

Follow on Commentary and Elaboration: The “P’s” & “Q’s” of Assessing Program & Project ‘Outcome’ Effectiveness article by Dr. Ken Smith¹

Dr. Paul D. Giammalvo

As a follow up to and in support of my longtime friend and highly respected colleague from SE Asia Pacific, Dr. Ken Smith, Col. US Air Force (retired), who initiated this discussion thread in a “Letter to the Editor” in the [PM World Journal Volume XI, Issue 2 February 2022](#), entitled “ON THE SUBJECT OF THE PMBOK GUIDE, 7TH EDITION”² and his follow up commentary, the “P’s” & “Q’s” of Assessing Program & Project ‘Outcome’ Effectiveness, *PM World Journal*, Vol. XI, Issue III, March. Online.³

While I am in substantial agreement with Dr. Ken’s positions that “PMI’s new stance of holding Project Managers and their teams responsible for also attaining those Outcomes is excessive, incongruous, misdirected and untenable,” my biggest concern and my reason for following up lies in using PMI’s definition of “Project Manager, being the “person assigned by the performing organization to lead the project team **that is responsible for achieving the project objectives.**”

Figure 1 below originated with published work from Dennis Cohen and Robert Graham around 2000, but I believe the concept dates back well before that to the 18th Century Industrial Revolution. Unfortunately, I’ve found no evidence that either PMI, AACE, IPMA or APM/APMG have formally recognized this model. In particular, it is clear our Agile colleagues do not understand it. The fundamental question is, where, in this model, does the project manager, whether EXTERNAL or INTERNAL, have any control over the ASSET? Not only the ASSETS CREATED by the project but even control over those assets required to “initiate, plan, execute, control and close” the project? Often missed by PMI, AACE, IPMA, APM/APMG et al. is the fact that it “takes assets to make more assets.”

¹ How to cite this work: Giammalvo, P. D. (2022). Follow on Commentary and Elaboration: The “P’s” & “Q’s” of Assessing Program & Project ‘Outcome’ Effectiveness article by Dr. Ken Smith, *PM World Journal*, Vol. XI, Issue IV, April.

² [PM World Journal Volume XI, Issue 2 February 2022](#)

³ <https://pmworldlibrary.net/wp-content/uploads/2022/03/pmwj115-Mar2022-Smith-the-Ps-Qs-of-assessing-outcome-program-project-effectiveness.pdf>

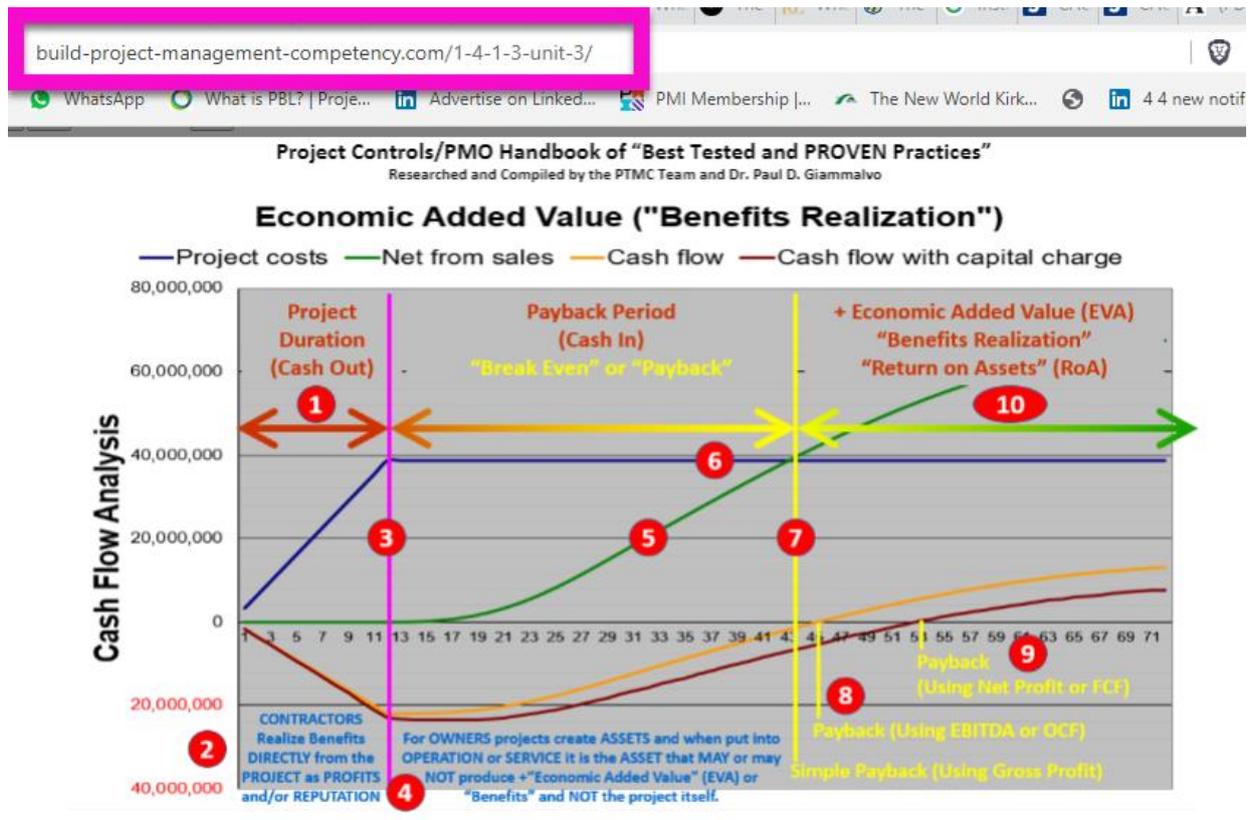


Figure 1- The real or true relationship between CONTRACTORS (external) and OWNERS⁴

As Dr. Ken is coming primarily from working in OWNER organizations and I am representing primarily a CONTRACTOR’S perspective, it is essential that all the professional societies purporting to represent the practice of project management include BOTH perspectives, understanding that for CONTRACTORS, projects are PROFIT CENTERS and the processes to “initiate, plan, execute, control and close” projects are the CORE COMPETENCIES around which we build our businesses. On the other hand, for OWNER organizations, projects are COST or INVESTMENT centers meaning that for OWNERS, projects are cash OUTFLOWS. Owners can only “solve problems” or “exploit opportunities” not from the PROJECT directly but from the ASSET that the project was undertaken to “create, acquire, expand, update, repair, maintain and eventually dispose of.” Explained another way, for OWNER organizations, projects are nothing more than a “means to an end,” an “ASSET Delivery System.” For OWNER organizations, projects CANNOT and DO NOT add any value. Only the PRODUCT of the project (which is always an ASSET) has the ability to “add value” to the organization.

⁴ [Dennis J. Cohen](#) and [Robert J. Graham](#) Adapted from “The Project Manager's MBA: How to Translate Project Decisions into Business Success 1st Edition” <https://www.amazon.com/Project-Managers-MBA-Translate-Decisions/dp/0787952567>

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Project Controls/PMO Handbook of “Best Tested and PROVEN Practices”
Researched and Compiled by the PTMC Team and Dr. Paul D. Giammalvo

What is an ASSET...

Investopedia defines an “Asset” to be: <https://tinyurl.com/yxo8438a>

- ✓ a resource with economic value that an individual, corporation, or country owns or controls with the expectation that it will provide a future benefit.
- ✓ are reported on a company's balance sheet and are bought or created to increase a firm's value or benefit the firm's operations.
- ✓ can be thought of as something that, in the future, can generate cash flow, reduce expenses or improve sales, regardless of whether it's manufacturing equipment or a patent.

Thus all Projects produce ASSETS and ASSETS (if they do what they were intended to do) produce BENEFITS, understanding some do, some do NOT.

To learn more, review PAS 55 parts 1 <https://tinyurl.com/yagxp4av> and 2 <https://tinyurl.com/y7wpa4ku>

And the Business Dictionary defines “Asset Management” to be:
“Prudent administration of investable (liquid) assets, aimed at achieving an optimum risk-reward ratio.”

Giammalvo, Paul D 2019 <https://is.gd/a3k7Vt>

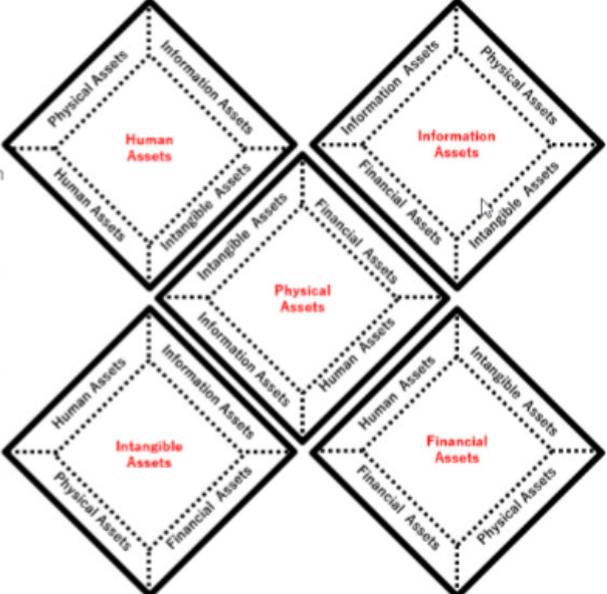


Figure 2- Definition and Classification of ASSETS⁵

Having established the only “true” or “honest” business case showing the relationship between projects and the assets they create and noting that this same model applies whether the “CONTRACTOR” is an EXTERNAL player or whether the project is being done INTERNALLY, there is still a very clear difference in PERSPECTIVES as well as a big difference between the relative roles and responsibilities between the individual actors in our “play.”

