Integrated Project Implementation Performance Monitoring: Only Earned Value Analysis Assesses Status Correctly! [1]

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During implementation, a project is inescapably in **one of thirteen** possible **states** with respect to its **work schedule** & **budget** ***vs*** **its plan –** ***i.e. On, Ahead*** *or* ***Behind Schedule;*** *and* ***On, Over*** *or* ***Under Budget.***[2] However, traditional management monitoring methods misconstrue integrated project performance analysis as being in one of **only nine states.** Moreover**, they are only accurate when the project is *On Schedule*.** Consequently, ***in most implementation situations, Project Financial Status is assessed Incorrectly!*** **Shocking,** *but* ***nevertheless True.***

I stumbled onto this finding many years ago, and subsequently alerted coworkers on-the-job, seminar participants & colleagues. But generations of project practitioners 'at large' and beyond my immediate reach are still blinded -- or misguided -- by the myopic & obscured 'nine-state' monitoring perspective; so are oblivious to this flagrant financial flaw; even with **--** ***and especially without*** -- knowledge of **Earned Value** methodology.

So here's an attempt to enlighten the unaware, and unwary. *First,* a primer on KPIs and an overview of the 13 states; *highlighting the erroneous financial perspective & monitoring metrics.* *Then,* a better practice *for you to conduct accurate integrated performance analysis*.

Relevant KPI's:

The **six Key Performance Indicators** for understanding, and applying **Earned Value Analysis** are:

1. **PV = Planned Value.** *[AKA Budgeted Cost of Work Scheduled,* BCWS *or* BS.*]* The Amount Budgeted (*i.e. Planned*) for the cumulative **Work Scheduled to be Completed to Date.**[3]

2. **AC = Actual Cost of Work Performed***,* ACWP or AP. The Amount Actually 'Committed' for the **Work Actually Completed to Date**, ***regardless Whether or Not it was Planned &/or Scheduled*** **at this time; or completed Ahead, or Behind Schedule.**

3. **EV = Earned Value.** *[Also known as the Budgeted Cost of Work Performed,* BCWP *or* BP.*]* The **Planned Value for the Work Completed to Date** [i.e **The original PV: The Work Budget**, but ***without regard for Whether or Not it was completed Ahead, or Behind Schedule*****.]** [**NOTE: The EV** KPI **is unique to the Earned Value Methodology**.]

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[2] **13 Combinations** derived from 25 Permutations *(i.e. 1 x 5 x 5)*, or 27 Permutations *(3 x 3 x 3).*

[3] **NOTE. Often Overlooked; PV** & **AC** should be related to ***specific work Completion*** **Milestones;** They are **NOT** simply cumulative running costs *vs* the project schedule. **AC** & **PV** ***comparisons with EV*** -- ***instead of each othe****r* - **accurately pin-point the *now*-static status of historical project performance to date** for reporting & forecasting.

4. **BAC = Budgeted Cost at Completion.** Amount Planned for the Total Project.

5. **SPI & 6. CPI = Schedule** and **Cost Performance indices; %Variances** from a **base** of **1.**

Given a **Project Schedule & Cost Baseline derived from a time-scaled network, *with activity costs tied to completed-activity milestones***, as depicted in Figures 1 & 2, the scene is set for subsequent implementation and performance monitoring.

