This report represents the conclusions and recommendations of the majority of the study team; however, not all conclusions or recommendations are supported by all team members.

Additionally, as pointed out in this report (Appendix H) and in the November 29, 2000 USD(AT&L) policy memorandum, many of the report recommendations are not currently permissible within today's regulatory and statutory environment.

Additional information on contracting for applied research can be found at:

http://www.acq.osd.mil/dp/docs2001/Contracting_for_Applied_Research.pdf

This report represents the conclusions and recommendations of the majority of the study team; however, not all conclusions or recommendations are supported by all team members.

Report of the Price-based Acquisition Study Group

Office of the Under Secretary of Defense for Acquisition, Technology and Logistics

15 November 1999

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Introduction

The Price-based Acquisition (PBA) Team's charter asked us to:

- Analyze the implementation of price-based acquisition in the Department of Defense (DoD),
- Identify specific tools and techniques to facilitate greater use of price-based acquisition within the Department, and
- Identify what actions (statutory, regulatory, and policy) will be required to transform the Department's buying practices into ones that are more commercial-like.

We view expanding the use of PBA and becoming more commercial in buying practices as the means to achieve three desirable outcomes.

- Increase DoD's access to leading edge technology available only in the commercial sector,
- Reduce Government infrastructure, and
- Get better prices for what we buy.

This Executive Summary provides a top-level synopsis of our key findings. There are many additional findings and recommendations included in the report that are not addressed here.

Defining Price-based Acquisition

One of the early challenges we faced was reaching a common understanding of what "price-based acquisition" means. We devised our definition and understanding as follows:

Price-based acquisition is a way for DoD to buy goods and services that does not rely primarily on a supplier providing cost data.

Price-based acquisition (PBA) is a way of doing business that begins with identification of a need and flows through post-award activities. The decision to use a price-based approach is driven by choices made during the Requirements Definition process, is heavily dependent on risk mitigation and the chosen acquisition strategy, and is aided by competition or alternatives. In its purest form, PBA results in a firm-fixed-price (or fixed-price with performance incentives) contract and a fair and reasonable price is established without obtaining supplier cost data.

We concluded that "pure" price-based acquisition is at one end of a continuum. At the other end is "pure" cost-based acquisition (CBA) where virtually every aspect of the DoD/supplier relationship demands that the supplier provide DoD with actual or estimated

costs. There is room for both. However, in this report we focus on PBA and how its use can be expanded.

Changing the Risk Equation

Throughout the 1990s, a number of studies, including the 1998 Defense Science Board (DSB) Task Force Sub Panel on Research and Development report, have reached the conclusion that DoD should adopt more commercial practices.[1] The Federal Acquisition Streamlining Act, the Federal Acquisition Reform Act, and former Defense Secretary Perry's mandate to use performance-based and commercial specifications are notable steps in that direction. Yet, there is more that should be done. In fact, the most recent DSB report concluded that the "most compelling (acquisition reform) initiative currently underway is Price-based Acquisition".[2]

One of our major conclusions is that the ability of DoD to transition to an environment that is more price-based critically hinges upon its ability to alter the risk equation. In particular, we believe there are major steps DoD can take to reduce the risk associated with acquisitions by aligning DoD practices more closely with the commercial world. For example, within DoD, the level of perceived risk associated with procurements significantly affects the determination of contract type. In contrast, contract type in the commercial sector is a given, firm-fixed-price for most acquisitions. Is this because the commercial sector does not buy high-risk products? We think not. The commercial sector structures their purchases to use fixed-price contracting and price-based acquisition. DoD can take a similar approach. How can DoD increase the use of firm-fixed-price contracts, even for major system research and development efforts, without placing undue risk on suppliers? By doing what a commercial firm does – structuring the work and using and overall acquisition approach designed to lower the risk.

The Defense Science Board suggested Incremental and Evolutionary Development as two acquisition strategies to lower risk.[3] We concur, but believe these strategies have a broader application than just development programs. To this end, **we recommend the Undersecretary of Defense (Acquisition, Technology & Logistics) (USD(AT&L)) issue a DoD-wide policy requiring, for every acquisition where risk appears to warrant a cost reimbursable contract, that maximum consideration be given to using an evolutionary and/or incremental strategy. If neither approach is appropriate, require that an explanation be included in the Acquisition Plan or other equivalent document.**

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[1] Office of the Under Secretary of Defense for Acquisition & Technology, Report of the Defense Science Board Acquisition Workforce Sub Panel of the Defense Acquisition Reform Task Force on Defense Reform, March 1998.
[2] Office of the Under Secretary of Defense for Acquisition & Technology, Report of the Defense Science Board Acquisition Workforce Sub Panel of the Defense Acquisition Reform Task Force on Defense Reform, July 1999.
[3] DSB Report, March 1998.

To facilitate PBA, another major change needed in how DoD buys is to establish a strong link between the requirement and the price – to in effect reduce the risk of pursuing unaffordable requirements. Commercial industry typically treats the price of the item as part of its technical requirement. Whenever the price and technical requirements are not in harmony there are four options:

1. Relax the requirement, or
2. Raise the price threshold, or
3. Pursue a different alternative, or
4. Abandon the buy outright.

Commercial industry is successful with this process because there is a seamless relationship between the requirements and purchasing functions.[4] In DoD, requirements and affordability have often been de-linked. The Cost as an Independent Variable (CAIV) initiative has made some progress in bringing these into harmony, but more needs to happen if DoD is going to expand PBA. Consequently, we recommend that **every user Operational Requirements Document include a dollar amount stating what the user is willing to pay to acquire the capability described in the ORD.** We believe that adopting this recommendation is important, both to discourage unaffordable, high-risk programs, and to give the acquisition community a measure of the value that the user attributes to the system. We initially expect this price requirement to be stated as a range of prices. As the ORD's technical requirements become firm, we expect the price the user is willing to pay will also become firm. The "price" would ideally be in terms of a total future outlay (i.e., total ownership cost).

Another way that commercial companies reduce buying risk is to spend considerable effort and resources to become experts about the products and services they buy. That is, they understand the criticality of being smart buyers. For example, at the Roundtable we heard from the H.J. Heinz Company that they employ people whose sole jobs are to completely understand the market – the technology, cost, applications, etc.[5] The example they gave had to do with packaging. Having access to this kind of highly specialized expertise is one of the reasons that commercial industry can successfully do price-based acquisition. We conclude there would be enormous payoff if DoD emulates commercial industry in this area. **We recommend DoD establish an Overarching Integrated Process Team (OIPT) responsible for forming a small DoD organization to advocate and integrate market research across the Department and to determine how to address the "surveillance" function in market research. Further we recommend that the Services participate by creating an integrated market research capability within each Service and by providing representation on the OIPT. Each Service will serve as a center of excellence for a given pilot product to test costs/benefits associated with cross-Service integration of market research.**

[4] "Price-based Acquisition Industry Roundtable", coordinated by Arthur Anderson Government Services. On December, 15, 1998, USD(AR) sponsored an Industry Roundtable discussion about commercial buying practices. Industry representatives were from Allied Signal, Bell Atlantic, Boeing, Bose, Daimler-Chrysler, Dyncorp, Harley Davidson, Intel, Langford Partners, Litton, Lockheed-Martin, Mobil, Rockwell- Collins, and TRW.

[5] ibid.

Developing innovative ways to make use of competitive incentives is another way to alter the risk equation to favor price-based acquisition. Clearly, head-to-head competition facilitates PBA. However, there are many circumstances where head-to-head competition is impractical or where it is practical only for the first part of an acquisition, but not for later phases. How do we deal with these situations?

One approach mentioned in the DSB Report is Dissimilar Competition.[6] We believe this strategy can be used to maintain price pressure, and if needed, provide a viable alternative to fulfilling most, if not all, of the requirement. The key to this form of competition is that both the user and the supplier believe it to be a real option – one that, under certain circumstances will allow the buyer to walk away from an acquisition. To be most effective this approach must be considered from the onset of the acquisition. To maintain continuous price pressure and viable alternatives, **we recommend USD(AT&L) issue a DoD-wide policy that for all sole-source major system acquisitions that either head-to-head or dissimilar competitive alternatives be considered through the life of the program.**

There is another approach that may have great merit in advancing PBA – long-term pricing agreements secured in the competitive marketplace. This approach does not apply to every situation. However, its recent use on some major programs, in the form of production price commitment curves, has yielded good results. It is akin to the commercial practice of securing long-term pricing agreements from vendors with a concurrent commitment from the buyer to help the vendor reduce its costs. **We recommend the Defense Acquisition Executive (DAE) issue a policy encouraging the use of production price commitment curves as a means to implement price-based acquisition in sole source procurements.**

Another innovative way to use the competitive incentive is through the use of an incentive-term incentive, Award Term, which is especially, but not exclusively, applicable to service contracts. This incentive operates similarly to an award fee contract, except that instead of earning additional fee, the contractor earns additional periods of performance based on current performance. Use of this incentive should be documented and approved in initial acquisition planning documents. As there has been limited use of this incentive, **we recommend this incentive be publicized through regulatory guidance that contains conditions for its appropriate use.** A DFARS case to implement incentive-term needs to be considered.

In developing our recommendations, we paid particular attention to the problems of and the lessons from the 1980's, particularly as they pertain to the use of fixed-price development contracts. We learned that a substantial contributing factor to these problems was inadequate communication between the Government and the offerors (contractors) about the requirements, both technical requirements and the actual work to be done during development. We also discovered that an overly formal selection process discouraged the kind of dialog that promotes mutual understanding. Commercial firms

[6] DSB Report, March 1998

use collaborative interaction with their suppliers to reach an understanding of the requirements and allow for a fixed-price contract. Both statutory and regulatory restrictions prohibit DoD from operating identically to industry in regards to this collaborative approach.

So, we have developed a new source selection approach that closely parallels industry practice. We call it multi-phase. This source selection approach allows DoD, in the Requirements Refinement Phase, to eliminate sources from further consideration and discuss and refine the requirements with only a select few offerors. In the Proposal Development and Evaluation Phase (and any successive phase) a competition is conducted between only those offerors remaining in the previous phase, whose further participation is deemed in the best interest of the Government.

The recent changes to the Federal Acquisition Regulation (FAR) Part 15 that allow for more interaction between offerors and the Government do not, in our view, go far enough in encouraging the kind of open, give-and-take dialog that will make price-based acquisition work. **We recommend the Deputy Under Secretary of Defense (Acquisition Reform) (DUSD(AR)) pursue the requisite statutory language for the multi-phase source selection included in this report. We further recommend that DUSD(AR) request from Congress pilot test authority to implement this approach and identify acquisition programs from all Services and a select number of Defense Agencies to validate it.**

The commercial sector reduces their risk of faulty promises by relying on past performance as a major criterion for selecting vendors and for maintaining long-term relations with those vendors. In contrast, the Government historically has not penalized companies (i.e., affected future business opportunities) for making optimistic or false promises. Consequently, **we recommend that offeror past performance be, as a matter of Department-wide policy, at least equal to the highest ranking factor in every DoD source selection valued at more than $1 million, unless waived by the Head of the Contracting Activity (HCA) for a specific exception.** This policy will be an enormous enabler, not only for expanding price-based acquisition, but also for encouraging industry to be more realistic in their promises and pricing. Although, it may limit some of the flexibility now available in individual acquisitions, we believe the overall benefit to the Department makes it more than worth the price of reduced flexibility.

Finally, we believe DoD has often inadvertently encouraged contractors to submit high-risk proposals by placing too much emphasis on “instant contract price” as a competitive factor during source selection. This is a clear case where DoD has increased the risk associated with an acquisition by how it has chosen to select its suppliers.

