

## LIFE CYCLE COST MANAGEMENT: THE LONG TERM VIEW

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### ABSTRACT

This paper addresses the precepts of Life Cycle Costing that are integral to the successful management of items and systems that have a service life cycle. It discusses Life Cycle Cost as a useful, necessary, and mandated decision criteria.

"For which of you, desiring to build a Tower, does not first sit down and count the cost, whether he has enough to complete it? Otherwise, when he has laid a foundation, and is not able to finish, all who see it begin to mock him, saying, 'This man began to build, and was not able to finish.'"<sup>1</sup>

### INTRODUCTION

We have long known about Life Cycle Cost. The standard St. Luke, chapter 14 passage comes to mind and is often quoted, perhaps without any real thought given to the requirements of LCC management. Life Cycle Costing has become the "buzzword" for the long-term. But, thinking realistically, just how do we let long-term performance affect the way we do business in today's environment? Our buzzword dropped at the appropriate moment, smooths all the expectations of the managerial and supervisory personnel seeking to check the block in the contractual requirement for Life Cycle Costs. We have lost sight of the objective. We have lost sight of the long-term view.<sup>2</sup> It is now, as ever, very important to be able to fight our Armies, engage our airborne weapon systems, and steam our warships into national policy scenarios. It is also very important to be able to plan, fund, and support more than just a few days worth of full-scale engagement so that we do not have to "go nuke". That is a military standpoint. But if we think about industry, the same sense of long

term requirements apply. Strategic planning and thinking is critical to a going concern. Recent successful specifics include Dow Chemical Company and AMP Inc. Their strategic success stories have been bright examples in the current market. Their success can be attributed to their long-term view. Let's think a little about the management of Life Cycle Costs - the long-term view - as an appropriate issue.

Before we engage the topic, let's look over some definitions for the purpose of 'smoothing' our knowledge base.

First, let's look at Life Cycle Costing defined as "An approach to costing that considers all costs (Government and contractor) incurred during the projected life of the system, subsystem, or component. It includes total costs of ownership over the system life cycle including all research, development, test and evaluation, initial investment, production, all operation and support costs,"<sup>3</sup> and disposal costs where applicable.

Second, Life Cycle Cost Management's objective is to assure that the buyer (DoD or whomever) acquires and the seller (Industry or whomever) produces products which satisfy operational needs, yet provide the lowest feasible Life Cycle Cost characteristics or the best balance of Life Cycle Cost, Performance, Schedule, and Supportability.

And finally, let's look at the word precept. What is a precept? The most widely accepted meaning is a "Command or Rule" intended as a general rule of action<sup>4</sup>. In that light, we want you to consider the following precepts as central to the conduct of LCCM activity.

I. Overcome Inertia. Psychologists and management supervisors in general

have long been aware that people, groups or individuals, are comfortable in their old ways. You hear phrases like "We've always done it this way" or "Why rock the boat?". This is specifically indicative of the inertia that pervades an organization or business. People as well as organizations resist change. An example of this was NASA during the 1986 (and earlier) period. The bureaucracy and the inertia that it encouraged were firmly entrenched to the point of denying responsibility and accountability in their main mission areas. Short-term considerations ruled in order to procure necessary budget appropriation support. Change was made through massive organizational modification in this system.

Think for a minute about how to overcome inertia. In particular, think about how to overcome it in reference to the system's or product's life cycle. It is necessary for us to change the attitudes of the people involved. There must be a concerned effort to make the people in the elements of the organization involved think differently. Making Life Cycle Cost equal in priority to Cost, Schedule, Performance, and Supportability in the long-run view is essential. How? Try these suggestions.

1. The leaders of the organization must believe it and it must be considered as a criteria at the highest levels. Publicize the fact that Life Cycle Costing is a valid, essential, long-term and strategically necessary view that has to be ingrained from concept inception for the benefits to be realized fully. It can be made to work to everyone's advantage.

2. Ensure that everyone is educated in Life Cycle Costing. The image of a viking ship with all the oarsmen pulling in one direction while facing the stern of the ship comes to mind. Only one person sees where everything is going. That may work fine for a rowboat organization, but do you want your long-term success to be dependent on blind teamwork with only a select group (or possibly only an individual) knowing and determining the company's strategic direction? A team which fully comprehends the implications of their actions on the big picture is more likely to be repeatedly successful in their

endeavors. Everyone in your organization should know the Life Cycle Cost Management process. Communication of your Life Cycle Cost efforts and the subsequent decision-making processes are important not only for their effect on the bottom line but also on the attitudes and performance of your personnel. Danger: This is the "Big Wink" territory. Lip service will go a long way toward undermining your efforts. The unspoken routines that are so deeply ingrained in the organizational culture must be addressed and brought into congruence with the (new) philosophy.

## II. Develop a Questioning Approach.

Is this really what is necessary for the organization's success in the long run? Is this action even necessary? Absolutely! The questioning must start at the top where a majority of the ideas concerning the strategic plan originate. If the need is questioned, then all other aspects of the program can be questioned. The AQUILA and DIVAD weapons programs were perhaps questioned too late, and termination was extremely expensive. Most things can be changed. If the program or project is considered necessary, then requestion once the cost drivers have been identified during your cost analysis. Logistically speaking, one of the problems we constantly face in the military is the assessment of high failure items and the cost driver analysis. One item in that vein that should be addressed is whether or not the increase in performance, scheduling, or supportability factors are worth the dollars and effort being obligated to achieve them. In these critical periods of diminishing resources you have to continually question your approaches to the problems in order to meet the mission requirements.