Figure 1

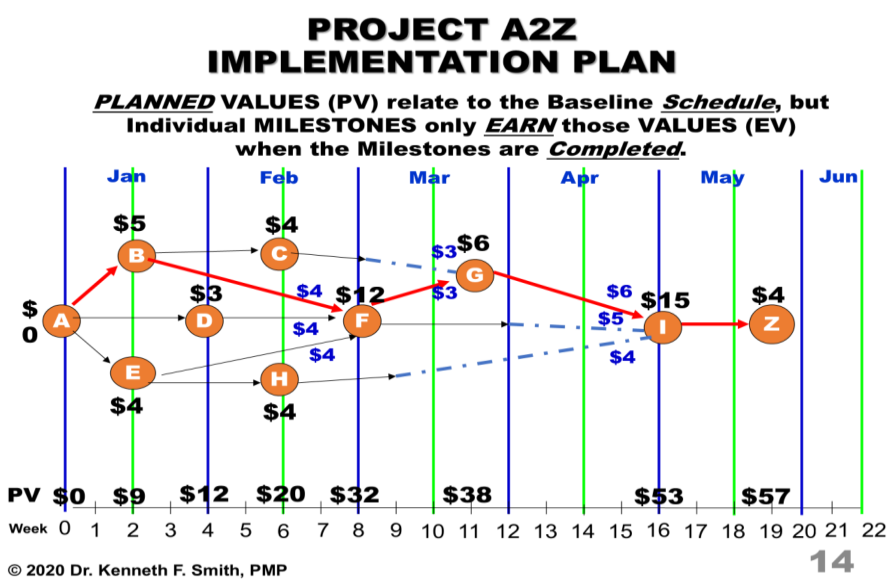
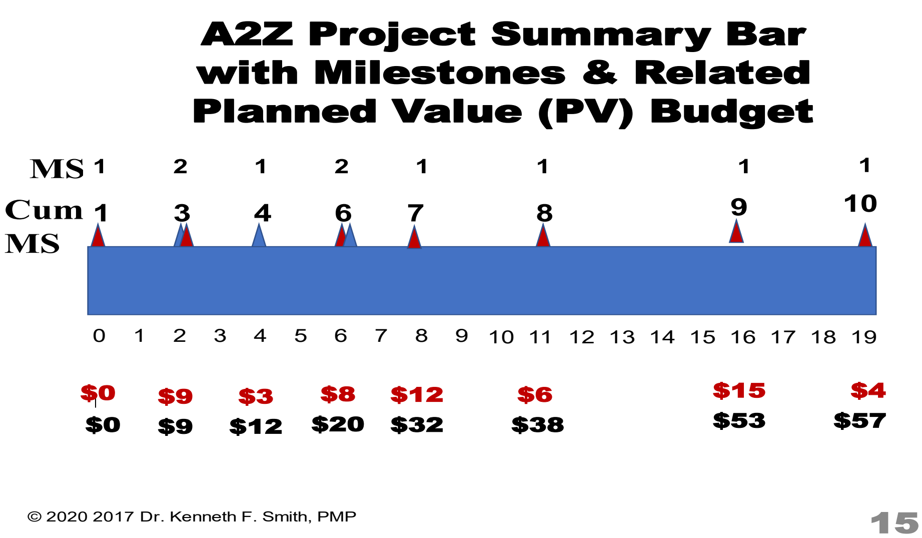


Figure 2



<u>To reiterate</u>: Costs are tied as 'lump sums' to <u>*static*</u> milestones of <u>completed</u> activity-on-arrow work. Although **Costs** ***of incomplete in-process 'work package' activities*** are continuously recorded as they are incurred, and the information is subsequently available to the PM team for consideration and discussion of specific substantive past work ***&/or concerns with current cost trends, and possible remedies; partial completion estimates and related running costs of on-going activities should not be included <u>and reported by the PM as additional percentages</u> of their respective PVs & ACs.***

<u>Second, the Thirteen different states</u> during project implementation, with illustrative costs and related Status Indicators, are as follows:

<u>Figure 3</u>

<u>The 13 Integrated Project Performance Indices (IPPI)</u>
& Possible Project Status Conditions

During implementation, thirteen (13) *"performance vs. plan"* scenarios are possible — depending on the interrelationship between Planned Value (PV), Actual Cost (AC), and Earned Value (EV) — which the project's manager should recognize, assess, *and redress if necessary*. These alternatives (with illustrative data) are shown in the table below.

