Earned Value Management: The Truth, the Whole Truth and Nothing but the Truth [1]

(Part 2 of a 2-Part Paper)

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FUNDAMENTAL CONCEPTS OF APPLIED EARNED VALUE PER GILLETTE & DANA

In the first installment of this paper, the author established a basic understanding of the real or true story of the origins and evolution of Earned Value Management. In this, 2nd installment, the author will walk the reader through the pages of Gillette and Dana's 1909 book "*Cost Keeping and Management Engineering: A Treatise for Engineers, Contractors and Superintendents Engaged in the Management of Engineering Construction*, and then show you step-by-step how we have updated the work of Taylor, Gantt, Fayol, the Gilbreth's et al. as compiled and explained by Gillette and Dana for use in Excel and how we have taken advantage of established AI tools & techniques.

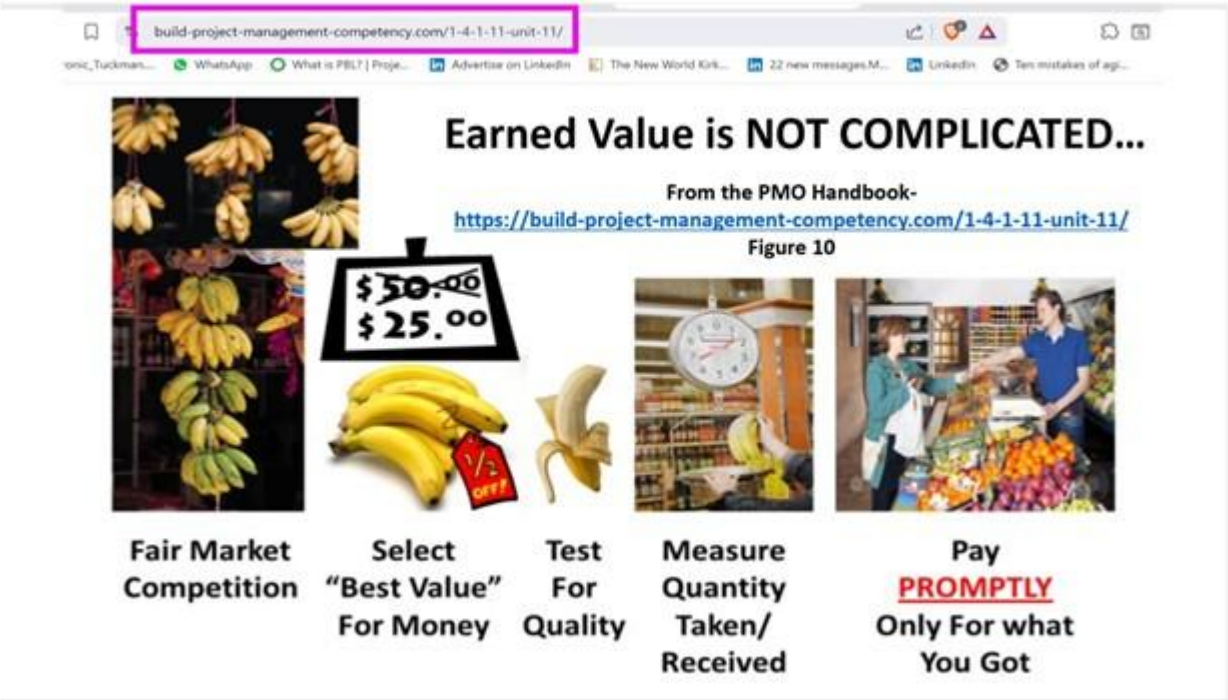

Figure 1- Earned Value was NOT Designed to be COMPLICATED.

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While there is sufficient evidence indicating that the fundamental concepts of applied Earned Value Management can be found in the Old and New Testaments[2], the tangible proof indicate that what we know today as Earned Value Management (EVM) ORIGINATED as a "payment for performance" or "cash on delivery" system, which is a tested and PROVEN system that originated with the French and British Guilds in the 16th Century.

A 16th-century farmer would take his/her grain to the local miller. The miller would grind the grain into flour, and the following day, the farmer would return to the miller. Together, they will weigh the flour (the finished product or asset), and the farmer will pay for the "value-added services" provided by the miller.

Is everyone familiar with the greengrocer example process shown in Figure 1? Is it UNFAIR to the BUYER? Is it unfair to the SELLER? So why does the US Government not apply this same concept to government contractors? If it works for the private sector and has been in use since biblical times, why can't or won't governments adopt a system that has been tested and proven to work for hundreds, if not thousands, of years?

With the growing dissatisfaction with the US Government's FIDUCIARY STEWARDSHIP[3], and management of the TAXPAYER's money, this author is proposing you consider ABANDONING SAE EIA 748D-2019 and REPLACING it with an EVM System that protects the interests of both the SELLER and the BUYER while working to ensure that the US TAXPAYER is getting honest "value for their money"- Quality products/assets delivered on time and within budget designed to substantially fulfill the purpose for which the asset was commissioned to achieve.

Why is all this so important? As we are already using **generative AI**, which has typically focused on administrative tasks, such as tech support and file management. The focus now is on **agentic AI**, a more advanced form of artificial intelligence with enhanced reasoning capabilities that can independently plan and execute complex tasks. Before we can do this, we MUST purge the system of any and all "fake news" or systems that have failed to prove their effectiveness. (e.g., ANSI 748)

The primary objective of CONTRACTORS is to earn a profit from the project. Comparing the simplicity of Earned Value Management as the private sector uses it to how the government uses SAE EIA 748D-2019, we developed a basic illustration that shows how simple yet effective it is when we visit the greengrocer or butcher each week.

In this model, no one is cheated. The SELLER (= Contractor) is obligated to provide documented proof that the quality of the PRODUCTS (=ASSETS) being offered or developed for sale to the BUYER (in this case, the US Government) has met these 3 requirements:

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[2] Taybi, Y. (2019). Is Earned Value Management (EVM) consistent with Sharia Law? Will it help in fighting corruption? PM World Journal, Vol. VIII, Issue VIII, September. Retrieved from https://pmworldlibrary.net/wpcontent/uploads/2019/09/pmwj85-Sep2019-Taybi-is-evm-consistent-with-sharia-law.pdf

[3] Johnson, Vincent R. (2019) "The Fiduciary Obligations of Public Officials" St Mary's School of Law https://commons.stmarytx.edu/lmej/vol9/iss2/4/#:~:text=Regardless%20of%20whether%20specific%20rules,lmej/vol9/iss2/4

✓ Work has been physically completed.
✓ Deliverables are in "substantial conformance" or compliance with the technical requirements.
✓ The SELLER has complied with all other contractual requirements

(This is why your greengrocer provides a peeled orange for you to taste before you buy.)

In their offer to sell, proposal, or tender, the SELLER must comply with these three legal requirements under the Federal Trade Commission Act:

✓ Advertising must be truthful and non-deceptive.
✓ Advertisers must have evidence to back up their claims; and
✓ Advertisements cannot be unfair.

As "for-profit "public sector contractors, this is the EVM System we (the author and his business partners) have used for our successful businesses for 50+ years, and we have documented success after sharing it with many clients.

Figure 2- Earned Value is TESTED and PROVEN as an EFFECTIVE INCENTIVE SYSTEM

If people go back and review the work that evolved and was refined during the 18th Century Industrial Revolution by Frederick Taylor, Henri Fayol, Henry Gantt, Frank and Lillian Gilbreth et al and documented by Halbert Powers Gillette, and Richard Turner Dana in their 1909 book "Cost Keeping and Management Engineering: A Treatise for Engineers, Contractors and Superintendents Engaged in the Management of Engineering Construction", the OBJECTIVE to produce a simple yet very powerful EVM SYSTEM based on "common sense" that has proven to work so effectively at protecting the interests of both the SELLER and the BUYER, it is still in pervasive use today by the private sector.

Despite the "weaknesses" of these systems, especially in light of today's DEI/ESG considerations, they still proliferate, and hardly anyone alive today does not benefit from the products or assets produced by this system.

Common examples include most tradespeople, especially painters, roofers, tile layers, and most civil contractors, who price, bid, quote, and bill based on the square footage, square meters or cubic yards. But we also see examples in other trades and professions:

- Accountants who will charge a flat fee for filing a tax form. (e.g., Pilot, KKSM Business Services.)
- Lawyers who will charge a Firm Fixed Fee for a house closing or uncontested divorce.
- Dentists who charge a flat fee for tooth cleaning or a cavity filling
- Your local mechanic who posts a flat fee for an oil and filter change or aligning and balancing your wheels and tires.
- And what about Lyft, Uber, or Grab? Don't they quote a firm fixed price in advance that you are free to choose or reject?
- Or how about your Greengrocer who discounts fruits or vegetables that are approaching the end of their market appeal and need to be eaten promptly before they spoil?

Once we understand the principles underlying Earned Value, we find real-life examples exist all around us. This makes us wonder how or why the US Government missed the importance and effectiveness of linking payment to performance.