We believe there are many circumstances where it will be appropriate to evaluate instant contract price only from the standpoint of fairness and reasonableness. This means looking to other criteria to provide discrimination. An implementation could consider either total ownership costs in lieu of instant contract price or could weigh instant contract price as a general consideration. While not applicable to every situation, such a measure

will result in more realistic contractor proposals. This will be a marked change in the way we buy, but one that will be quite helpful in implementing PBA and having executable programs. **We recommend the DAE designate two programs entering EMD to pilot the concept of substantially reducing instant contract price as a competitive factor in source selection.**

Establishing the Business Arrangements

There are some bold steps the Department can and, we believe, should take to dramatically and positively alter how DoD does business to be more in line with commercial companies. One of these is to pursue changes to the Truth-in-Negotiations Act (TINA). Numerous industry studies have identified the requirement to obtain cost or pricing data under TINA as a significant impediment to doing business with the Government, especially for commercial firms.[7] We believe both the low-dollar threshold for applicability and the high approval level needed to obtain a waiver to TINA requirements are impediments to establishing a PBA culture. **We recommend statutory changes to TINA that will establish the approval for waivers at a level no lower than the business clearance approval authority. We further recommend raising the threshold for application of TINA from $500K to $1M.**

We were specifically asked to review the adequacy of price-based tools and examples. We found that there are many tools available for doing price analysis and that their uses are addressed in manuals and training courses. However, in spite of the existence of these tools, there is still a great deal of confusion in the workforce regarding how much price or cost data is adequate for any given procurement. **We have developed an automated cost or pricing analysis tool that identifies and weights the variables that affect how much and what kind of cost or price data is appropriate.** The tool also calculates the appropriate range of cost or price data required. **We have created a pricing model summary, provided value-analysis pricing examples, and recommend greater fidelity and use of Independent Government Estimates.**

A review of the four-volume pricing manual revealed a clear focus on competitive price-based pricing tools versus price-based tools that can be used to price sole source procurements. **We believe a rewrite of the Price Analysis Manual to incorporate sole source price-based tools and case studies will be beneficial.** Another useful step, and one **we recommend, is that there be a regulatory definition of what constitutes a "fair and reasonable price" – a definition that supports price-based acquisition** by considering the variables associated with price.

We have concluded that there is a place for a new contracting approach and contract type, Fixed-price, Variable Outcome. This approach is particularly applicable to and will allow many high-risk Science and Technology (S&T), risk reduction, and service contracts to be firm-fixed-price. This approach parallels how commercial firms manage

[7] Coopers and Lybrand, "Acquisition Reform Implementation, An Industry Survey", October 1997 and Program Manager Jul/Aug 1998, "Using Commercial Suppliers—Barriers and Opportunities, Michael Heberling, J. Ronald McDonald, R. Michael Nanzer, Eric Rebentisch, Kimberly Sterling

high-risk investments. Many commercial firms decide on a specific dollar amount to invest in a technology project. Although project monitoring occurs throughout the process, once the funding is exhausted, an assessment of results is made. This is followed by a decision to either add more investment dollars, terminate the project, or adjust the expected project outcome. A similar approach can be used within DoD without a change to current regulations. **We recommend USD(AT&L) issue a DoD-wide policy making, Fixed-price, Variable Outcome the preferred approach for all S&T and risk reduction contracts (e.g., Preliminary Design and Risk Reduction) and other contracts where a range of plausible outcomes is possible and acceptable**.

Another contracting approach that has seen limited use, but has real potential for expanding PBA is Share-in-savings. This approach offers commercial-like incentives that have merit in specific situations to help reduce future contract costs (e.g., total ownership costs). The costs of generating the savings are not a factor in deciding how much profit the contractor should receive. **We recommend that DoD pursue legislative language to establish two pilot programs to demonstrate the share-in-savings concept.**

Sustaining the PBA Environment

In most of the PBA-related studies to date, the emphasis has been on awarding contracts without relying on cost or pricing data. However, to achieve the full benefits from PBA, it is equally important to find methodologies that will support its continued use after contract award (e.g., without relying on cost or pricing data). In many ways, sustaining PBA in post-award is a more formidable challenge than using a PBA approach during the initial stages of the acquisition. We include several recommendations for changing post-award functions to eliminate or drastically reduce the need for cost or pricing data.

Unique to the Government is the concept of supplier financing. Typically, commercial companies do not provide financing for suppliers. The Government does so on many fixed-price contracts because it results in lower prices. Today, the most common practice is that the Government provides financing based upon incurred costs – a cost-based acquisition practice. **We recommend DoD seek statutory authority to allow financing payments prior to the first payment event for those procurements that use performance-based payments. We further recommend DoD create a new type of financing that would apply to fixed-price contracts valued at less than $10M. This financing, price-based financing will make payments based upon realistic forecasted expenditure profiles as opposed to costs incurred.**

Another challenging post-award activity that requires cost data is the settling of claims. We believe it is important to implementing PBA that there be an expeditious process for resolving claims and disputes. **We recommend USD(AT&L) establish a policy that every DoD ACAT I and II Program consider an alternative disputes resolution procedure. This can be implemented through a contract clause or Memorandum of Agreement. Further, we recommend the Department continue efforts to seek statutory authority to have a five-year pilot project that will allow access to the**

Department of Justice's Judgment Fund for claims settled via ADR under specified circumstances.

At times, DoD has to terminate contracts. An overwhelming majority of these terminations are for small contracts or small partial terminations of larger contracts (i.e., less than $500K). However, as with many other practices, DoD heavily relies on incurred costs to decide what the termination settlement should be. This makes the process cumbersome, time consuming (i.e., well over one year on average), and resource intensive. Commercial companies typically settle terminations quickly and without audits of incurred costs – a process not unlike that used by DoD when it terminates purely commercial contracts**. We recommend DoD create a new termination clause similar to the one used in commercial item contracts. This clause will apply to contracts valued at less than $100K and partial terminations of larger contracts.**

Bringing About Cultural Change

It is difficult for people to discard old paradigms and develop new ones. This is particularly true when the new paradigms are radically different from what the workforce, both Government and industry, have grown accustomed to over the years.

There clearly needs to be a catalyst for change – one that not only "jump-starts" the change, but also gives it urgency. We believe there needs to be a push from several simultaneous points. Moreover, the changes in DoD acquisition that have been most successful have emphasized the change through regulatory policy; early, comprehensive training; and a major campaign to build support from the executive level to the working level. We include several recommendations meant to foster the change toward PBA.

First, we **recommend the Defense Federal Acquisition Regulation Supplement (DFARS) be revised to express a clear, unambiguous preference for price-based acquisition. We also recommend that the Defense Federal Acquisition Regulation Supplement (DFARS) Part 207 and the DoD 5000 series regulations require that efforts to use PBA techniques be addressed in every Acquisition Plan or equivalent document.**

Second, we believe the current policy requiring a specific determination to use a firm-fixed-price contract for a research and development effort is clearly at odds with expanding PBA. While there probably needs to be a check to prevent the inappropriate use of firm-fixed-price contracts for high-risk efforts, the current policy, because of the approval level, is more than a check; it is a barrier to using firm-fixed-price development contracts. Consequently, **we recommend amending the DFARS to lower the approval authority for a determination to used a fixed-price research and development contract from the current level (DUSD (AT&L)/DP) to the Service**

Acquisition Executives (SAEs), re-delegable not lower than Flag Officer or Senior Executive Service.

We believe strongly that training the workforce before implementing any other recommendation related to PBA is an absolute "must-do". **We recommend that PBA overview training be conducted at all major buying commands for acquisition teams and their industry counterparts within 180 days. In addition, this training must be provided to the requirements community. Follow-on, specialized, functional training (detailed "how-to" training) should be available within 240 days and be provided on a just-in-time basis to programs needing it for specific acquisitions. Finally, modules on PBA should be incorporated into existing Defense Acquisition University and Service acquisition courses within one year.**

Having support from the “top”, the executive levels within DoD, is a must if PBA is to be a wide spread success. To this end, **we recommend USD(AT&L) sign and issue two memoranda, one to the acquisition, requirements, and supplier communities to introduce PBA, and the other to the Defense Acquisition University requiring the development of “rapid insertion” PBA overview training.**

Conclusion

We have identified numerous recommendations that will increase the use of price-based acquisition and allow the Department to adopt more commercial-like ways of doing business. Although many of our recommendations can be implemented today, others will require regulatory or statutory change. What is required most is a strong leadership commitment to make the transition to PBA, communication to the workforce that this is a priority, and substantial training.

We know that many of our recommendations are controversial. We see this as constructive because it has stimulated a healthy debate, and has and will continue to bring all the issues and concerns to light.

We thank USD(AT&L) for the opportunity to have participated in what we believe will be a landmark effort.

Introduction

Introduction

Price-based Acquisition Objectives

On 15 October 1998, the Under Secretary of Defense (Acquisition, Technology & Logistics) (USD(AT&L)) directed the establishment of a study group to analyze implementation of a price-based acquisition system on a Department-wide basis.

The charter for this study, included as Appendix A, states that to continue its revolution in business affairs, the Department of Defense (DoD) must eliminate or reduce the differences between its buying practices and those of commercial buyers. While continuing to maintain the public's trust, the objectives of a price-based approach to defense acquisition are three-fold:

1. To reduce the prices of military products through civil/military business integration and increased efficiency;
2. To increase access to commercial products, technology, and services, and;
3. To reduce Government infrastructure.

These objectives are consistent with the vision set forth in Federal Acquisition Regulation (FAR) Part 1.102 for the Federal Acquisition System. It states that the System will deliver the best value products or services to the customer by balancing the many competing interests resulting in a system that works better and costs less.

What is behind these particular objectives? The focus must be on meeting the needs of the warfighter and improving mission readiness. These needs are often described in terms of achieving results *better, faster, and cheaper.* By achieving these objectives, DoD will continue to provide "best value" goods and services to the warfighter in a system that works better and costs less.

Our recommendations were influenced by insights gained at an Industry Roundtable sponsored by the Deputy Under Secretary of Defense for Acquisition Reform (DUSD(AR)).[8] We heard that in commercial buying practices, the following key elements characterize a buyer/seller relationship.

- Trust but verify,
- Market/make knowledge is essential to leverage the commercial industrial base,
- Use a team approach with early stakeholder involvement,
- Supplier profit margin is not an issue – cost reduction is,
- Displacing an incumbent supplier requires a 25-40% price improvement,

[8] "Price-based Acquisition Industry Roundtable", coordinated by Arthur Anderson Government Services. On December, 15, 1998, DUSD(AR) sponsored an Industry Roundtable discussion about commercial buying practices. Industry representatives were from Allied Signal, Bell Atlantic, Boeing, Bose, Daimler-Chrysler, Dyncorp, Harley Davidson, Intel, Langford Partners, Litton, Lockheed-Martin, Mobil, Rockwell-Collins, and TRW.

- Cost data is often obtained, but used to focus on collaborative cost reduction initiatives not on price negotiations, and
- Cost contracts, legal action, supplier financing, and funding of Research and Development (R&D) efforts via contract with another company are rare.

As a subset of this study, Litton-TASC was awarded a contract to estimate the costs that could be avoided through application of commercial practices. Their report indicates cost avoidance of approximately $57M and $105M for supplies/equipment and services, respectively.[9] Appendix B, which uses this same data, provides an analysis of the products and services DoD procured in fiscal year (FY) 1998 by category, sole source/competition, and contract type.[10] We have highlighted specific categories that appear to offer significant "targets of opportunity" for using a PBA approach.

In terms of total savings or cost avoidance, we believe these estimates may be significantly understated. The study conducted by Litton-TASC looked at those areas/commodities where at least one Service or Agency has successfully used a price-based acquisition approach in the past. The estimates were based on expanding PBA in these "traditional" areas. By implementing the recommendations in this report, we believe this value will significantly increase. In many cases, we recommend pilot programs to prove the concept or recommendation. When implementing a pilot program, one common requirement should be to measure the change in terms of cost savings or cost avoidance.

