TCM IMPLEMENTATION ON INTERNATIONAL PROJECTS

ABSTRACT

This paper will specifically focus on the international implementation of the Total Cost Management process, its challenges and some recommendations Uniform accounting procedures Then we will describe in detail the TCM process as created and presented by AACE International as used by many companies. The objective is to represent that TCM is integrated and transparent in working on the programs with as much real time data as possible. Critical is that Project Controls is based on timing and ability to provide information as accurate as possible, but not like accounting to account for perfection.

AUTHOR BIO

Dr. Regan has 30 years of experience in planning, scheduling, estimating, cost engineering, contracts and Total Quality Management (TQM). He has had positions in project controls field & home office systems and worked as Project Controls Supervisor, Project Controls Manager, Superintendent, Contract Administrator and Project Manager. Dr. Regan has a proven record of excellence in achieving goals for project team and client in execution of Project Management and Controls in the Middle East, North Africa, Eastern Europe, and the Former Soviet Union. Dr. Regan is also experienced in implementing Project Management and Construction Control systems for facilities, telecommunications, power, infrastructure, nuclear, and petrochemical projects. Dr. Regan has experience with DTRA/DCMA/FAR, IMF, World Bank, EBRD, and Asian Bank polices and tendering in support of projects. He also is an active member, author and presenter for AACE, PMI, ACostE, RICS, and the Project Controls Guild with over 20 years of presenting at conferences, universities, and programs.

INTRODUCTION

AACE was created in 1956 to introduce standardization of project controls skills based upon the competency model. This is the utilization of skills and knowledge in the competency format, not just the theoretical basis of project management tools.

The TCM as a printed and then e-printed document was developed 1996 and the 2nd edition was released in 2015, www.aacei.org, members can download for free.

“Total cost management (TCM) is the effective application of professional and technical expertise to plan and control resources, costs, profitability and risk. Simply stated, TCM is a systematic approach to managing cost throughout the life cycle of any enterprise, program, facility, project, product or service. The TCM Framework is a representation of that systematic approach.

The TCM Framework is a structured, annotated process map that explains each practice area of the cost engineering field in the context of its relationship to the other practice areas including

allied professions. It provides a process for applying the skills and knowledge of cost engineering. A key feature of the TCM Framework is that it highlights and differentiates the main cost management application areas: project control and strategic asset management.

Those working in the project management and controls fields will find similarities with the Project Management Institute's (PMI) A Guide to the Project Management Body of Knowledge (PMBOK Guide) as project control is a subset of the field of project management. and with a greater focus on project control, the TCM Framework enhances many of the processes. More importantly, the TCM Framework addresses strategic asset cost management practices in business and capital planning, operations and maintenance, and product cost management, both upstream and downstream of the project processes.

Asset owner companies will particularly appreciate the enhanced coverage of areas such as historical data management, cost modeling, economic and decision analysis, and value analysis.

The TCM Framework is a significant contribution to the cost management profession applicable to all industries. It is an AACE cornerstone technical document that joins the current body of knowledge for related fields such as project management, operations management, and management accounting. It is also consistent with organizational and portfolio thinking which ties all practices and processes back to overall business strategies and objectives.

As a framework, this document is a conceptual representation that provides a structured, integrated overview of cost engineering. It will guide AACE International's development of more detailed technical products including the following:

- Recommended Practices (RPs): original, peer-reviewed documents that define the specifics of methods or procedures outlined in the TCM Framework,
- Professional Practice Guides (PPGs): a set of structured, edited compilations of selected AACE publications on specific areas of cost engineering,
- Cost Engineer's Notebook (CEN): a single structured, edited compilation of selected AACE publications that provides an overview of all the key fundamental areas of cost engineering.[i1]

The critical questions that the author has been asked about TCM is as follows:

1. Is the TCM Framework is a guide to implementation of TCM on a project?
2. Do all AACE Member and support companies fully implement TCM?
3. What Software programs utilize TCM?