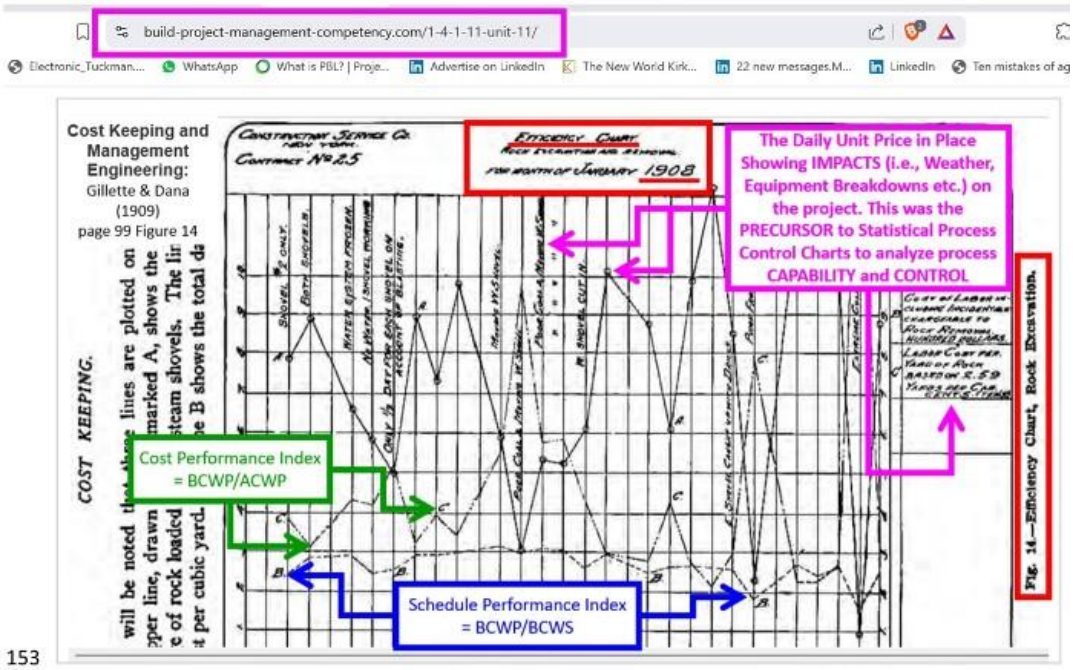
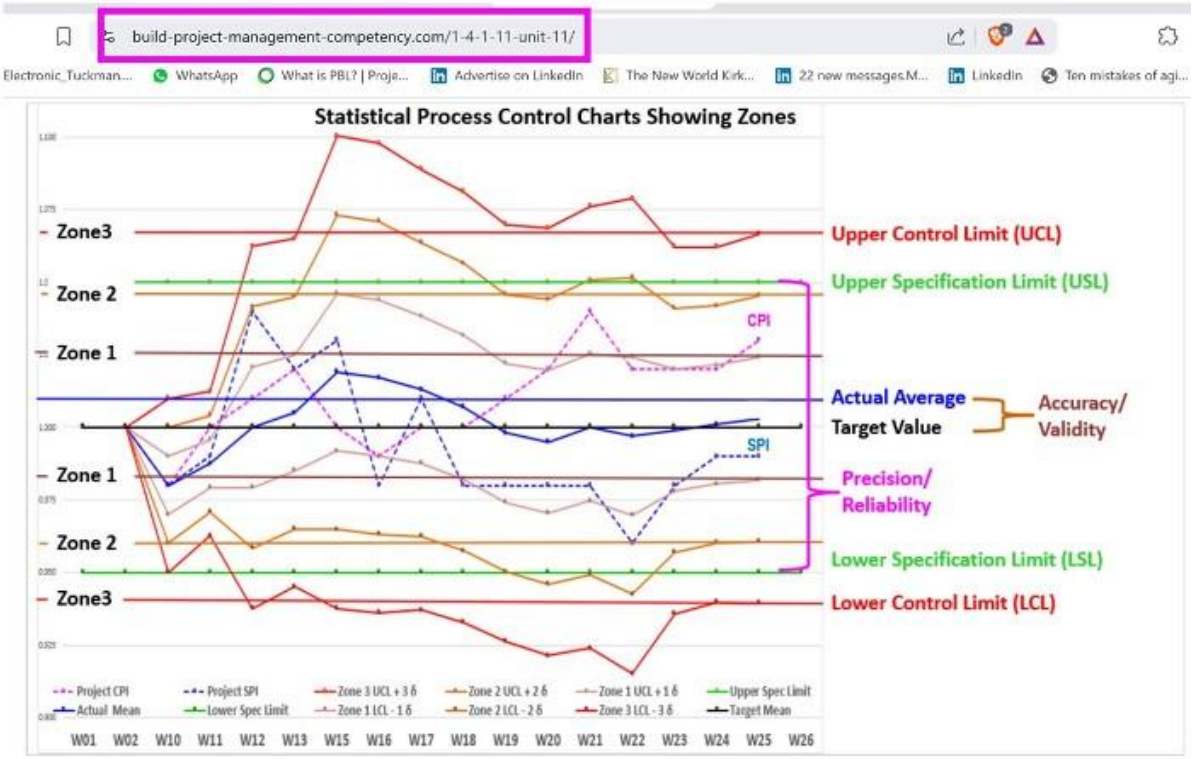


Figure 3- [Cost Keeping and Management Engineering: A Treatise for Engineers, Contractors and Superintendents Engaged in the Management of Engineering Construction,](#) Page 99, Figure 34.

In the graph shown in Figure 3, we can see how Gillette and Dana plotted the same efficiencies for money and time, using the same formula we still use today. If you reference the DAU "Gold Card," you will find the formula to calculate SPI is the BCWP/BCWS X 100, which will yield the % above or below the target or estimated value. To calculate CPI, the formula is BCWP/ACWP X 100, and that will give the percentage by which the targeted or estimated value is exceeded. For both SPI and CPI, the ACCEPTABLE RANGE ESTIMATE (as defined by the GAO, NDIA, and private sector contractors) is between 0.95 and 1.05, OR SPI and CPI between -5% and +5% from the TARGET, ESTIMATED, or BID/QUOTED COST. (Keep in mind that <1.0 is BAD and >1.0 is GOOD.



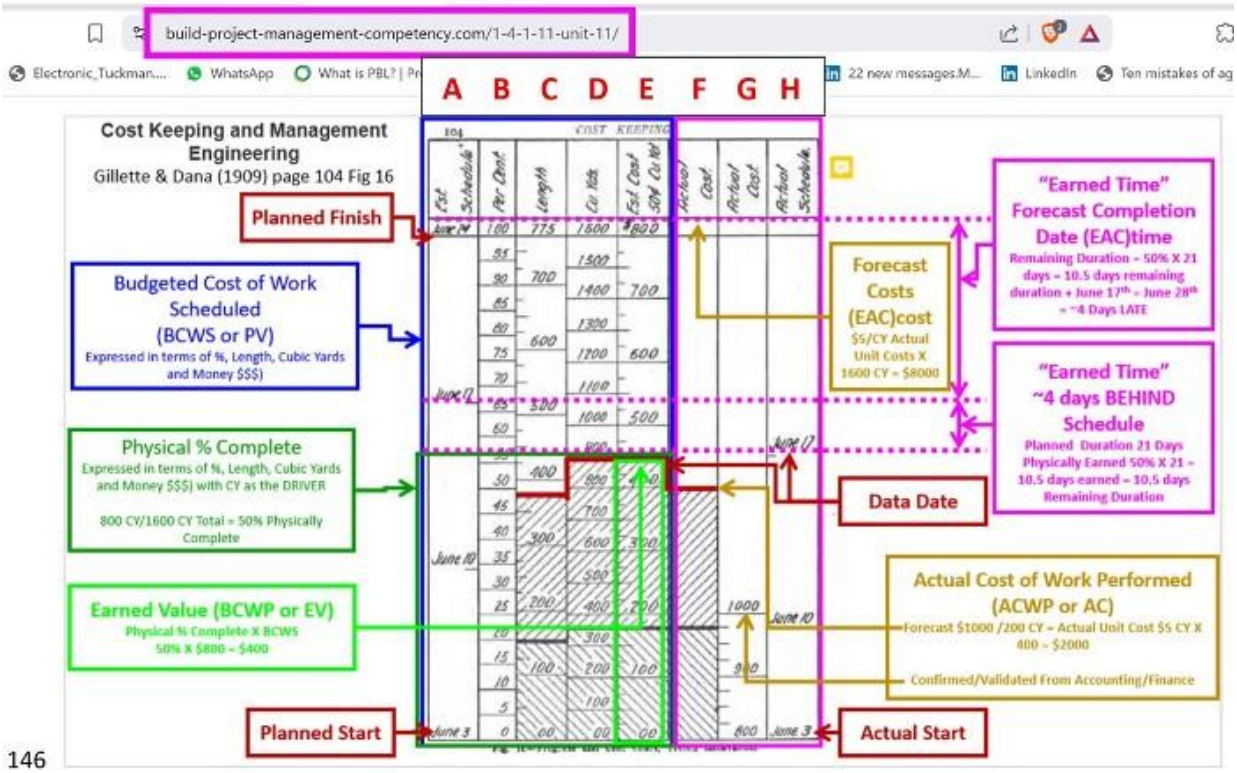
2106 **Figure 52– Simple Statistical Process Control Charts Applied to Analyze SPI and CPI.**[6]

Figure 4. PMO Handbook Unit 11, Figure 52, Line Item 2106

We use the same formulas developed and employed by Gillette & Dana. However, instead of relying on a manual spreadsheet, we utilize Excel spreadsheets. Unlike Taylor, Gantt, and the Gilbreths, we apply Artificial Intelligence (AI) statistical process control chart tools & techniques. (We use and recommend you consider "SPC For Excel", but we also use and recommend Luminvero or Oracle's Crystal Ball. There are many other Excel Statistical Process Control Chart apps.

What other pages from Gilette and Dana have we adapted? Figure 36 on page 104 is considerably more complicated to analyze, but as you try to adapt this for use in Excel, you will quickly discover how savvy these people were and really how much "common sense" plays in the evolution of Earned Value Management.

