

MONITORING PROJECTS MORE EFFECTIVELY: What the PMBOK Doesn't Tell You about Earned Value!

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This article highlights why project financial assessment is so prone to errors during project monitoring, and illustrates a better practice for applying earned value to analyze & reporting project schedule and cost data quickly and accurately.

As a project manager, during implementation you are expected to monitor and report three essential items of information on the project's status:

1. Overall Status – Percentage of project completed
2. Current Schedule & Budget Status – Whether “on,” “ahead” or “behind” the planned schedule, and “on,” “under” or “over” the budget. [If ahead or behind, under or over – also by how much.]
3. Forecast when the project will most likely be completed, and its estimated cost at completion.

But did you know that during implementation thirteen (13) different scenarios of the current status are possible? If so, you are amongst the very few “in the know,” as most project managers do not!

Project status information is frequently analyzed and depicted against the project's planned schedule with two separate “S-Curves” as follows:

FIGURE 1 -- Work vs. Schedule

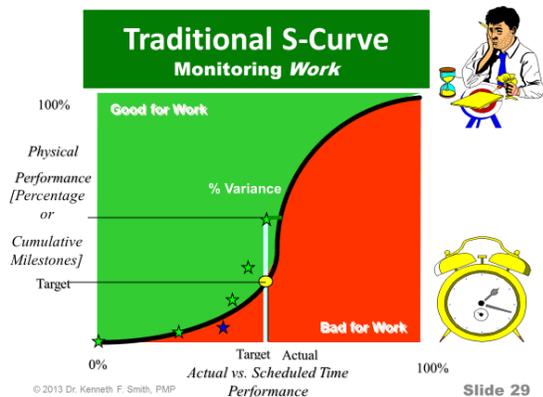
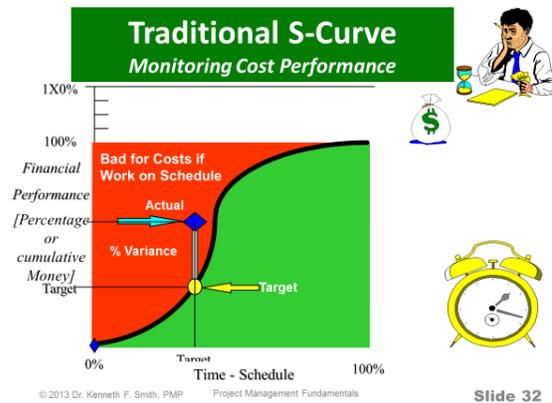


FIGURE 2 -- Cost vs. Schedule



By comparing the percentage of milestones “completed” vs. the project's total milestones as well as those scheduled to be completed to date, both the project's overall physical schedule status and current variance can be quickly, easily and effectively assessed; and -- to a lesser extent -- its completion date can be forecasted based on the rate of completion to date.

But did you know that monitoring and forecasting financial performance in a similar manner – as depicted in Figure 2 above -- is inaccurate most of the time? If so, again you are amongst the very few “in the know,” as most project managers do not!

Read on if you want to know:

1. Why project financial assessment and reporting is so prone to errors
2. What the thirteen project implementation status situations are, as well as
3. A better practice for analyzing & reporting project schedule and cost data quickly and accurately.

1. Why Project Financial Assessment is so Prone to Errors

While Cost vs. budget data for a particular time period is relevant for establishing baseline budgets, unless the project's physical 'Current Status' is 'On Schedule' -- which occurs in only three of the thirteen possible status situations -- comparing the actual Cost vs. Schedule is replete with error. This is because the budget was for completing specific amounts of work. Thus, when the work is actually done is immaterial. Cost Variance is only of concern for the project manager when the cost of work exceeds -- or underruns -- the budget for accomplishing that work.

For instance, if project work is to be performed ahead of schedule, it is highly probable that funding related to its accomplishment will need to be concomitantly accelerated. Similarly, if the project is behind schedule, most likely the funds budgeted for its attainment will not yet have been drawn down. Therefore, rather than variance from the schedule, "actual vs. budgeted costs" should reflect the cost for the budgeted work accomplished.

However financial managers tend to ignore the fundamental reason for the cost estimate -- as being related to work accomplished -- and focus only on the pre-planned 'burn rate' based on the planned schedule, as depicted by the traditional S-curve.