Figure 3 is yet another fundamental “Truth” that despite having been validated for project management by none other than R. Max Wideman back around the mid-1980s, somehow got “lost” between the 1987 PMBOK and the 1996 PMBOK Guide, and despite having been reminded of this “best tested and proven” model, PMI specifically has refused to recognize and acknowledge.

⁵ Definitions of “Asset” Researched and Compiled by PTMC Team 2021 Figure 35- <https://build-project-management-competency.com/1-4-1-3-unit-3/>

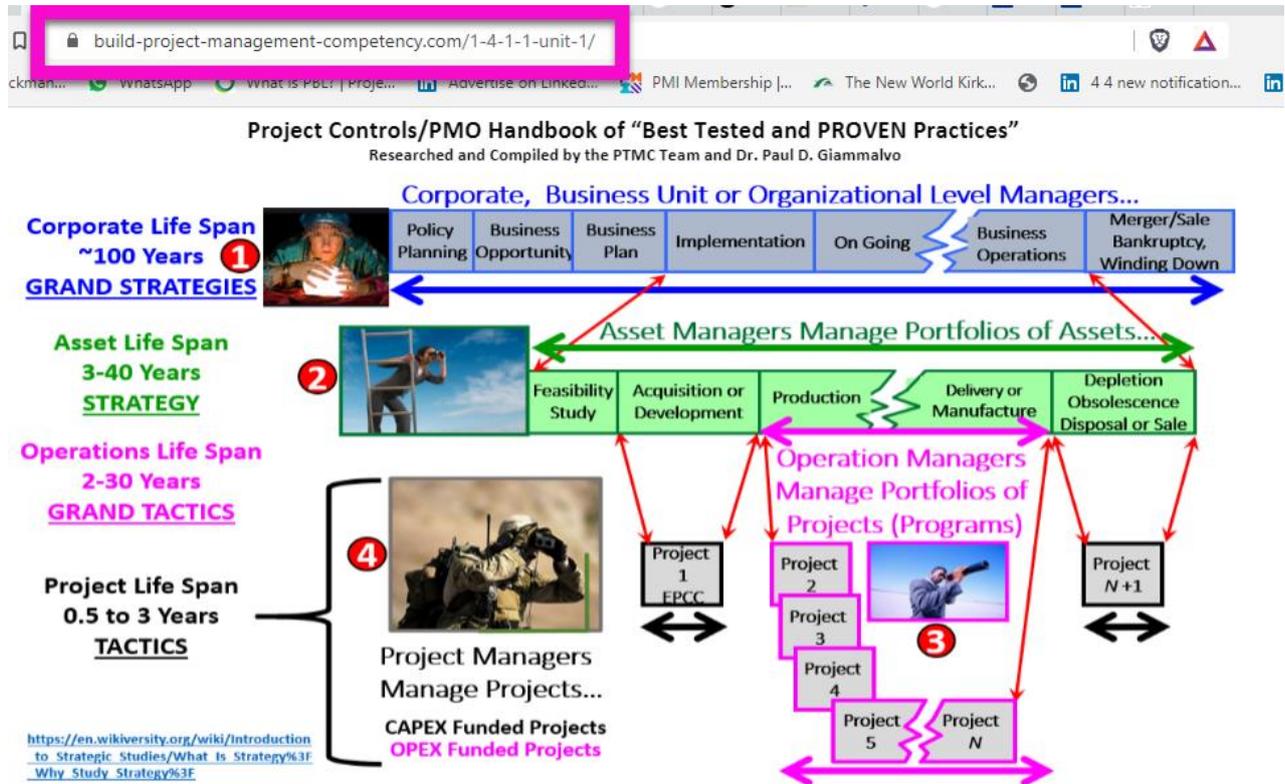


Figure 3- The Four Starring “Actors” in the Asset Management Model⁶

Figure 3 originated with Sun Tzu around 544-496, was validated in the late 1800s by Field Marshal Helmuth von Moltke (the Elder) and more recently has been validated by the US Air Force with their “Situational Awareness” model⁷. More importantly, as recently as 1 month ago, when we checked with our Fortune 500 clients, this “Hierarchy of Decision Making” remains the primary decision-making model used in most companies today. So if it is by far the predominant decision-making model, how or why is PMI (or IPMA or APM/APMG?) not embracing it? Where is it that we are seeing PROJECT MANAGERS empowered to make STRATEGIC decisions? In many OWNER organizations, we find that project managers are not even empowered to make TACTICAL decisions. Suppose you want to have more FORMAL authority. In that case, you have to become a CONTRACTORS project manager⁸, as they normally have near-total P&L responsibilities and the formal authority to go with that responsibility, including hiring firing of their core team and key subcontractors and vendors.

⁶ Adapted from published research by Max Wideman circa 1985 and Jaycial Aubrey (ND)
[https://en.wikiversity.org/wiki/Introduction to Strategic Studies/What Is Strategy%3F Why Study Strategy%3F](https://en.wikiversity.org/wiki/Introduction_to_Strategic_Studies/What_Is_Strategy%3F_Why_Study_Strategy%3F)
⁷ Docauer Alan Lt. Col. (2014) “Peeling the Onion- Why Situation Awareness is so important”
https://www.airuniversity.af.edu/Portals/10/ASPJ/journals/Volume-28_Issue-2/F-Docauer.pdf
⁸ Sauer, Chris, Liu, Li and Johnston, Kim (2001) “Where Project Managers are King”
<https://csbweb01.uncw.edu/people/rosenl/classes/OPS100/Where%20Project%20Managers%20are%20Kings.pdf>

SO WHY CAN'T WE “HOLD PROJECT MANAGERS ACCOUNTABLE FOR PROJECT OUTCOMES?”

There are two fundamental general management tenets that prevent us from holding project managers accountable for project outcomes, and those are:

- 1) We CANNOT hold anyone accountable for that over which they have no reasonable ability to control AND
- 2) We cannot hold anyone accountable unless they have the formal authority to ACT, to PREVENT, AVOID or MITIGATE an unfavorable outcome or EXPLOIT or otherwise take advantage of an OPPORTUNITY.

So the first step is to apply these two “tests” against the formal control and authority of each of the 4 “Actors” in our management decision-making model meet these two criteria and for exactly what decisions? Speaking as a CONTRACTOR, we recognize that our project managers have no control over the weather. So what do we do? We EMPOWER them to take whatever PROTECTIVE or PREVENTATIVE measures to protect the work from damage by weather, including providing them with the budgets and authority to spend those budgets. For extraordinary weather events, it is up to our Asset or higher-level managers to INSURE against catastrophic weather events, including contractual termination for “Force Majeure” events. Same thing with prices. So if we want to hold our onsite project managers ACCOUNTABLE for budgets, doesn't it make sense that we have to determine what they do and do NOT have control over and then EMPOWER them through formal authority to make decisions about what to purchase, from whom and when to have it delivered?

WHAT GUIDELINES OR STANDARDS CAN WE ADOPT TO HELP US ESTABLISH “ACCOUNTABILITY”?

For those who believe Project Management is a PROFESSION (which I do not believe to be substantiated⁹), here are the LEGAL CRITERIA needed to prove PROFESSIONAL NEGLIGENCE.

*“According to Hofstra Law Review, these elements include”:*¹⁰

- **Duty:** *“the ability to prove the defendant (Not only the Project Manager but also the Asset, Portfolio or Program Manager) owed you a duty of care not to cause you or others harm.”*
- **Breach:** *“the ability to prove that a violation of standard care resulted in an injury or financial loss for you or a family member.”*
- **Cause in fact:** *“the ability to prove a CORRELATION between the negligent or harmful action that took place and the negative consequence you suffered.”*

⁹ Giammalvo, Paul D (2007) “Is Project Management a Profession? If not what is it?”
https://www.academia.edu/63424585/Is_Project_Management_a_Profession_And_if_not_what_is_it_PhD_Dissertation_2008

¹⁰ Owen, David G (2007) Hofstra University Law Review
<https://scholarlycommons.law.hofstra.edu/cgi/viewcontent.cgi?article=2282&context=hlr>

- **Proximate cause:** “the ability to prove a direct link CAUSATION between a negligent act and the injury or financial loss that resulted from that action.”
- **Harm:** “the ability to prove you suffered injuries, loss, or other expenses because of someone else’s negligence.”

Furthermore, in order to PROVE “PROFESSIONAL NEGLIGENCE,” these are the “Standards of Care” that a professional owes to a client or customer that must be shown “by a preponderance of the evidence”¹¹ by the plaintiff were violated by the defendant:^{12, 13}

“[A/An] [insert type of professional] is negligent if [he/she/nonbinary pronoun] fails to use the skill and care that a reasonably careful [insert type of professional] would have used in similar circumstances and locations. This level of skill, knowledge, and care is sometimes referred to as “the standard of care.” [Jury must determine the level of skill and care that a reasonably careful [insert type of professional] would use in similar circumstances and location-based only on the testimony of the expert witnesses[, including [name of defendant],] who have testified in this case.]”