You will find that they incorporated everything we do today, with the exception that when choosing to measure physical progress, they selected not one method; in this example (trenching), they opted to measure physical progress using 3 metrics or KPI's:



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147 **Figure 4- Gillette and Dana's Figure 16 Showing Today's EVM Metrics.**

Figure 5- Cost Keeping and Management Engineering: A Treatise for Engineers, Contractors and Superintendents Engaged in the Management of Engineering Construction, Page 104, Figure 36.

In Column **B**, they used the physical percent complete method. In Column **C**, they used linear feet of trenching; in Column **D**, they used cubic yards; and in Column **E**, they used Cumulative Costs. It is worth noting that the Length shown in Column **C** is LOWER than the Cubic Yards shown in Column **D**, indicating that the contractor ended up excavating deeper (or wider?) than they planned, which is great IF the contractor was being paid based on the Cubic Yard (Volume) and not by the Linear Foot. This raises an important point for contractors bidding, costing, and billing; they must choose the progress measurement method that most accurately and precisely captures the real or true cost of that progress.

To adapt Gillette & Dana's manual spreadsheets into Excel spreadsheets, we had to turn their two graphs into three Excel spreadsheets. The first two examples illustrate the SPI and CPI values from two different perspectives. The "Target" or "Bullseye" chart displays the SPI and CPI from

an end view. By turning the same date to show the right-side view, we can see the SPI and CPI over time, which enables us to apply the appropriate Statistical Process Control Charts to the SPI and CPI Data.

To address the schedule information, we need to create an additional Excel spreadsheet to track physical progress, ACWP, BCWP, BCWS Early Date, BCWS Late Date, and Actual Progress.

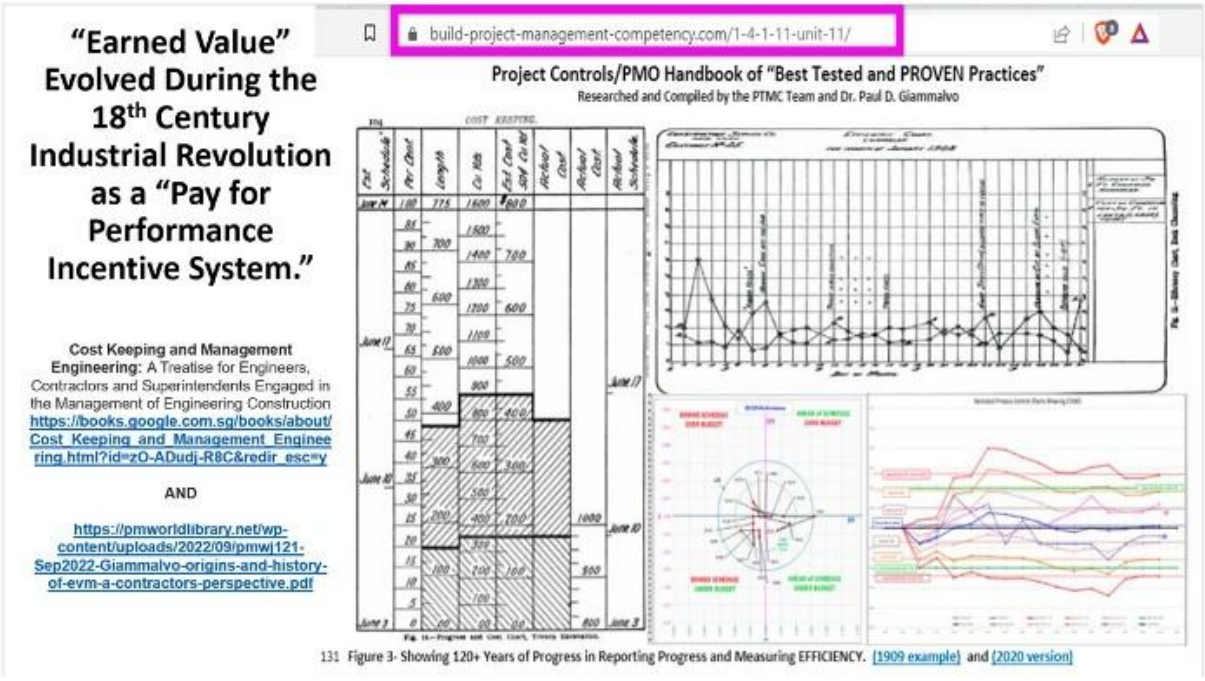

Figure 6- Illustrates Figures 34 and 36 from Gillette & Dana to Excel Spreadsheets Today

CASE STUDIES EXPLAINING HOW TO APPLY EARNED VALUE PER GILLETTE & DANA

Figure 6 (previous) explains how to take the manual spreadsheets from Gillette & Dana, page 99, figure 34 and page 104, figure 36, and in the lower right hand corner, you can see the center graphic illustrates the END VIEW of the SPI and CPI Data and on the lower far right, you can see the SPI and CPI data showing the applied Statistical Process Control Chart, adapted for use in Excel.

The easiest way to illustrate this is by presenting an actual case study from one of our top graduates from a recent class. To put his experience into perspective, he is a planning/scheduling engineer with 7 years of experience, is working on his master's degree in project management, and holds his PMP certification. As Gillette and Dana present SPI and CPI as a single chart, we display SPI and CPI as two separate charts: one to show the end view and the other to facilitate the analysis of the Statistical Process Control Chart.

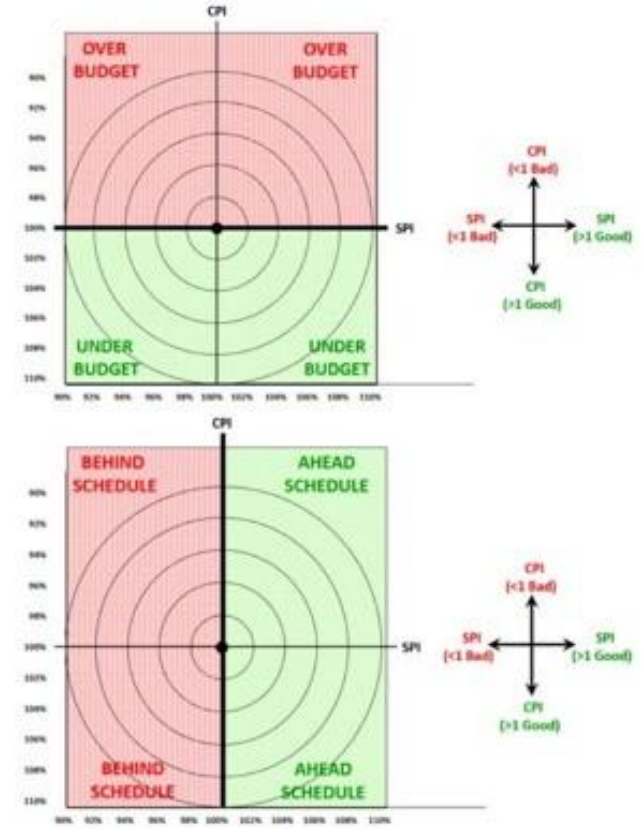

Figure 45- CPI vs. SPI "Bullseye Chart" Explained

Figure 7- CPI vs SPI Bullseye Chart Explained

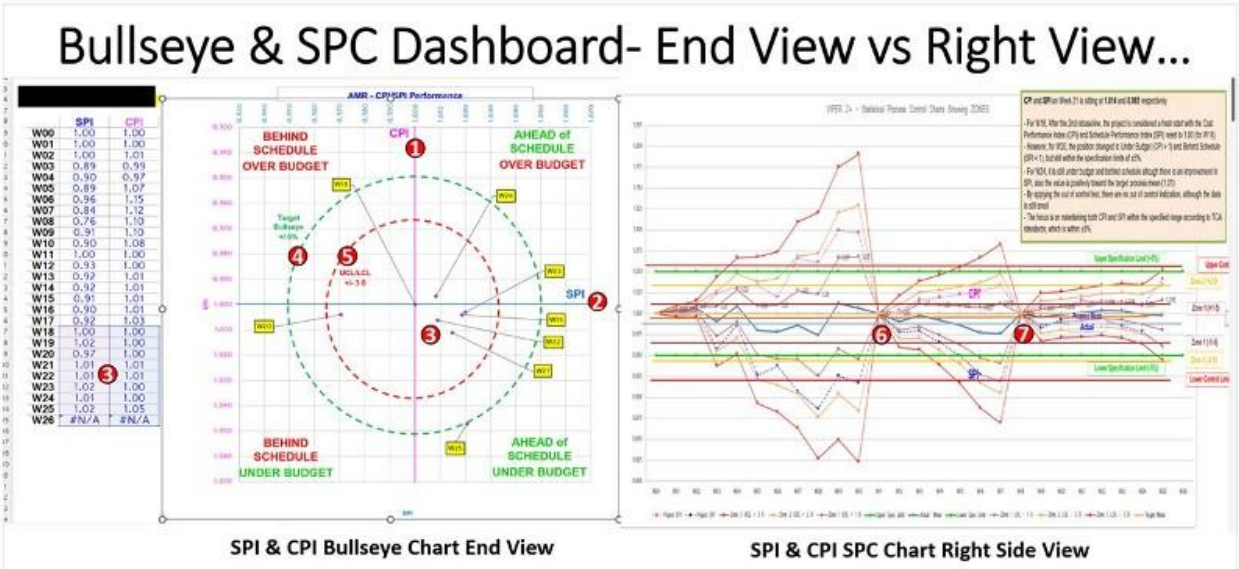

Figure 8- CPI vs SPI Bullseye Chart and SPC Chart Explained

As noted previously, this is an actual case study from a top student in our 26-week-long, graduate-level competency development and assessment program. In this course, each student is assigned seven projects, some of which are individual, and some are team-based. They are free to use whatever software they choose, with this team opting for MS Project. This student considers himself an expert scheduler. To view the seven projects and how each student is graded using the principles of earned value management, please go HERE and scroll down to slide #29.