Consequently, by using the wrong metric, inaccurate assessments of the financial aspects are made in most project implementation scenarios; which -- unless successfully rebutted -- tends to trigger inappropriate executive management decisions and action!

Integrating schedule with cost data is the essence of the Earned Value Method (EVM), and the 'Earned Value' indicator is the budgeted cost of the work accomplished. However, the aspect overlooked by the Project Management Institute's "Guide to the Project Management Body of Knowledge" (PMBOK) and obscured & misinterpreted by traditional S-curves is that there are thirteen possible combinations (i.e. different project status scenarios) of Planned Value, Actual Costs and Earned Value. These thirteen states can be color-coded for ready identification: i.e. red (negative), yellow (mixed), or green (positive), and triaged for 'Immediate Remedial Action, 'Close Watch & Minor Adjustment,' or 'No Action Necessary.' They can also be rank-ordered -- on a "1 to 13" scale -- as a Project Performance Index (PPI).

2. The Thirteen Different Project Implementation Status Conditions

These thirteen different Project implementation status conditions are shown in Figure 3 -- with some illustrative data. The ten situations that result in misinterpretation of financial status are indicated with an asterisk (*).

FIGURE 3 – Thirteen Different Project Implementation Scenarios

Project Status Condition / Performance Index PSC / PPI #	Budgeted Cost of Work Scheduled (BCWS) <i>or</i> Planned Value (PV)	Actual Cost of Work Performed (ACWP) <i>or</i> Actual Cost (AC)	Budgeted Cost of Work Performed (BCWP) <i>or</i> Earned Value (EV)	PROJECT STATUS CONDITION (PSC)
1*	\$100	\$70	\$120	Good. Work is ahead of schedule & with cost savings on the work done, as well as an apparent cost underrun on the budget.
2*	\$100	\$100	\$120	Good. Work is ahead of schedule, with cost savings even though the budget has been spent as planned.
3	\$100	\$80	\$100	Good. Work is on schedule, with cost savings.
4*	\$100	\$120	\$150	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	\$130	\$80	Bad. Work behind schedule, cost overrun <i>[and possible cash flow problem.]</i>

The errors engendered by traditional financial management analysis for the ten “off schedule” situations – indicated with an asterisk in the foregoing table are highlighted in Figure 4:

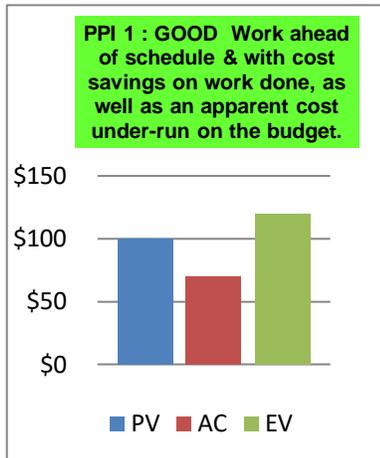
FIGURE 4 -- Erroneous Assessments by Financial Managers -- Descriptive

PSC / PPI	PV	AC	EV	SITUATION ASSESSMENT
1*	\$100	\$70	\$120	A Traditional Financial S-Curve Incorrectly Assesses the Amount of this Cost Underrun as \$30, instead of \$50
2*	\$100	\$100	\$120	A Traditional Financial S-Curve Incorrectly Assesses this Combination as "On Budget" instead of an Underrun of \$20
3	\$100	\$80	\$100	A Traditional Financial S-Curve portrays this situation accurately.
4*	\$100	\$120	\$150	A Traditional Financial S-Curve Incorrectly Assesses this Combination as a Cost Overrun of \$20 instead of an Underrun of \$30
5*	\$100	\$120	\$120	A Traditional Financial S-Curve Incorrectly Assesses this Combination as a Cost Overrun of \$20 instead of "On Budget"
6	\$100	\$100	\$100	A Traditional Financial S-Curve portrays this situation accurately.
7*	\$100	\$60	\$80	A Traditional Financial S-Curve Incorrectly Assesses the Amount of this Cost Underrun as \$40, instead of \$20
8	\$100	\$120	\$100	A Traditional Financial S-Curve portrays this situation accurately.
9*	\$100	\$80	\$80	A Traditional Financial S-Curve Incorrectly Assesses this Combination as a Cost Underrun of \$20 instead of "On Budget"
10*	\$100	\$140	\$120	A Traditional Financial S-Curve Incorrectly Assesses the Amount of this Cost Overrun as \$40, instead of \$20
11*	\$100	\$80	\$60	A Traditional Financial S-Curve Incorrectly Assesses this Combination as a Cost Underrun of \$20 instead of an Overrun of \$20
12*	\$100	\$100	\$80	A Traditional Financial S-Curve Incorrectly Assesses this Combination as "On Budget" instead of a Cost Overrun of \$20
13*	\$100	\$130	\$80	A Traditional Financial S-Curve Incorrectly Assesses the Amount of this Cost Overrun as \$30, instead of \$50