TRADITIONAL EVM PERFORMANCE INDICES

Project Perfor-mance Index IPPI #	Planned Value PV or Budgeted Cost of Work Scheduled BCWS	Actual Cost AC or Actual Cost of Work Performed ACWP	Earned Value EV or Budgeted Cost of Work Performed BCWP	PROJECT STATUS CONDITION PSC	PERFORMANCE INDEX: SCHEDULE SPI	PERFORMANCE INDEX: COST CPI
1	$100	$80	$120	**Good.** Work is ahead of schedule & with cost savings on the work done, as well as an apparent cost underrun on the budget.	1.20	1.50
2	$100	$100	$120	**Good.** Work is ahead of schedule, with cost savings even though the budget has been spent as planned.	1.20	1.20
3	$100	$80	$100	**Good.** Work is on schedule, with cost savings.	1.00	1.25
4	$100	$120	$140	**Good.** Work is ahead of schedule, with costs savings. *[But may have a cash flow problem if funds are released incrementally.]*	1.40	1.17
5	$100	$120	$120	**Good.** Work is ahead of schedule, with costs as planned for work done. *[But may have a cash flow problem if funds are released incrementally.]*	1.20	1.00
6	$100	$100	$100	**"Ideal". Everything going according to plan – On Schedule & Spending.** *[Extremely Rare!]*	1.00	1.00
7	$100	$60	$80	**Mixed – Good & Bad.** Saving money on the work performed; but work is behind schedule.	0.80	1.33
8	$100	$120	$100	**Mixed – Good & Bad.** Work on schedule, but cost overrun incurred. *[May have a cash flow problem if funds are released incrementally.]*	1.00	0.83
9	$100	$80	$80	**Mixed – Good & Bad.** Spending as planned; but work is behind schedule.	0.80	1.00
10	$100	$140	$120	**Mixed – Good & Bad.** Work ahead of schedule, but a cost overrun has been incurred. *[May have a cash flow problem if funds released incrementally.]*	1.20	0.86
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.	0.60	0.75
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.	0.80	0.80
13	$100	$120	$80	**Bad.** Work behind schedule, cost overrun *[and possible cash flow problem.]*	0.80	0.67

<u>Note</u>: The first <u>six</u> conditions are favorable for both Schedule and Cost Performance
The next <u>four</u> conditions are mixed, while
The last <u>three</u> are unfavorable for both Schedule and Cost Performance
These conditions are <u>rank-ordered</u> for a 13-scale Integrated Project Performance Index.

<u>Third, the Root Cause of the Problem with the Financial Management Perspective</u>

<u>Traditional Financial analysis only compares Actual Costs *vs* the Planned Value</u> (i.e. the Baseline Budget) **<u>ignoring the pace of work completion</u> which is dynamic – *indicated by the Earned Value*** kpi – ***and fluctuates***. Consequently, **<u>when the project is not On Schedule</u>** relating **financial analysis to a static schedule & cost baseline results in '*false positives*' and '*false negatives*.'** For instance, if project work is delayed, the likelihood is the project **would *<u>not yet have incurred the cost</u>*** budgeted for its accomplishment. But costs would be **incorrectly indicated as *'under budget.'*** Moreover, even if the project had incurred *<u>additional</u>* costs, costs would still be incorrectly reflected as '*under' or 'on budget' <u>until the cumulative budget was exceeded</u>.* Similarly, if project work is performed *ahead* of schedule, even if *'on budget'* it will utilize its budget earlier than scheduled. Cumulatively that would be incorrectly reflected as "*over budget;*" *i.e. 'a False Negative'* with resultant errors. Also, there are **four more situations** – for a **totality of 13 possible circumstances -- *of which <u>only three are accurately perceived, financially</u>,* as shown below:**

<u>Figure 4</u>

EARNED VALUE ANALYSIS is *ESSENTIAL* because Traditional Financial Analysis is *WRONG <u>MOST OF THE TIME</u>!*

Traditional Financial Analysis (TFA) Incorrectly Assesses the *<u>DIRECTION</u>* of SIX PPI Cost Combinations
as "*Over*" instead of "*Under*," or "*Under*" instead of "*Over*;" or "*On*" BUDGET. *That is a 46% ABSOLUTE ERROR RATE!*

For Example:

AS well as the *<u>AMOUNT</u>* of Underrun or Overrun in FOUR other Combinations
for an additional 31% ERROR RATE, and a* TOTAL 77% ERROR RATE*!

PPI	PV	AC	EV	
1	$100	$70	$120	TFA Incorrectly Assesses the Amount of this Cost Underrun as $30 instead of $50
2	$100	$100	$120	TFA Incorrectly Assesses this Combination as On Budget instead of an Underrun of $20
3	$100	$80	$100	
4	$100	$120	$150	TFA Incorrectly Assesses this Combination as a Cost Overrun of $20 instead of an Underrun of $30
5	$100	$120	$120	TFA Incorrectly Assesses this Combination as a Cost Overrun of $20 instead of "On Budget"
6	$100	$100	$100	
7	$100	$60	$80	TFA Incorrectly Assesses the Amount of this Cost Underrun of $40 instead of $20
8	$100	$120	$100	
9	$100	$80	$80	TFA Incorrectly Assesses this Combination as a Cost Underrun of $20 instead of "On Budget"
10	$100	$140	$120	TFA Incorrectly Assesses the Amount of this Cost Overrun as $40 instead of $20
11	$100	$80	$60	TFA Incorrectly Assesses this Combination as a Cost Underrun of $20 instead of an Overrun of $20
12	$100	$100	$80	TFA Incorrectly Assesses this Combination as On Budget instead of a Cost Overrun of $20
13	$100	$130	$80	TFA Incorrectly Assesses the Amount of this Cost Overrun as $30 instead of $50