We start by plotting the CPI **(1)** on the Y axis, ranked in descending order from low (top) to high (bottom), and the SPI **(2)** on the X axis, ascending from low (left) to high (right). We then capture the SPI and CPI values on a weekly basis. **(3)** Note that just as shown in Gillette and Dana's data (and as hunters, shooters, and archers well know), you will rarely get a reading exactly hitting the bullseye. There is natural randomness to the SPI and CPI readings. (See Deming's Red and White bead experiment.) We then calculate and plot the Upper and Lower SPECIFICATION LIMITS (USL/LSL). **(4)** These are NORMALLY set at +/-5% (consistent with GAO recommendations, NDIA, and private sector contractors' practices), but they can vary. Then we calculate and plot the Upper and Lower CONTROL LIMITS (UCL/LCL) **(5)** using the appropriate SPC formula.

It is important to note that while this specific student considered himself to be an expert scheduler, consider his performance from the beginning of the program to Week 11. **(6)** What this illustrates is a common problem with most schedulers. While they can run the software, they lack field experience, so they have no clue how to create a realistic and achievable working plan. While he improved between Week 11 **(6)** and Week 18 **(7)**, it took him until close to the end of the program on Week 25 to be competent in creating and following a realistic work plan, maintaining his performance within +/-5%. (SPI and CPI between 0.95 and 1.05) This shows that between W0 and W18, **(7)** his workflow processes were STATISTICALLY OUT OF CONTROL and thus were INCAPABLE of meeting the specifications. This helps to explain why so many projects finish LATE and/or OVER BUDGET. To see his weekly blog, you can follow his progressive improvements culminating in his "Lessons Learned" in his final blog posting.

In Figure 9 below, we feature paper written by another of one of our top students, Mr. Rizkia Arifan Zain. https://pmworldlibrary.net/authors/rizkia-arifani-zain/

He researched and published a paper entitled "Developing Parametric Modelling for Class 4 Estimate of Pier and Jetty Construction - Featured Paper - Zain - April 2024. In this paper, he had access to a historical database of 95 jetty projects executed over a 20-year period.

Due to the extended timeframe, we had to update all the projects to their current year's value. So the first step in this process was to apply the concept of "Purchasing Power Parity" (PPP), and because gold has long been recognized as maintaining a stable purchasing power parity over long periods, he converted all projects into ounces of gold using this formula: Cost of the project on the date it was completed/Average Cost of an Ounce of Gold on that date = Value of that project in ounces of gold at the time it was completed. He did that for all 95 projects, and to

bring them into "Today" or "Current" dollars, he multiplied by the ounces of gold for each project X TODAY'S average value of gold, which normalized all the projects in terms of today's value.

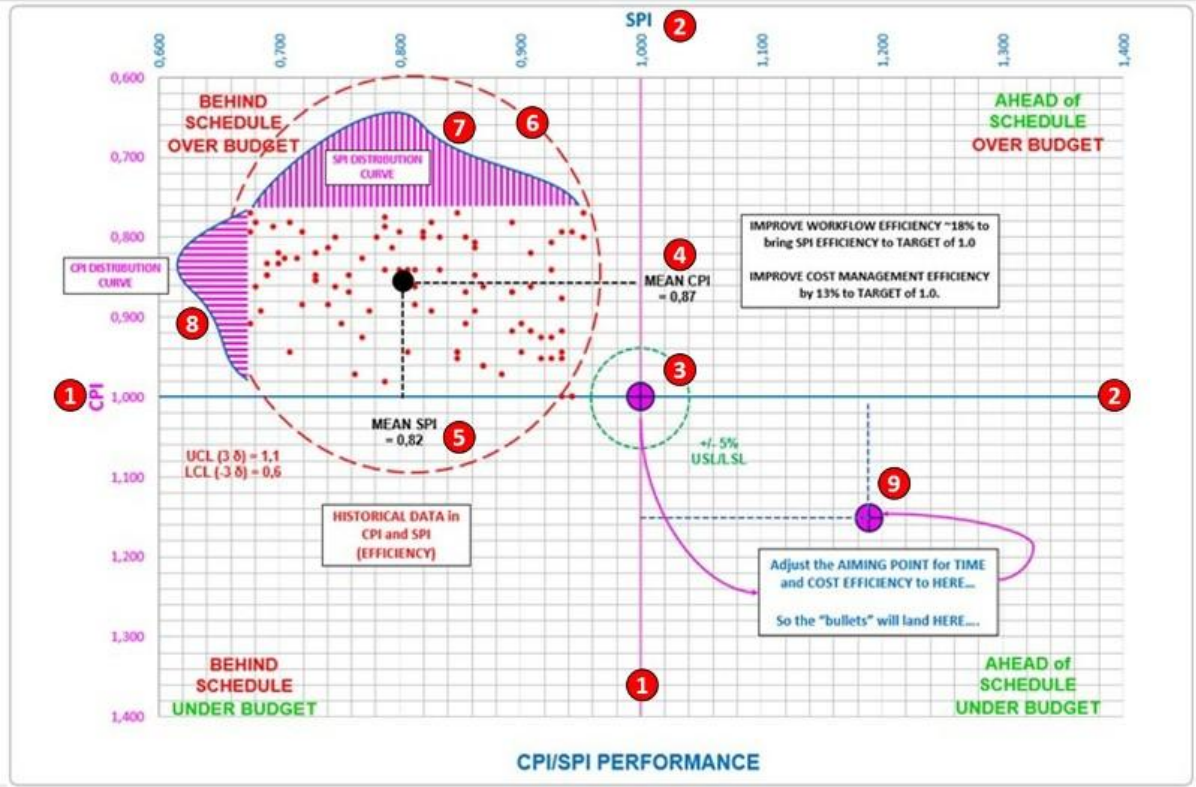

Figure 9- Another Case Study Illustrating How to Use SPI and CPI for Historical Databases

The next step was to calculate the SPI and CPI by adapting the same formula shown in the DAU's "Gold Card," which involves taking the Original Budgeted AFE Cost/FINAL Actual Cost of the Project = CPI. **(1)** Likewise, to calculate the SPI, he divided the ORIGINAL DURATION/ACTUAL DURATION = SPI. **(2)** As you can see, over 20 years, 100% of the projects finished LATE by on average, 1.00-.82 = 18% **(5)**, and 98% of the projects finished OVER BUDGET by 1.00-87 = 13%. **(4)** We can also see that his COMPANY has an UPPER and LOWER TARGET of projects finishing +/-5% **(3)**, which the company is not even coming close to achieving, indicating that they have an FEL system that is BROKEN. Applying Statistical Process Control Chart tools & techniques, we can see that the UPPER and LOWER CONTROL LIMITS are set at +/-3 Sigma. **(6)** Applying AI tools and techniques, we can plot the data distribution for the SPI **(7)** data on the X axis and the CPI data **(8)** on the Y axis. Lastly, IF we fail to fix what is broken in our WORKFLOW PROCESSES during the FEL System, and we want to hit the bullseye, making management happy, means we would have to make the cost and time adjustments as shown in Step 9. **(9)**

Now, the question is: Does this information provide something your management needs or wants to see from your PMO? If so, then the way to do this is to adopt EVM as advocated and shown by Gillette and Dana.

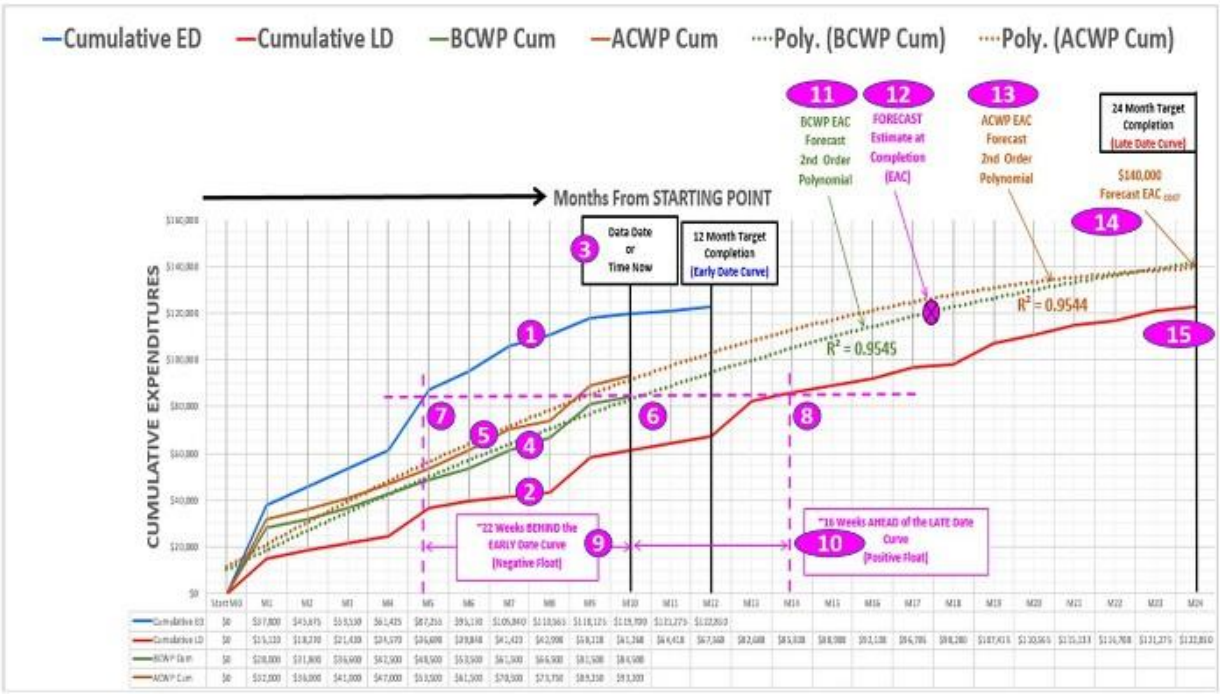

Figure 10- A COMPLETE S-Curve Containing all REQUIRED Data.