## III. Do Your Quantitative Homework.

Gut feelings may be correct or they may be incorrect, but they are seldom supportable. In most cases, (certainly not in every case in the Aerospace and Electronics industry) effective data is available for adequate estimation. Business decisions are a numbers game. Arguments are heavy and often heated at this point, but we are looking at the costing view here. Quantitative support is a necessary decision tool for your budget creation and support. Without it your position can become weak and your credibility soft. A good example was the GAO report concerning mandatory officer cuts in the military services. The officer requirements study did not provide Congress with the necessary quantitative discussions or other

information sufficient to fully justify and explain the reasons for growth in officer corps. "A full justification should have included an analytic framework which demonstrated the relationships, missions, and end strengths (Quantitative Homework, Questioning Approach missing?) and identified direct impacts of reductions with numbers". The *raison d'être* for quantification is to facilitate trade-offs. The magnitude of the trade-off is critical. Its quantification is essential. The believable estimate is supported by standardized replicable techniques. These methods vary and we will not treat them here. Suffice it to say that the quality of the quantitative work which can make or break your effort.

IV. Iterate the Design. It is highly unlikely that the first design will meet any goal of the system for which it is designed. Cost effects need to be fed back to the designers. Rework later in the effort with a Design to Cost emphasis is less effective than the initial step of including Life Cycle Cost considerations early in the design phase. When the item or system is redesigned and changes are applied, consider the redesign of the high cost drivers with lower total costs as part of the goal. Iterate the design until your mission requirements are part of the goal. Iterate the design until your mission requirements and cost requirements are both satisfied. Time is required to get the best effect with design iteration. The Logistics Rule applies emphatically here: "Get involved early and stay involved forever!".

V. Trade-off for Effective Costing. Usually there is some cost ceiling over which we cannot spend, some schedule limit which we cannot exceed, and some performance floor we cannot go below. As many options as possible should be considered to lower your long-term costs. We know that some systems have long lives. Aircraft carriers, commercial passenger transport aircraft, and military aircraft all have longer and longer operations and support periods. Trade-offs which maximize the short-term at the expense of the long-term cause a ripple effect

later when assets and appropriations are expected to be even thinner. Your strategic planning factors will have been manipulated, perhaps at the expense of future profit or market position. You cannot afford to be short sighted in today's market. Rarely are the new term opportunities for a quick profit and the long-term cost solutions compatible; yet it is this compatibility that is constantly sought. Emphasizing near term profit performance is crucial for stockholder satisfaction, but as we stated earlier, a going concern cannot afford to commit itself totally to that endless loop.

VI. Contractor Commitment to Success. The business of contracting is not an amateur sport. If you are in Government procurement you must constantly remind yourself that most of the Government's work is performed by contractors and that our reliance upon them is all encompassing. The creation of a contract, the bridge between the buyer and the seller, must include Life Cycle Cost considerations. Air Force Regulation 800-11 mandates it under certain circumstances. It is realistic to think about the following items.

1. Convince the seller/contractor that you are serious and make it a matter of concern for him to perform. Some examples are reliability improvement warranties and contractor performance indices, support cost guarantees and post-delivery support for the product or system. A specific example of this concern for performance was demonstrated by the Air Force when it threatened to exercise its "walkaway option" for the last 21 of its C-5Bs under Fixed Price contract from Lockheed. The high percentage of profit discovered during the contract led to the government requiring a concession (by the contractor) on the price and the long-term view moved into the forefront. The GAO has issued a report discussing the suspicion that fixed price contracts are inflated. On the other hand, citing a Navy situation, it stated that "It appears, ... that contract cost overruns can be primarily attributed to optimistic bidding fostered by a competitive environment, anticipated production efficiencies which have not yet materialized, and unrealistically low labor hour estimates".<sup>10</sup> There exists a need for change here.

2. Place Life Cycle Cost requirements high(est) on the list of criteria for contractor selection. Passing this along to your subcontractors in some situations would be effective. In other words, contract the commitment. Caution: This does not indicate an increase in dependency on inspection for the success of this effort.

3. Ensure that some ownership or cost incentive is tied to the contract as appropriate. Prevent short-term solutions from becoming long-term problems.

VII. User Commitment To Success. The effectiveness of Life Cycle Cost long-term management is not just a function of the contractor. It takes concerned effort on the part of the end user also. An appropriate long-term view may include modification of the organization and it's operational plans. As individuals and as members of various processes within the organization, we must constantly improve our situation. When the equipment is under design and before the equipment has arrived in place, determine if the technology will allow reduced manning and other changes in maintenance requirements and practices. Can the item be a depot level repairable vice base level? The user must make this new item or system work or find another way to achieve the mission requirements. The development and selection of alternatives must be evolved properly and controlled by the user organization to solve or prevent the common problem of a mania (our way is the only way!) from developing. All attempts should be made to control this to help solve the inertia problem. A cultural change initiative may not be easy but it will be necessary if we are to control our future success. If this is beginning to sound like something we've talked about earlier in this paper, you are right.

We have come full circle. With the user committed to success, we find ourselves looking to the user for involvement in planning. We look to the user to train his staff and work groups toward understanding life cycle cost and design to cost efforts

and objectives; toward the big picture of mission scenario achievement. The involvement of the user in the periodic reporting of the product or system is essential, and the development of and selection of of alternatives by the user is critical.

The need for a unified approach to the application of Life Cycle Cost Management in a long-term view of successful acquisition is obvious. In the environment of increasing demands on our diminishing resources, and the economics of providing the shareholder with a bottom line quarterly result, this strategic plan is recognized but difficult to affect. Only with the long-term continuous improvement of products, services, and systems will today's company's success be insured. Insure it for the long-term with effective Life Cycle Cost Management planning.

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