The Team

There were two groups, the Study Group and the Executive Steering Group (ESG), involved in the conduct of this study. The Study Group was initially divided into three focus groups: 1) acquisition strategies and enabling actions; 2) pre-award issues, principally pricing methodologies and contract terms; and 3) post-award issues. This approach ensured that price-based acquisition was considered at all points in the acquisition cycle. Focus Groups 1 and 2 were each headed by co-leaders. Group 3 had a single leader. As time progressed, the Focus Group leaders essentially formed one team, ensuring synergy between the recommendations.

The ESG had representatives from various functional areas within the Department of Defense, National Aeronautics & Space Administration (NASA), and the Office of Federal Procurement Policy (OFPP). The ESG was charged with providing general guidance to the Focus Groups.

In addition, representatives from the Council of Defense and Space Industry Associations (CODSIA) provided industry perspective. Appendix C lists the team members and other contributors who provided support to this study.

[9] The Potential Impact of Price-Based Acquisition, A Supplementary Study to the Section 912C Panel"; Interim Report; by Litton-TASC; April 1, 1999
[10] ibid.

Price-based Acquisition Defined – A Progression of Thought

One of the early challenges we faced was reaching a common understanding of what "price-based acquisition" means. Understanding what PBA is and is not has been a complex undertaking. We define PBA as follows.

"Price-based acquisition is a way for DoD to buy goods and services that does not rely primarily on a supplier providing cost data."

Price-based acquisition (PBA) is a way of doing business that begins with identification of a need and flows through post-award activities. The decision to use a price-based approach is driven by choices made during the Requirements Definition process, is heavily dependent on risk mitigation and the chosen acquisition strategy, and is aided by competition or alternatives. In its purest form, PBA results in a firm-fixed-price (or fixed-price with performance incentives) contract and a fair and reasonable price is established without obtaining supplier cost data.

In order to understand PBA, it is necessary to also understand cost-based acquisition (CBA), to be able to compare and contrast. Simply stated, with cost-based acquisition, contract prices are largely established and post-award administration functions, including financing payments, are completely based on supplier's estimated or incurred costs plus profit.

Given our definition that PBA is more than a pricing methodology, we came to realize that there is a continuum between PBA and CBA, with many acquisitions having characteristics of both. As a first step, we pictured this continuum as having three primary factors or dimensions. These factors were:

1. The degree to which competition exists,
2. The degree to which technical risk exists, and
3. The degree to which there is confidence that a fair and reasonable price can be determined through means other than by obtaining certified cost or pricing data from the supplier.

These factors defined both ends of the spectrum between "pure" CBA and "pure" PBA, while highlighting the gray area between (i.e., those acquisitions that have characteristics of both). This initial perspective helped us to establish that PBA is not appropriate in every circumstance. In fact, selecting a CBA or PBA approach is more than picking a point on the continuum. It requires the exercise of sound judgment and sufficient acquisition planning, must result in shared interests and motivations between the Government and supplier, and must obtain a balance between risk and rewards.

As part of our initial understanding, we looked to differentiate between PBA and CBA as depicted in Figure 1.

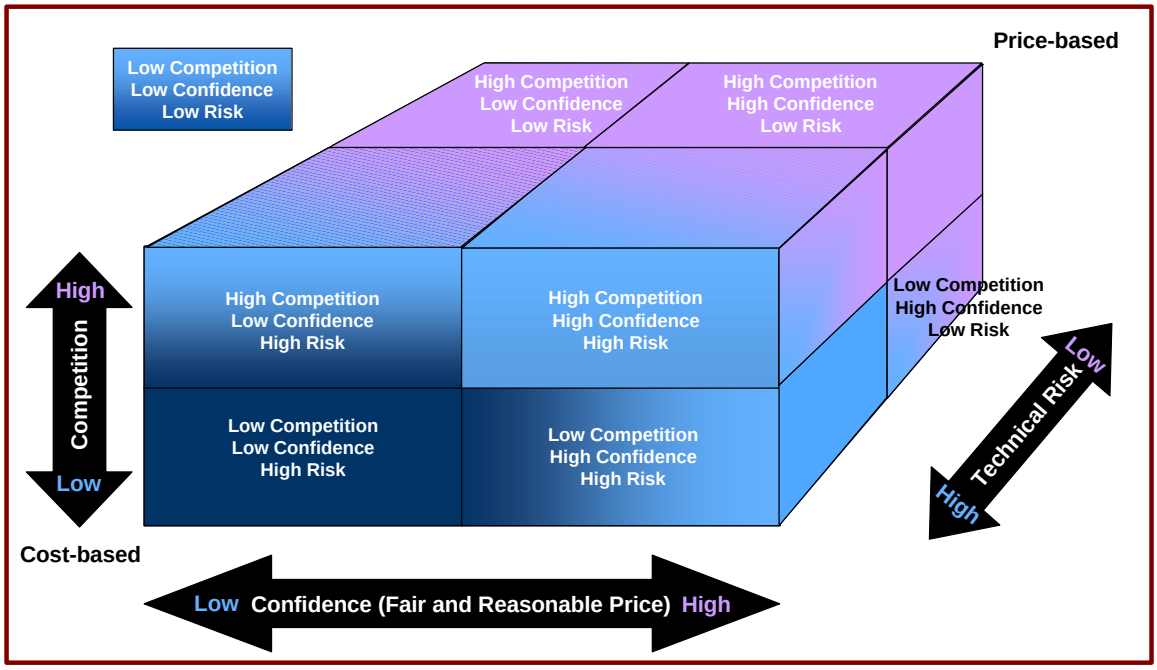

Figure 1. CBA vs. PBA, The First Continuum

Figure 1 indicates that if there is a high degree of competition, high confidence that price analysis will yield a fair and reasonable price, and low technical risk, then a PBA approach is most likely appropriate. Conversely, where there is little or no competition, low confidence in the ability to use price analysis to establish a fair and reasonable price, and high technical risk, then a CBA approach is most likely appropriate. Between these two ends of the continuum, PBA and CBA in their purest forms, an approach that mixes aspects of CBA and PBA can be used, dependent on particular circumstances of the acquisition.

We came to realize that this three-dimensional focus, with emphasis on technical risk, degree of competition, and confidence in determining a fair and reasonable price, was not complete – it was too narrow in view and actually limited our thinking about PBA. It did not consider the purpose of the acquisition, tended to give equal weight to the three factors (which may not necessarily be valid) and ignored the development of the business case (i.e., those pre- and post-award activities) associated with each acquisition.

Instead, we began to think that there is really a series of continuum. Individual continuums are grouped into three categories: 1) Acquisition Strategy, 2) Enablers, and 3) Business Case Development (pre- and post-award activities). This is shown in Figure 2.

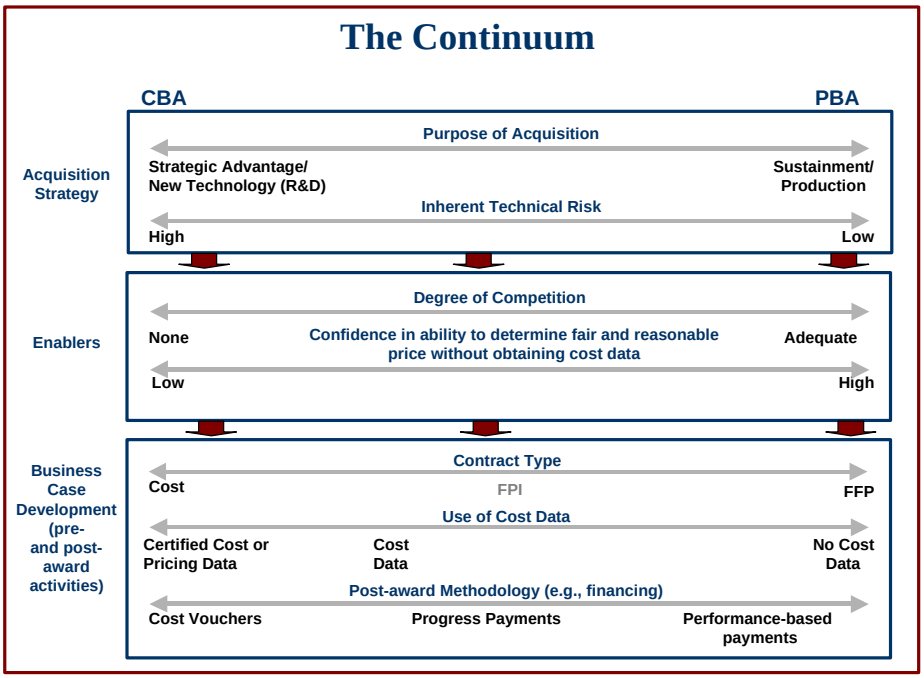

Figure 2. The Continuum, CBA to PBA - Another Perspective

The individual continuums and the three groups are not of equal importance. By listing Acquisition Strategy first, we are emphasizing the importance of the planning process. The purpose of the acquisition (e.g., research and development, production, or sustainment) is generally directly linked to the risk associated with the program. The actions taken to mitigate risk will tend to drive the entire acquisition and will set the stage for using a CBA or PBA approach.

There are two individual continuums within the Enabler group. The major point here is that market conditions should not solely determine whether a PBA or CBA approach is more appropriate. This is best represented by the competition continuum. We believe that competition is not a prerequisite for PBA, it is an enabler. This means that PBA may be appropriate in a sole-source market. (There is a separate section in this report that addresses PBA in a sole source environment.) The degree of confidence that the purchasing activity has in its ability to determine a fair and reasonable price without obtaining supplier cost data is another consideration in determining whether a cost-based or price-based approach is warranted. The following questions must always be asked, "Is it necessary to develop an estimate of cost/price to the level of detail that is common today?" "By developing a detailed estimate, to what degree has the overall confidence in

It is the program office team who must develop an appropriate business case analysis for the specific acquisition. The first continuum within the "Business Case Development" group, addresses contract type. In their purest forms, cost-plus and fixed-price-incentive (FPI) contracts with the incentive on cost are contract types used under CBA. Under PBA, firm-fixed-price (FFP) and fixed-price with performance incentive contracts are used to establish a contractual relationship between the Government and the supplier.

A fundamental principle for the application of PBA (in its purest form) is that risk has been sufficiently mitigated such that a firm-fixed-price contract can be used to appropriately allocate risk between the Government and the supplier. This report discusses two acquisition strategies, which may be used to mitigate risk sufficiently such that firm-fixed-price contracts may be appropriate.

In regards to the use of cost data, note that requiring cost or pricing data automatically invokes the Cost Accounting Standards (CAS). We realize that many companies may be performing under both cost-type and firm-fixed-price contracts. In such cases, the company's accounting system must be CAS compliant. Knowing this, however, is not a valid reason to obtain cost or pricing data, data that may not be warranted for the particular acquisition. "No cost data" is on the PBA end of the "Use of Cost Data" continuum. This in itself does not imply that a procuring activity cannot use historical cost or pricing data already in its possession or require "price level" data such as sales data.

The third continuum in this group, "Post-award Methodology," represents numerous actions that must be dealt with at the start of the acquisition. If this is not done, an otherwise PBA approach may revert back to CBA during post-award. The example shows the methods available to determine appropriate financing payments. Other post-award activities may include, but are not limited to, the processing of contract modifications and changes, terminations, and waivers and deviations. Today, acquisitions initially established using a price-based approach often revert to using a cost-based approach for handling post-award activities. Many of our recommendations are specifically aimed at changing this pattern.

For the majority of acquisitions, the Continuum shown in Figure 2 is highly representative of the range of decisions that, once made, will affect whether a CBA or PBA approach is more appropriate. As stated earlier, the difficulty in labeling an acquisition as one or the other, that is CBA or PBA, is often quite difficult as many use a combination approach. The jagged line in Figure 3 depicts this combination.

