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## WHAT'S THE NEW LOOK IN SPACE PROCUREMENT?

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### Summary

Procurement procedures for today's space programs require a new, creative approach somewhat different from the procedures used in the procurement of military items.

In military procurement we are now involved in new concepts such as "total package procurement," "life cycle costing," and "contract definition." Some of these new concepts are proving to be highly successful, while others are being questioned. However, they all share one commonality -- a cradle-to-grave sequence.

In contrast to military procurement, space procurement presents a new set of problems caused by lack of experience, low volume production, unknown environments.

Also, there is a recent trend in the military to emphasize post delivery obligation on the seller which may prove to be both expensive and dangerous. There is a real concern in the aerospace industry that this trend in the military toward post delivery obligation may eventually move into the field of space procurement.

Imposing post delivery obligations on the seller is not the answer and will not provide guaranteed performance. The problem is compounded when the product, or end item, is used in the space program.

The best answer to continued high reliability and maintainability is in the establishment of proper acceptance criteria. Once the acceptance criterion has been firmly established, the risk of meeting it is the responsibility of the seller and the risk of use is carried by the buyer.

There is a new approach to procurement in our nation's space and defense programs. New policy decisions have been and are being made; procurement philosophies are undergoing constant change. These decisions and changes are most important to all of us and will have a far-reaching effect on every firm which does, or plans to do, business with our government.

These procurement decisions are so important that it would be a major error for management to neglect its role in making procurement decisions. As managers we must accept a

greater responsibility for the procurement process. This, then, is my primary role today -- to urge you to take a good, long look at the role of procurement and to get deeply involved in the procurement function.

There are a lot of catchy phrases and elaborate procedures in the Defense Department procurement of today. In the Defense Industry Bulletin of October 1966, Lt. Col. Jacob B. Pompan, U.S. Air Force, covered this new look in a very informative and interesting article, "An Overview of Air Force Procurement." I recommend this article to you, for it is certainly educational and presents the government's interest accurately. Although I do not agree completely with all of Lt. Col. Pompan's views, this is to be expected since our end objectives are different.

In the interest of more complete planning, more practical weapons systems, and lower costs, the Department of Defense has attempted to resolve a major dilemma. How does the government (a single customer) stimulate and control a group of suppliers with no off-the-shelf products? Further, how can the government realize the benefits of competition in a free enterprise system in acquiring required products at sound prices?

We all hope that these products are technologically the best available, and certainly that they are better than those of a potential enemy. Bear in mind that there can be a real difference between an adequate product and the best product. As for me, I belong to the group which says the military must acquire the best. However, we are not here today to argue the merits of this particular issue.

Typical in today's lexicon of procurement policies at DOD are such phrases as "total package procurement," "contract definition," and "multiple-year procurement." I could go on and on with other new and similar titles.

As a matter of fact, one of our more basic problems today is that we cannot all agree on what these new phrases and catchy titles really mean. What we need is a standard glossary of terms.

The buyer-seller dialogue must be grounded in complete understanding of the terminology

involved so the intent of the buyer and the liability of the seller will be free of misinterpretation.

And among reasonable and conscientious men, there can be misinterpretation unless such understanding is basic and firm.

The possibility of that became apparent to us at the Orlando Division recently when some of our engineers began compiling a glossary for use in exploring the life cycle costing philosophy. They found that no such glossary existed and, to compile 213 definitions, had to employ 37 different references. And this was an admittedly modest beginning at compiling a list of standardized definitions.

My point is this: in weighing government-industry procurement decisions with multi-million dollar implications, legal implications, and upon which might rest our national prestige, there is no room for error caused by misunderstanding.

We dare not be the victims of poor communications. We must mean what we say and feel secure in the knowledge that we say what we mean.

Despite the new phrases, good old-fashioned competitive fixed-price, advertised bidding is still the most effective procurement process -- so long as the buyer knows precisely what he wants and has been buying it for a long time. In this environment, the forces of the market place are in action, and we can assume that the government is getting the most for its money.