Instead of comparing the Actual Cost with the cumulative Planned Value to date (i.e. AC *vs* PV), the <u>TRUE COST situation</u> *<u>is the difference between the Actual Cost & the Earned Value kpis</u>* (<u>AC *vs* EV</u>). Consequently, the Traditional Financial status analysis is *only accurate* <u>during three</u> *of the thirteen possible* situations -- 3, 6 and 8 -- which is <u>when the project is On Schedule</u>.

Another beneficial feature of the Earned Value KPI is that the difference between the completed work budget and the planned budget to date – i.e. EV *vs* PV -- indicates (*in monetary terms*) whether the work was completed On, Ahead or Behind Schedule![4]

Fourth, a Remedy; A template to capture PV, AC & EV & schedule data, and compute the correct status[5] **as well as – *given any variance* -- forecast the trend, is depicted below.**

Figure 5

INTEGRATED PROJECT PERFORMANCE STATUS (IPPSTAT)
for On-going Implementation Performance Assessment © 2025 Dr. Kenneth F. Smith, PMP

In Monitoring Project Schedule, Cost and Quality* Implementation Performance, Thirteen (13) combinations of the Triple Variables PV AC & EV -- -- are possible.

	Planned Value (PV)	Actual Cost (AC)	Earned Value (EV)	Budget at Completion (BAC)	PERFORMANCE INDEX
	Budgeted Cost of Work Scheduled (BCWS)	Actual Cost of Work Performed (ACWP)	Budgeted Cost of Work Performed (BCWP)	Total Cost Planned for the Project (BAC)	IPPI
ENTER:	100	125	130	250	4
SCHEDULE		SCHEDULE Performance Index SPI	COST Performance Index CPI	COST	
Well Ahead		1.30	1.04	On Track	

*NOTE: Quality is implicit in successful Milestone attainment

IPPSTAT analyzes a **Project's current Schedule & Cost performance status** (on a numeric scale from *1 = High to 13 = Low*) as an ***Integrated Project Performance Index (IPPI),*** **highlighted with a "Traffic Light" color code,** based on the **Four adjacent Variables (PV, AC, EV & BAC),** for project management review and possible corrective action. *The **IPPI** is compatible with the "**Best Practice**" **Earned Value** Methodology advocated by the international **Project Management Institute (PMI).*** **The traditional Schedule Performance Index (SPI) and Cost Performance Index (CPI) are also computed.** Other analyses for Planning, Monitoring & Evaluating Projects are contained in my Book **PROJECT MANAGEMENT PRAXIS while Issues are discussed in my Book MUSINGS; both of which are** *Available from Amazon*), and **PM&E Tool Kit** available from : *kenfsmith@aol.com*

GOOD: Work is ahead of schedule, with cost savings, but may have a cash flow problem if funds are released incrementally

52% Complete	Schedule Variance : 30%		Cost Variance : -4%	
NOTE: Schedule Assessment is based on Project **Earned Value vs Planned Value;** ***NOT Completed Milestones***	Ahead of Schedule		-5 Under Budget	
	Project Start Date (DDMMMYR)	Current Date (DDMMMYR)	Scheduled Completion Date (DDMMMYR)	
ENTER:	2/Jan/25	20/May/25	15/Dec/25	

EARNED SCHEDULE FORECAST 1: IF Work Performance rates are Irregular, % Variance from the Plan TO DATE added to the Scheduled Completion Date is the most realistic. COMPARE THIS FORECAST with a detailed '*Work vs. Schedule Status*' S-Curve Chart to detect irregularities, AND THEN USE YOUR OWN JUDGEMENT. *[NOTE: Excel calendar does not adjust for non-work days.]* — **27/Oct/25**

SCHEDULE FORECAST 2: IF Work Performance rates are *Linear Extrapolation* time intervals of the Schedule, the Variance from the % Complete Date is used. — **25/Sep/25**