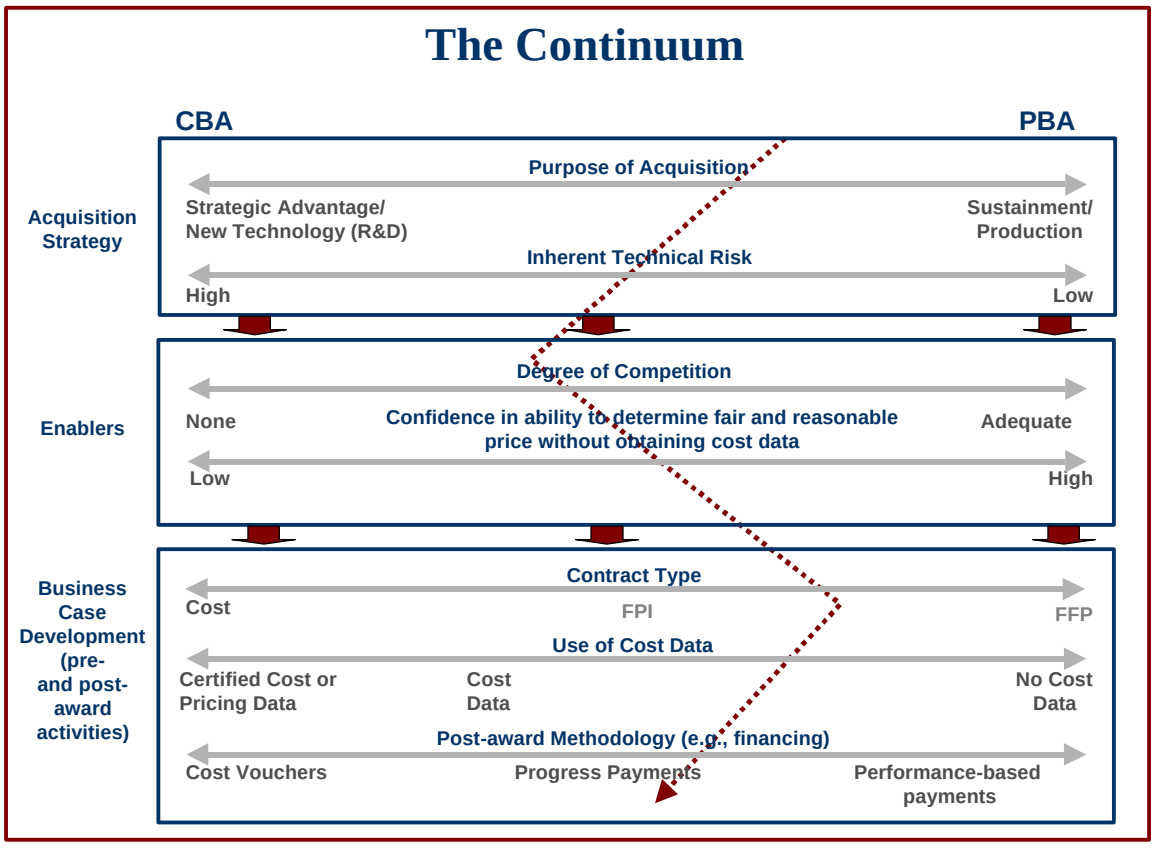

Figure 3. The Continuum, CBA or PBA?

For example, when uncertainty exists and a reasonable basis for establishing a firm price is absent, then cost-type or fixed-price-incentive contracts with a cost incentive should be considered for use. Nevertheless, use of a CBA contract type does not preclude the use of price-based estimating methodologies under certain circumstances. Alternatively, a firm-fixed-price contract type may be appropriate in a given situation but circumstances dictate that a fair and reasonable price may only be established by estimating the costs expected to be incurred.

The label placed on the acquisition is not what is important in the long run. What is important is that, in the larger scheme of all acquisitions, a significant move towards PBA is made along all individual continuums. The Continuum needs to be looked at as a whole, rather than taking each individual continuum as stand-alone. There is a relationship between all individual continuums. A balanced acquisition determines how a decision in one area may affect another.

The 1980's

Before we look to the future and to expanding the use of PBA in Government acquisitions, we first need to look at the past, particularly the 1980's. During the course of this study, we heard numerous cautionary concerns, from both Government and industry, that any move toward PBA must not repeat the mistakes of the 1980's. Those mistakes are most commonly related to the practice of using firm-fixed-price contractual arrangements for technically risky development efforts. As a result, contractors had to shoulder inappropriate financial risk.

Because of the pervasiveness of the comments, we believe it is essential to understand what those mistakes were. To do so, we interviewed several people who either worked on programs that were active during the 1980's or participated in the decision processes for those programs. We interviewed both contractor and Government employees. The interviews were anonymous to assure candor.

Based on these interviews, we conclude that characterizing the mistakes of the 1980's as merely the inappropriate application of fixed-price contractual arrangements is an over-simplification. In fact, the root causes of the problems identified are much more complex and have only partially to do with technical risk.

For many 1980's development programs, the fixed-price of the contract, agreed to by both the Government and the contractor, was unrelated to the cost the contractor actually estimated would be required to complete the effort. As a rule, a contractor derived its bid for the development program by estimating the price required to either beat the competition or to fit within the Government's budget. Bids seldom assumed or contained reserves for problems. The rationale for optimistic bidding was typically that a company expected to recoup any losses on the development contract either through modifications to the contract or by obtaining large profit margins on future production contracts. The Government abetted, and even encouraged, this behavior in several ways.

First, there was a heavy emphasis on "instant" contract price as a source selection criterion. By instant contract price, we are referring to the price associated with the development program only. Unit production price or total life cycle cost (more commonly known today as Total Ownership Cost) carried little weight, if any. In every case we surveyed, instant contract price was a major factor in the source selection decision. This emphasis on instant contract price occurred in some cases because of the weighting of the source selection criteria. In other cases, it was because other, more highly weighted criteria turned out not to discriminate among offerors.

Second, Government budgets were often unrealistic for the program described in the solicitation. Original budget submissions clearly reflected overly optimistic assumptions as viewed in retrospect. However, we found that, even during that time, there was a widespread belief among those closest to the programs, including the Government's program manager and technical team, that the development budget was far too low to

accomplish the necessary work. We are aware that in at least one case an otherwise capable offeror declined to bid because the program budget was too low.

We cannot explain why there was no early action to adjust the budget. Perhaps, it was politically unpalatable or there was not sufficient obligation authority in the out-years to accommodate increases. It may also have been that having at least one contractor willing to propose a fixed-price bid at or below the budget provided some reason for optimism. It is noteworthy, but not surprising, that all offerors knew the Government's budget for the particular development contract and had received a clear, but informal, message that a bid in excess of the budget would not be acceptable.

Third, there was no obvious penalty for submitting an optimistic or unrealistically low bid. The high probability of incurring a substantial loss on a fixed-price-development contract should have been a deterrent to aggressive bidding. It was not for reasons we mentioned earlier. Being eliminated from the competition did not appear to be a deterrent. Nor was there a deterrent in the form of a long-term impact on the contractor's business base. As far as we could ascertain, the companies that had problems with development contracts had no negative repercussions with future competitions (i.e., establishing a record of poor past performance was not a problem).

Other important factors that contributed to the mistakes of the 1980's include the lack of pre-award planning and the absence of discipline after award. There was little in-depth discussion between the Government team and the offerors before a contract was awarded. Pre-award communications were mostly formal and in writing. The Statement of Work (SOW) was often open to interpretation. The work the contractor proposed to perform was often vague and poorly defined. The approach used by the Government and contractors alike was totally inconsistent with a fixed-price contract. One interviewee described his program's plan as "making it up as we went along." It was not uncommon for the program office and successful contractor to discover, shortly after award, that each had a different understanding of what the contractor had promised to do. An aggravating factor was that scope-of-work changes were frequently agreed to without altering the contract or the price – at least, until it was apparent that the program was in trouble.

There is no doubt that many of these 1980's fixed-price development programs had very high technical risk efforts associated with them. But was this risk necessarily inherent? Generally, it was not. Many of the "requirements" for these development programs evolved directly from overly optimistic contractor and Government promises about what was possible – not from risk-based assessments of what was reasonable or likely. Until a program actually began experiencing significant cost and schedule growth, there was little or no consideration for cost/risk implications of the stated requirements. Both the contractors and program offices considered the requirements as sacrosanct. The concept of Cost as an Independent Variable (CAIV), trading cost for technical and schedule, was not a common business practice. Because of the aggressive nature of a fixed price, a contractor often felt it had to adopt high technical and schedule risk approaches to try and minimize instant contract losses. That these approaches often

failed and increased the problems should not have been a surprise. Last, the structure of development programs was to "go for it all." Few programs attempted an incremental or evolutionary approach to reduce risk to a level appropriate for a fixed pricing arrangement.

We have developed recommendations that we believe directly deal with the root causes of those past mistakes. Because we realize there is still a high level of skepticism, in many cases we suggest that our concepts and associated recommendations first be proven through one or more "pilot" programs.

Report Structure

This report is structured in such a way that each section builds on the previous section. Following this Introduction, all of our recommendations are grouped in four major sections: 1) Changing the Risk Equation, 2) Establishing the Business Arrangements, 3) Sustaining the PBA Environment after Award, and 4) Bringing about Cultural Change. Each section begins with a brief introduction that describes how the recommendations included within that section are related. Each of our recommendations contributes to one or more of the objectives associated with PBA as well as address specific requirements of the Charter. Two charts, included in Appendices D and E, respectively, show these relationships.

In developing our recommendations, we tried to ensure the acquisition workforce retains maximum flexibility. We recognize that DoD buys a broad range of products and services under a multitude of different circumstances. We have not used the term "PBA" to place a value judgment on the "goodness" or "badness" of the acquisition approach. We do recommend that using a PBA approach be given priority consideration. The goal must always be to efficiently acquire and deliver the "best value" product or service to the warfighter.

Following the four sections containing the recommendations, we include a discussion of the application of PBA in two specific areas – PBA in a sole source environment, and PBA and subcontracts. The final section of the Report includes the appendices.

To the extent that a statute or regulation may impede greater implementation of PBA, changes to them are recommended. These legislative and regulatory changes, along with proposed language, are included in the Appendices F and G, respectively. Because the current political environment may not be receptive to these changes, we did not draft the necessary legislative or regulatory language for all recommendations. We believe the effort required is not warranted until such time a decision is made to push forward with the specific recommendation. Appendix H provides a summary checklist highlighting whether the recommendations can be implemented today, with possibly only a policy change needed; regulatory changes are required; or statutory changes are required.

Changing the Risk Equation

Changing the Risk Equation

Acquisition Strategies

Price as an ORD Requirement

Market Research Center of Excellence

Maintaining Competitive Incentives

Selecting the Supplier

What do the recommendations included in this group have in common? They all focus on how the risk associated with any given acquisition can be mitigated or controlled. Although several of the recommendations specifically address technical or performance risk, we are also concerned with other practices that, have in the past, had negative impacts on program execution and therefore increased the overall risk of the acquisition.

The first section, Acquisition Strategies, includes a discussion of two strategies, Evolutionary and Incremental Development, that are aimed at controlling the technical / performance, schedule, and cost risk that is often associated with major weapon system development programs. Successful implementation of these two strategies requires close coordination and collaboration between the user, acquisition team, and supplier. Although we focus on the acquisition of weapon systems, we believe the concepts can be modified to fit the procurement of services.

The next section supports our rationale for recommending that the user include a dollar amount in the Operational Requirements Document (ORD) that represents what the user is willing to pay to acquire the specific capability. Again, we believe it is important to make sure the user and acquisition team work toward the same goal. By having the value stated up-front, we believe more emphasis will be placed on cost/price throughout the program. If the requirements as specified are not obtainable for the stated value, the goal is to bring the user back into the process as early as possible so that “difficult” decisions can be made. The focus here is on managing cost risk, although, this recommendation applies to technical and schedule risk as well.

Understanding the market and being able to exploit this knowledge to leverage emerging commercial technologies instead of designing a new system is another way to mitigate the risk associated with a program. In a PBA environment, having an understanding of the marketplace is critical to ensuring the Government pays a fair and reasonable price for a specific product or service. The third section recommends an approach for improving the market knowledge of the acquisition community. We not only discuss the “here-and-now” needs for information, but also address the need to maintain a constant focus on the future.