*NOTE: Traditional 'Cost vs. Schedule' S-Curves used by Financial Managers absolutely incorrectly assess Six (6) of the above Thirteen Conditions (#s 2, 4, 5, 9, 11 & 12) – i.e. 46% -- as "Over" instead of "Under," or "Under" instead of "Over;" or "On" Budget; and incorrectly assesses the amount of "Overrun" or "Underrun" for Four (4) additional conditions (#s 1, 7, 10 & 13) – i.e. an additional 31% -- for a TOTAL 77% ERROR RATE!

These thirteen unique conditions are further clarified in Figure 5, comparing PV, AC and EV graphically:

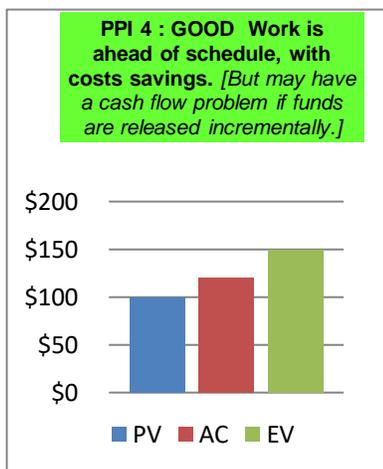
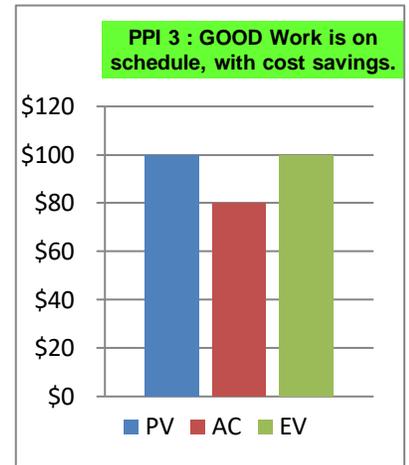
FIGURE 5 -- Erroneous Assessments by Financial Managers -- Graphic



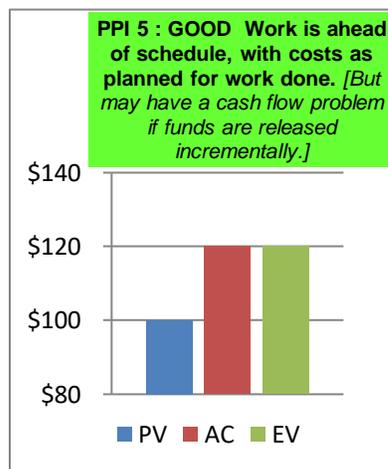
PPI 1: FM WRONG ASSESSMENT



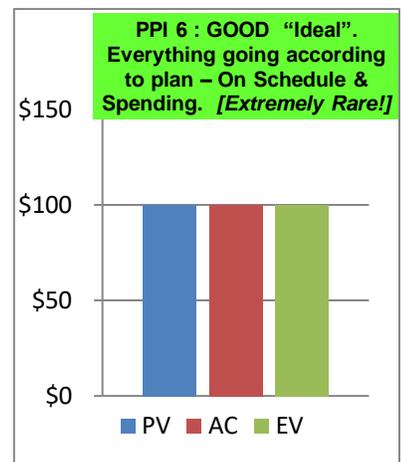
PPI 2: FM WRONG ASSESSMENT



PPI 4: FM WRONG ASSESSMENT

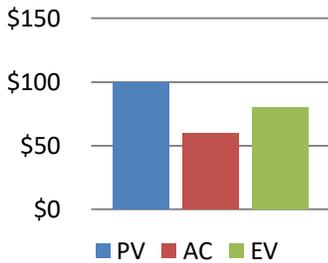


PPI 5: FM WRONG ASSESSMENT



PPI 7 : Mixed – Good & Bad.