Although some of you may argue effectively that negotiations can drive prices lower than simple market place competition, let us accept this form of procurement as being a reasonable method of buying if only because it has been with us for so long. Somehow the government buys nuts and bolts from the lowest bidder and seldom gets criticized.

At the other end of the procurement policy spectrum, very sophisticated schemes are being adopted in the hope of producing a simulated competition. There is also the hope that only the minimum needed requirements will be specified for a particular weapon system. Two more recent innovations are the contract definition process and the total procurement package process. Both are classics and I predict they will be with us for some time.

Ultimate success of these procedures, as measured against the original objectives, is yet to be demonstrated. We know that the com-

panies recently and currently involved in these types of procurements feel that several questions remain unanswered. For example, DOD's policy on cost sharing is well stated and really says, "Don't cost share." Is this policy being followed? Contract definition programs typically require much more effort than the contracts are funded for. The cost to contractors of entering and succeeding in contract definition races is extremely high, sometimes two or three times the amount actually funded by the contract.

Another question deals with technical innovations. Will the contractor be motivated in the contract definition phase or in the acquisition phase to discover and implement technical improvements which will improve the weapon systems? We all know that technical discoveries are being made at an accelerating rate. The decisions being made today in a contract definition phase for a weapon to be fielded five years from now are guaranteeing us that the fielded weapon will be obsolescent. Will we take advantage of technical innovations even if we do find them? Let's hope that our potential enemies are operating under the same procurement rules that we are.

Another question deals with disengagement. We've heard that the government will remove itself from the contractor's day-to-day operation of these programs and will merely observe the progress being made. The policy sounds fine, but will it happen? I feel that disengagement is the government's term for saying "We won't be held responsible for interfering with your program, but we still intend to get as much or more paper from you and to require more reports and to give you advice as freely as we ever have." Sometimes the kibitzer can foul up a friendly poker game.

Let me turn from the procurement experiments in the Department of Defense to the question of procurement for space. Unanswered technical problems have created a parallel set of procurement problems. At least most of the military hardware we produce can be expected to find its final resting place on or in "Mother Earth." Space hardware may orbit the planets endlessly or be destroyed in the heat of re-entry. We have much more to learn about space environment. Many of our space products will never return, and high volume production is unlikely. First shot reliability is an absolute necessity.

What makes up the life cycle? Who is the customer? Where and when does he accept hardware? These are just some of the ques-

tions which must be answered. In an effort to solve some of these problems NASA has instituted the PPP, or Phased Program Planning, as a tool for realistic planning of programs. This process is a good one and should force both buyers and sellers in the space business to at least identify some of the right questions and develop some answers to them. If these plans are implemented, they will be reflected in the contracts which form the interface between the buyer and the seller.

How can we influence this procurement process for space items to increase the probability that the end item will perform as required? Also, how can we do this at the lowest sound price? NASA's recent procurement practices demonstrate some of the tools which can be used. Contract types have ranged from old fashioned CPFF to the new Cost Plus Award Fee to multiple incentive to planned interdependency to multiple incentive to firm fixed price.

I know of one contract which calls for a penalty-reward system for the end item based on the performance of a Lunar drill by an astronaut on the surface of the moon. This is a firm fixed price contract. How will the contractor ever observe that incentive demonstration? What if the astronaut doesn't have time to run that incentive event? What if the astronaut misuses the end item? What if the astronaut doesn't return?

Many of these procurement practices are simply extensions of what the military is experimenting with and are not necessarily appropriate to space procurement. In some cases, the military is learning that the process has many problems and should not be used. Please understand that these procurement practices are not so outrageous as to force me to recommend that my company refuse to accept such contracts. Obviously, the customer is always right and we are willing to accept business under any legal contractual arrangement. I am trying to say that the best contractual method for long term use are not always an application of what DOD is doing. The new look in space procurement must examine different approaches.