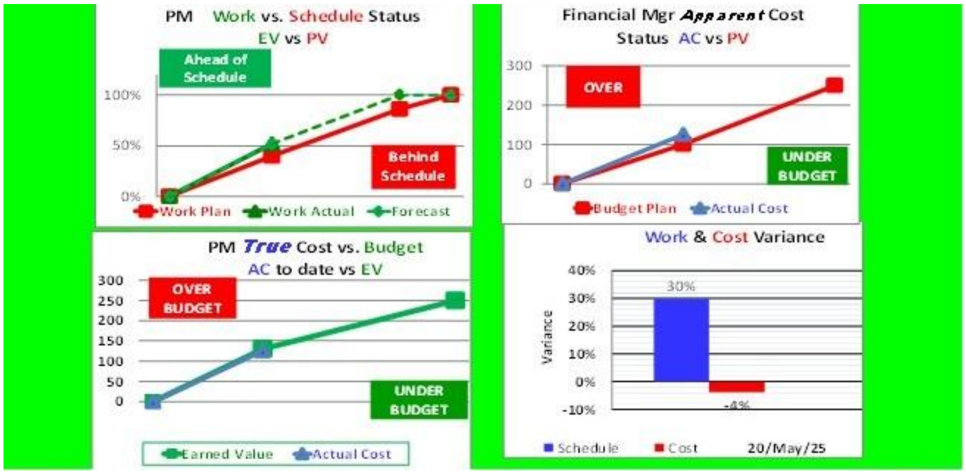
COST FORECAST: Based on Project Performance to date, the Budget Estimate at Completion (EAC1) is UNDER RUN **240**

and Variance at Completion (VAC) is: **-10**

See Graphs Below:

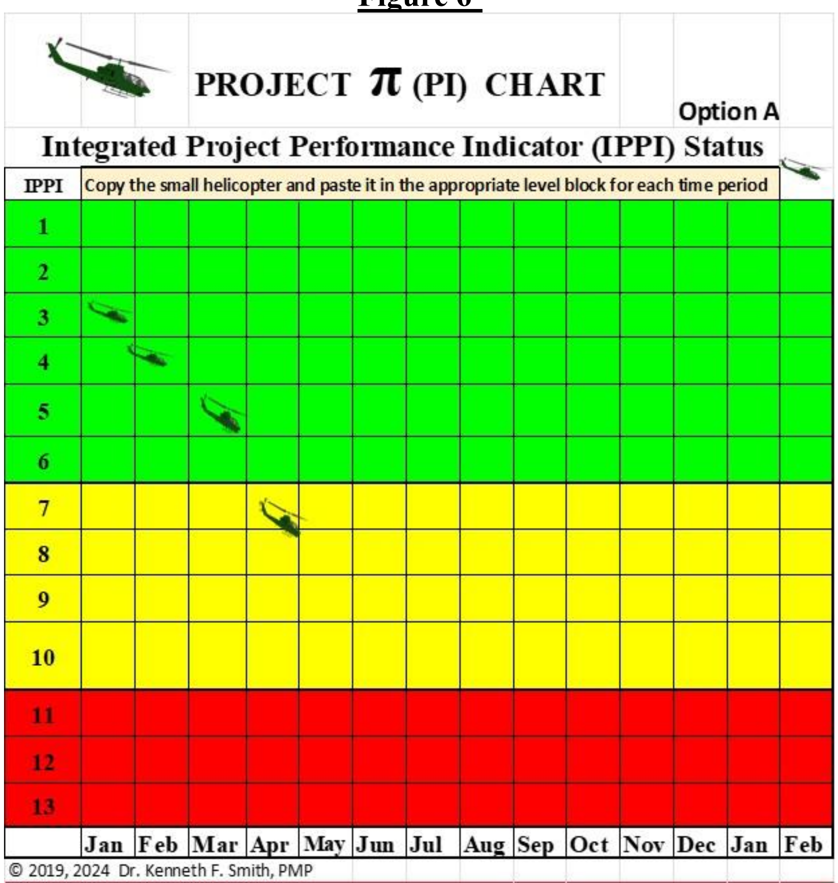
[4] **TO REITERATE: EV** is only applied to ***Completed*** work. **On-going** work Costs are not – ***or should not be*** -- included in the analysis as they are tied to the **milestones of completed work; not the running cost**. IMO, the protocol -- *by some EVM practitioners, & software* -- of attributing a '***percentage of the PV cost***' to **EV** based on the ***estimated percentage of on-going "work completed"*** **is erroneous!** This practice defeats the accuracy, reliability & validity of the **EV** kpi; and responsible for piecemeal 'busywork' and, allegedly, many **95% *incomplete*** 'white elephant' projects!