[1] TCM Framework 2nd Edition, AACE International

4. How do we start TCM Implementation?

The questions can be answered as follows:

1. TCM in the name itself is a Framework, it does not provide process, procedures, or software recommendations. AACE Specifically as a Non-Profit association will not recommend specific Approved Education Providers (AEP), Software, people or companies. The Association provides a list through the website of certified and members, when a company is a member to review and seek support. Specifically, there are within areas of geography there are experts familiar with the international processes to support member firms under the COMP (AACE Corporate Membership Program) Program or postings that are willing to work within the regions.
2. This is a straightforward answer is No. Many of the top firms in the world are AACE members, but their internal programs utilize key aspects, and it forces a focus on their own internal programs.
3. As identified in Question 1, there are no specific software programs recommended by AACE. They support programs and allow white papers and advertising, but this is done in a neutral format. AACE Annual, Region and Section Meetings actively seek participation and allow for advertising, but this is not an endorsement of software. In fact, most companies, regretfully still utilize in house built database programs or excel.
4. The development of a process in alignment to the framework is straightforward. An evaluation of processes as are against the Framework is the first review, then development of an Execution Plan which can grow with the organization. Then a Management review and Change Order process to meet the Framework would be outlined, so that appropriate training and an internal auditing program can be developed for execution.

Overall this is not a complicated process. With the framework in place you have a recommended outline for the program in which to develop processes and procedures.

The TCM Framework is aligned into a series of steps in which the framework is developed. This is then supported by the utilization of Recommended Practices (RP), which are written and reviewed by industry technical experts. This material is considered the intellectual property of the association and is distributed only to members for free.

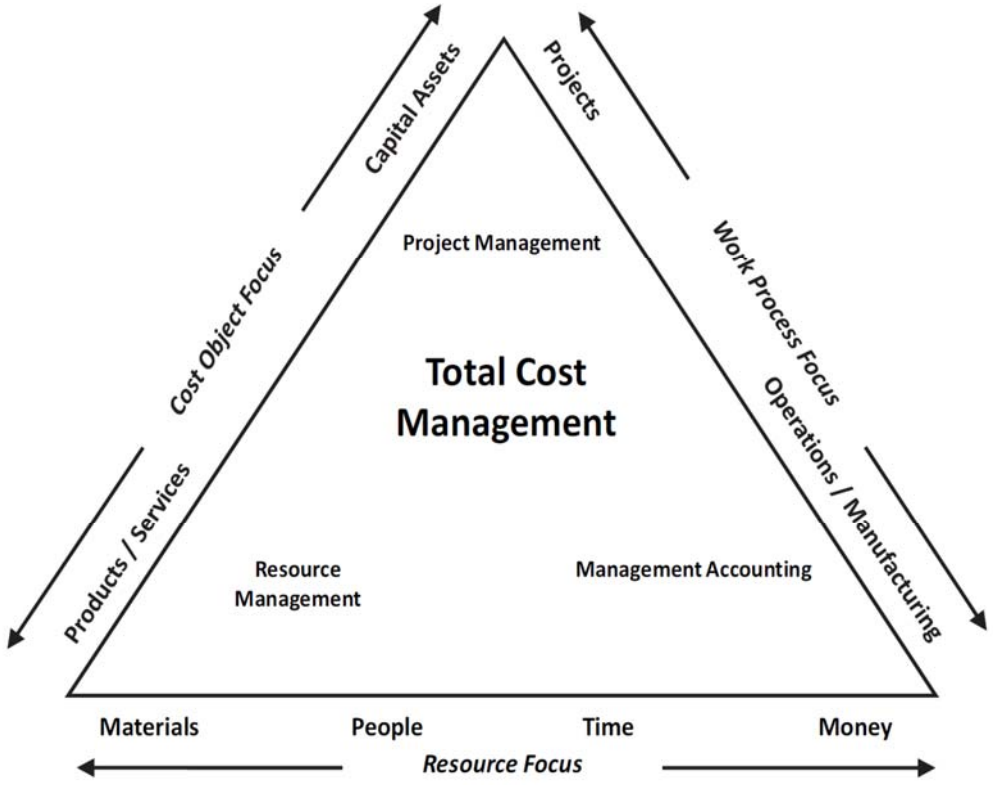

Figure 1 – TCM's Place in the Cost Management Spectrum

As noted in the TCM:

[5] AACE's Constitution defines the areas of association focus as follows: "Total Cost Management is that area of engineering practice where engineering judgment and experience are utilized in the application of scientific principles and techniques to problems of business and program planning; cost estimating; economic and financial analysis; cost engineering; program and project management; planning and scheduling; and cost and schedule performance measurement and change control." Furthermore, AACE's Recommended Practice 11R-88, "Required Skills and Knowledge of Cost Engineering" specifies cost engineering knowledge that is "core" (i.e., recommended that professional cost engineers know) and identifies skills that are recommended for individuals to put that core knowledge into practice.