Although we have clearly stated that we believe competition is not a requirement for PBA, but rather an enabler, we do recognize that the existence of competitive alternatives can positively affect the management of a program and the price paid by the Government. We have included three recommendations that are specifically aimed at garnering the benefits of competition even in a sole source environment – dissimilar competition, procurement price commitment curves, and an incentive-term incentive.

With regards to competition, we also know of many cases where the competitive source selection process itself has resulted in contracts being awarded even though there was an inadequate understanding, on the part of both the Government and contractor, of the requirements of the program and the associated risk. In the section "Selecting the Supplier," we address these specific problems with the source selection process. We have included four recommendations, two that address source selection methodology, and two that address specific problems with evaluation criteria.

Risk also comes from another source, one we did not specifically address. Nor were we expected to do so. We are talking about the risk associated with pursuing programs that are not reasonably planned and fully resourced. Yes, we address strengthening the ties between the user and acquisition community and have provided recommendations for increasing cooperation and collaboration. But this does not solve the larger issue – DoD must change the larger requirements planning process and budgeting/resource allocation process to obtain the maximum benefits from PBA.

Findings

Price-based acquisition and fixed-price contracts are the norm in the commercial marketplace. Commercial buyers determine strategies, negotiate requirements, detail the work, and structure the buying arrangements to be compatible with fixed pricing (i.e., they identify and mitigate risk). Commercial buyers may also look at supplier costs, but they generally do so to identify cost drivers rather than to determine price reasonableness or allowable profit. With this knowledge of the cost drivers, the commercial supplier and the vendor are then able to work collaboratively to reduce costs by modifying requirements, changing processes, or otherwise altering the acquisition.

The Department of Defense, on the other hand, does not generally structure an acquisition to deliberately use a price-based acquisition approach or achieve a firm-fixed-price contract. Although the Federal Acquisition Regulation (FAR) specifies that fixed-price contracts are preferred over cost reimbursable contracts, in DoD the contract type is largely a consequence of what DoD is buying and how DoD is buying it. For instance, virtually every large R&D effort in DoD is cost reimbursable. In 1998, less than 20% of R&D dollars were expended through fixed-price contracts. This should not be a surprise, as current regulations require a specific determination to award a fixed-price R&D contract. This is not the case when awarding a cost reimbursable contract. Likewise, under the Truth-in-Negotiations Act (TINA), obtaining certified cost or pricing data is a requirement unless a statutory exception applies or a waiver is obtained. Cost-reimbursable contracts and certified cost or pricing data are clearly at odds with price-based acquisition.

DoD does buy many goods and services using price-based acquisition techniques that largely mirror those used in the commercial world. However, there remain entire categories of acquisitions (e.g., R&D and sole source, non-commercial item procurements) where DoD uses mostly cost-based techniques. We need to ask, “Why is DoD so different than the commercial world with regard to using price-based acquisition techniques?”

Some people argue that, where major differences exist, they exist because of the unique nature of what DoD buys. Commercial firms certainly do not buy fighter aircraft, tanks, or submarines. Nor do they typically contract with other companies for large, high-risk R&D ventures. However, they do purchase complex systems that often are, in many respects, as advanced or more advanced than anything DoD buys. This is particularly the case in complex electronics. The days when DoD was on the leading edge of technology and was the largest buyer of high technology are, for many technologies, behind us.

High technology commercial companies do purchase R&D, but not in the same way DoD does. They typically buy R&D in one of three ways. First, they buy it from themselves.

They do this by making fixed-price investments into various ventures within the corporation. They make the investment based upon market potential, return on investment (i.e., value), and the companies' core expertise. In general, these investments have formal, contract-like terms and conditions, are often inter-divisional within the same company, involve unique items, and are fixed-price arrangements. Investments are often made in increments. That is, the company funds the investment one step at a time, re-examining the projects periodically to see whether they warrant added investment dollars or should be cancelled. Many private sector examples exist including prescription drug, software, computer hardware, industrial and electronics manufacturing equipment, automotive and commercial aircraft industries. If one contrasts the risks of many of these commercial developments to the risks of DoD ventures, it is hard to make the case that DoD's research and development is of higher risk. For example, less than one drug out of three that enters development, or Phase 3 trials, as it is known in the drug industry, ever reaches production. Even when a drug reaches production, there is no guaranteed market.

Second, commercial companies can also buy R&D as part of the purchase price of the product in the same way that a consumer purchases R&D by buying a new version of Microsoft Office to run the computer. This approach is not unique to the commercial sector. There are at least two models where this routinely occurs in military procurement. One, major defense contractors performing large, cost-reimbursable development efforts frequently subcontract on a fixed-price basis with vendors who must do substantial R&D to supply the product to the prime. The price for that R&D is part of the product price. Two, the British model for systems acquisition is that the fixed purchase for a system includes the R&D necessary to prove and produce it.

Third, large, high technology commercial companies buy research and development by purchasing other companies. They invest either dollars or stock to buy another company's products, its on-going research and development, and its technical know-how. These too are fixed-price investments based upon the aggregate value of the company and not on the amount of money the company has spent on research and development.

It is true that the monopsonistic environment in which DoD buys many of its products affects how DoD purchases. Likewise, many of the statutes applying to Government purchasing do not apply in the commercial marketplace. However, the manner in which DoD buys is also a strong function of the acquisition culture or practice, a perceived need to standardize, an aversion to risk, what the defense industry is comfortable with, and convenience. We conclude that these factors, more than any others, are responsible for what makes DoD buying different from commercial buying, particularly with regard to price-based acquisition. Besides the recent Defense Science Board Report that was a prelude to this study, there are several other studies that have reached this same conclusion.[11] Among these are: Integrating Commercial and Military Technologies for National Security: An Agenda for Change. Senator Jeff Bingaman and Dr. Jacques

[11] Office of the Under Secretary of Defense for Acquisition & Technology, Report of the Defense Science Board Acquisition Workforce Sub Panel of the Defense Acquisition Reform Task Force on Defense Reform, March 1998.

Gansler; Marrying Commercial and Military Technologies, Lt. Col. Jeanne Sutton (USAF), Industrial College of the Armed Forces Executive Research Paper; and Redesigning Defense: Planning the Transition to the Future U.S. Defense Industrial Base, Office of Technology Assessment.

In this section, we examine acquisition strategies that we believe can materially reduce the differences between how DoD and commercial buyers obtain goods and services. We developed these strategies by adapting to DoD purposes some of the techniques that commercial companies use. This is not to say that these strategies provide answers that apply to every type of acquisition.

There will be times when cost-based acquisition is the only reasonable alternative. Likewise, there will be times when the best approach uses a combination price-based and cost-based approach. We are not suggesting that adopting a strategy merely to pursue a price-based approach is necessarily always a good thing. Using price-based acquisition techniques must be in accord with achieving an overall goal of buying goods and services better, faster and cheaper. In some cases, where price-based acquisition is feasible, it may cost more, take longer, and result in a product that is not as good as it would have been under cost-based acquisition. In those cases, it may make sense to not use a price-based acquisition approach.

We discuss two acquisition strategies or tools that we believe will be helpful in expanding price-based acquisition. What they have in common is that both, in many circumstances, have the potential to reduce buying risk so as to make a fixed-price arrangement reasonable for both the buyer and the seller. Also, when used with some of the pricing techniques we discuss later in the report, both can lead to establishing a fair and reasonable price without relying primarily on cost or pricing data. The two strategies are Evolutionary and Incremental Development.

Because these acquisition strategies, as we relate them to PBA, are also linked to the goal of using firm-fixed-price contracts, we include a recommendation in the “Bringing About Cultural Change” section of this report to lower the level for approving the use of a FFP contract for R&D.

Recommendation

In order to increase the use of and meet the goals of price-based acquisition, USD(AT&L) issue a DoD-wide policy that for every system development or other acquisition, where risk seems to warrant a cost reimbursable contract, that maximum consideration be given to using an evolutionary and/or incremental development strategy. If neither approach is to be used, require that an explanation be included in the Acquisition Plan or other equivalent document.

Discussion

Table 1 lists the two acquisition strategies that we believe will facilitate price-based acquisition together with the types of acquisitions where they will most likely apply. We envision that these two strategies may often be used in combination with one another.

Strategy	Applications		# of Awards
	Phase	Degree of Competition	
Evolutionary	EMD, Production	Competitive or Sole Source	1 or more
Incremental	EMD, Services	Competitive or Sole Source	1 or more

Table 1. Acquisition Strategy Application

The extent to which these two acquisition strategies support the goals associated with price-based acquisition – access to commercial technology, reduction of infrastructure, and better contract prices through civil-military integration and increased efficiency in the process, varies. A major focus of these acquisition strategies is to sufficiently reduce program risk to the point that firm-fixed-price contractual vehicles and price-based techniques for determining a fair and reasonable price can be used.

Evolutionary acquisition strategies are not new. The concepts of pre-planned improvements and structuring acquisitions to yield some tangible outcome quickly have been around for a long time. An evolutionary approach is a way to more quickly give the user an improved or new capability by fielding it in stages or blocks. The user gets a capability that partially meets the requirement while development and technology maturation continue toward meeting the full requirement. Besides shortening cycle time, an evolutionary strategy is also a technique that allows a program to move forward even when adequate budget or technology is not available to do everything that the user wants.

We believe evolutionary acquisition is also a major enabler for price-based acquisition. Using such a strategy clearly reduces the technical risk of a development program (as compared to a non-evolutionary or "all-at-once" strategy) by making it shorter and directed at achieving more modest objectives.

An evolutionary strategy can be useful in either a competitive or sole source environment, for development, production, or services, and in either a price or cost-based situation.

Figure 4 depicts an evolutionary acquisition strategy using a generic aircraft program.

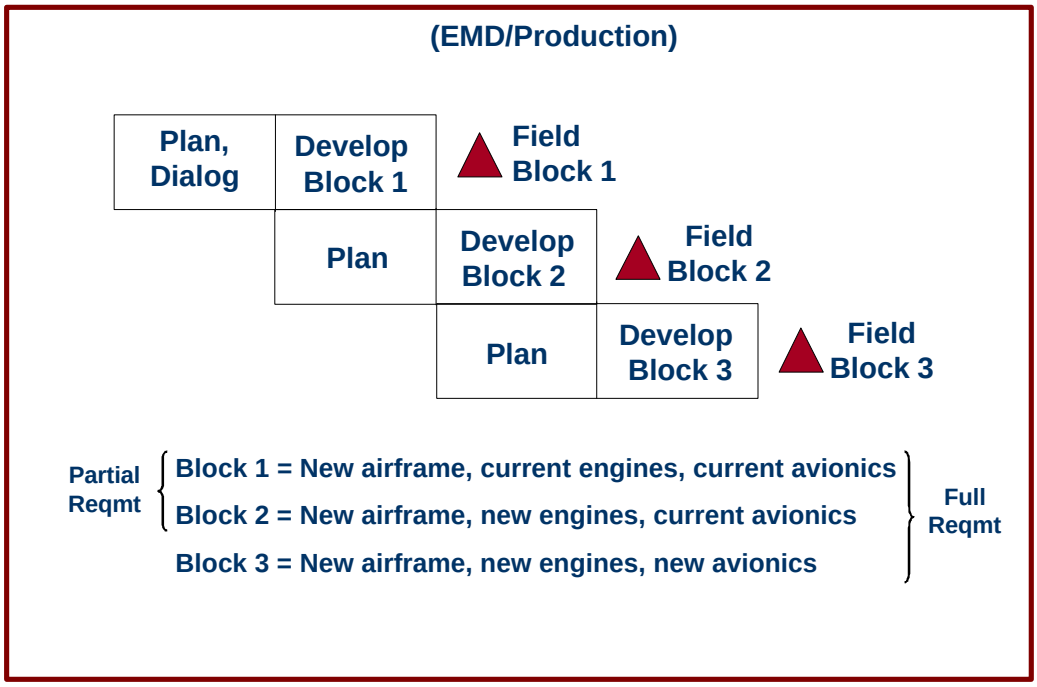

Figure 4. Evolutionary Acquisition Strategy

One can see from Figure 4 an added advantage of the evolutionary strategy as compared to a non-evolutionary one. That advantage is the existence of an extended, deliberate, and funded period for doing the planning, refining of requirements, and reducing of risks for the follow-on blocks. This is an enormous enabler for establishing price, even when the baseline acquisition is cost-based. In addition, an evolutionary approach provides some limited opportunities for the Government, but especially the contractor, to reevaluate their position in the event that there were significant errors in judgement regarding the “real” effort required to complete the given statement of work (e.g., pursuing smaller increments allows for “off ramps” prior to proceeding with the next block or increment).

