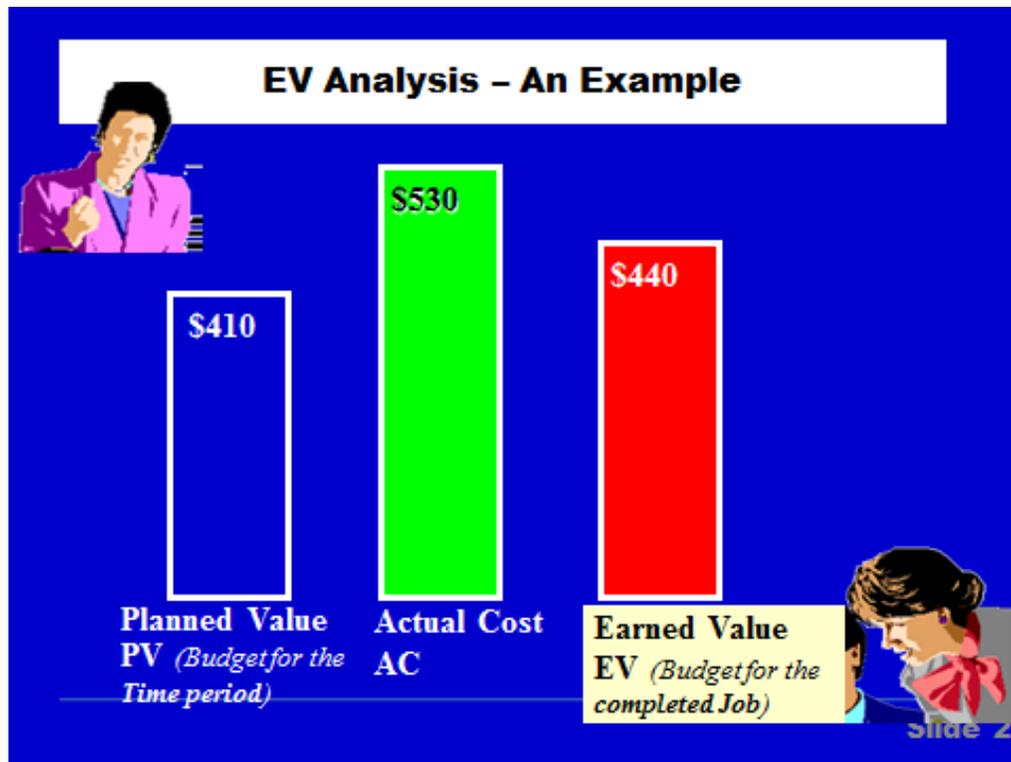
1. *Less than* (<)
2. *the Same as* (=), or
3. *Greater than* (>)

... the Planned Value.

The fourth driver, BAC [= *Budgeted Cost at Completion*, i.e. the Amount originally Planned to be Spent for the Total Project] is essential for forecasting cost and schedule under-runs or overruns.

The key to knowing a project’s status at any point in time during project implementation is the juxtaposition of PV, AC and EV. For example (as shown in Figure 2 below)