And for those who do NOT agree that project management is a profession (including this author), here are the “building blocks for a culture of accountability” as defined in the January 2016 issue of HBR by Peter Bregnan in his paper “The Right Way to Hold People Accountable.”¹⁴

1. **Clear Expectations.** “The first step is to be crystal clear about what you expect. This means being clear about the outcome you’re looking for, how you’ll measure success, and how people should go about achieving the objective. It doesn’t all have to come from you. In fact, the more skilled your people are, the more ideas and strategies should be coming from them. Have a genuinely two-way conversation, and before it’s over, ask the other person to summarize the important pieces — the outcome they’re going for, how they are going to achieve it, and how they’ll know whether they’re successful — to make sure you’re ending up on the same page. Writing out a summary is a good idea but doesn’t replace saying it aloud.”
2. **Clear capability.** “What skills does the person need to meet the expectations? What resources will they need? If the person does not have what’s necessary, can they

¹¹ Preponderance of the Evidence defined to be =>51%. Cornell Law School Legal Information Institute
<https://www.law.cornell.edu/wex/preponderance>

¹² “Standard of Care” used in Professional Negligence Cases- <https://www.justia.com/trials-litigation/docs/caci/600/600/>

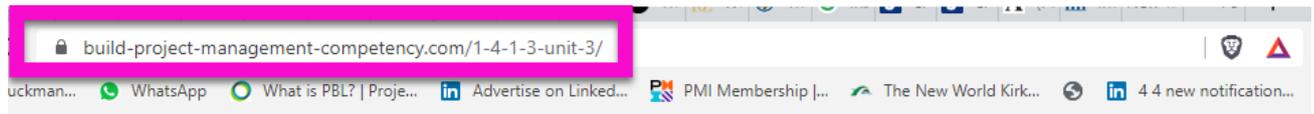
¹³ See Also “Judicial Council of California Civil Jury Instructions (2020 edition)” <https://www.justia.com/trials-litigation/docs/caci/400/400/>

¹⁴ Bregnan, Peter (Jan 2016) HBR “The Right Way to Hold People Accountable” <https://hbr.org/2016/01/the-right-way-to-hold-people-accountable>

acquire what’s missing? If so, what’s the plan? If not, you’ll need to delegate to someone else. Otherwise, you’re setting them up for failure.”

3. **Clear measurement.** *“Nothing frustrates leaders more than being surprised by failure. Sometimes this surprise is because the person who should be delivering is afraid to ask for help. Sometimes it comes from premature optimism on both sides. Either way, it’s completely avoidable. You should agree on weekly milestones with clear, measurable, objective targets during the expectations conversation. If any of these targets slip, jump on it immediately. Brainstorm a solution, identify a fix, redesign the schedule, or respond in another way that gets the person back on track.”*
4. **Clear feedback.** *“Honest, open, ongoing feedback is critical. People should know where they stand. The feedback can be fact-based and easily delivered if you have clear expectations, capability, and measurement. ‘Is the person delivering on her commitments? Is she working well with the other stakeholders? If she needs to increase her capability, is she on track? The feedback can also go both ways — is there something you can be doing to be more helpful? Give feedback weekly, and remember it’s more important to be helpful than nice.”*
5. **Clear consequences.** *‘If you’ve been clear in all of the above ways, you can be reasonably sure that you did what’s necessary to support their performance. At this point, you have three choices: repeat, reward, or release. Repeat the steps above if you feel that there is still a lack of clarity in the system. If the person succeeds, ‘you should reward them appropriately (acknowledgment, promotion, etc.). If they have not proven accountable and you are reasonably certain that you followed the steps above, they are not a good fit for the role, and you should release them from it (change roles, fire them, etc.).’*

So until or unless PMI (and AACE, IPMA, APM/APMG et al.) are willing to incorporate whatever “standards of care” they want to adopt, then there is no way that they can expect that project managers can be held “ACCOUNTABLE” for “ACHIEVING PROJECT OBJECTIVES” when there are so many variables over which they have NO REASONABLE CONTROL and/or DO NOT HAVE THE FORMAL AUTHORITY TO ACT, to avoid, prevent or mitigate or to exploit, share or enhance.



1337

Figure 4- Strategic Level Risk and Opportunity Concepts¹⁵

Because as contractors, we are extremely sensitive to the supply and demand curves (See Figure 5- A curve CONTRACTORS refer to as the “20/20 Rule”) where our gross profit margins are about 20% +/- and at those margins, we only win about 20% of the work we bid, we do not have the luxury of simply marking up our bids based on every risk we identify. If we were to do that, we would NEVER win any work. Therefore, we have to do as CONTRACTORS if we want to win any work and not risk driving ourselves into bankruptcy court in the process, and we need to focus less on RISKS and more on OPPORTUNITIES. In other words, we have to MAXIMIZE the identification of OPPORTUNITIES and using the Expected Monetary Value (EMV) use that Amount to OFFSET or “balance out” the EMV of our risk events.

¹⁵ Giammalvo, Paul D Course Materials Figure 43 <https://build-project-management-competency.com/1-4-1-3-unit-3/>

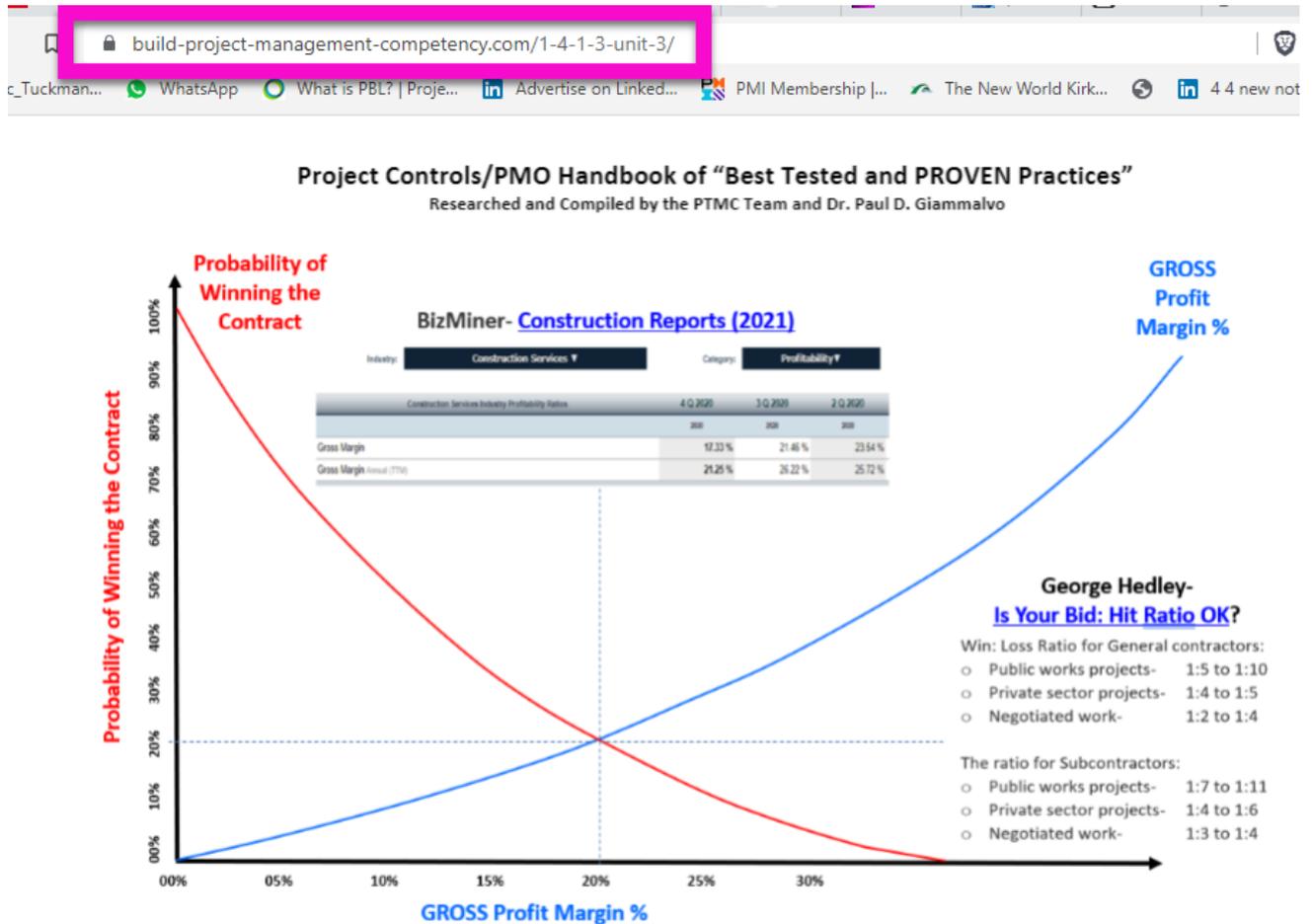


Figure 5- The “20/20” Rule Used by CONTRACTORS to determine the Target Profit Margins

We show in Figure 4 yet another “Fundamental Truth” or “REALITY” that PMI, AACE, IPMA, APM/APMG et al. seem to have either forgotten or ignored. The reality of this can best be illustrated or supported by this graphic showing how many contractors exploit errors/omissions in the OWNERS bid documents to issue change orders. It also helps to explain why so many INTERNAL projects run late/over budget because this step of developing REALISTIC time and cost estimates is often largely ignored or worse yet, as Prof. Bent Flyvbjerg has identified the costs or durations have been “strategically misrepresented” by the sponsors to avoid the projects getting canceled.



Figure 6- Change Order vs. Original Contract

ESTABLISHING CORRELATION AND CAUSATION

While Dr. Ken did an outstanding job of explaining and even demonstrating using Excel how to calculate CORRELATION as we know from the previous section on the definition of “Professional Negligence” that not only do we have to prove “Cause in Fact” (Correlation) but we ALSO must prove “Proximate Cause” (Causation). So how do we establish CAUSATION?