The Department of Defense has rarely used evolutionary acquisition. We believe there are three primary reasons for this. One, users have not embraced it. It has been rare that the user's Requirements Document has provided for an evolutionary approach. We understand this is because there is a widespread belief in the user community that follow-on capabilities may not happen with an evolutionary approach. Once a system is in the field, the urgency and momentum necessary for continued funding is expected to dissipate. So often, the capabilities the user wants most are also the ones included in the later blocks. Retrofits of prior blocks to the most advanced capability result in multiple configurations with their attendant logistical and operational problems. Retrofitting can also be very expensive, especially when planning is poor.

Two, contractors and acquirers invariably underestimate program risk. To adopt an evolutionary approach at the beginning of a development program is to admit that

meeting some user requirements is risky. Typically this is more risk than contractors and acquirers are willing to admit at a program's onset.

Three, recent history indicates that a new start program must promise to be multiple times as good as the system it is replacing in order to be approved. Many people perceive that an evolutionary strategy will only hurt the chance of program approval. The Joint Strike Fighter and the F-22 are prominent examples. It is not clear that a promise for a system to be a little better initially, but multiple times better through evolution, will be a pattern that our acquisition process will accept as justification for a new start. In order for evolutionary acquisition to work, there will have to be a new paradigm that recognizes when existing systems have maximized their growth potential and that having a new system with huge growth potential is the right way to proceed.

Three examples of an evolutionary strategy are included in Appendix I.

Another way to reduce risk sufficiently to allow a fixed-price arrangement is to use an incremental acquisition strategy. The principle behind an incremental strategy is to divide an effort into an incremental series of consecutive, but overlapping phases. Each phase can be fixed-priced, but not at the same time. Figure 5 depicts this incremental acquisition strategy conceptually applied to a development program.

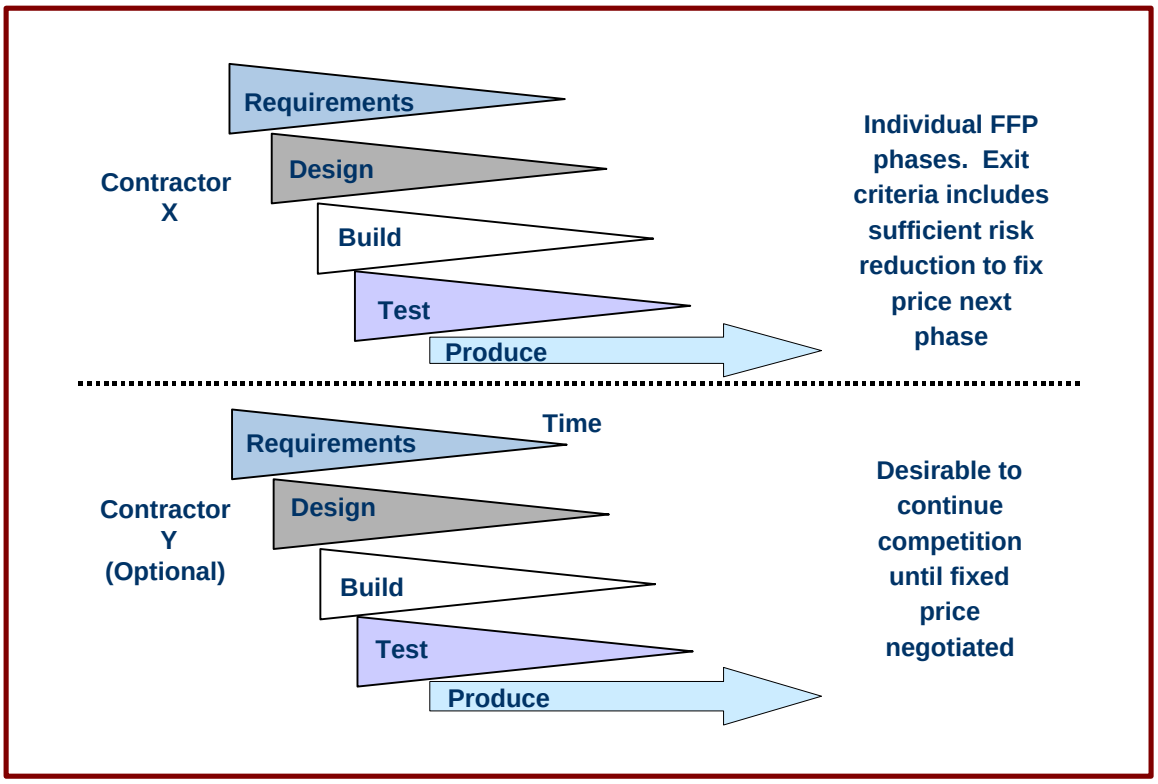

Figure 5. Incremental Development Acquisition Strategy

The primary goal of each phase is not only to move forward with the program, but also to reduce the technical risk, to conduct detailed planning, to harmonize the technical requirements, and do whatever else is necessary to allow reasonable risk, firm-fixed-price contracts for the next successive phase. The chief criterion to enter a successive phase is to have accomplished enough work that a firm-fixed-price contract is a reasonable arrangement. It is not necessary to complete a phase before entering the subsequent phase. The number of phases and the context and duration of each phase will primarily depend on the nature of the requirement, including budget constraints, and the risk remaining. The timing of the phases is based on accomplishment, not the calendar. The decision authority for moving from one phase into the next should be at a low level; either the program manager, the Program Executive Officer (PEO), or the designated acquisition commander. A necessary condition to enter a successive phase is that the Government and contractor must reach a mutually agreeable firm-fixed-price for the next phase that, in turn, presumes there has been enough work done so that the risk is acceptably low.

Again, as with an evolutionary approach, the incremental development strategy, by its nature, provides opportunities for either the Government, but especially the contractor, to reevaluate their position in the event that there were significant errors in judgement regarding the effort associated with any given phase. Pursuing smaller increments allows for “off-ramps” prior to proceeding with the next block or increment.

An incremental acquisition strategy can be useful in either a sole source or competitive environment. However, a major downside is the contracting workload it imposes on both the Government and the contractor. At least conceptually, it will also increase cycle time. However, when one considers actual cycle time as compared to the planned cycle time, an incremental strategy may even be quicker than a non-incremental one.

Three examples of the incremental development strategy are included in Appendix I. These examples are all hypothetical, as we found no examples where this strategy has been used to date.

Implementation

Both the evolutionary and incremental acquisition strategies can be used today. However, at this time a firm-fixed-price development contract requires a determination at the Office of the Secretary of Defense (OSD) level. In the section, “Bringing About Cultural Change,” we include a recommendation to amend the DFARS language to lower this approval level.

Additionally, in order to use an evolutionary strategy, user Requirements Documents will have to provide for evolutionary solutions. Decision-makers in the new start approval process will also have to recognize that a new start with large growth potential may be a preferred alternative to upgrading an existing system that has no significant growth potential beyond the immediate need. Implementation will require a significant paradigm change to current thinking.

Price as an ORD Requirement

Findings

The basic principle of Price or Cost as an Independent Variable is equivalent to treating price as a technical or operational requirement. Under this concept the developer must treat price in the same manner as range, payload, reliability, mission effectiveness, maximum speed, maneuverability, or any other technical parameter. Price itself becomes a design requirement. It is not merely a consequence of, or derivation from, all the other design requirements. The developer must demonstrate during development that it can meet the system requirements including the price requirement. Where price has not been treated as a technical requirement, there is a long history that shows that neither contractors nor the acquisition community really make price a priority during development. Where does the price requirement come from? It comes from the same place that the other operational requirements do: the user. Why is price an operational requirement as opposed to an acquisition one? In today's budgetary climate, the number of systems the user can buy, the rate at which they can be bought, and, in some cases whether or not they are affordable, is directly a function of price. Furthermore, since the total budget is insufficient to fund all of the user's requirements, a price threshold is essentially a user statement about the priority of the requirement relative to other requirements.

Recommendation

Require that every user Operational Requirements Document include a dollar amount stating what the user is willing to pay to acquire the capability described in the ORD.

Discussion

We believe that adopting this recommendation is important, both to discourage unaffordable, high-risk programs, and to give the acquisition community a measure of the value that the user attributes to the system.

What is the basis of the price? The user sets the price based upon such factors as the complexity and urgency of the requirement, the size of the budget, the development community's judgement of what is reasonable, the price for other alternative approaches, the priority of the requirement relative to other competing ones, etc.

When is the price requirement set? We initially expect this price requirement to be stated as a range of prices. As the ORD requirements become firm, we expect the price the user is willing to pay will also become firm. That is, there should be congruency between the requirements in the ORD and price. In the long run, we expect the "price" would ideally be in terms of a total future outlay (i.e., total ownership cost). However, before Milestone II, this value could be a **goal** consisting of the development and average unit

production prices for the first 30-50% of the total production buy. At Milestone III, this value should be changed to per unit Total Ownership Cost.

How important is the price requirement relative to the other technical requirements? We assert that the price established by the user is of great importance as it gives the acquisition community a measure of the value that the user attributes to the system. We believe the price may become so significant, that in some cases it may be treated as a key technical parameter which, if not met, would result in either:

1. Program termination,
2. A re-evaluation of the program to see if it is possible to relax requirements to meet the price threshold,
3. A conscious, corporate decision to adjust the price upward reflecting a willingness to pay more, or
4. Reevaluation of other alternatives.

We realize that having the ORD include a price requirement may remove some flexibility from the Services who might wish to continue funding programs even when their price exceeds the stated value or who might be unwilling to relax other requirements to satisfy a price requirement. The intent is to provide a "check and balance" in the system to ensure program estimates are updated to reflect changing requirements, establish warfighter accountability for the price of the requirement, and help efficiently allocate the limited acquisition monies the Department has available.

Implementation

This recommendation can be implemented through policy. No statutory or regulatory change is required.

Findings

FAR Part 10 requires that market research be conducted at a level commensurate with the acquisition. FAR Part 12.202 describes market research as an "essential element of building an effective strategy for the acquisition of commercial items." Within DoD there is a bias towards developing new equipment and capability in lieu of exploiting an existing or emerging commercial capability. In commercial industry the bias is in the opposite direction. In fact commercial firms rarely initiate a new development and prefer to exploit available or emerging technology.[12]

Fewer "traditional defense" companies, due to mergers and acquisitions, characterize the current business environment in which the DoD operates. For example, from 1990 to 1998 the number of prime defense contractors decreased from 13 to four, eight to three, and eight to five in the tactical missiles, fixed-wing aircraft, and satellite market sectors respectively.[13] A greater percentage of DoD dollars go sole source to these few traditional Defense companies, than in years past, due to the present emphasis on weapon system upgrades vice new weapon systems. In fiscal year 1998, four contractors vice five in the prior year, received 30% of defense purchases, of which about half were sole source ($17 billion).[14] However, these few defense companies do compete with each other and foreign firms in the international defense market. Also, in many commodity areas, DoD is no longer a majority buyer and no longer "pushes" technological advances. Therefore, it is vital for DoD to lower barriers to rapid insertion of commercial technology so that its systems keep pace with commercial technological advances.