Figure 2
Earned Value Analysis: AC and EV Compared with PV



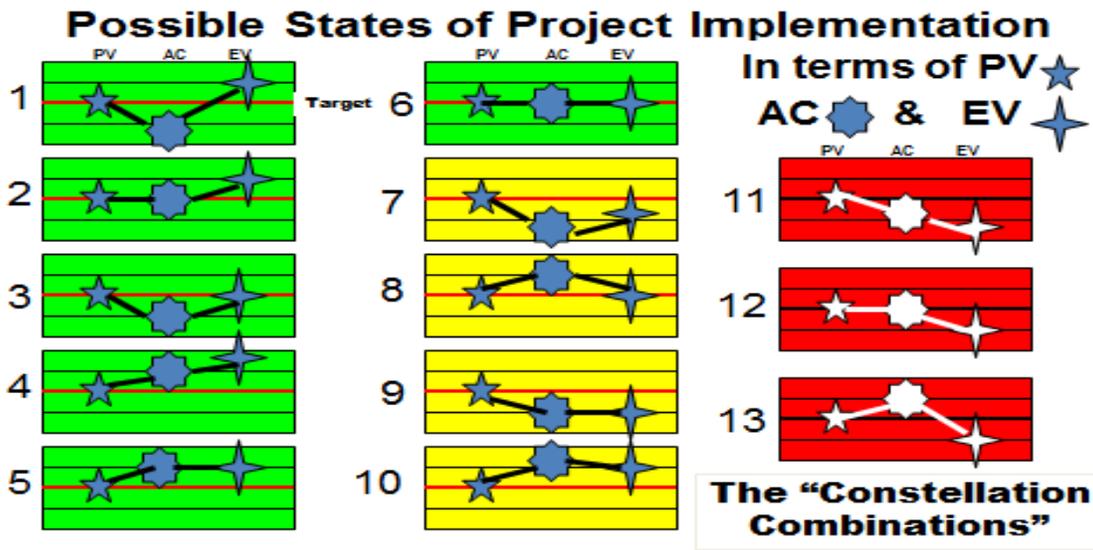
1. Cumulative Actual Costs “as of” the schedule are greater than the Planned Value. This indicates a potential problem if funds are released incrementally.

2. Cumulative Actual Costs for the work successfully completed – i.e. the Earned Value -- are also greater than planned. This indicates an actual Cost Overrun.
3. However, since the Earned Value is also greater than the Planned Value as of that date, this indicates that the Project is Ahead of Schedule.

Disregarding actual monetary amounts, during project implementation thirteen (13) different comparative rank-ordered PV, AC & EV “Constellation” combinations are possible. Six (6) of these scenarios are “Good”; Four (4) are “Mixed” while Three (3) are “Bad.” Rank-ordering the actual array of Project Status scenarios for each alternative provides a new 13 point Project Performance Index.

Furthermore, because they can be classified as either “Good” “Mixed” or “Bad”, these 13 status possibilities also systematically highlight the respective status in a tricolor “traffic light” system, as shown in Figure 3 below.

Figure 3
Thirteen (13) Possible Project Status “Constellation” Combinations



These “constellation combinations” are essentially a “Rosetta Stone” to quickly and easily identify, monitor and prioritize project implementation performance status. [Although the other seventeen indicators may be useful from time to time to analyze specific issues, **most of the benefit to be derived from Earned Value can be obtained from these three indicators**, rather than wallowing in the entire package of possible indicators. Essentially, *in this case* a “rifle” is better for determining project status than a “shotgun” approach.]

The thirteen color-coded and rank-ordered conditions (*with illustrative monetary data*) are summarized in Figure 4, below.

Figure 4
Integrated Project Performance Indices (PPI)
for Assessing a Project’s Implementation Status Condition (PSC)

Situation # [PPI]	Planned Cost PV BCWS	Actual Cost AC ACWP	Earned Value EV BCWP	Project Status Condition: PSC
1	\$100	\$80	\$120	Good. Work is ahead of schedule & cost savings.
2	\$100	\$100	\$120	Good. Work is ahead of schedule & cost savings.
3	\$100	\$80	\$100	Good. Work is on schedule, with cost savings.
4	\$100	\$120	\$140	Good. Work is ahead of schedule, with costs savings. <i>[But may have a cash flow problem if funds are released incrementally.]</i>
5	\$100	\$120	\$120	Good. Work is ahead of schedule, with costs as planned for work done. <i>[But may have a cash flow problem if funds are released incrementally.]</i>
6	\$100	\$100	\$100	“Ideal”. Everything going according to plan – On Schedule & Spending. <i>[Extremely Rare!]</i>
7	\$100	\$60	\$80	Mixed – Good & Bad. Saving money on the work performed; but work is behind schedule.
8	\$100	\$120	\$100	Mixed – Good & Bad. Work on schedule, but cost overrun incurred. <i>[May have a cash flow problem if funds are released incrementally.]</i>
9	\$100	\$80	\$80	Mixed – Good & Bad. Spending as planned; but work is behind schedule.
10	\$100	\$140	\$120	Mixed – Good & Bad. Work ahead of schedule, but a cost overrun has been incurred. <i>[May have a cash flow problem if funds released incrementally.]</i>
11	\$100	\$80	\$60	Bad. Spending is slower than planned, but the Value is low — indicating a cost overrun; and the work is also behind schedule.
12	\$100	\$100	\$80	Bad. Although the spending rate is as planned, since the Value is low, there is a cost overrun; and the work is also behind schedule.
13	\$100	\$120	\$80	Bad. Work behind schedule, cost overrun <i>[and possible cash flow problem.]</i>