As a quick refresher, we know that correlation between any two variables indicates that as one variable changes in value, the other variable tends to change in a specific direction and often, but not always, at a constant rate. A correlation coefficient is a value between -1 and +1, measuring the direction and the strength of this tendency to vary together. A plus value means the slope of the line showing the relationship of the variable to the base is trending UPWARDS, and a negative value means the relationship is trending DOWNWARDS. Likewise, the closer the ratio is to 1, the stronger or more powerful the relationship. A coefficient of 1.0 would appear as a 45-degree angle. For each incremental change in the constant or baseline, there would be exactly the same incremental change in the variable)

As Dr. Ken explained, the two most common types of correlation coefficients are Pearson’s Product Moment Correlation and the Spearman Rank-Order Correlation.

The simple case study I like to use in our classes comes to us from the popular National Geographic reality TV show “[Wicked Tuna](#).” If we as retail consumers go into the fish market and purchase Tuna, as it is sold by weight, the larger the piece we buy, the more it will cost. The formula is KG or Lbs. X Price per KG or Lb. = Amount Paid. This is a POSITIVE correlation with the unit cost being a constant and the weight being the variable. HOWEVER, that is not how the fishermen are paid. Of course, their fish are weighed, but the Amount of money the wholesaler will pay them is a variable that is based on two sub-variables, both of which are QUALITATIVE:

- 1) Amount of fat in the meat
- 2) Color of the core

This means the price the wholesaler offers them is NOT a constant but an amount (determined quite arbitrarily) based on fat content and core color. So in this example, you could have two fish of identical weights that earn the fisherman two very different prices. Unfortunately, this is a common problem in projects, where quality or other QUALITATIVE variables determine the price of the unit in place. This helps to explain why “level of effort” is not a recommended practice to determine the earned value and why “cost-plus” contracts are generally not used by most owners.

‘Once you find a correlation, you can test for causation by running experiments that “[control the other variables and measure the difference](#).”¹⁶ You identify what QUANTITATIVE or QUALITATIVE ATTRIBUTE you think may be the “root cause” problem or opportunity and make that a constant,

¹⁶ Shah, Darmesh (2013) “Measuring What Matters- How to Pick a Good Metric”
<https://www.onstartups.com/tabid/3339/bid/96738/Measuring-What-Matters-How-To-Pick-A-Good-Metric.aspx>

and then see what impacts other variables have on the constant. Common examples of this test are the various sensitivity diagrams, Spider Plots and Tornado Diagrams.

Coming back to our [Wicked Tuna example](#), if we had the data, we could create a Sensitivity or Tornado Graph model showing market demand for Tuna, the fat content and the color of the meat and its impact on the price the wholesaler offers the fisher(wo)men.

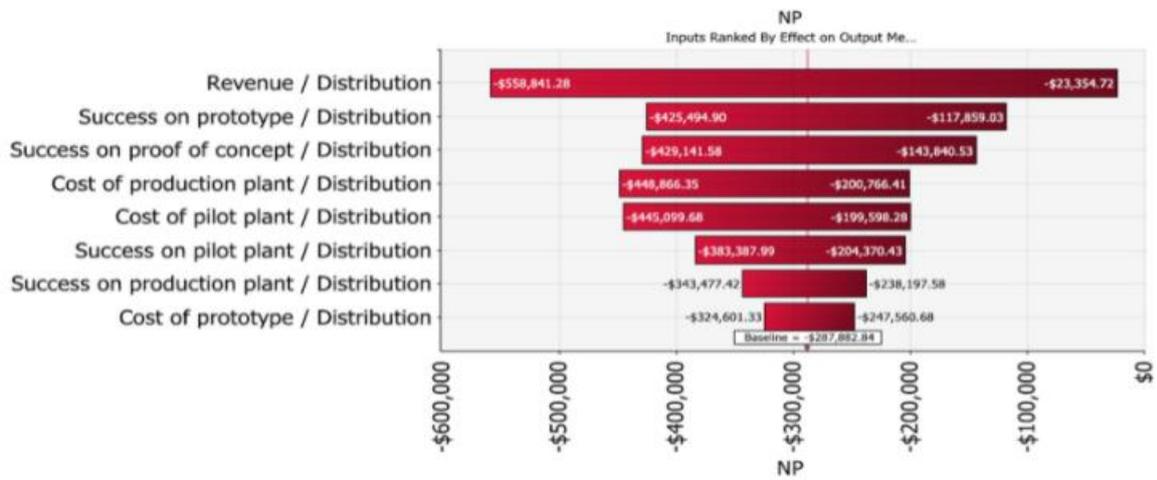
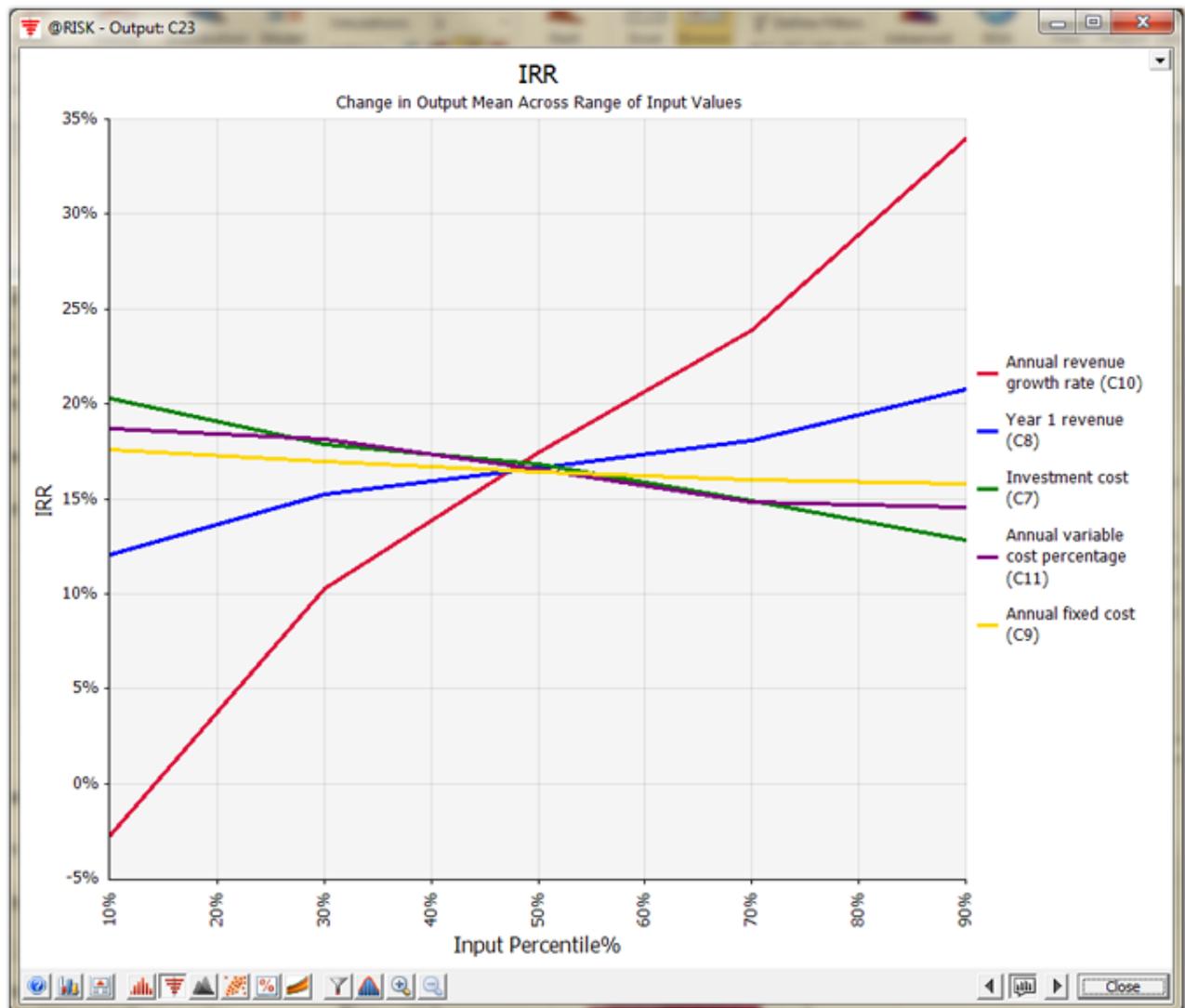