In contrast to the recent growth in space procurement, the military procuring process in this country has been in development for about 200 years. In the last 20 years we have seen some radical and significant changes, and for the past two years, military procurement has certainly been interesting, to say the least.

On the brighter side, many unknowns with respect to military hardware procurement are being answered. We are getting answers to questions such as: What is the environment that the item will be exposed to? How long will it be exposed? Who will operate the item? How intelligent is he? Who will repair the item? Should the item be repaired?

However, it also appears that the military is expecting more and more in the way of post-delivery obligations on the part of industry. These demands are being met in various ways by industry, and post-delivery obligations will probably become another catchy phrase in the military procurement process. In general, industry's sense of responsibility for its product results in many examples of field repairs or replacements which are not necessarily contractual obligations.

An illustration of what I mean can be seen in the amount of attention the Department of Defense has recently given to the concept of life cycle cost procurement. The application of this principle can easily lead to the conclusion that life cycle cost is attained when the supplier's price has been beat down to a minimum and when the supplier has accepted a life time guarantee.

This is a mistake to think along these lines. The purpose of life cycle costing is not to saddle the seller with a life time guarantee. The man behind the gun in Viet Nam is not concerned with whether or not the seller of the gun will replace it if it doesn't work. He is concerned only that the gun works.

By imposing post-delivery obligations on the seller, customer satisfaction is not automatically assured.

Nevertheless, there is a fear among aerospace industry leaders that NASA may be lured into experimenting with a policy of post-delivery obligations. Admittedly, it appears logical that having a guarantee on the performance of an item after it is delivered certainly motivates the supplier to supply reliable hardware. However, this is a tender but deadly trap.

A typical example of what I am driving at can be seen in the consumer market place. The common practice in the products we buy every day - from washing machines to outboard motors is often interpreted as one where the supplier has committed himself to post-delivery obligations. This is not so. Read the warranty carefully on your next washing machine, air conditioner, automobile, or fountain pen.

In most cases the seller dictates the terms under which he will honor a warranty, and frequently the decision on whether or not he has a responsibility is the seller's decision. The new trend in automobile warranties is certainly desirable and leads to very interesting advertising. However, the frequency of claims against such warranties should impress us to feel that we do not care to see the same low degree of reliability in a major weapons system and certainly not in a space system. In many cases it appears that the warranty period is one in which the buyer is expected to find all the faults in the car and bring it back to the dealer so that the automobile may be completed. The well-behaved product with a warranty that is never exercised certainly has more satisfied customers than the misbehaving product with a warranty that is frequently exercised.

The buyer is entitled to expect trouble-free use of the item that he accepts. Once he does accept it the item should perform as specified. He should only accept the item if it does perform as required. His confidence in trouble-free use should depend on demonstrations of such use while the item is still the responsibility of the seller. If his confidence is grounded only in the guarantee, then the buyer as well as the seller runs the risk of the item failing to perform to the minimum requirements.

The seller's risk should be limited to the probability that his item is acceptable. The demonstration of such acceptability must be a responsibility of the seller and must be clearly specified as a contractual commitment. In many cases the buyer's failure to identify completely the entire range of acceptance criteria leads him to insist that the seller's obligation extend beyond the acceptance period. Further, the seller must assume liability for unknown performance criteria which neither party contemplated at the beginning of the contract.

Warranties in situations like this seldom lead to correction of defects, and more likely lead to some form of litigation. The challenge to the buyer and user is simple. Specify completely what you want to buy. The age of this trite rule merely supports its fundamental truth. Satisfactory and efficient space procurement must be based on complete definition. (Here, again, may I point out the need for a standard glossary of terms.) This definition must include finite factors for reliability and maintainability. The procurement process must provide for rigorous demonstrations that these requirements can be met repeatedly.

The point I am making is simple. The seller must demonstrate that his product is satisfactory before the buyer accepts it. How can this be done for space hardware? For high volume production, lot sampling procedures have traditionally served this purpose well. For low volume production, such as space, what will be the substitute for lot sampling? Perhaps lot sampling must be applied to low volume production in some way. Perhaps experimental models must be expended to demonstrate life tests and to demonstrate maintainability and reliability. Perhaps the experimental models will number many times more than the so-called production items that are eventually accepted.