Despite the plethora of other indicators and possible analyses in the Earned Value Method, the 13 point Project Performance Index encapsulates the overall status (and over time, the project implementation trend) -- somewhat akin to Wall Street’s Dow Jones Industrial Index -- for a project manager to present for *stakeholder review, assessment, and redress* — *if necessary and feasible*.

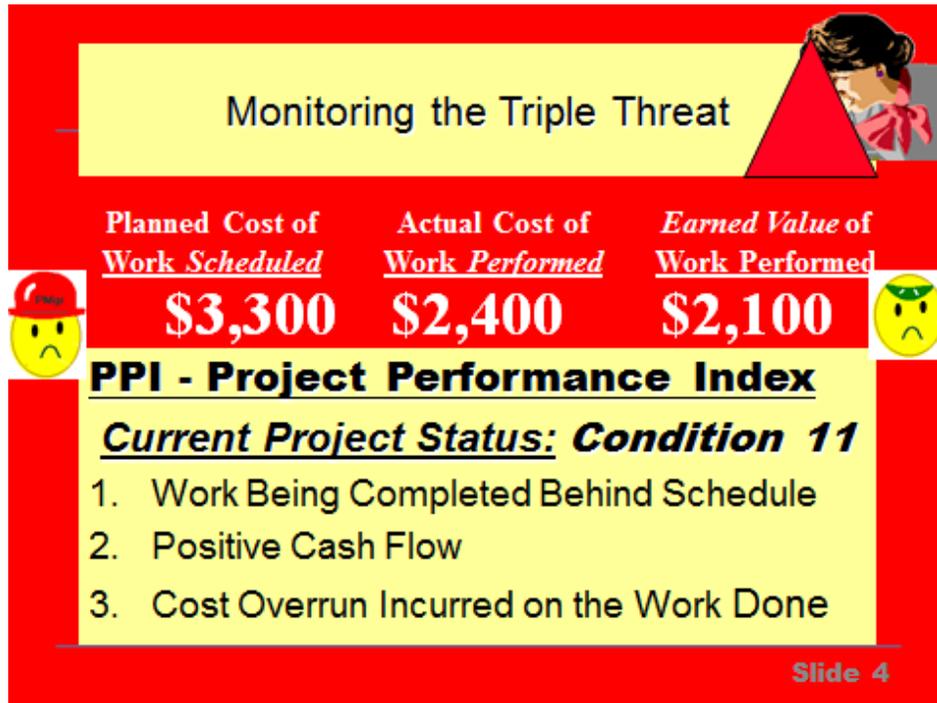
3 – Computer-assisted Support System

Quantitative data is essential to effectively manage project performance, but number-crunching is the bane of many project managers and their staffs. Furthermore, even given formulas appropriate for particular situations and circumstances, computing such data is not very efficient. Instead it is labor-intensive, time-consuming and prone to error.

Three “Quick & Easy” computer-assisted tools overcome this barrier.