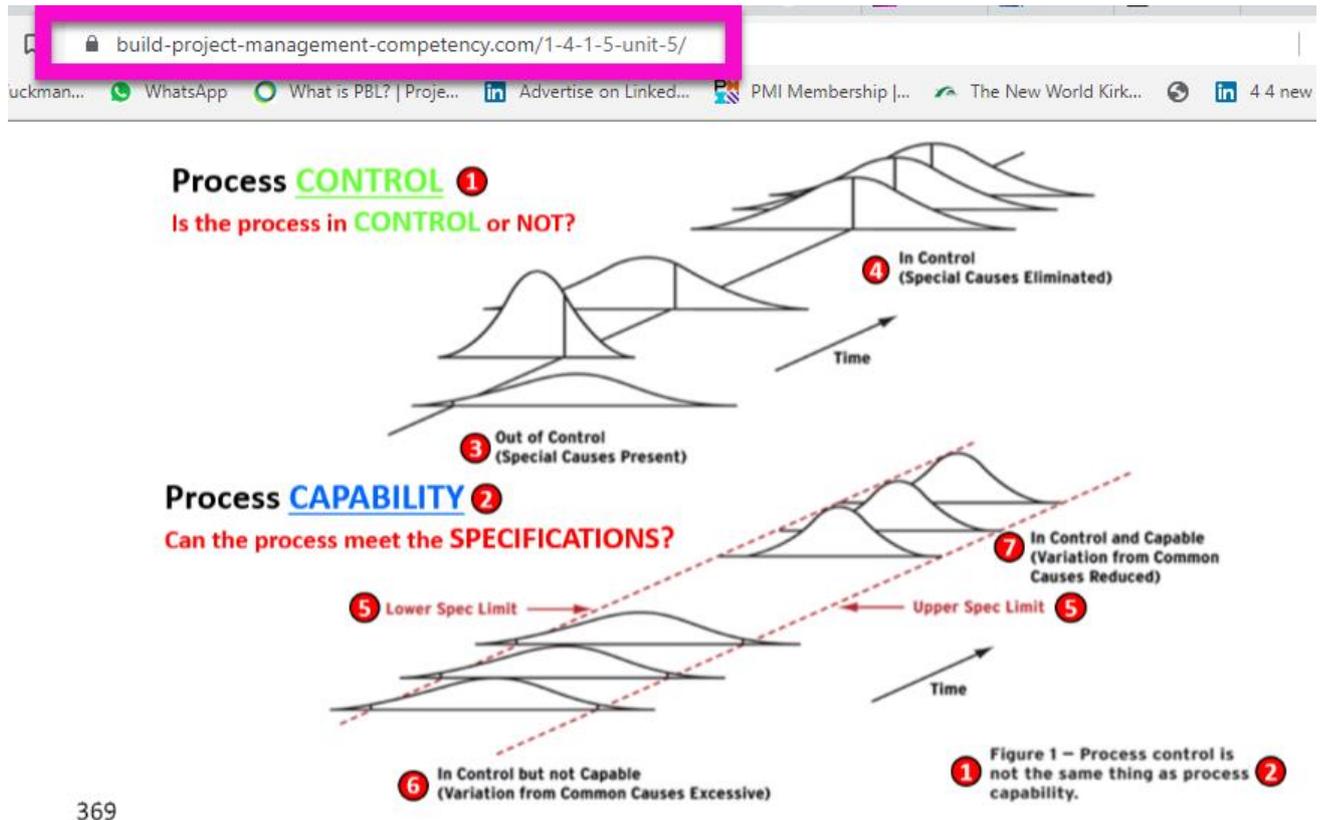
Figure 7- Showing a Tornado Diagram



Spider graphs in @RISK show intuitively how an output changes as a given input changes.

Figure 8- Showing a Spider Plot Sensitivity Diagram

Other “tests” commonly used by project managers are Statistical Process Control Charts which show you not only are our work processes IN or OUT OF CONTROL, but they also indicate whether or not the workflow process is CAPABLE of meeting the technical specifications.



369

Figure 9- Process CONTROL vs. Process CAPABILITY

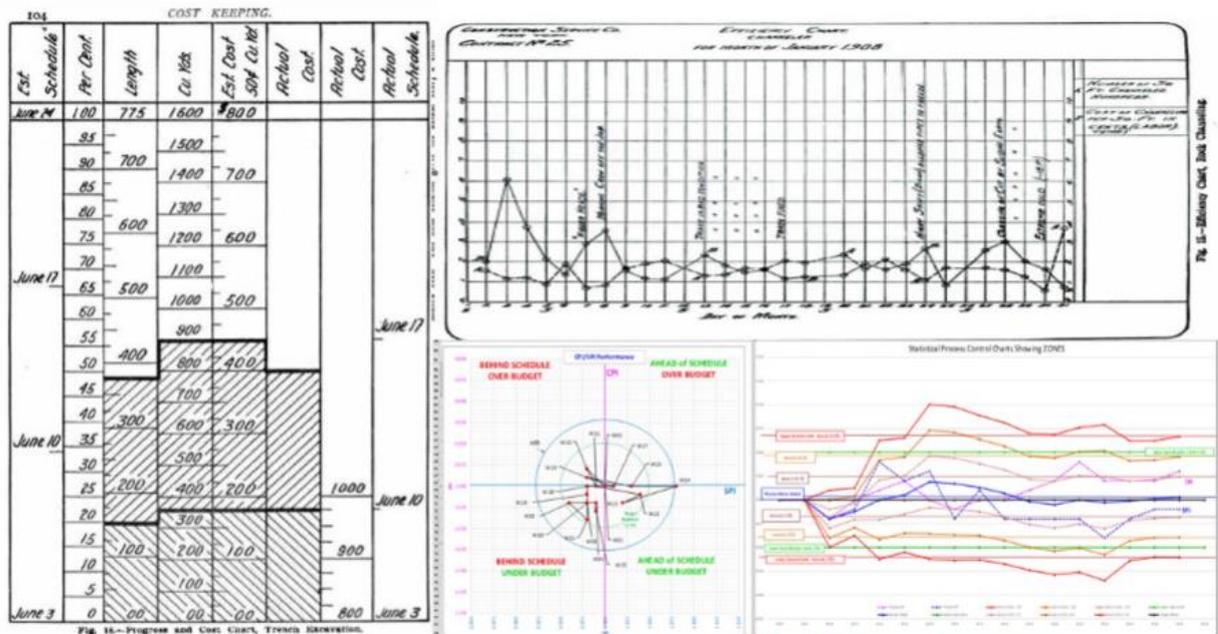
Speaking as a CONTRACTOR, I must know that our WORKFLOW PROCESSES are not only CAPABLE of meeting the technical or other target requirements (in our case, cost efficiency measured by CPI and productivity efficiency as measured by SPI) but that the WORKFLOW PROCESSES are IN CONTROL as defined by Shewhart and Deming measured using 3 Sigma Statistical Process Control Charts.

And none of this is or should be “new” to us. The basic concepts date back to the 18th Century Industrial Revolution factory floors as captured in [Halbert Powers Gillette](#), [Richard Turner Dana](#)’s 1909 book “[Cost Keeping and Management Engineering: A Treatise for Engineers, Contractors and Superintendents Engaged in the Management of Engineering Construction.](#)” I believe this book to be the seminal work on the origins of Earned Value Management as a “pay for performance” or “incentive payment scheme,” which is still in use today by private sector contractors but largely ignored by the US Government, PMI and AACE in their standards. While beyond the scope of this paper, I believe one of the reasons so many companies are reluctant to embrace the use of Earned Value Management is that IF the link between PERFORMANCE and PAYMENT was more closely re-established, that Earned Value would be DEMANDED by owners and contractors alike.

ESTABLISHING CAUSATION (CONTRACTORS PERSPECTIVE)



Project Controls/PMO Handbook of “Best Tested and PROVEN Practices”
 Researched and Compiled by the PTMC Team and Dr. Paul D. Giammalvo



120 Figure 3- Showing 120+ Years of Progress in Reporting Progress and Measuring EFFICIENCY. (1909 example) and (2020 version)

Figure 10- Gillette and Dana’s original Progress and Efficiency Data (1909) to Excel Reports (2000)

Figure 10 compares the original progress tracking advocated by Gillette and Dana, which was based on the practices that evolved from the demise of the Guilds in the 16th Century to the factory floors of the Industrial Revolution in the 18th Century and along with the work of Taylor, Gantt, Fayol, the Gilbreath’s and many others during the late 18th and early 19th centuries, formed the foundations of what we know today as “Modern Project Management” in general and “Earned Value Management” specifically.

Based on Gillette and Dana’s work supported by that of Henri Fayol, we start by tracking the Cost Performance Index (CPI) and Schedule Performance Index (SPI) rather than using the actual Cost and Schedule Variances. Why? Because we work globally, we are working with different currencies and given inflation and currency exchange rates vary so much, it is hard to compare projects in different countries or over different periods by converting the data to EFFICIENCY FACTORS (CPI measures how EFFICIENT we are in using the MONEY allocated to the project while SPI measures how EFFICIENTLY we are using the PEOPLE, EQUIPMENT and FACILITIES allocated to the project) we don’t have to worry about currency conversions or inflation adjustments.

Figure 11 is the PRIMARY or MAIN dashboard gauge we use on our projects, and we teach in our courses that evolved from the work of Gillette and Dana, updated to take advantage of the features in Excel. For a complete explanation of these graphics, including not only step by step instructions on how to create and use them but also free access to the Excel templates, you can go HERE <https://build-project-management-competency.com/1-4-1-11-unit-11/>