[6] Where concept definitions are provided, they are consistent with AACE's primary terminology reference: Recommended Practice 10S-90, "Cost Engineering Terminology."

The TCM Framework utilizes a standard organization structure, which is organized into parts, chapters, and sections. This is basically four parts, with 11 Chapters for development of TCM Programs.

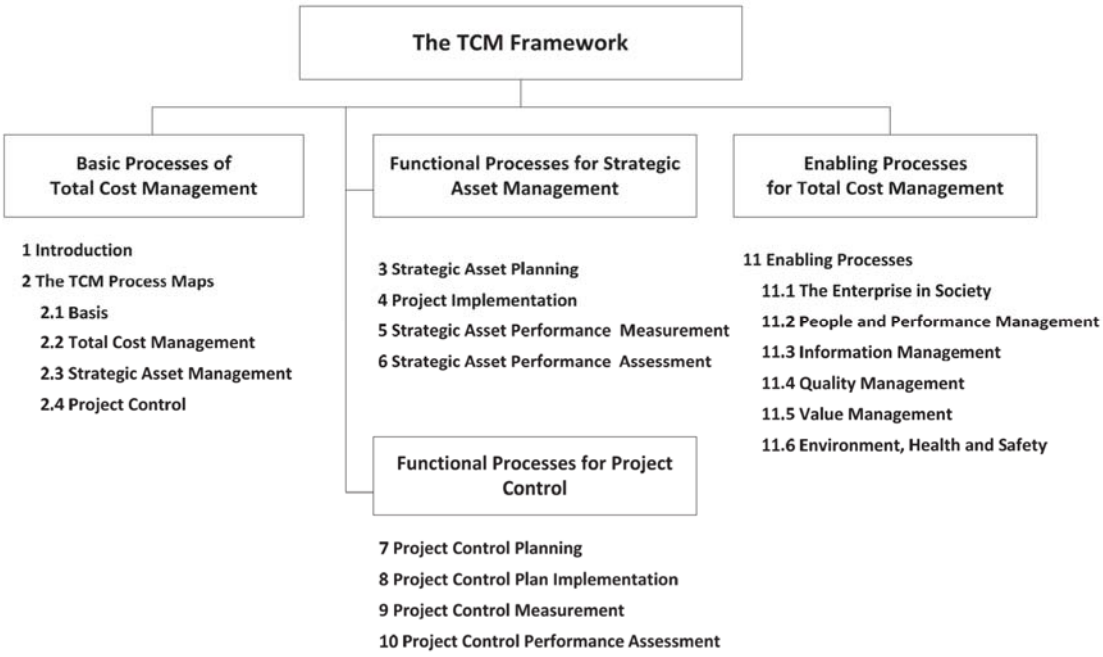

Figure 2 – TCM's Structure Framework Parts and Chapters

The two base RP for the TCM Framework are RP 10S-90– Cost Engineering Technology and RP 11R-88 –Required Skills and Knowledge of Cost Engineering. RP 10S-90 provides standard definitions in the industry for terminology. These terms sometimes have more than one meaning due to the application, so they all will be listed. RP 11R-88 provides a sound basis for the skills and knowledge as required to excel in Cost Engineering. Many companies use this as a basis to establish a training program.

RP's when develop are numbered by the TEC Board in accordance to supporting the TCM Framework and then the Year of the Initial Publication. Some RP are update frequently, as such they are considered a living document of the intellectual property, others are every few years. As the RP are developed based on requirements identified by the TEC Board, they are written by technical experts with reviews by peers, then final approval by the TEC Board.

The TCM operates on a basic process model utilizing Plan, Do, Check, Act.