This S-curve originated from a paper written by the author while a graduate student at the GWU Master of Science in Project Management program. This case study is used because it spans a sufficient amount of time to keep the lines distinct enough to observe them. As with all schedules, we need to start with both an Early Date Curve **(1)** and a Late Date Curve. **(2)** Anyone who shows only the ED curve communicates that he/she clearly does not understand how to use S-Curves as a management tool effectively. In most cases, we recommend using historical data from projects with similar characteristics, or any repetitive "Fragnet" that starts with the Best-Case Schedule **(2)** as the ED curve and the Worst-Case Scenario as the LD Curve. **(15)** That practice will consistently yield more realistic results. Why? Because today's schedulers have consistently produced schedules (and cost budgets) that are overly optimistic. [4]

Each week or at the latest, each month, we enter the ACWP **(5)** and the BCWP **(4)** data. When we want to analyze progress, we enter a DATA DATE **(3)**, which determines the point at which we are analyzing our PHYSICAL PROGRESS against our ED and LD Plan. This is where the

CUMULATIVE BCWP **(4)** intersects the DATA DATE **(3)** or TIME NOW line. We draw a horizontal line from the point where the BCWP intersects the Data Date **(6)** and extend that pink dotted line horizontally until it intersects the ED BCWS Curve **(7)** and the LD BCWS Curve. By dropping a vertical line to the Date Scale and comparing that against the number of days between the ED Date and the Data Date, we determine the amount of TOTAL FLOAT that we are behind schedule

[4] Flyvbjerg, Bent (2011) "Over Budget, Over Time, Over and Over Again: Managing Major Projects" https://www.researchgate.net/publication/235953357_Over_Budget_Over_Time_Over_and_Over_Again_Managing_Major_Projects

against the ED Curve. **(9)** But by far the more important data is to calculate between the Data Date and the LD Curve intersection, which tells us how much TOTAL FLOAT **(10)** we have left before we end up with NEGATIVE FLOAT. It is, by far, more important than we know where our physical progress (as measured by BCWP) aligns with the LD Curve. But there is so much MORE we can do with this. By applying Artificial Intelligence (AI) tools, we can utilize the actual ACWP **(13)** and BCWP **(11)** data and leverage Excel's best-fit line feature. We can then use the historical data from both ACWP and BCWP to forecast the future and understand our direction. We can also predict the point at which we will have spent our budget **(12),** which, if the original budget was accurate, will tell us when we should be completed with this project. **(15)** This also indicates that if we take the full 2 years, **15,** most likely, the budget we have allocated will not be sufficient. **(14)** Is this information IMPORTANT for your management? With 39 years of experience in this business, both as a contractor and as an owner, this author can assure you that this is the information we require from our project managers and PMO Teams.

Figure 11 below is the actual Earned Value progress from a recent 26-week-long class. They are now in week 16 of a 26-week program. We selected this as a case study because we want to emphasize why it is so much more important as a management tool to show the relationship between the intersection where the BCWP line intersects the Time Now Line then drawing a HORIZONTAL LINE where it intersects the BCWP and Time Now Line, and extend that line **(4)**

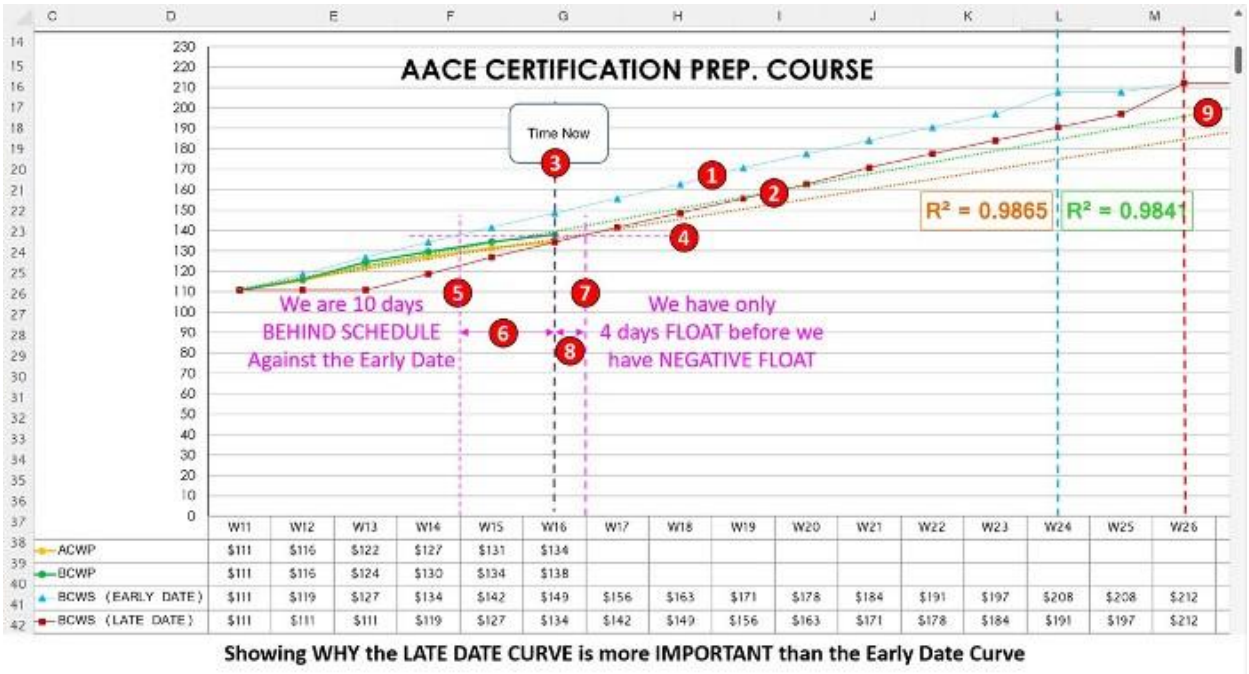

Figure 11- Demonstrating WHY the LD Curve is more IMPORTANT than the ED Curve

until it crosses both the Early Date Curve and Late Date Curve, by dropping a vertical line from where the line **(4)** intersects the ED Curve **(5)** and dropping a vertical line from where the line 4 intersects the LD Curve **(7)** that will give us the TOTAL FLOAT that belongs to the project.

Figure 11 above is the actual Earned Value progress from the same recent 26-week-long class. They are now in week 16 of a 26-week program. We selected this as a case study because we want to emphasize why it is particularly important as a management tool to show the relationship between the BCWP and the Late Date Curve. When they REBASELINED in Week 11, they had 14 days of TOTAL FLOAT. They just finished Week 16. In 5 weeks, they have managed to "eat up" 10 of those 14 days. How much longer do you think that continuing as they have for the past 5 weeks is going to take them to eat up the remaining 4 days of TOTAL FLOAT?

When this team REBASELINED their 7 projects in Week 11, they had 14 days of TOTAL FLOAT. (Between **(5)** and **(7)**. They are now in Week 16 **(3)** and you can see that they have already consumed 10 **(6)** of the 14 days of total float, leaving them with only 4 more days of FLOAT **(8)** before their BCWP will CROSS OVER the LD curve, meaning unless they invest considerable effort in the coming week, their project will have NEGATIVE FLOAT. And as we know, NEGATIVE FLOAT is an impossible situation that if we don't correct it, our project will finish late by that amount of time. **(9)**

Once again, the question we ask you is "This information IMPORTANT to those responsible to manage the project?" "Is this information important to the other key stakeholders?" If the answer is YES, then there is no better "tool" or "technique" than to use Earned Value Management, not as ANSI 748 tells us, but as shown by Gillette and Dana.

As we can visually appreciate, this class is in serious trouble. Why or How? By simple inspection, we can see that the slope of the BCWP (green) line is insufficient to remain between the ED and LD curves. This is known as the "burn rate," and it indicates that the level of effort being expended by this team is insufficient to deliver this project on time, which in turn, will mean the project will almost surely finish over budget.