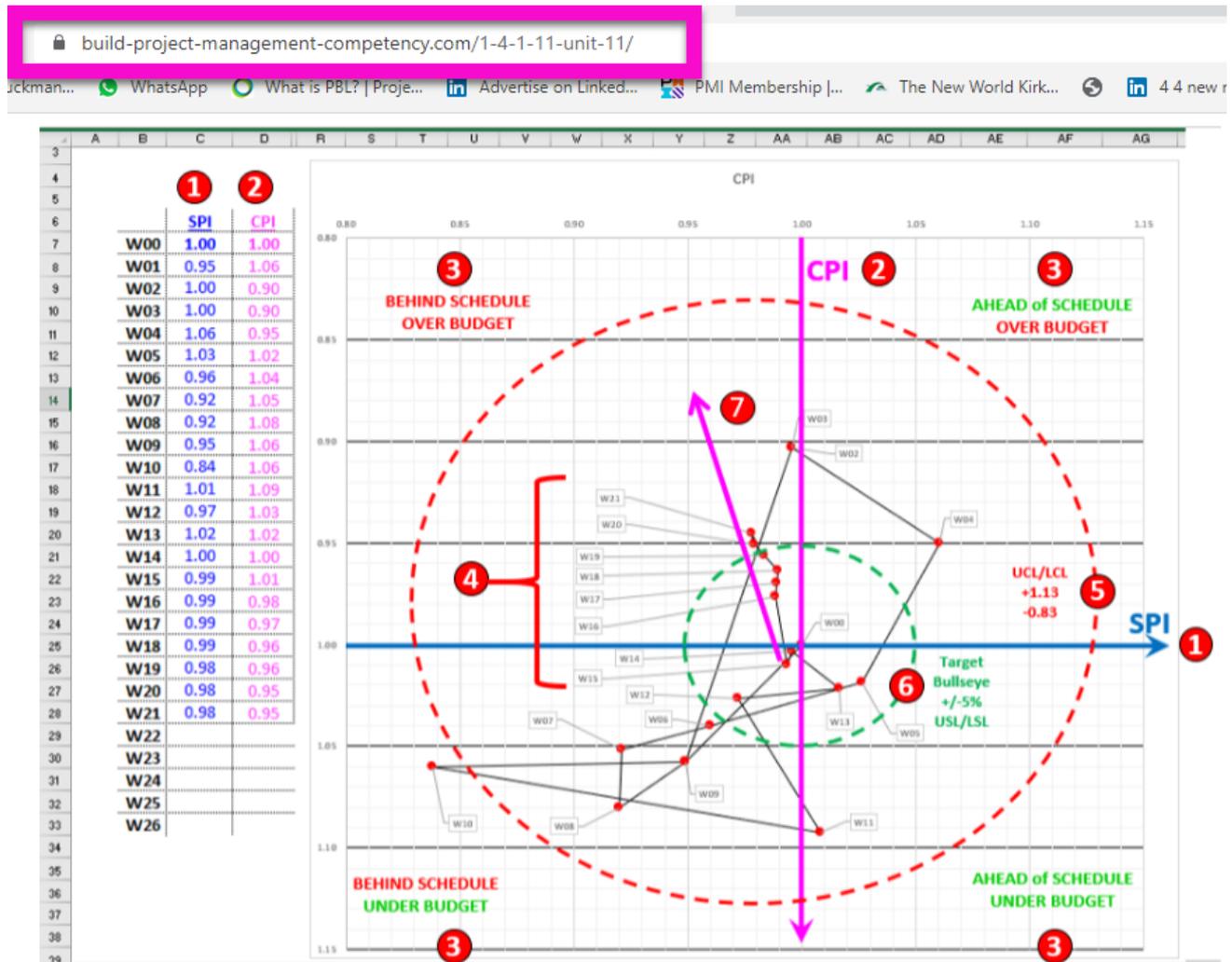


Figure 11- Detailed View of SPI and CPI Target Chart vs. the UCL/LCL and USL/LSL

For anyone who has done any shooting can appreciate how this SPI vs. CPI Target or “Bullseye” chart shows us at a glance how close or far from the “Bullseye” our weekly SPI (1) and CPI (2) calculated values are falling, providing the opportunity to make whatever adjustments in TIME (productivity) or COSTS (labor, material or equipment) to try to keep those readings close to the Bullseye, which is established using Activity Based Costing from our winning bid.

By plotting our Upper and Lower CONTROL limits (5) (UCL/LCL), we can also tell at a glance IF our processes are IN CONTROL. (Aside from a single reading in the lower left quadrant that indicates our workflow process in Week 10 was OUT OF CONTROL due to an EXTERNAL or SPECIAL cause)

We still have to see if the process is IN or OUT of control due to INTERNAL or PROCESS related factors. (See Figure 12)

By plotting our Upper and Lower SPECIFICATIONS Limits (6) indicates that while we were “shooting wildly” in the early weeks, by about Week 12, the “Learning Curve” was over, and we were able to consistently remain within the TARGET CPI and SPI values of +/-5%. (SPI and CPI between 0.95 and 1.05)

Lastly, if we look at the Pink Arrow (7), we can see that a TREND has developed from Week 15 to the last reading on Week 23. This is an example of the “Rule of 7,” which using Statistical Process Control Charts tell us that something has gone wrong INTERNALLY with our workflow process. IF we fail to take corrective or remedial actions or interventions, we can see this trend is headed in a direction that will leave our project LATE and OVER BUDGET.

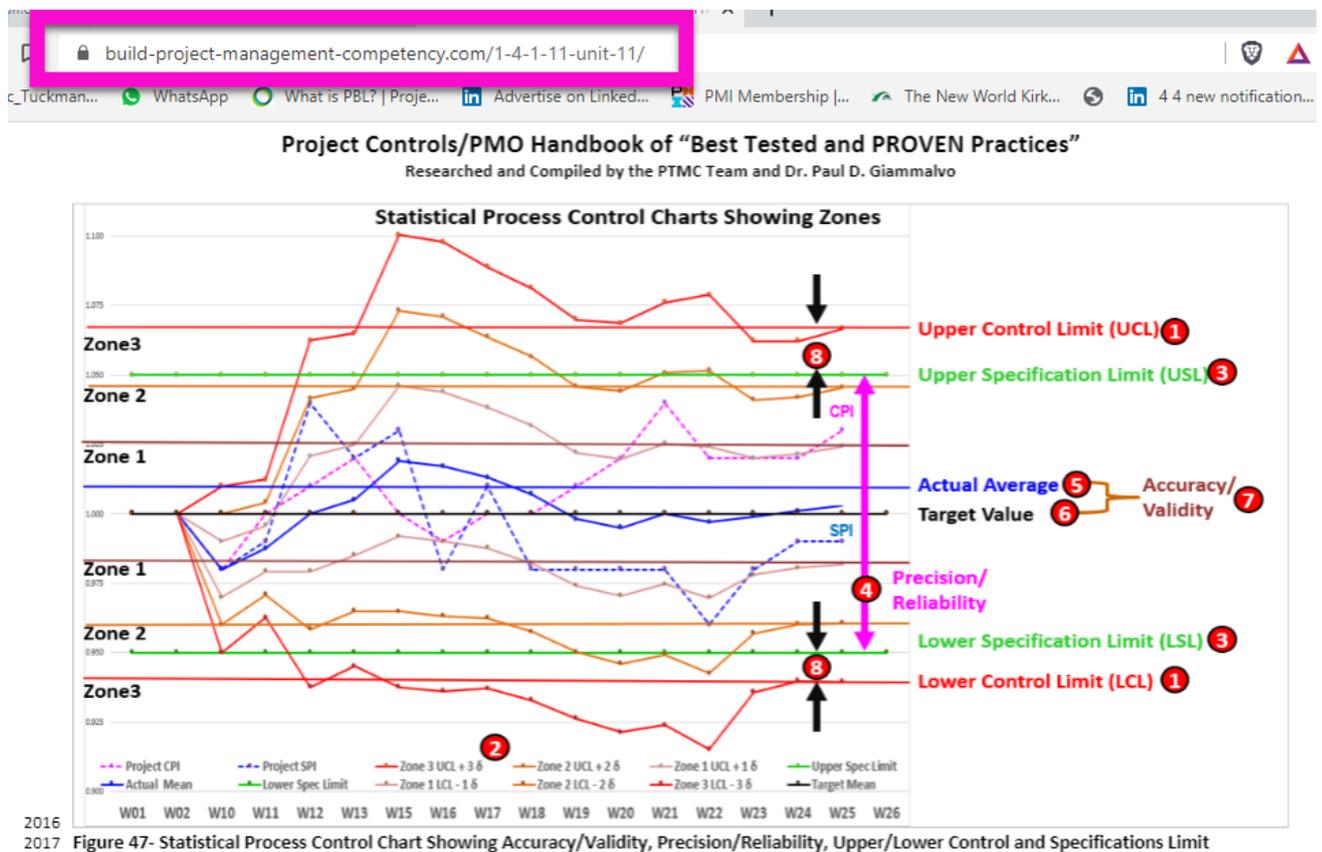


Figure 12- Detailed View of Statistical Process Control Charts using SPI and CPI Data

If we take the graph shown in Figure 11 and turn it to the RIGHT, we can see the same data as shown in Figure 11, and by looking at over TIME, we get Figure 12. (Also see Figure 10, lower right-hand quadrant to see the relationship between Figures 11 and 12) Using this chart (also done in Excel), we can apply the various 3 Sigma Statistical Process Control Analysis tools to find out the root cause(s).

What do we do with this information in the context of determining CAUSATION? There are 4 metrics or Key Performance Indicators we can or should be applying to any dataset BEFORE we use it retrospectively or prospectively.

- 1) Accuracy- How close to the Bullseye are we?
- 2) Precision- How “tight” are the readings? Are they widely dispersed or a “tight” grouping?
- 3) Reliable- How consistent are we? Are our readings falling all over the chart (Figure 11, Weeks 1-Week 14), or are they more like the readings from W15 to W23?
- 4) Validity- How much can we or should we trust the results if we use this data to forecast the future? Can we or should we add this data to our historic databases? For those familiar with trend analysis or forecasting, this is reflected in the R² value.