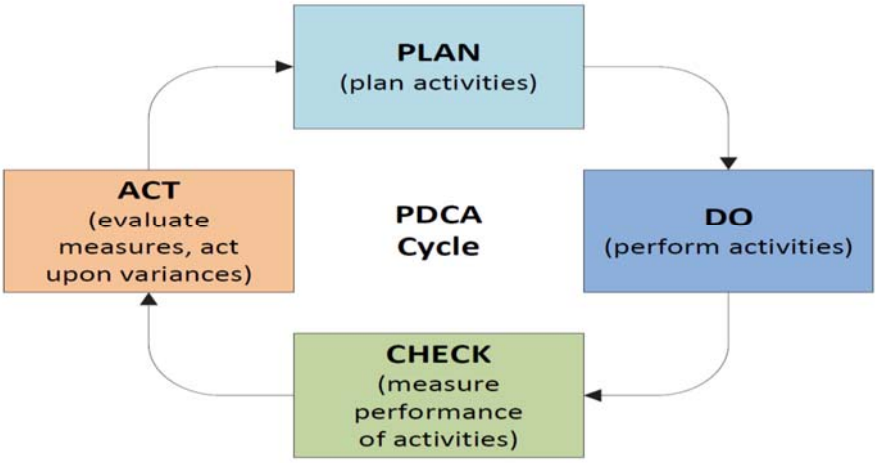

Figure 3 – TCM's Plan, Do, Check, and Act Model

This cycle basically involves two critical factors 1) You cannot manage what you cannot measure and 2) Whatever you measure allows tends to improve. As identified in the TCM you basically utilize the four steps as follows:

- Plan - plan asset solutions or project activities
- Do (i.e., execute) - initiate and perform the project or project activities in accordance with the plan
- Check (i.e., measure) - making measurements of asset, project, or activity performance, and
- Act (i.e., assess) - assessing performance variances from the plan and taking action to correct or improve performance to bring it in line with the plan or to improve the plan.

The TCM PDCA evolves in its support of the TCM Process Map. The Process Map is an integrated process map that allows for utilization of portfolio management inclusive of Strategic Asset Planning, but many EPCM focus on the project or portfolio of projects. As identified above, therefore the scope of the TCM is an integrated process, based upon the scope of work being applied. As such the program for the second scope will be the focus of this paper and presentation. This is called the Project Control Process Cycle. This cycle represents the logical formulated process in Planning, Implementation, Measurement, and assessment.

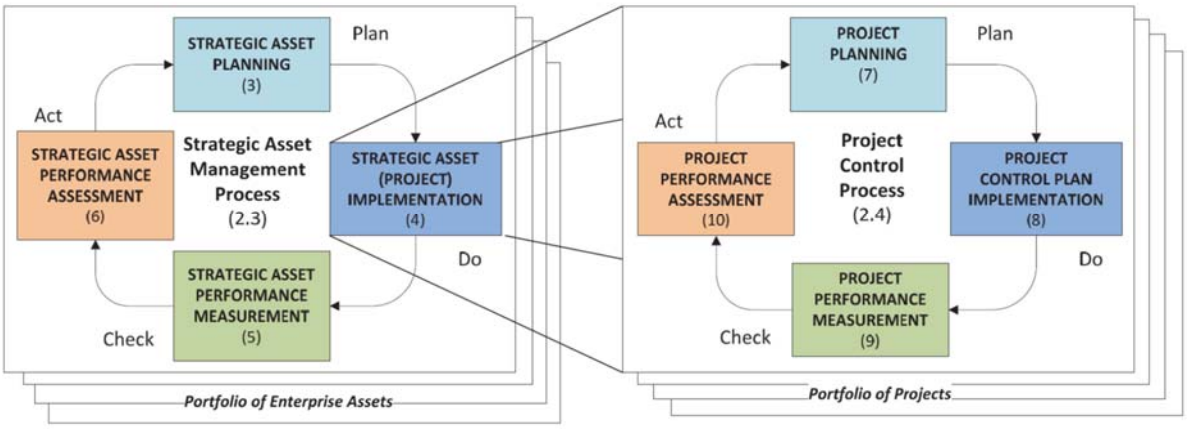

Figure 4 – TCM's Process Map

"There is no one best organizational approach to achieve successful TCM implementation. Organizational approaches will be as varied as the strategic objectives of enterprises. However, all organizations should be focused on customer needs and on the entire life cycle of strategic assets rather than on short term functional considerations."[2]

This reference is directly attributed to the authors experience as well. Having worked on Commercial, Government, Owner and EPCM, in International programs / projects, with 30 plus years of experience and over $40 Billion managed, the author has encountered numerous process and procedures. Some of which maybe only one department or division within a company will fully utilize the TCM Process. It has been the experience of the author that the biggest issued encountered among the implementation is that what may be beneficial for the Commercial side for the firm, it may not work for the government side, similarly for the roll up between EPCM and Client operations.