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FIFTY+ YEARS OF "LESSONS LEARNED" APPLYING EARNED VALUE PER GILLETTE & DANA

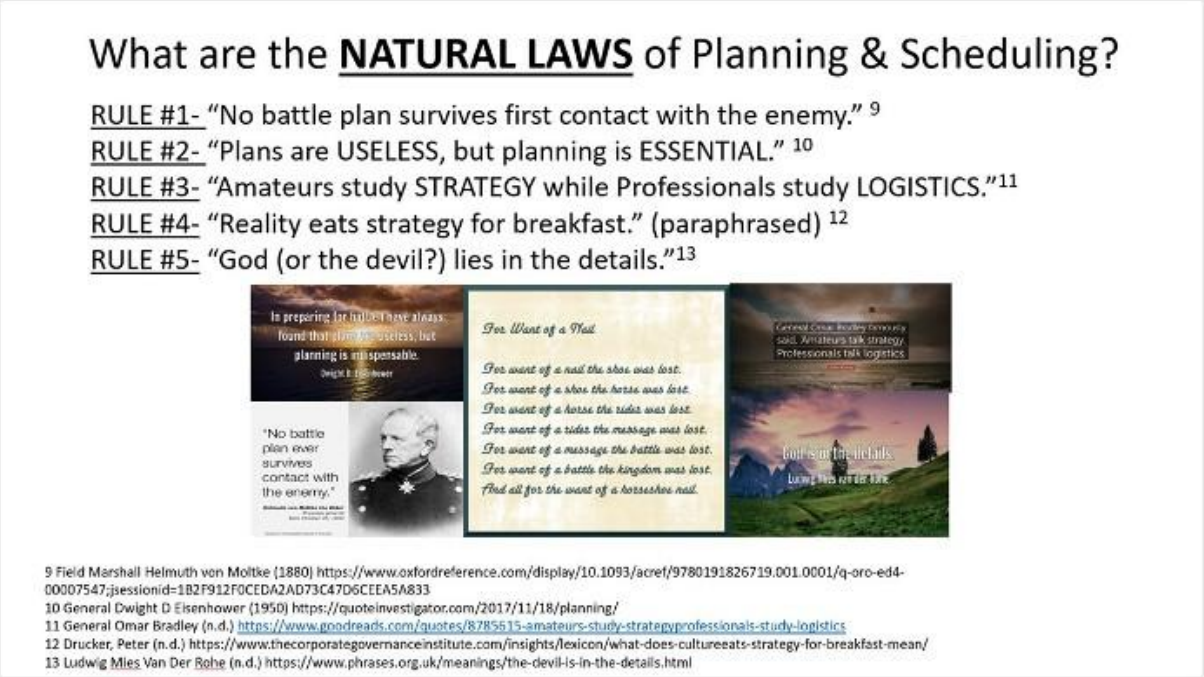


Figure 12- Some BASIC TRUTHS that Apply to Planning & Scheduling. [5], [6],[7],[8],[9]

These are 5 Simple Truths that 50+ years' experience as both an owner and contractor have been validated by the "school of hard knocks," or, as William Ottley quoted, "Experience is a tough teacher. She gives the test first and the lesson afterwards."

One of General Omar Bradley's most famous quotes is that "Amateurs study strategy, professionals study logistics." This is why we try to keep C-level and B-school people away from the projects. We don't want "Big Picture" thinkers as our project managers. We need people who "sweat the details." Or as Ben Franklin told us- "For lack of a nail the shoe was lost…"

Two other quotes from military leaders are important to project managers: Field Marshal Helmuth von Moltke, who stated in 1865 that "no plan survives first contact with the enemy," and General Dwight Eisenhower, who said that "plans are useless, but planning is essential."

[5] *9 Field Marshall Helmuth von Moltke (1880) https://www.oxfordreference.com/display/10.1093/acref/9780191826719.001.0001/q-oro-ed4- 00007547;jsessionid=1B2F912F0CEDA2AD73C47D6CEEA5A833*
[6] *10 General Dwight D Eisenhower (1950) https://quoteinvestigator.com/2017/11/18/planning/*
[7] *11 General Omar Bradley (n.d.) https://www.goodreads.com/quotes/8785615-amateurs-study-strategyprofessionals-study-logistics*
[8] *12 Drucker, Peter (n.d.) https://www.thecorporategovernanceinstitute.com/insights/lexicon/what-does-cultureeats-strategy-for-breakfast-mean/*
[9] *13 Ludwig Mies Van Der Rohe (n.d.) https://www.phrases.org.uk/meanings/the-devil-is-in-the-details.html*

These three quotes help us to understand why one of the most important roles and responsibilities of the PROJECT MANAGER and PROJECT TEAM is to "bridge the gap" between what is happening in the field (Tactical Awareness) and what RESOURCES or ASSETS that the people on the front lines need from the ASSET MANAGERS (functional or line managers) to execute the plan understanding that it is constantly changing. This is why, when people talk about strategy, it is a clear indication that they do not fully understand project management, which is all about logistics and organization. As a construction manager, if I don't have the latest drawings, the specified materials, and the right number and skillsets of people on a "just in time" basis, I will not be able to maintain the schedule.

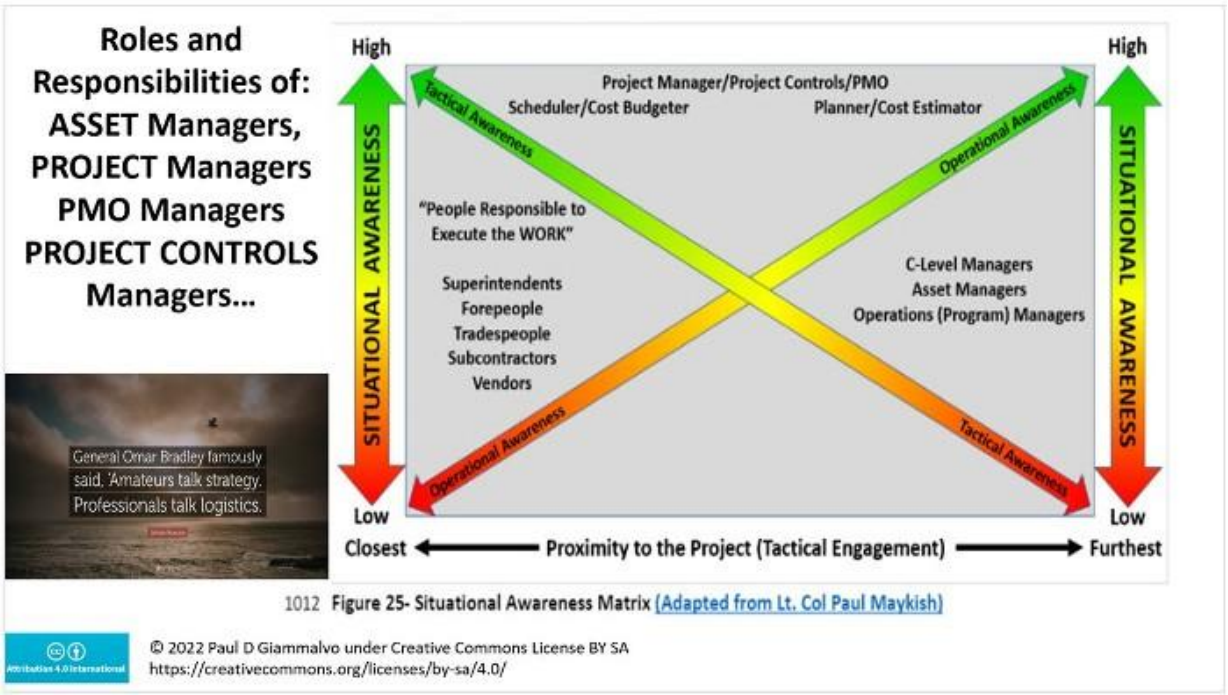


Figure 13- Some BASIC TRUTHS that Apply to Planning & Scheduling

One of the most important "Lessons Learned" that none of the professional societies seem to have embraced and that is the critical role that the Project Manager, Project Controls or PMO Team has to IDENTIFY, COMMUNICATE and FACILITATE communications between those in the field who are responsible to EXECUTE the plan and those in the home office who CONTROL the ASSETS (= RESOURCES) necessary by the field to EXECUTE THE PLAN. This means each of the 5 ASSET CLASSES:

1) FINANCIAL ASSETS- by paying bills promptly, not expecting subs & vendors providing interim financing to the project.
2) HUMAN RESOURCES- providing the necessary people for the project.
3) KNOWLEDGE ASSETS – includes engineering, procurement, legal, and process SOPs.
4) PHYSICAL ASSETS- tools, equipment, buildings, and some software are classified here.
5) INTANGIBLE ASSETS- reputation, some software is classified as an intangible asset.

This contribution by the US Air Force is far more relevant and important than claims that the Air Force "invented" or "adapted" earned time or earned schedule. See the detailed explanation in this paper by Lt Col Alan Docauer in his paper "Peeling the Onion: Why Centralized Control / Decentralized Execution Works."