Because of these factors, we strongly believe DoD must conduct market research in a more structured way, sharing the results across the Services. By institutionalizing DoD market research, it will be better postured to exploit the vast capability of the U.S. and global commercial industrial base. Also, in-depth knowledge of a commodity's market is an important management control in assuring DoD continues to pay fair and reasonable prices in a price-based acquisition environment.

Industry works hard at being informed buyers. Firms use multi-disciplinary teams, often organized by commodity to conduct market research. Team members gain in-depth knowledge through factory floor experience, training in manufacturing processes, staying abreast of technical and market share developments in a particular commodity, analyzing historical cost data to identify cost drivers, attending trade shows and industry conferences, reading trade journals, and forming strong relationships with key

[12] "Price Based Acquisition Industry Roundtable", coordinated by Arthur Anderson Government Services, December 15, 1998.
[13] GAO/NSIAD 98-141 Report, "Defense Market Sectors" and DD 350 data.
[14] http://www.govexec.com/top200/98charts/98dod.html

suppliers.[15] Additionally, many firms can "make" the products they buy and therefore have a good understanding of the associated risks and can develop fairly accurate cost estimates.[16] Industry consensus is that market knowledge must be managed as an asset. It provides vital leverage to be used in a price-based acquisition environment to assure best value is received for the price.[17] The Army Corps of Engineers and Navy Facility Systems Command are good examples of informed buyers in the construction market.

FAR Part 10.001 and DoD Regulation 5000.2R require program managers to conduct market research before developing new requirements and before soliciting offers for new acquisitions. Training in market research methods is available through DoD, many commercial and university sources, and professional associations such as the National Contract Management Association and National Association of Purchasing Managers. The principle methods of conducting market research are synopses of requirements in the Commerce Business Daily and market surveys. Only recently have DoD Integrated Program Teams begun to use information available on the Internet to conduct market research. Because responsibility rests with the individual program manager to conduct market research and execute his/her program accordingly, the results of such market research are usually not shared beyond the individual program. Such market research is generally focused on determining what sources are available to satisfy a specific program requirement.

There is presently little market research conducted to determine what sources, both domestic and international, provide similar products, their respective market share, specific technical and pricing differences among similar products, future technical advances planned in a given commodity, etc. Such broad market research occurs infrequently and when it does, it is performed in an ad hoc manner with the information remaining in a given program office. For example, the Harpoon missile competes internationally against the Exocet missile. Yet it is presently difficult to obtain market information about technical and price differences and relative market share so that these international competitive market pressures can be leveraged in the annual sole source Navy negotiations for Harpoon Foreign Military Sales missiles.

Recognizing that DoD is not fully exploiting available market knowledge to leverage emerging commercial technologies to meet requirements, improve cycle times, and reduce total ownership costs, the Services have taken some preliminary steps to institutionalize market research. Examples include the USAF "Lightning Bolt" to provide a structured market research capability at each USAF product center and the Naval Surface Warfare Center (Crane, Indiana) Product and Technology Surveillance (PATS) tool to provide market research on Commercial-Off-the-Shelf (COTS) equipment for military embedded computer applications.

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[15] "Price Based Acquisition Industry Roundtable", coordinated by Arthur Anderson Government Services, December 15, 1998.

[16] "World Class Commercial Buying Practices Review for Defense Contract Management Command", Arthur Andersen Government Services, September 17, 1998, page 23.

[17] "Price Based Acquisition Industry Roundtable", coordinated by Arthur Anderson Government Services, December 15, 1998.

Recommendation

Establish a DoD Overarching Integrated Process Team (OIPT) responsible for forming a small DoD Center of Excellence (COE) charged with advocating and integrating market research across the Department, and to determine how to address the "surveillance" function in market research. Direct the Services to participate by creating an integrated market research capability within each Service and by providing representation on the OIPT. Assign each Service to serve as the Center of Excellence for a given pilot product to test costs/benefits associated with cross-Service market research.

Discussion

There is currently not a universally recognized way to determine if another Service or Agency has market research information on a product or service. It is difficult enough to coordinate field activities within a Service, and even more difficult across Services.

What if there existed a list of cross-Service points-of-contact (POCs) with phone numbers by product code? It would certainly provide people in the acquisition community with a place to initiate queries for data. The types of data that can be shared include, but are not limited to, price, technical characteristics and performance parameters, contract terms and conditions, sources, and technological alternatives. Some organizations may even find that another Service or Agency already has a contract in place that can meet their needs.

We recommend that the OIPT, in establishing the small DoD COE, consider including the following functions in the COE charter.

- Identify impediments to PBA and commercial acquisition.
- For given areas of expertise, explore and recommend criteria for establishing a fair and reasonable price, without resorting to contractor provided cost data, for the given commodity or service.
- Facilitate integration of cross-Service market research tools and techniques.
- Share best practices.
- Serve in an advisory capacity regarding what organizations may be available to assist in various aspects of market research. For example, the Air Force Research Laboratory conducts research on a variety of IR&D topics.
- Be the expert on what the capabilities of the Services are and where they reside.
- Ensure the POC list is kept up to date by the Services.

The OIPT may want to examine the lessons learned from the Naval Warfare Center Product and Technology surveillance tool, and the Air Force Lightening Bolt 99-3, Market Research Centers of Excellence.

The OIPT will also be responsible for addressing, with the Services, how the market research surveillance function should be carried out. Currently, many programs are only

focusing on immediate issues and are not looking toward the future. One example of the problem this short view can cause is in the areas of diminishing manufacturing sources and obsolescence. Many programs are finding themselves faced with having to buy large quantities of parts to carry them through all procurement lots. Buyouts themselves can lead to program funding issues.

There is a need for someone in each Service to be responsible for surveillance and to ensure this surveillance data is considered in both near-term and future program requirements and decisions. Typically, programs are so occupied with day-to-day program execution, that market surveillance is not considered a priority.

The Services must provide representation on the OIPT. In order to test the concept of integrating market research across the Services, each Service must identify their core products and provide POCs with web-based search capability.

In addition, each Service should "pilot" a product in their area of market expertise. The product selected, should be one where the Service intends to use a commercial and/or PBA approach to the acquisition. The market research practices and data obtained from the "pilot" project should be publicized and shared with other Services and agencies.

The goals of this recommendation are to facilitate synergy and reduce duplication of effort across DoD in the area of market research. A centralized approach to market research will foster knowledge sharing. Institutionalizing market research within DoD will leverage the benefits of the commercial acquisition practices for DoD. This step is vital in an era of declining resources.

Implementation

No statutory or regulatory changes are required to implement this recommendation. OSD needs to charter the OIPT.

Maintaining Competitive Incentives

Findings

The use of price-based acquisition in commercial industry largely depends upon actual competition, the threat of competition, whether expressed or implied, or the willingness to walk away. Maintaining long-term relationships with suppliers and having an understanding of the production process in order to ascertain a fair and reasonable price, also supports commercial industry's use of PBA.

DoD often moves to a sole source position and abandons competitive alternatives while there is still substantial uncertainty about the outcome and little or no assurance about the price that ultimately will be paid.

Although we have clearly stated that competition is not a requirement for PBA, but rather an enabler, we do recognize the existence of competitive alternatives can positively affect the management of a program and the price paid by the Government. We have included three recommendations that are specifically aimed at garnering the benefits of competition even in a sole source environment.

A major impediment to implementing price-based acquisition for multiple-year production programs has been the impracticability of maintaining head-to-head competition into the production phase of the program. Typically, when there has been competition during a program's early risk reduction phases, there is insufficient knowledge about future production costs to allow contractors to provide firm production price bids without assuming undue risk. Recently, several Air Force and Navy programs have pioneered the use of a production (procurement) price commitment curve (PPCC) as a means to establish firm-fixed-price production goals during the competitive phase (or early in the development phase of a program) without placing unacceptable risk on the contractor or the Government.

As we have seen it applied, the PPCC generally has both incentives for meeting (or beating) price goals, or penalties in the event the contractor is unable to meet the goals. It is these incentives that, if successful, lead to long-term relationships – an important, if not critical, practice in commercial industry. Understanding this, we have explored other ways to incentive good performance, incentives that can lead to longer-term relationships.

Recommendations

1. USD(AT&L) issue a DoD-wide policy that for all sole source major system acquisitions either a head-to-head or dissimilar competitive alternative be considered through the life of the program.

2. The Defense Acquisition Executive (DAE) issue a policy encouraging the use of production price commitment curves as a means to implement price-based acquisition for sole source production programs.
3. Publicize a new incentive, called Incentive-term, through regulatory guidance that contains conditions for its appropriate use. A DFARS case to implement incentive-term needs to be considered.

Recommendation 1

USD(AT&L) issue a DoD-wide policy that for all sole-source major system acquisitions either a head-to-head or dissimilar competitive alternative be considered through the life of the program.

Discussion

Dissimilar competition should be considered in the acquisition of both system and subsystem production units. It can also be used to apply leverage and to control costs of development programs, if and only if, viable alternatives exist.

Dissimilar competition is an approach that allows DoD to look at competition from a different perspective. The intent is to bring price pressure to bear on the current procurement by:

- Maintaining a previous system that is viable, potentially by maintaining a reasonable upgrade program;
- Comparing the current system to the next generation system that may be in the early stages of development;
- Considering any number of alternatives or combination of alternatives that may satisfy the requirement with different technology; and
- Reserving the right to walk away if the price exceeds the user's threshold.

This approach is depicted in Figure 6 for an aircraft production program.

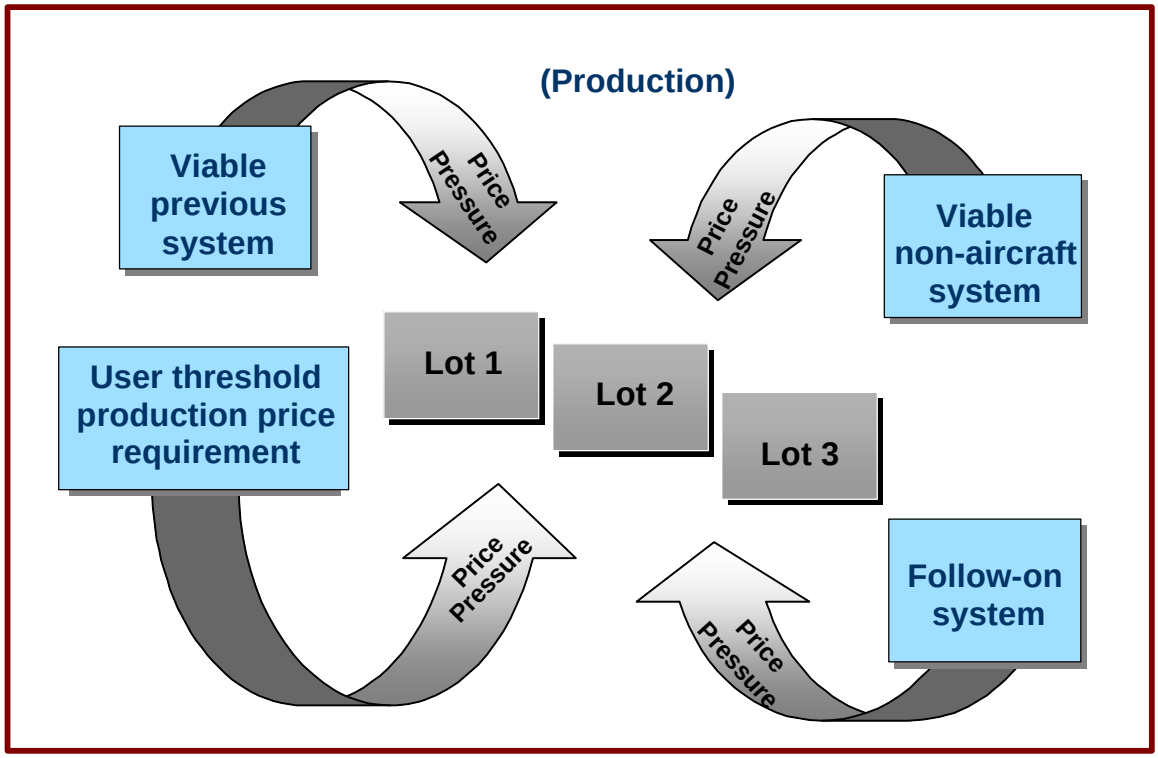

Figure 6. Dissimilar Competition, Generic Aircraft Production

Two examples of the Dissimilar Competition approach, one being hypothetical, are included in Appendix J. This approach is also discussed further, with examples, in the section, "PBA in a Sole Source Environment."