EVA-2006 is a dedicated program that calculates all EVM indicators (and in addition to US\$, another monetary indicator in a currency of your choice), and presents the results in a table for whatever further use is desired. It also displays project status in several graphics. The following format illustrates the graphic presentation for one such condition.

Figure 5
 Summary Status Chart
 EVA-2006 (Project Management Tool Kit # 65)



The comparative graphic shown in Figure 2 is also presented in EVA-2006, together with a tri-color performance “quadra-graph” and a one page Executive Summary, shown in Figures 6 and 7 below.

Figure 6
 Summary Tri-Color Quadra-Graph Status Chart
 EVA-2006 (Project Management Tool Kit # 65)

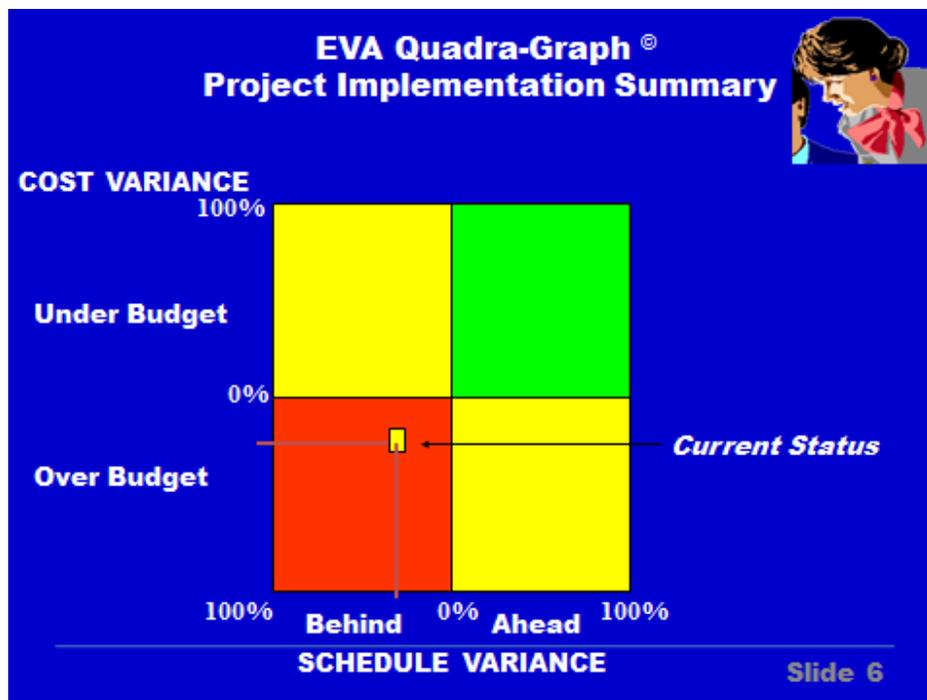
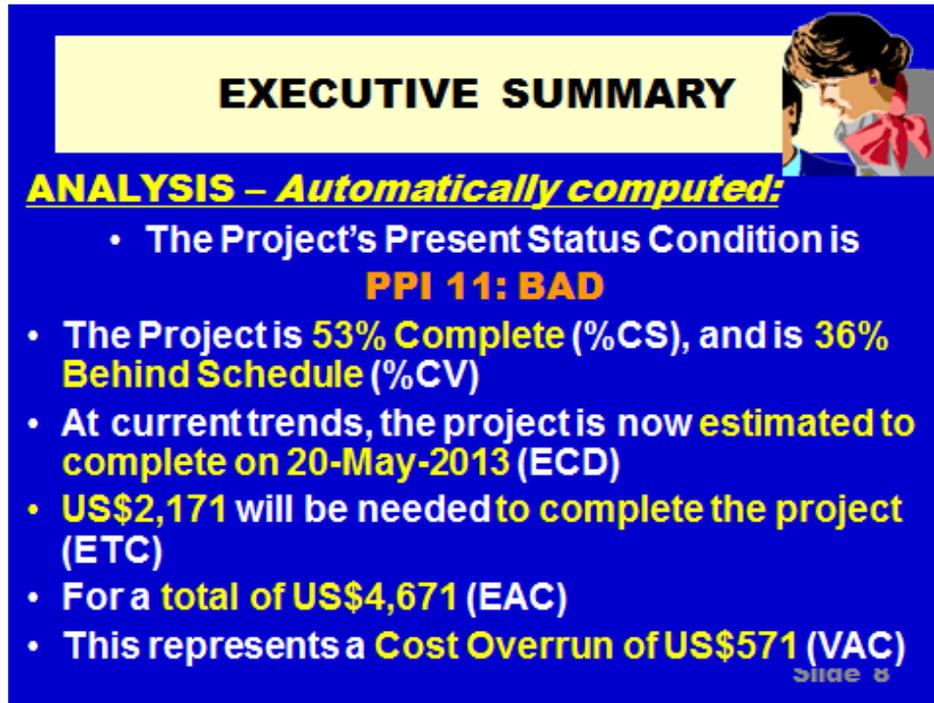
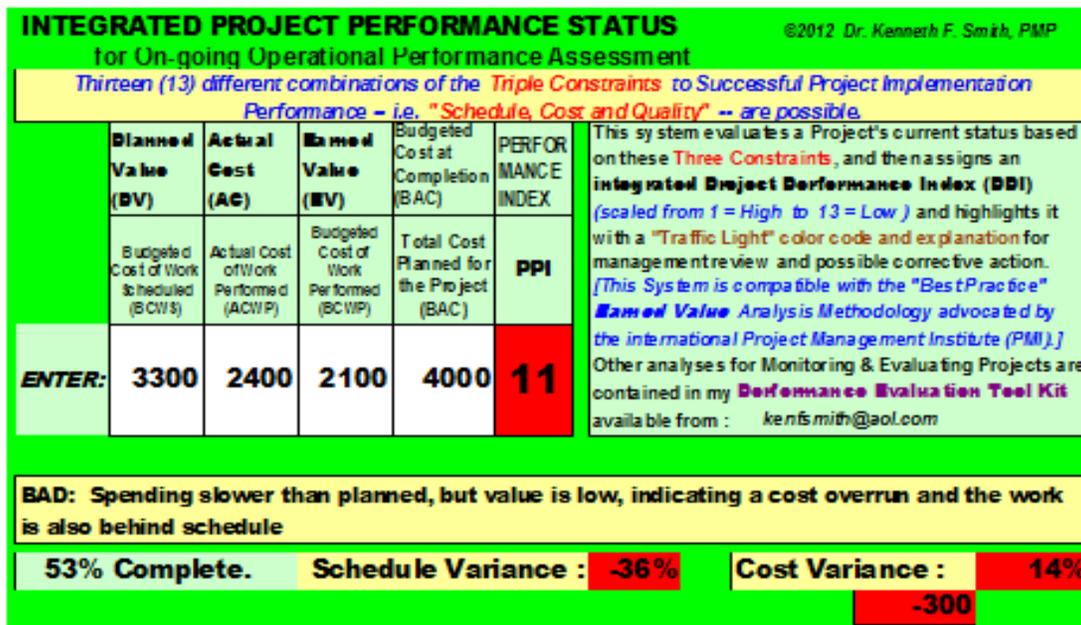