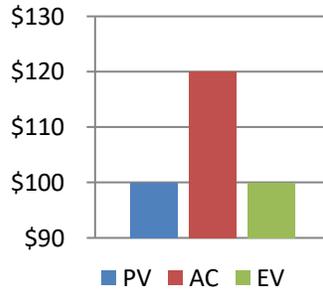
Saving money on the work performed; but work is behind schedule.



PPI 7: FM WRONG ASSESSMENT

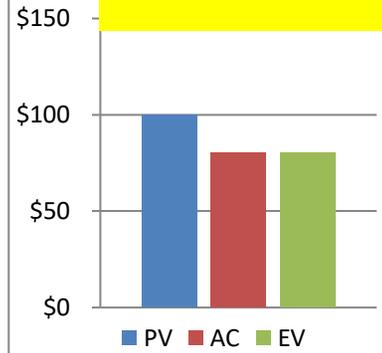
PPI 8 : Mixed – Good & Bad.

Work on schedule, but cost overrun incurred. [May have a cash flow problem if funds are released incrementally.]



PPI 9 : Mixed – Good & Bad.

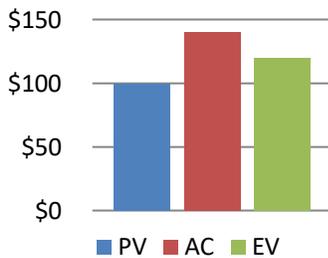
Spending as planned; but work is behind schedule.



PPI 9: FM WRONG ASSESSMENT

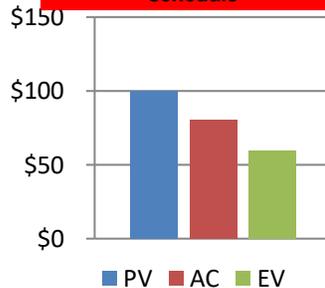
PPI 10 : Mixed – Good & Bad.

Work ahead of schedule, but a cost overrun has been incurred. [May have a cash flow problem if funds released incrementally.]



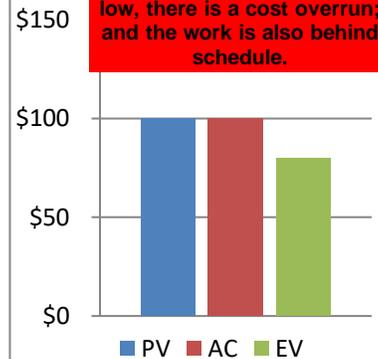
PPI 10: FM WRONG ASSESSMENT

PPI 11 : BAD Spending is slower than planned, but the Earned Value is low — indicating a cost overrun; and the work is also behind schedule

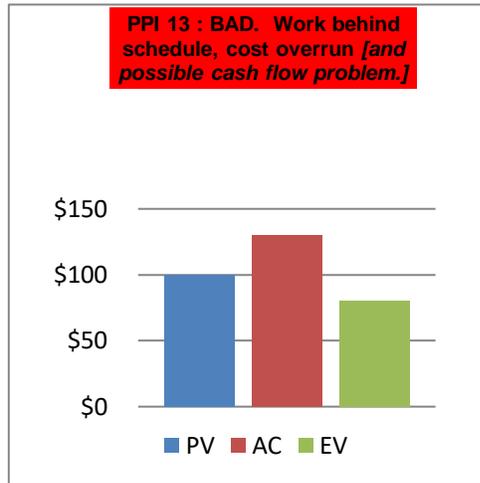


PPI 11: FM WRONG ASSESSMENT

PPI 12 : BAD. Although the spending rate is as planned, since the Earned Value is low, there is a cost overrun; and the work is also behind schedule.