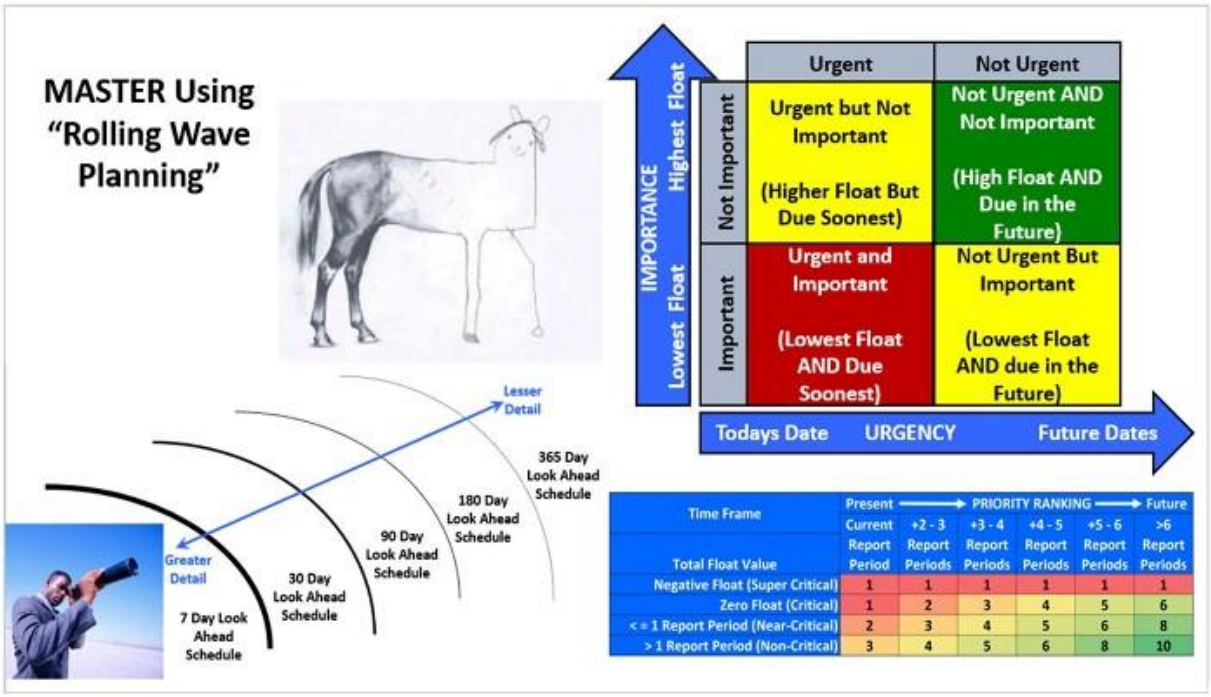


Figure 14- Learn to Use Rolling Wave Planning and MANAGE YOUR FLOAT

We do NOT advocate the creation of "Integrated Master Schedules". Instead, we both PRACTICE and TEACH to learn how to effectively utilize "Rolling Wave Planning," also known by our IT colleagues as "Sprints" and/or" SCRUMS," and focus on managing Total Float as a PROJECT ASSET.

Another important KPI that contractors use, but which is not often seen or utilized on government projects, is rolling wave planning and the prioritization of work based on the amount of float or slack on an activity ("IMPORTANCE") and proximity in terms of time, also known as "URGENCY."[10]. This enables the contractor to see, for any given shift, where their best crews should be allocated, as well as identify "Plan B" assignments if the first-priority work cannot be accomplished for any reason. Standardizing this process and communicating priorities in engineering and procurement helps ensure that the latest drawings are completed and the necessary materials are procured and on site "just in time" for the work to commence.

We follow in our business and recommend to our clients that (based on the "rule" that "God (or the Devil?) lies in the details,) that we stop and look at:

[10] Adapted from Covey, Stephen (2005) The 7 Habits of Highly Effective People (Covey S)

- Where are we right now? (Done at frequent periods- Usually weekly or less)
- Where do we have to get at the end (or to the next interim milestone) as defined by the contract? (Or expectations for internal projects?) (Time? Budget?)
- What ASSETS or RESOURCES do we have available, and what is their PRODUCTIVITY?
- How can we most EFFICIENTLY/EFFECTIVELY utilize those ASSETS or RESOURCES to meet the contractual time and cost budgets?
- If we are not going to be able to finish on/within target, who do we have to notify?

Never forget that the half–life of any project data from the field has about the same half-life as that of a ripe banana.

Any field data older than 7 days since it was generated is WORTHLESS as a field management tool. It only tells you what has happened in the PAST, with little or no way to IMPROVE THE WORKFLOW SYSTEM. You will forever be chasing a system that is moving faster than you are. (Like the Whack-a-Mole game at the arcade?)

Figures 5 and 7 provide us with a TESTED and PROVEN SYSTEM that Gillette & Dana provided us with. This system has been in use for at least 120 years, and it is likely to have been in use for closer to 600 years or even more, going back to biblical times.

The fundamental concepts and formulas associated with Earned Value Management date back to the work of Taylor, Fayol, Gantt, the Gilbreths, Gillette, and Dana et al.

The origins of Earned Value Management were intended to be an incentive-based system.

Incentive payments have been, are, and should remain a core element of applied earned value management, regardless of whether adopted by the private sector or the governmental sector.

For more information on this topic, please visit HERE for a detailed explanation.

Figure 15- The Future of Integrated Scheduling and Budgeting Using Agentic AI.[11]

[11] Giammalvo, P. D. (2023). The Futility of Integrated Master Plans Prepared by Planner/Schedulers with Little or No Hands-on Field Experience, PM World Journal, Vol. XII, Issue IX, September. https://pmworldlibrary.net/wp-content/uploads/2023/09/pmwj133-Sep2023-Giammalvo-futility-of-master-plans-prepared-with-little-or-no-hands-on-experience.pdf

The graphic shown in Figure 15 (above), came from a previous paper by this author showing what the future of Integrated Scheduling and Budgeting is likely going to look like, which closely resembles any GPS packages using Google Maps, where Agentic AI is going to show you all the possible decisions you can choose from, and the costs of each option, understanding that there are trade-offs that need to be considered between TIME and COSTS.

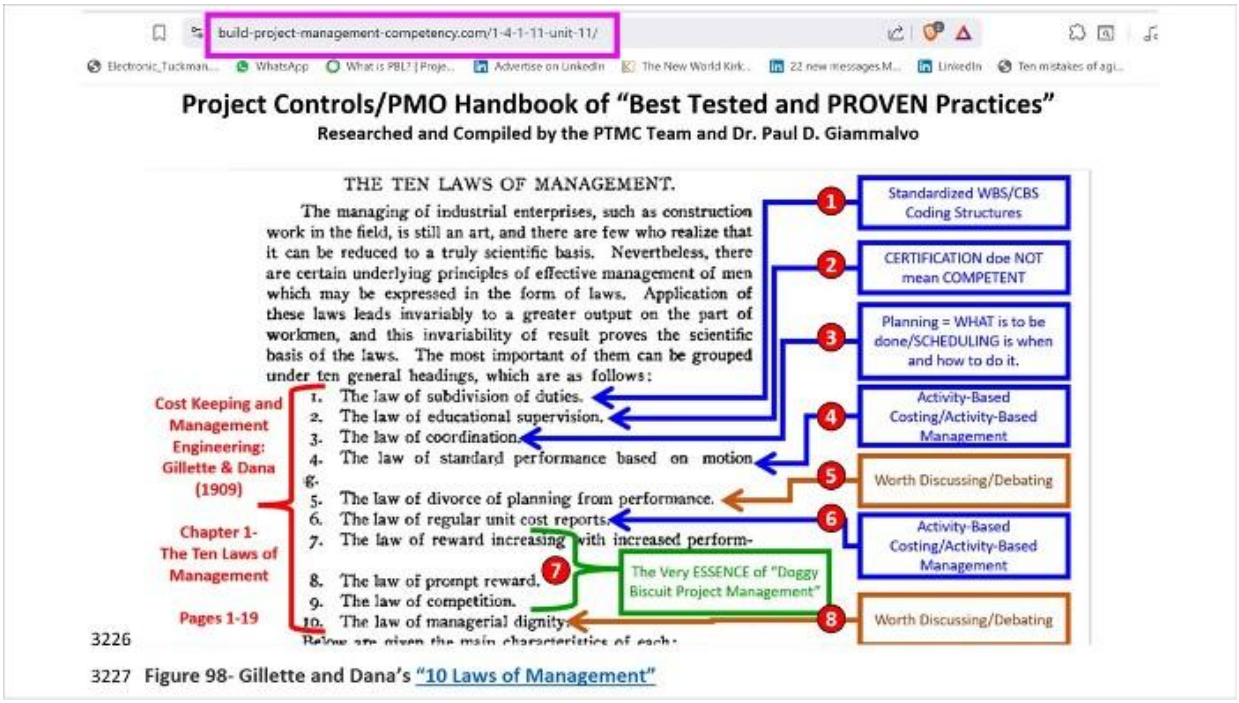


Figure 16- Gillette and Dana's "10 Laws of Management", Chapter 1, Page 1

The author would be remiss in our introduction and exploration of the key points in Gillette and Dana's 1909 book if we were to overlook a brief discussion of their "10 Laws of Management" in the context of 2025. (No DEI/ESG!!!)

1. ***The law of subdivision of duties****- This was a core element from Henri Fayol and is just as relevant and important today, especially as we adopt Building Information Modeling (BIM) and AI. We have long advocated for and on behalf of the adoption of STANDARDIZED, RELATIONAL, or OBJECT-ORIENTED WBS/CBS/OBS architecture rather than the use of "flat file" or "hierarchical" organized databases. Strong support for this can be found in NASA's 2008 Cost Estimating Handbook, in particular, Appendix B- Work Breakdown Structure and Appendix J- Joint Cost and Schedule Analysis (JCL).*

2. ***The law of educating supervision****- This has evolved just in this author's lifetime. Prior to WWII, "project managers" were typically chosen from either master carpenters or master masons, and most of these individuals were not engaged as "project" or "construction" managers until they had accumulated 40 years of experience and a track record of successful projects. Today, we find "accidental project managers" with less*

than 5 years of experience, no track record of "successfully" managing projects, but they hold a PMP or PRINCE2 credential and a 4-year degree. Merely holding a university degree and/or passing a multiple-choice exam is NOT evidence of COMPETENCY!