We seem to be stuck with the destructive test as the only reliable scheme for demonstrating reliability. In most cases this is not a practical solution, so we must develop more acceptable, non-destructive tests. I feel that this is a tremendous challenge to the entire quality control profession to spell out acceptance procedures which in themselves do not deteriorate the end item.

Pre-delivery demonstrations with high confidence levels on reliability will certainly cost more than we are accustomed to pay. However, substituting guarantees and post-delivery obligation requirements in a contract will not in itself improve the confidence that the item will perform in its ultimate environment.

This concept of clear definition of buyer risk and user risk is more than a simple defense mechanism as stated by a seller.

I am reminded of those two scoundrels, Abdul and Ahmed, who were fearfully awaiting a painful execution in some dark dungeon in Arabia many years ago. They were guilty of some petty crime which called for the ultimate penalty. The day before certain death, the powerful King issued a proclamation:

"If any of my prisoners can teach my white stallion to fly within one month, he shall be a free man."

Ahmed, the pessimist said, "Big deal! What kind of nut is he? He's only torturing us. I won't try such foolishness."

Abdul, the optimist, immediately volunteered to teach the horse to fly.

"What can I lose?" he asked. "One, the king may feel kindly and pardon all of us during the

month. Two, the King may die and the prince might pardon us. Three, I might die a nice easy death in my sleep during the month, and four, who knows, I might even teach that horse to fly!"

Abdul had no trouble defining his risk. But the distinction between buyer risk and seller risk is not so simple.

In procurement of systems and equipment to be used in space exploration, the buyer owes himself and the astronauts who will be using this equipment the highest possible degree of confidence that the end item will be used in an environment that is clearly understood. Most important, the item must have repeatedly demonstrated its survivability.

Our major problem is that these requirements are not easily identified. Many, many millions of dollars will be spent to determine what they are. My point is that it is not in the seller's charter to assume what these requirements and environments are. The seller is in no position to guess at the temperature of Venus, the density of meteorites, the levels of radiation near Mars.

It is the responsibility of the seller, however, to demonstrate conclusively that all requirements set by the buyer have been met. If the seller fails to demonstrate compliance he must run the risk of nonacceptance. This risk, and consequently the risk of no payment, is certainly more motivating than the risk of a part being returned for rework.

I believe that the seller's responsibility should be limited to the acceptance of his products, and the buyer's responsibility is for the use of the product. I realize that some of you may feel that this is a "let the buyer beware" attitude. This is not the point I am making. If we, as a member of the aerospace industry, wish to stay in business, we will have a keen interest in product responsibility. We have to be prepared to investigate field troubles, to get the equipment back on

the air, to respond to the user's operational needs.

Where the seller's contributions are outside of the contractual responsibilities, he should be compensated. But even if he is not compensated, I know of no aerospace firm unwilling to make every conceivable effort to keep the products working.

In the space age of tomorrow, however, the space product supplier will have no opportunity to retrieve the failed receiver which is on its way to Mars - with or without a warranty. I am not advocating less product responsibility. I am simply stating that the opportunities for the aerospace firm to back up its sense of responsibility will not exist for hardware on its way into outer space.

To summarize the new look in space procurement, these are my key points:

- 1 Develop a standard definition of terms so that we may all speak and understand the same language.
- 2 Select only those incentive events which are under the control of the seller. Keep incentive events simple, and limit them only to significant events.
- 3 Establish specific and measurable acceptance criteria.
- 4 The buyer should insist on a reliability criterion. If the buyer wants a high confidence reliability demonstration, he should be willing to pay for it, and the seller must be prepared to demonstrate it.
- 5 Keep buyer risk separate from seller risk.
- 6 Industry must continue to have and to demonstrate a sense of product responsibility.