PPI 12: FM WRONG ASSESSMENT



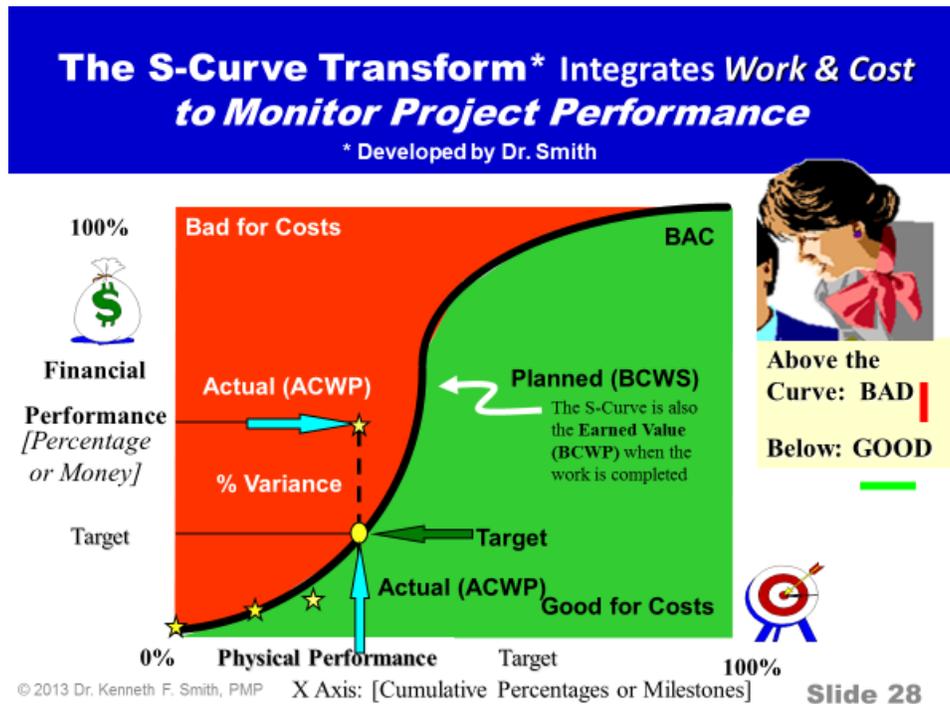
PPI 13: FM WRONG ASSESSMENT

3. Better Practice & Related Tools

Despite the glaring errors in traditional depiction and analysis, there is a better practice to resolve the problem of erroneous cost assessment.

An accurate situation is readily revealed and the faulty cost analysis can be easily rectified with an S-Curve “Transform” that depicts “Budgeted and Actual Costs vs Work” as shown in Figure 6:

FIGURE 6 – Budgeted & Actual Cost vs. Work



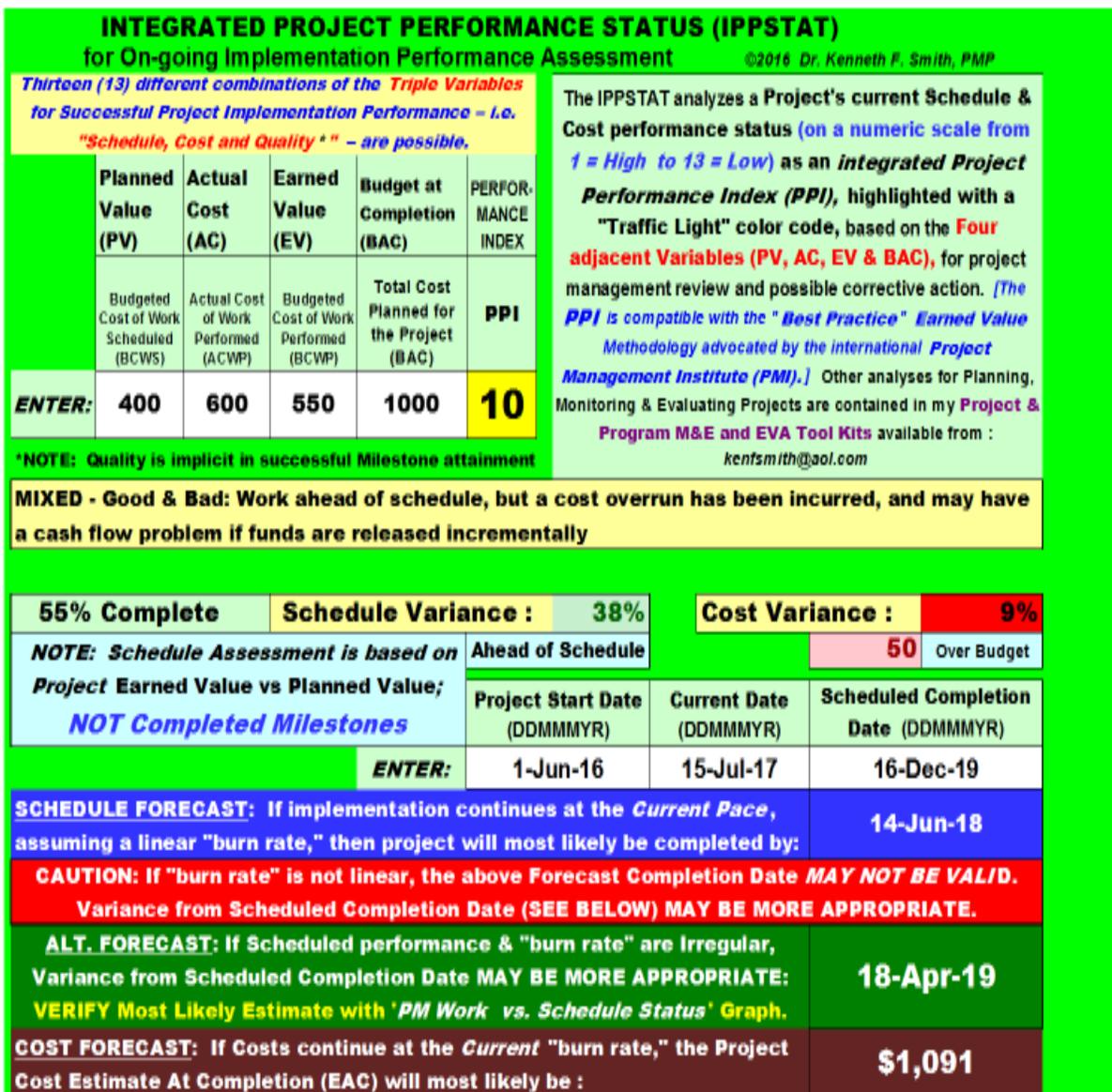
The S-Curve 'Transform' of 'Cost vs. Work' reveals the correct relationship and Project Status Condition (PSC), as indicated in Figure 6 above – regardless of when the work is actually accomplished; on time, earlier or later than planned.

Furthermore, the project's Estimated Completion Date (ECD) and budget Estimate At Completion (EAC) can be readily forecasted by first extrapolating the current 'work accomplishment' rate, and then relating the financial 'burn rate' to the projected target date.

Two additional tools & techniques are also able to facilitate accurate status analysis and reporting of both the project schedule and its budget.