For a more detailed explanation of all these graphics, including access to the supporting Excel spreadsheets, go HERE <https://build-project-management-competency.com/1-4-1-11-unit-11/>

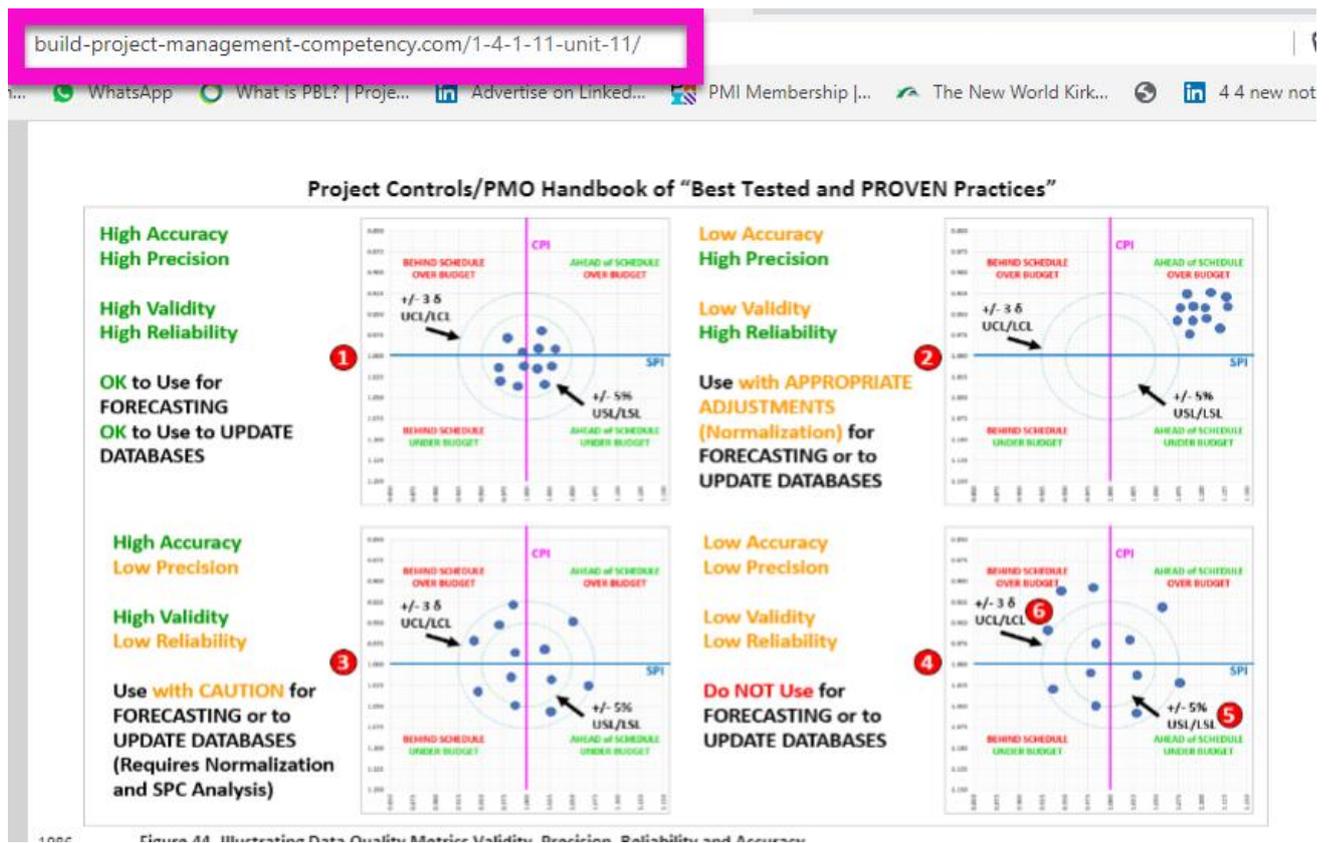


Figure 13- The Four Quality Metrics of Data

Two additional experiments or analyses you can use to identify causation with your PROJECT or the PRODUCT = ASSET your project created are:¹⁷

- 1) Hypothesis testing
- 2) A/B/n experiments

1. Hypothesis testing

The most basic hypothesis test involves the creation of at least two hypotheses:

- 1) H0 (null or void hypothesis) (i.e., Grass is BLACK)
- 2) H1 (your primary hypothesis). (i.e., Grass is GREEN)

You can also have secondary hypothesis, H2 and even tertiary hypothesis, H3; etc. (Grass can be any color in the rainbow)

The null or void hypothesis will always be “the opposite of your primary hypothesis.” Why? Because while you cannot prove your primary hypothesis with 100% certainty (the closest you can get is 99%), you can disprove your null hypothesis¹⁸.

“The primary hypothesis points to the **causal relationship** you’re researching and should identify an independent variable,”¹⁹ yielding at least one or more dependent variable(s). (i.e., Cost Efficiency as measured by the CPI and Schedule Efficiency as measured by the SPI)

First, it is best to create your H1, then identify its opposite and use that for your H0. Your H1 should identify the relationship you’re expecting between your independent and dependent variables. So, if we use the former example of the impact of in-app social features on retention, your independent variable would be joining communities, and your dependent variable would be retention.

As a CONTRACTOR working on slim margins, we do this all the time, trying to OPTIMIZE the number of people working on a crew or when deciding whether to replace people with machines.

As CONTRACTORS, we are continuously trying to “tweak” our processes by changing individuals on the crews, changing the mix of trades (i.e., replacing expensive carpenters with laborers or changing the ratio of Journey people to Apprentices) or by replacing the number of people on the crews with machines. So especially for anyone hoping to remain in business as a CONTRACTOR, this is a never-ending process.

¹⁷ Mardhaven, Archana (2019) “Correlation vs Causation: Understanding the Difference for your Product”

<https://amplitude.com/blog/causation-correlation#>

¹⁸ Correlation vs Causation: Understand the Difference for <https://amplitude.com/blog/causation-correlation/>

¹⁹ Correlation vs Causation: Understand the Difference for <https://amplitude.com/blog/causation-correlation/>

Hypothesis testing is helpful when trying to identify whether a relationship exists between two variables, and rather than looking at anecdotal evidence, instead look at historical data to run a longitudinal analysis that looks at changes over time, as shown in Figures 11 or 12.

As an alternative, you could perform a cross-sectional analysis that analyzes a snapshot of data, as shown in Figure 13.

2. A/B/n Experimentation

Alternatively, A/B/n testing links correlation and causation. Look at all the variables, then change one and see what happens. If your outcome changes (with the same trend), you’ve found the variable that makes the difference.

Examples of this can be found using a Tornado or Spider Graph (Figures 7 and 8), or we can use the SPI vs. CPI Target Chart (Figure 11) combined with the Statistical Process Control Chart (Figure 12)

ANALYSIS AND CONCLUSIONS

When applying the various testing tools for both CORRELATION and CAUSATION, we need to consider the following possibilities:

- 1) The opposite is true: The “Success” or “Failure” of the PRODUCT or ASSET determines whether or not the PROJECT was a “Success” or “Failure.” (The “tail wagging the dog” syndrome) While many owners may look at it in this light, consider that the project could have been an outstanding success for BOTH the CONTRACTOR and OWNER, finishing on time, within budget with no lost-time injuries or unresolved claims and earning him/her a fair and reasonable profit.
- 2) The two are correlated, but there’s more to it: Project “Success” or “Failure” is correlated to Product or Asset “Success” or “Failure,” but some other factor causes them. (i.e., the price of commodities such as Oil, Gold or Coal or other materials can impact BOTH the Project and the Asset) The rising commodity prices helped the OWNER realize a faster RoI or RoA, while the rising commodity prices during the construction or implementation phase eroded the contractor’s profit margins.
- 3) There’s another variable involved: Project “Success” or “Failure” are correlated to Product or Asset “Success” or “Failure,” but only as long as some variable happens. (I.e., the Wicked Tuna example- The price paid for Tuna will increase but ONLY if the fat content and the color of the core meet or exceed whatever arbitrary standard established by the wholesaler.
- 4) There is a chain reaction: Project “Success” or “Failure” are correlated to Product or Asset “Success” or “Failure” but only if a series of interim pieces of the puzzle fall into place. The best examples are plane crashes and other disasters where a series of

events happen where the “cumulative impact” (“ripple effect”) is greater than the sum of all the individual change orders. As a contractor, calculating the cumulative impact of multiple change orders on a project is a big challenge when negotiating or adjudicating claims.²⁰ This can be evidenced by the old idiom about the death of King Richard III during the Battle of Bosworth:²¹

LYRICS TO “FOR WANT OF A NAIL”

*‘For want of a nail, the shoe was lost;
 For want of the shoe, the horse was lost;
 For want of the horse, the rider was lost;
 For want of the rider, the battle was lost;
 For want of the battle, the kingdom was lost;
 And all from the want of a horseshoe nail.’²²*



		The PRODUCT of the Project (the ASSET created by the PROJECT)	
		Succeeds	Fails
The PROJECT Undertaken to “create, acquire, upgrade, repair, maintain, expand and eventually dispose of ORGANIZATIONAL ASSETS”	Succeeds	Project Succeeds Product of the Project Succeeds	Project Succeeds Product of the Project Fails
	Fails	Project Fails Product of the project Succeeds	Project Fails Product of the Project Fails

Figure 14- Project vs. Product/Asset Success>Failure Matrix

RARELY do we find a PROJECT that is 100% “successful” from both the OWNER and CONTRACTORS perspective. There are too many external and internal risks and opportunities that neither party has any “reasonable control.” However, while there can be no guarantees, there are many PRODUCTS (Assets) that not only meet but can and do exceed the expectations,

²⁰ Adelstein, David (2020) “How The Cumulative Impact Theory Has Been Defined”
<https://www.floridaconstructionlegalupdates.com/how-the-cumulative-impact-theory-has-been-defined/>

²¹ All Nursery Rhymes (2022) <https://allnurseryrhymes.com/for-want-of-a-nail/>

²² For Want of a Nail, the Shoe Was Lost - Words for Life. <https://wordsforlife.org.uk/activities/for-want-of-a-nail-the-shoe-was-lost/>

regardless of whether the project was a “success” in the eyes of either the CONTRACTOR or the OWNER.

At the same time, there are examples, such as the Sydney Opera House where, by any standards, the project was an abysmal failure- late, over budget, beset by quality problems, where the “PRODUCT” (=ASSET) turned out to become the iconic “brand image” of Sydney Harbor.