Project Control Process map focuses on the AACE principal is the utilization of project control applications as a quantitative process, which is a subset of the Project Management process. It is based not on theory, but application in the focus of utilization of the skills, engineering, and judgement of the process in a competency based application.

Project Controls whether in Manufacturing Resource Planning (MRP) or Enterprise Resource Planning (ERP), utilize the same processes in the application of the project controls tools. The size of an organization leads to an industry term of a graded approach. Small Organizations may have a smaller or more limited use of resources, but can adhere to the base application

[2] TCM Framework, Section 2.2.1.5, Page 44, AACE International

principals. The basis for developing these processes can be in the Project Execution Plan (PEP) or within a subset of the PEP is the Project Controls Execution Plan (PCEP).

The Project Control Process map is broken down as follows:

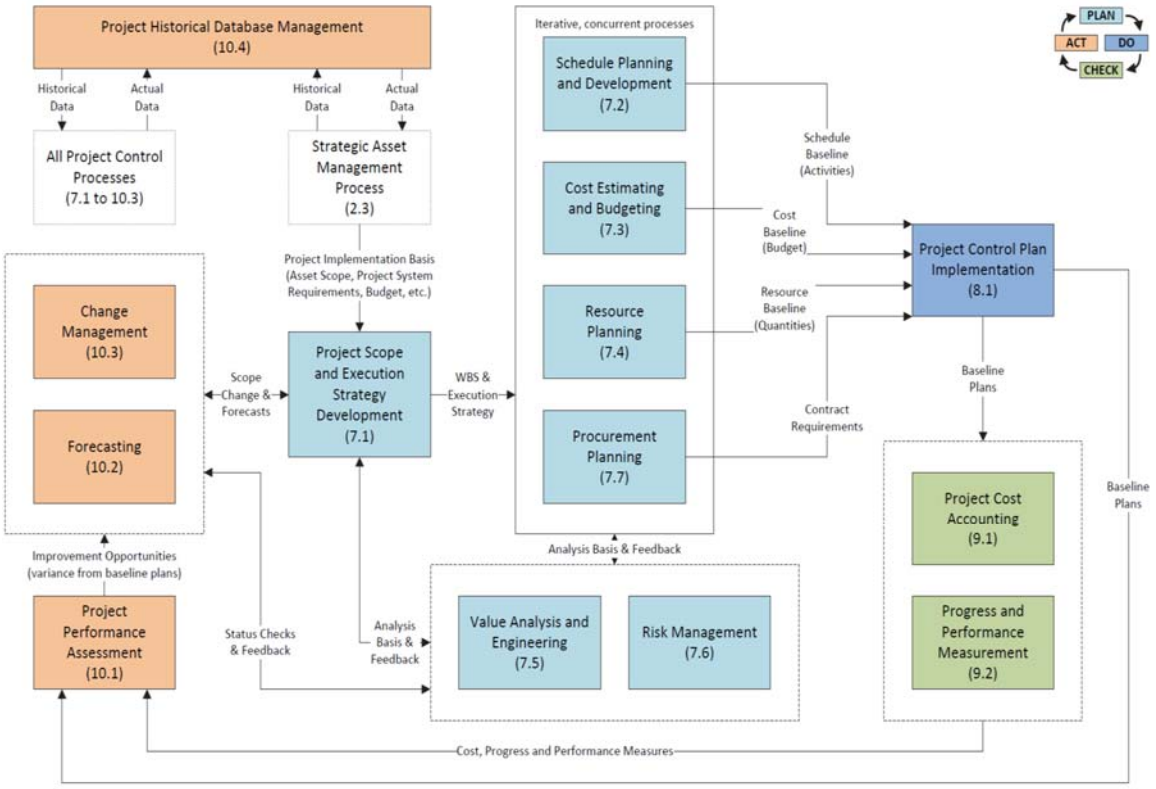

Figure 5 – TCM's Project Control Process Map

TCM IMPLEMENTATION INTERNATIONAL PROJECTS

What does implementation of TCM mean for an International project? It means that a company should have a systematic approach to their execution of project controls. There are many standards which can be discussed or reviewed, based upon many credible sources. The major difference that will be discussed in this is the utilization of the systems of a competency based program.