3. ***The law of coordination****- Henri Fayol with his 5 Responsibilities of MANAGEMENT (Prevoyance, Organizing, Commanding, Coordinating, and Controlling) remain just as valid today as it was 120 years ago. Even today's "self-directed teams" appoint or designate SOMEONE responsible for these 5 functions.*

4. ***The law of standards of performance based on motion and time studies****- Ms. Pangestu in her paper "Enhancing Productivity in Greenfield Mining Projects through Earned Value Management and Timely Contractor Payments, Pangestu, S. A. (2024). ; PM World Journal, Vol. XIII, Issue X, October/November, where she provided 3 case studies showing this remains an important aspect of SUCCESSFUL Earned Value Management.*

5. ***The law divorcing those who do the planning from those who do the work****- This may have been true in the 1800's but today one of the "root causes" that so many projects finish late and/or over budget are the result of planner/schedulers and cost estimators/budgeters who lack any practical field experience. This is covered in a previous paper by this author- https://pmworldlibrary.net/wp-content/uploads/2023/09/pmwj133-Sep2023-Giammalvo-futility-of-master-plans-prepared-with-little-or-no-hands-on-experience.pdf*

6. ***The law of regular unit cost reports****- We covered this with the Freeport case study where we were issuing physical progress report 3 times per day, 365 days per year and because we know that the project progress data has the half-life about the same as a ripe banana. We also didn't explore that topic in depth in this paper, but the importance of Activity-Based Costing/Activity-Based Management is essential to making EVM work.*

7. *The laws of **7. The law of increasing reward with increasing performance**, as stated in **8. The law of prompt reward** and **9. The law of competition** lies at the very heart of getting EVM to work. Those who deliver above and beyond what was required deserve to be compensated accordingly. As we have long called EVM "Doggy Biscuit Project Management", this suggests that giving a reward is most effective in recognizing performance when given immediately upon performing the "trick". Ivan Pavlov proved that with his experiments on dogs, and it remains just as valid today. It also makes us, as taxpayers, cringe when the DAU divorced payment from performance, and then they wonder why the EVM in ANSI 748 failed?*
8. ***The law of managerial dignity****- Having come up through the trades (as did Taylor and Frank Gilbreth, before becoming academics), this author believes that many people today have lost their pride in their work results. Especially having been builders, we can look back years later and see evidence of our competency and say, "I did that". We also see evidence of that from NASA, where people collect "Mission Patches" to show the projects they worked on. Today, many workers who produce soft or intangible*

> *deliverables find it is not quite as easy to develop a sense of pride in their work. To address that need for "knowledge workers", nearly all the 'professional societies" (PMI, AACE, PRINCE2, APM/APMG) are quick to give recognition, which in many instances, has become to mean little more than "show-up" trophies rather than recognition for producing truly outstanding work. (e.g., PMI's recognition to Walt Lipske for having "discovered" earned schedule or earned time based on nothing more than incomplete or sloppy research) In the world of credible academic journals, papers found to contain falsified or incomplete research would be retracted.*

As many of the 10 laws outlined by Gillette and Dana remain as relevant and important today as they were over 120 years ago, this author believes they will become even more important in future years, as many jobs are likely to be replaced by or at least significantly different from Artificial Intelligence. (AI) For anyone serious about implementing EVM, it would be remiss not to heed the 10 laws, updated to reflect the changes in today's workers.

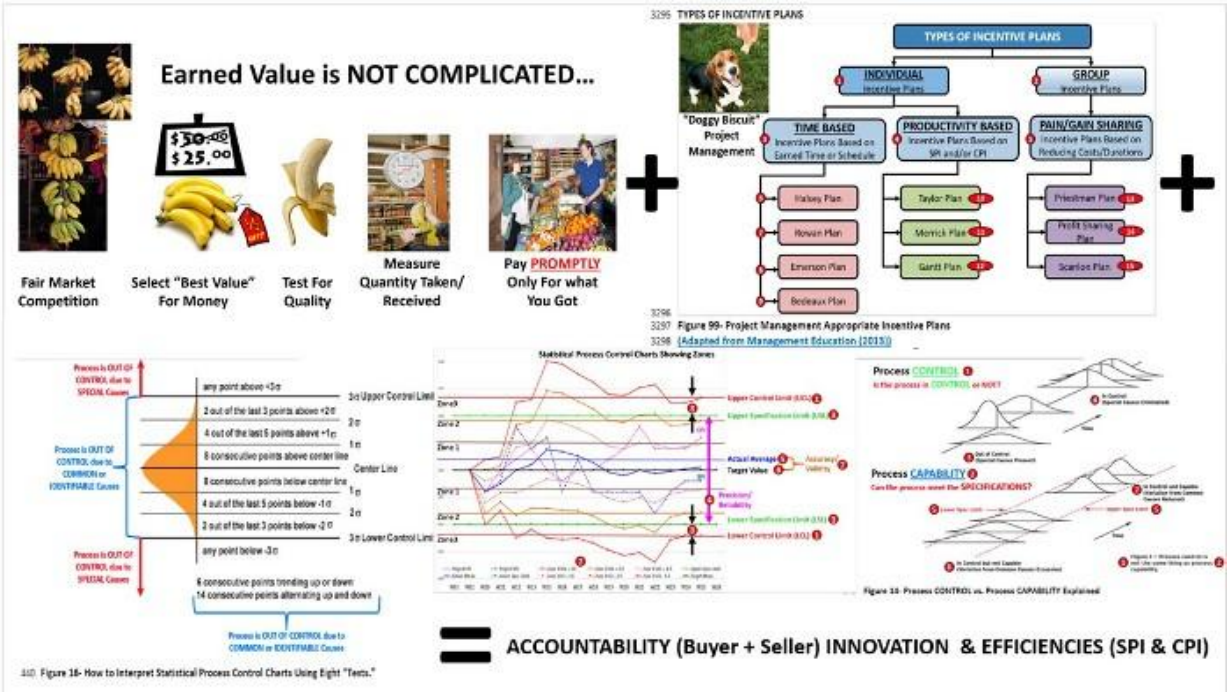
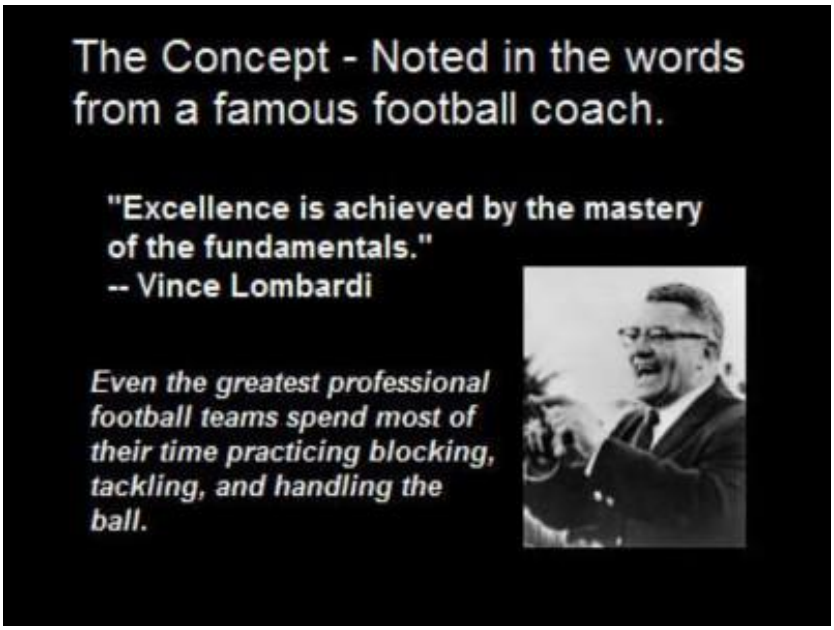


Figure 17- Project Management is NOT ROCKET SCIENCE

For 6000+ years, humans have been "initiating, planning, executing, controlling, and closing" projects, and SURELY in those years, we could or should have learned how to do it. If our Neanderthal ancestors were able to figure out the fundamental tools & techniques of project management to tame fire 300,000 years ago and if 6000 years ago humans were able to master the art and science of project management to invent the wheel and if Ibn al-Haytham, the Muslim scientist who birthed the Scientific Method 1000 years ago, is there any rational argument why we cannot do it successfully?

Worth noting for our Muslim readers, EVM is CONSISTENT with Shariah Law… (Reference *Hadist* from Baihaqi & Ibnu Majah- "*Promptly pay your labor/employee worker salary before his sweat is dry and tell them how much they will be paid while they are working*.") from Farid Malone, CCP

It all comes down to mastering BASICS, as explained to us 120 years ago by Frederick Taylor, Henry Gantt, Henri Fayol, Frank and Lillian Gilbreth and others and captured for us by Halbert Powers Gillette and Richard Turner Dana in their 1909 book "Cost Keeping and Management Engineering: A Treatise for Engineers, Contractors and Superintendents Engaged in the Management of Engineering Construction" and reinforced by American Football legend, Vince Lombardy, Green Bay Packers.



About the Author

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Dr. Paul D. Giammalvo, CDT, CCE (#1240), MScPM, MRICS, is a Senior Technical Advisor (Project Management) to PT Mitratata Citragraha. (PTMC), Jakarta, Indonesia. www.build-project-management-competency.com. He is noted for the development and delivery of graduate level, blended learning curricula designed for the mid-career path, English as Second Language (ESL) professionals to develop competency in the local practitioner and build capacity for the local organizations. For 25+ years, he has been developing and delivering Project Management training and consulting throughout South and Eastern Asia Pacific, the Middle East, West Africa, and Europe.

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 plus the UN Projects Office and many 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 PhD in Project and Program Management through the Institute Superieur De Gestion Industrielle (ISGI) and Ecole Superieure De Commerce De Lille (ESC-Lille) under the supervision of Professor Christophe Bredillet. "Dr. PDG" can be contacted at pauldgphd@gmail.com.