Figure 7
Executive Summary Chart
EVA-2006 (Project Management Tool Kit # 65)



A Project Integrated Performance Excel worksheet template computes and summarizes the project status and performance highlights – i.e. the 13 point Project Performance Index, with related criteria as the basis for the assessment, plus key statistics -- the percentage of completion, schedule and cost variance.

Figure 8
Project Integrated Performance Status
Project Management Tool Kit #66



Another Excel worksheet – **Project, Portfolio and Program System** computes and summarizes the status of each project in a portfolio or program – whether or not they are related -- using the **Project Performance Index**, as well as the overall summary status of the program or portfolio.

Figure 9
Project, Portfolio and Program System
Project Management Tool Kit #67

PROJECT PORTFOLIO & PROGRAM PERFORMANCE SYSTEM ©										
for On-going Operational Performance Assessment										
"Organization Name"			PORTFOLIO PERFORMANCE INDEX				Thirteen (13) different combinations:			
Location			AVERAGE				40%	GOOD	assigns a status with (NOTE: 1 adequate for entire #1000.0)	
5	#NAME?		As of:	July	MIXED - Good & Bad: Saving money on the work p					
TOTAL Portfolio/Program COST		342	375	314	2400	16% Total Budget Spent to D				
To change the number of projects, Enter the number of Active Projects in cell B-5, above. You can then OVERWRITE Columns C-10 to H-509; If you need FEWER lines. DELETE Cells from the UNUSED rows in Column C through I-509; HOWEVER, DO NOT DELETE THE ROWS!! ALSO You Must adjust the number of active projects in Cell B-5.								13% Work Accomplished t		
Line #	Project #	Project Title	Planned Value (PV)	Actual Cost (AC)	Earned Value (EV)	Budgeted Cost at Completion (BAC)	PERFORMANCE INDEX	WARNING IF RED	PROJECT MANAGER	PERFORMANCE STATUS
B	C	D	BCWS: Budgeted Cost of Work Scheduled	ACWP: Actual Cost of Work Performed	BCWP: Budgeted Cost of Work Performed	BAC: The Total Cost Planned for the Portfolio / Program / H	I	TOTAL COST OVER-RUN		
1	101	Anoyan	18	30	18	100	8		KEN	MIXED - Good & Bad: Work is
2			100	100	120	500	2			GOOD: Work is ahead of sche
3			100	90	100	700	3			GOOD: Work is on schedule &
4			44	66	56	600	10			MIXED - Good & Bad: Work af
5			80	89	20	500	13			BAD: Work behind schedule, c
6										#N/A
7										#N/A

PROJECT MONITORING & EVALUATION

The Project Manager’s monitoring responsibility goes beyond obtaining and “crunching” numbers, ratios, indices and percentages derived from the **Earned Value** indicator drivers. *The data should also be presented in an easy-to-understand format. If there is a significant variance in the Project Status Condition from the Plan [as indicated by the Project Performance Index (PPI)] — i.e. one of the twelve situations other than #6 (the “Ideal”) — it should be readily recognized; the issues reviewed, and possible courses of action determined.* The aforementioned software and Excel templates in the Project Management Toolkit both crunch numbers and present status results. The toolkit items are all "drop-in-the-data" and "read the analysis" type programs, so no knowledge of the underlying formulas -- or "number crunching" -- is necessary. Furthermore, **no new collection effort is required to obtain on-going Earned Value performance data.**

CONCLUSION

Earned Value methodology provides many different indicators for measuring project implementation performance, and they are relatively easy to compute. However, the sheer *number* of indicators tends to generate confusion amongst project practitioners and stakeholders. Furthermore, since each indicator analyzes the project from a different perspective, there is no consistent **“One Best Way”** to guide reviewers in the use and interpretation of these indicators during periodic project reviews. **The Project Performance Index described herein, coupled with succinct graphic and computational software fulfills that need with a consistent “Quick & Easy” systematic approach.**

About the Author

Ken Smith is a member of PMI, IPMA & *asapm*, and an independent project management consultant with many years of experience. He was formerly a management systems specialist, project manager and advisor with several agencies of the US Government and the international development donor community -- *i.e. the World Bank Group, the Asian Development Bank and the U.S. Agency for International Development (USAID)* -- for developing country government projects. Ken now conducts workshop/seminars in various aspects of project management, monitoring and evaluation. Ken developed the innovations described in this article, and the EVA-2006 software and Excel Templates for computing and displaying the indices are contained in a *Project Management Toolkit* -- available from kenfsmith@aol.com

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