The Author has reviewed programs Internationally since 1995, through direct implementation of Project Control fundamentals. This has accounted for over $40 Billion of projects, and as a member of AACE since 1991 and was introduced to these fundamentals in 1987. Working with numerous programs such as Project Management Institute (PMI), International Project Management Association (IPMA), Construction Management Association of America (CMAA),

Royal Institute of Charter Surveyors (RICS), Dutch Association Cost Engineering (DACE), Chinese Cost Engineering Society (CEC), American Society Testing Materials (ASTM), International Standards Organization (ISO), Association Cost Engineering (ACOSTE), International Cost Engineering Council (ICEC), Defense Cost Management Agency (DCMA), and Planning Plant/Project Controls Guild are just the many associations that have a cross relationship of utilization of TCM.

What does that mean to you, as a program applying TCM?

As seen by companies such as Bechtel, Fluor, CH2m, Hill International, Parsons, Worley Parson, KBR, Technip, etc. we have seen that various aspects are utilized in the application of PM and PC Tools. This can be similarly seen by the utilization among Clients such as Chevron, Shell, BP, Total, Gazprom, Sinopec, and others. You are now seeing the same within programs of the International Financial Institutions (IFI) and Government funding from US, UK, Australia, China, United Nations, and World Bank.

The application of TCM presents to programs, not a fix all or a decision on programs and software. It focuses on the aspects of overall control can be met for all programs. Depending on the entity TCM allows a company to find where they are missing tools and a way to find those systematic gaps in the program and review all the critical aspects, which are required to present a competency based process for evaluation of the program.

The utilization of TCM has seen an increase of Cost Maturity and Assessment of contractors who come into programs, they recommend changing software's, additional support, versus the basis of the true TCM. The most simple answer is often the most overlooked, revision of process, procedures may in many cases even be the same, when you throw out terminology and changes to the formatting.

TCM is based on an analytical assessment of the program:

- Plan the work,
- Budget the work to the schedule,
- Execute the work,
- Analyze the Work,
- Forecast the work,
- Update or Modify as required to complete the work, and
- Provide this information of work to the program, to develop future work.

The author spent 3 years on projects in "Damage Control" in US, Italy, Suriname, UK, Oman, Iraq, Kuwait, Saudi Arabia, Morocco, Russia, Kazakhstan, and China and there was one common

denominator of the assessments and reviews. There was continually a lack of training to prevent the teams from doing consistent and repetitive data entry. There was no one who had spent the time with the team members, to produce reliable analytical data. In simple words, the teams could not analyze the volumes of data and Management was unable to make viable decisions for the project. Nothing complicated, just very straight forward. An appropriate and seamlessly integrated software will considerably remedy and help guide the users.

IT APPLICATION

The author is continually asked to pick the software for correct application of TCM. This is the proverbial Unicorn. The Purest of project controls wishes for the application of a software that integrates Estimating, Scheduling, Budget, Cost, Performance, Change Management, Document Control, and Risk.

The biggest concern that the author sees is the application of Multi Language, Multi Currency, not just one or two with a bucket, but to support the IFI, the utilization of 5 to 7 currencies, one project the Author had to asses and review had USD, GBP, Euro, Russian Rubble, South Korean Won, and Japanese Yen. This was due to the financial loans considered on a multi-Billion USD program that was funding from Multiple IFI sources.

For International Companies still applying Norms and Standards, the programs internationally are set based on the rules of Credit and Generally Accepted Account Procedures (GAAP) and International Financial Reporting Systems (IFRS).

The other consideration was that reporting had to meet the tax requirements such as Acts of Acceptance required of the Russian Government. This required a matchup of the norms and standards of Russia, as there was Tax Considerations and requirements for the providers of services to receive payments.

As such the biggest consideration for the selection of software is the ability to meet Multiple Languages, Currency and Reporting. Another consideration, often missed due to the integration of IT departments, which do not have the competency experience of understanding the applications. They often select programs, which are in alignment to their programs, but not in consideration of the applications cross matrix requirements.

What happens to a software when it is selected is that the cost considerations are by that specific company or their main database provider such as SAP, Oracle, or SQL. Yet the ability to code and have service support maybe limited to where the parent of the software is in. Result is that there is an error or bug in the program, yet you may lose an entire day of the staff,

because they cannot get support during their working time. Additional issues that can be considered is the assumption that all people working on the program speak English. Finding a program that has 24-hour customer support with native language speakers, so that support can be generated is lacking in many firms now, due to internal self-reliance and the issues of Companies direct staffing with IT personnel of the software companies.