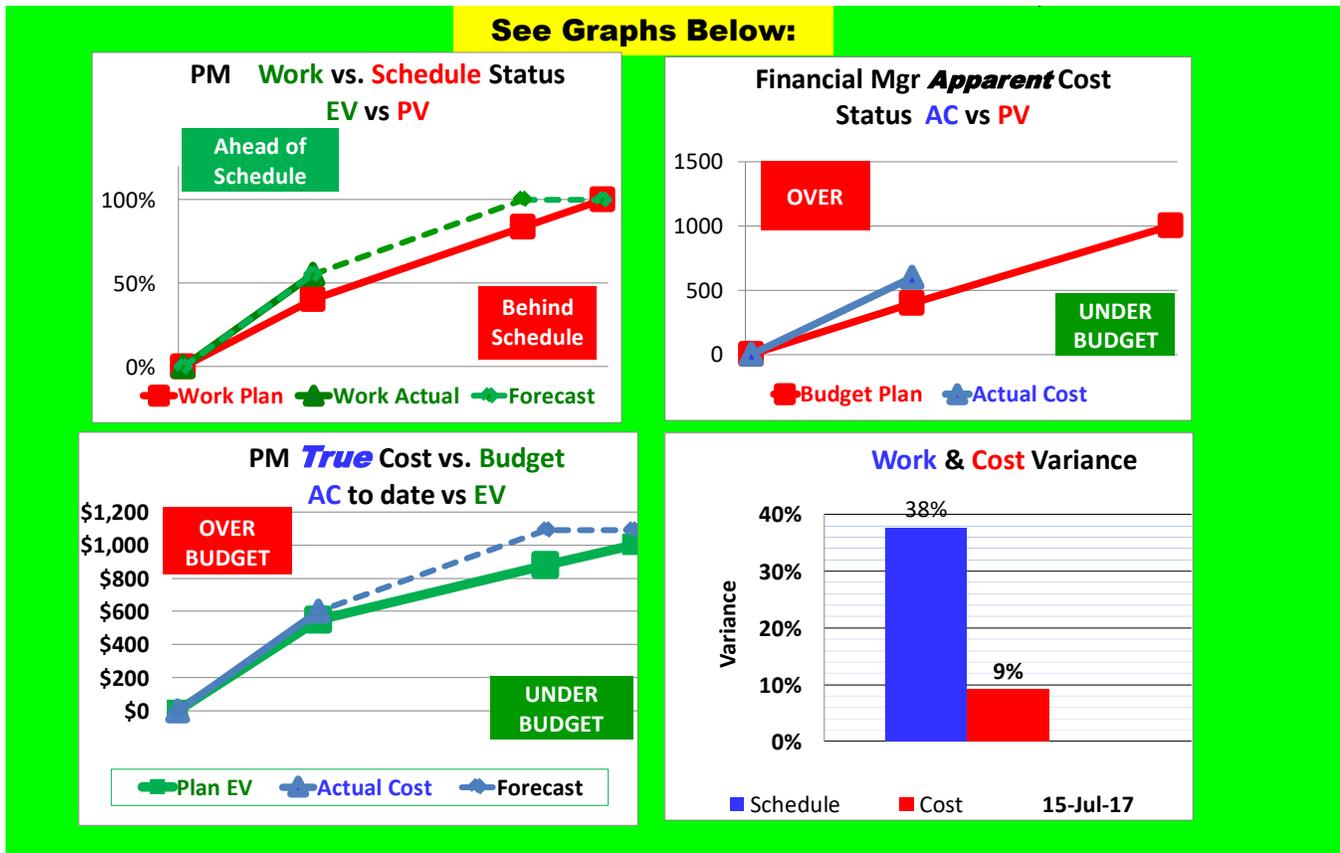
Given the Planned Value, Actual Cost, Earned Value, & Budget at Completion, the project start date & target completion date, an Excel template – such as the one in Figure 7 below -- can facilitate identification of relevant scenarios and 'number crunching' to provide the essential elements of information for any on-going project.

FIGURE 7 – 'IPPSTAT' Data Input & Instant Analysis Template



The template can also produce three S-curves (the two traditional S-Curves, plus an S-Curve Transform); as well as a control chart of the work schedule and cost variance – as shown in Figure 8 below. [NOTE: The Schedule status and Variance is based on the Project Earned Value vs. Planned Value; NOT the completed Milestones.]

FIGURE 8 – ‘IPPSTAT’ S-Curves & Control Chart of Project Schedule & Budget Current Status & End of Project Forecast



CONCLUSION

The Earned Value (EV) concept -- relating costs to work accomplished, rather than elapsed time -- is reaffirmed as the Best Practice for analyzing the thirteen different implementation status scenarios.

Furthermore, by supplementing Earned Value Analysis with the following graphic and tabular tools:

- 1) An S-Curve Transform for the financial analysis
- 2) a 13 point-scale Project Performance Index, and
- 3) a template of a project's Overall Status, Current Status, and Forecast (such as IPPSTAT depicted in Figures 7 & 8)

a Project's financial and budgetary status can be quickly, easily and, most important -- accurately -- monitored, analyzed & reported during implementation.

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About the Author

Dr. Smith is a member of PMI and IPMA-USA, with many years of experience as a practitioner, researcher-evaluator, advisor, consultant and instructor/facilitator in project management. He was formerly a management systems specialist with the US Department of Defense; later a manager / advisor / evaluator on various sector projects -- world-wide -- as a representative of the US Government and the international development donor community -- i.e. the U.S. Agency for International Development (USAID), the World Bank Group, African Development Bank, the UN, and the Asian Development Bank. Dr. Smith now conducts workshop-seminars in various aspects of project management, monitoring and evaluation for PMI as well as other government, academic, and private sector organizations. Dr. Smith identified the 13 different implementation status conditions illustrated above and developed the S-Curve transform, Project Performance Index (PPI), and IPPSTAT template to accurately highlight and analyze project implementation status. [These and other analytical techniques are contained and available in a "toolkit" of over 100 'Quick & Easy' templates he created for on-the-job project planning, management and evaluation.] For further information, contact Dr. Smith at kenfsmith@aol.com.