[5] **CAUTION:** The ***'Well Ahead'* SPI *may be too good to be true!*** **A Blue background** in the IPPSTAT SPI or CPI also highlights the ***possibility*** of unrealistic planning, such as excessive buffering; ***or perhaps*** shoddy materials & work, coupled with insufficient or poor quality control during implementation.



<u>Fifth, a different kind of 'pie' chart to track, highlight & display</u> Integrated Performance Status over time for the project's Stakeholders enlightenment is shown in Figure 6:

<u>Figure 6[6]</u>



[6] I have a similar chart – *where the scale is reversed* – with a scuba diver to indicate the level.

This graphic is guaranteed to get stakeholder attention, whereas ponderous presentations of portfolios with spreadsheets, graphs and statistical kpi acronyms often don't.

In Conclusion

Promptly reimbursing contractors the Value they Earn – i.e. the EV -- for each milestone during, or immediately following the reporting cycle in which it is completed – *separate from overhead or other indirect costs* -- **would, IMO, make eminently more sense** than current practices of reimbursing overall running costs at fixed intervals based on innumerable detailed contractor invoice submissions; which are subject to scrutiny and possible disallowance of individual line items.

However, even if you continue with current financial document submission & payment practices, **it is essential to have financial specialists who understand EVM to structure a *milestone-related* financial database coding & reporting system.** Then, using the 13-point IPPI scale, together with the SPI + CPI both the PM & Finance Department can agree on the project's *Actual Costs* and *Planned Values* with its *Earned Values* to provide a more accurate financial picture than hitherto; for improved management control & follow-up.[7]

Like a medical doctor's diagnosis with improved tools,
Earned Value only reveals what's killing you.
It doesn't provide the cure!

About the Author

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Initially a US Civil Service Management Intern, then a management analyst & systems specialist with the US Defense Department, Ken subsequently had a career as a senior foreign service

[7] Cost overruns, schedule slippages and possible '*scope creep*' issues and disputes should be addressed, resolved and where approved, subsequently authenticated through the **Change Order** process.

officer -- management & evaluation specialist, project manager, and in-house facilitator/trainer -- with the US Agency for International Development (USAID). Ken assisted host country governments in many countries to plan, monitor and evaluate projects in various technical sectors; working 'hands-on' with their officers as well as other USAID personnel, contractors and NGOs. Intermittently, he was also a team leader &/or team member to conduct project, program & and country-level portfolio analyses and evaluations.

Concurrently, Ken had an active dual career as Air Force ready-reservist in Asia (Japan, Korea, Vietnam, Indonesia, Philippines) as well as the Washington D.C. area; was Chairman of a Congressional Services Academy Advisory Board (SAAB); and had additional duties as an Air Force Academy Liaison Officer. He retired as a 'bird' colonel.

After retirement from USAID, Ken was a project management consultant for ADB, the World Bank, UNDP and USAID.

He earned his DPA (Doctor of Public Administration) from the George Mason University (GMU) in Virginia, his MS from Massachusetts Institute of Technology (MIT Systems Analysis Fellow, Center for Advanced Engineering Study), and BA & MA degrees in Government & International Relations from the University of Connecticut (UCONN). A long-time member of the Project Management Institute (PMI) and IPMA-USA, Ken is a Certified Project Management Professional (PMP®) and a member of the PMI®-Honolulu and Philippines Chapters.

Ken has two KENBOOKS: 1. Project Management PRAXIS which includes many innovative project management tools & techniques; and describes a "Toolkit" of related templates, and 2. MUSINGS on Project Management -- a compilation of contemporary concerns in project planning, monitoring & evaluation, with some tools & techniques suggested for their solution. Either or both books are available from Amazon, and their related templates are available directly from him at kenfsmith@aol.com on proof of purchase.

To view other works by Ken Smith, visit his author showcase in the PM World Library at https://pmworldlibrary.net/authors/dr-kenneth-smith/