The net result that has been experiences is that you may purchase a software for $4 Million for the program, but the additional support, servers, changes, and training can turn it into a $16 to 24 million purchase, this has been a continuous struggle for many companies.

Based upon this review, it is why the TCM and AACE specifically will not endorse or specify a specific program as being the Unicorn. The considerations that are required will never be changed, by the applications, but are concerned about the application of the programs in a systematic and logical fashion.

CONCLUSION

To conclude, TCM is a practical application for the Project Controls team, which should be incorporated into the project. It does not focus on specifically providing the exact same standard to each project such as a Norms and Standards, but has an understanding that the competitive market of international programs will require utilization, but establish a clear program of the calculations and performance assessment.

As discussed in the IT scope, the author having worked with most of the major applications on the market recognizes that there is still the problem that many companies rely on the use excel. The implementation of TCM does not relay on the software, but on the training that the personnel have. The most critical aspect the author would recommend on software is to focus on the utilization and training.

Training is the most critical aspect of the TCM. Regretfully, it is the first area cut by International companies, yet time and time again many a company has a reliable software, procedures, and processes, but the staff are not adequately trained to execute the programs. There is a common misconception that the hiring of experts from one company to another, will solve, but there is also a protectionism of companies. They feel if they provide the training and experience, the person leaves and joins another. As such, some companies have even further developed this mercenary type attitude by employing contracts at will or services only contracts.

This has led to the substantial growth of the Project Management Office (PMO) support of programs, or consultants, where the loyalty is not to the companies, but to the process. This

trend while growing can lead to opportunities of reduction of cost in the near term, but an excessive cost increase in the future. An old term that has become the normative now is that we pay less now for more in the future, resulting in a trend that continues to grow in the industry worldwide.

Companies if they wish to implement TCM or sections, should focus on not just the literary content of the TCM, as it is meant as described as a framework, in which to incorporate the practices. The utilization of sound training, analytical support, will prevent the systematic and redundant data entry. Many software applications are capable of supporting project controls systems, but having one that has checks and help notes can be a critical support tool. There are a few applications that can support this feature, but not excel or mega database programs.

Too many of the software applications have made assumptions that everyone is an expert and this leads to issues of reliability of data. As the conscience of the project, Project Controls utilization of the data is important, but the analysis is critical. The other issue that impacts the decision and risk management process of TCM Utilization is credibility of the Data. No Manager will listen or respect the software issues, it becomes a project controls issue.

For projects that incorporate Earned Value Management, TCM provides a sound process of procedures and processes, which can be incorporated into the process, when the training and program are firmly established. While TCM does not specifically address EVM, ISO, PMBOK, and other standards, EVM addresses practices that are part of the functional matrix within TCM. As such, one of the critical areas is to address that a software can produce reporting in accordance to EVM Standards in accordance to DCMA and ANSI Standards. ANSI nor the EVM Intent guide mandate a specific software, nor despite claims by software companies any decree of EVM Compliance. As DCMA and others will not mandate a software, Excel and Access Programs, which produce viable data, is considered acceptable.

TCM is a process and framework that addresses all aspects on client and project application. It is not a IT Driven nor a how do guide, but a reference in which Project Controls can present in Commercial, Government, International relationships the best application of international standards.

KEY GLOASSARY TERMS

- Association for Advancement Cost Engineering International (AACE)
- American National Standards Institute (ANSI)
- Basis
- Budget

- Change Management
- Contingency
- Cost Accounting
- Estimate
- Execution Plan
- Forecasting
- Front End Loading (FEL)
- Gate
- International Standards Organization (ISO)
- PDCA – Plan, Do Act, Check Process
- Performance Measurement
- Performance Measurement Assessment
- Project Definition Rating Index
- Planning
- Procedures
- Project Control Plan (PCP)
- Project Control Process Map (PCPM)
- Project Planning Guides (PPG)
- Recommended Practices (RP)
- Resource Planning
- Quality Management
- Risk Management
- Scope
- Strategic Asset Management
- Total Cost Management (TCM)
- Value Engineering (VE)