Based on research published by KPMG, AIPM and IPMA in their “[Future of Project Management: Global Outlook 2020](#),” they show that **ONLY**:²³

- “52 percent of projects are delivered with stakeholder satisfaction.”
- “51 percent of projects are likely to meet the original goal and business intent.”
- “48 percent of respondents feel their organization manages projects and programs effectively or very effectively.”
- “42 percent of projects are likely to be delivered on time.”
- “40 percent of projects are likely to be delivered on budget.”²⁴

IF this is the BEST we can do after 50+ years of PMI and IPMA being in existence and 57+ years of AACE, how much longer is it going to take before “we stop doing the same things over and over again but expecting different results”²⁵ and start to look at what we know for a fact has been tested and proven to work, which is to INTEGRATE Asset, Portfolio, Program and Project Management into a single, “end-to-end” process built around the ASSET LIFE SPAN?

²³ KPMG/AIPM Project Delivery Performance Survey 2020 - KPMG

<https://home.kpmg/au/en/home/insights/2020/08/australian-project-delivery-performance-survey-2020.html>

²⁴ KPMG/AIPM Project Delivery Performance Survey 2020 - KPMG

<https://home.kpmg/au/en/home/insights/2020/08/australian-project-delivery-performance-survey-2020.html>

²⁵ Einstein’s definition of INSANITY <https://www.scientificamerican.com/article/einstein-s-parable-of-quantum-insanity/#:~:text=%E2%80%9CInsanity%20is%20doing%20the%20same,usually%20attributed%20to%20Albert%20Einstein.>



Figure 15- Integrated Asset, Portfolio, Program (Operations) Project Management Landscape

ACTIONABLE ITEMS

- 1) Start to DIFFERENTIATE between the OWNER’S perspectives and those of CONTRACTOR’S. For OWNER’S, projects are COST or INVESTMENT centers, while for CONTRACTORS, projects are PROFIT CENTERS. Context or perspectives is critically important. Owners obtain Economic Added Value (EVA) from the ASSET the project created, while Contractors receive their Economic Value Added (EVA) from the PROFITS made from “Initiating Planning, Executing, Controlling and Closing” the PROJECT.
- 2) STOP using the “used on most projects, most of the time” (PMI’s PMBOK) standard and embrace only “best tested and PROVEN” tools, techniques, methodologies, and processes.
- 3) Adopt the [5 Attributes of the Scientific Method](#) as the basis to identify and validate what qualifies as “best tested and PROVEN” tools, techniques, methodologies, and processes.
 - a. Empirical
 - b. Replicable
 - c. Provisional,
 - d. Objective and
 - e. Systematic.

- 4) STOP focusing so much only on RISKS. RISKS and OPPORTUNITIES should be EQUALLY identified, evaluated, and managed, understanding that they are NOT simply “two opposing sides of the same coin” but two separate and distinct sets of analysis and evaluation.

- 5) Using the legal definitions of ACCOUNTABILITY coming from the well-established field of PROFESSIONAL NEGLIGENCE, create the appropriate “Standards of Care” for the following key decision-making roles:
 - a. C-Level Decision Makers as “Grand Strategists.”
 - b. Asset Managers as “Project Sponsors” for CAPEX funded projects responsible for Strategy and Logistics
 - c. Program/Operations Managers as “Project Sponsors” for OPEX-funded projects.
 - d. Project Managers as Tactical Managers.Only then can we hold these decision-makers ACCOUNTABLE for their decisions

- 6) Follow the advice of General Omar Bradley and STOP focusing on STRATEGY and start to focus on LOGISTICS. (Has anyone been paying attention to the 40-mile-long convoy of Russian vehicles in Ukraine or how Germany lost the Eastern Front in WWII? “Lessons Learned” for Project and Asset Managers?)

- 7) Recognize and accept that the only model that has been tested and PROVEN to work for over 65 years is the Integrated Asset, Portfolio, Program (Operations) and Project Management Methodology as originally published by Esso or Diamond Shamrock Oil and already in use by all major and most national oil and gas companies, and nearly all public and private sector utility, infrastructure, and transportation companies. ([See an additional list of names here](#))

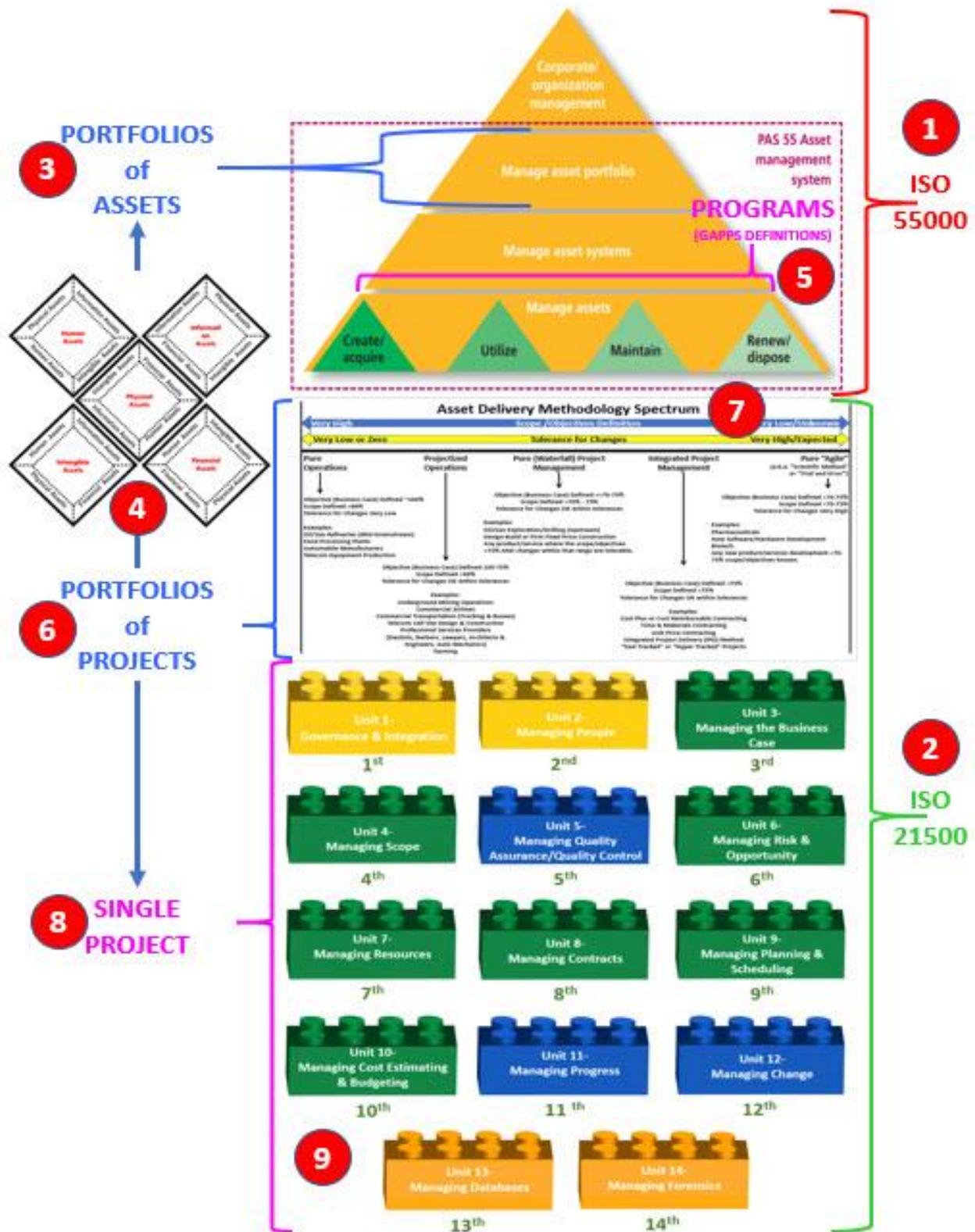


Figure 16- Integration of ISO 55000 and ISO 21500

About the Author



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He is also active in the Global Project Management Community, by playing a “thought leadership” role for the Association for the Advancement of Cost Engineering International, (AACEI) <http://www.aacei.org/> since 1991; He has also been active in two IPMA member organizations: The Green Project Management Association (GPM) <http://www.greenprojectmanagement.org/> where he served on the Certification Board of Directors for two years and the American Society for the Advancement of Project Management <http://www.asapm.org/> for which he served for four years on the BoD as Director of Marketing. He also sat on the Board of Directors of the Global Alliance for Project Performance Standards (GAPPS), www.globalpmstandards.org, Sydney, Australia, and is active as a regional leader. Currently, he is a compensated consultant to the International Guild of Project Controls. <http://www.planningplanet.com/guild> as the primary author of their “Compendium and Reference” as well as the chief architect of their competency-based credentialing program. <http://www.planningplanet.com/guild/certification>

He has spent 35 of the last 50 years working on large, highly technical international projects, including such prestigious projects as the Alyeska Pipeline and the Distant Early Warning Site (DEW Line), upgrades in Alaska and the Negev Airbase Constructors, Ovda, Israel and the Minas Oil Field in Rumbai, Sumatra. His current client list includes Fortune 500 major telecommunications, oil, gas and mining companies, the UN Projects Office, other multi-national companies, NGO organizations, and Indonesian Government Agencies.

In addition to 45+ years of hands-on field experience, Dr. Giammalvo holds an undergraduate degree in Construction Management, his Master of Science in Project Management through the George Washington University and was awarded his Ph.D. in Project and Program Management through the Institute Supérieur De Gestion Industrielle (ISGI) and Ecole Supérieure De Commerce De Lille (ESC-Lille) under the supervision of Professor Christophe Bredillet. “Dr. PDG” can be contacted at pauldgphd@gmail.com.

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