Implementation

The Dissimilar Competition approach can be used today under existing statutes and regulations.

Recommendation 2

The Defense Acquisition Executive (DAE) issue a policy encouraging the use of production price commitment curves as a means to implement price-based acquisition for sole source production programs.

Discussion

We have recently seen the successful application of a production price commitment curve as a means to establish fixed-price production goals during the competitive phase (or early in the development phase of a program) without placing unacceptable risk on the contractor or the Government.

The basic approach has two essential elements. The first is that the competitive, risk-reduction phase focus on production cost risk to the same degree that it has historically focused on technical risk. That is, the content of the early phase is specifically geared to reducing production cost risk to the point where the contractor is as comfortable estimating its production costs as it is estimating what the technical performance of the system will be. Typically, this will mean the contractor or subcontractors will actually have to gain some production experience on those parts that are both cost drivers and have substantial cost uncertainty. The consequence, of course, is that this phase of the program will last longer and cost more than a risk reduction program devoted exclusively to technical risk.

The second aspect of the strategy is to solicit production price commitments from the competitors for the Government to evaluate as part of the selection decision. Production price commitment curves are intended to provide an incentive to the contractor to reduce costs and as a means of reducing price risk for the Government. Price commitment curve clauses have been used to provide incentives to a contractor to achieve a pre-determined target price curve at a particular point in the contract. These commitments are not firm-fixed-prices. Rather, they are contractor commitments that may, as an example of a positive incentive, allow the contractor to later propose firm-fixed prices at or below the commitment price without having to furnish any cost or pricing data. This requires a pre-approved TINA waiver if sole source. A PPCC attempts to balance risk and reward by including both positive and negative incentives. The advantage to the contractor is that it will have an opportunity to realize substantial profit to the degree that it is able to reduce costs between the time the commitment is made and the time the item is produced.

This can occur because normally the contractor is responsible for design and configuration control. If the contractor is not able to reduce costs sufficiently to realize a fair and reasonable profit, then a price above the commitment can be offered. Of course, in doing so, there are consequences that occur. For example, a requirement to submit certified cost or pricing data. The Government gains the potential advantage of competitive pricing and, even if the contractor is unable to meet the price commitments, the advantage of the contractor focusing on aggressive cost reduction. The PPCC facilitates price-based acquisition by focusing on price reduction and the long-term relationship.

It is also possible to implement PBA using production price commitment curves in a sole source environment. Here the commitment would be relative to some historical norm such as a learning or price improvement curve for a specific product class. The use of this technique is covered in more detail in the section, “PBA in a Sole Source

We found that not all the Services are using the PPCC. Although, the clause can add complexity and administrative effort, its benefits make it a tool worth using.

Implementation

In order to train the acquisition workforce, we recommend the Deskbook incorporate discussion and examples of production price commitment curves. We also recommend that existing and future training materials on price-based acquisition tools, such as the Price Analysis Guide and DAU courses, incorporate discussion and examples of production price commitment curves.

To use the clauses, they must be tailored to the circumstances of the acquisition. Issues surrounding the use of the clause such as termination and program stability should be addressed in the training. Two example clauses are included in Appendix J.

Recommendation 3

Publicize a new incentive, called Incentive-term, through regulatory guidance that contains conditions for its appropriate use. A DFARS case to implement incentive-term needs to be considered.

Discussion

Incentive-term is a contract incentive that provides a supplier the opportunity to earn additional contract terms for good contract performance. Currently, there is one type of incentive-term incentive, Award Term.

Award Term is a derivative concept of award fee contracts and uses a similar process. The contractor earns additional periods of performance instead of earning award fee. An Award Term Review Board uses the Award Term Plan to evaluate contractor performance and make a recommendation to the Term Determining Official (TDO). The TDO is responsible for making the final decision.

The long-term contractual relationship of Award Term makes it necessary to consider the potential impacts of a Termination-for-Convenience (T for C). Terminating a contract for convenience remains a right reserved by the Government and should be addressed with industry early in the pre-award phase. It is a factor to be considered when determining minimum contract length, contingent liability, and contract type. Potential settlement issues should also be addressed and be annotated in the contract. If Termination-for-Convenience is not addressed early in the acquisition process, it could impede the benefits of initial contractor investment and continued improvements that a long-term relationship provides.

Determining when and how to apply an incentive-term incentive requires an understanding of the market and the acquisition situation. Consideration must be given to such factors as communication with industry to develop appropriate application, definition of the performance level to be rewarded, application to contract type, contract

length, impact of possible terminations for convenience, how to determine fair and reasonable price, and other business aspects of long-term contracts.

Government development of long-term contractual relationships using an incentive-term incentive does not conflict with the objectives of the Competition in Contracting Act (CICA). The entire contract, inclusive of all potential term, is subject to CICA and other applicable laws and regulations. The concept builds on the benefits provided by CICA as contractors are encouraged, and in fact are rewarded for continuing to provide a good value and make investments and improvements that they might not make with a shorter term contract. The entire period of performance should be approved as part of the acquisition strategy. A successful, long-term contractual relationship provides the added benefit of reducing the manpower-intensive effort of reacquiring the services or supplies provided. The commercial industry practice of rewarding quality performers with long-term relationships is an application DoD should pursue in the form of an incentive-term incentive.

Implementation

An amendment to DFARS 217, Special Contract Methods, is required to include coverage for an incentive-term incentive. A DFARS case to implement incentive-term needs to be considered.

Training also should be developed to familiarize acquisition personnel with the incentive, its implementation, and administration.

Selecting the Supplier

Findings

Most of the acquisition strategies used to procure research and development or other complex technical efforts today presume a cost-based acquisition approach will be used. The choice to use cost-based acquisition is often the result, not of perceived technical risk alone, but of an inadequate understanding on the part of both the Government and the contractor of the requirements of the solicitation and the risk associated with the proposed technical approach. Contracts are often awarded and contract execution begins before major differences are understood or resolved. Risk is seldom managed in discrete increments, but rather is dealt with from a total program level.

The key to moving to the far right on the CBA to PBA Continuum, or to PBA in its purest form, is to ensure risk has been sufficiently mitigated such that a firm-fixed-price contract can be used to appropriately allocate risk between the Government and the supplier. Reducing risk requires continuous, open dialogue between these two parties.

We recognize that the recent FAR Part 15 rewrite made considerable strides toward ensuring that the focus of the Government's resources are on obtaining the "best value" by using a more extensive negotiation process with those contractors that are rated the highest. Initially, communicating the Government's requirement is done either in a pre-solicitation notice and/or through the Request for Proposal (RFP). Many people in the acquisition community believe the pre-solicitation notice and RFP are often poor vehicles for communicating with potential offerors. This is particularly true when the request is for a complex effort such as a system research and development. FAR Part 15 specifically encourages early exchanges of information about future acquisitions. While potential offerors usually have the opportunity to provide information to or gain information from the Government after the issue of a pre-solicitation notice or comment on draft RFPs, the information they provide and/or their comments are often only superficial. Offerors have a fear of offending the customer by being too critical of the request and are also wary of jeopardizing their competitive positions by providing information that gives away their technical approaches. It is noteworthy that the lack of detailed, focused discussion between the Government and offerors was a significant factor in the problems with fixed-price R&D contracting in the 1980's.

Once the RFP is released, if discussions are going to be conducted, the Competitive Range must first be established. Although the FAR allows offerors to be excluded from the Competitive Range, many organizations today are operating in a "risk-adverse" environment and therefore "play it safe" and include all offerors. If during these discussions the Government decides a requirement should be changed, then the solicitation must be amended, with all offerors allowed to amend their proposals. The current process, which is often pushed forward as a result of artificial time constraints, rather than encouraging a full and open dialogue, leads to limited discussions, that often later become major problems in the execution of the contract.

A significant shortcoming of FAR Part 15 is that there is not an efficient way, in lieu of submitting an alternative proposal, for an offeror to make trades in the requirements specified in the RFP (i.e., performance/cost/schedule trades) without taking major risks, either prior to or during preparation of the proposal. The risk is that the Government either will not accept the proposal (i.e., the offer is rejected because it may not meet all requirements when several may not be technologically feasible for a reasonable price) or will give the other offerors the opportunity to make the same trade. This process inadvertently encourages offerors to be overly optimistic in describing the technical accomplishments that can be applied to meet the requirement vice identifying requirements that are likely to be unrealistic or to submit an unrealistic cost/price proposal. As a result, many research and development or other complex efforts must currently be acquired using cost reimbursable contracts, not necessarily because of technical risk, but because the Government and the contractor do not have a common understanding of the work requirements. Prior to contract award there is little meaningful give-and-take dialog to either help the contractor fully understand the requirement or to prompt the Government to alter requirements that are either too expensive or unattainable. Again, this was one of the significant issues we identified with the problems of the 1980's.

One of the major distinctions between the way the DoD selects suppliers and the way that world class commercial companies do is the role that potential suppliers' past performance plays in those source selections. Commercial companies very often consider a supplier's past performance as the most significant factor in source selection. DoD, on the other hand, usually considers offeror past performance, but rarely affords it much weight.

There are three underlying reasons why commercial companies are different than DoD in the weighting they place on past performance. All the reasons are cultural, not legal.

First, DoD buys most complex products or services by relying on detailed technical, management, and cost proposals to select a supplier. When past performance is evaluated, it is generally from a broad perspective and is not specifically focused on truly relevant performance. The Government's evaluation of these proposals sets the expectation for supplier performance. The supplier proposals are, in effect, promises for the future. Therein lies the problem. Depending on the offeror, those promises may not be reliable.

Commercial industry relies on proposals, too. However, they have long recognized that the best indicator of future performance is not what a proposal says – it is past performance.

Second, commercial industry, particularly large companies have found that consistently emphasizing past performance is an enormous motivator for a supplier's current performance. A supplier that performs well can reasonably expect future business even

if its cost is a little higher than that of its competitors. This is a very, very powerful motivator that DoD has not exploited to the fullest extent possible.

Third, commercial industry does not have to deal with the supplier protest process that DoD does. Many cite the possibility of protest as the reason that DoD can emulate industry only in the simplest acquisitions – acquisitions where evaluating supplier past performance can be straightforward and objective. While there may be some complexities introduced by the protest process, these are not a sufficient reason for DoD to be using a different process than commercial industry.

What do these differences in the role of past performance have to do have with PBA? They relate to PBA in three distinct ways.

First, the commercial companies DoD is trying to attract to its marketplace are used to having future business depend upon current performance. A supplier should realistically believe that when it does a good job, it would receive benefits in future business. Rewarding good performance in a consistent, DoD-wide way gives them that expectation. We believe that the lure of future business for a job well done can be almost as powerful a motivator to perform as head-to-head competition.

Second, we think one of the reasons DoD experienced so many problems with fixed-price arrangements in the 1980's was deliberate under-pricing or unrealistic promises made by suppliers – suppliers eager to win a particular contract, suppliers with no expectation that their actions would affect opportunities to win future contracts.

Third, we have found that commercial industry uses a very potent process for reducing the risk of particularly complex acquisitions. This process narrows down the array of potential offerors to a manageable number. A fixed-price arrangement is reasonable because this process permits the buyer to select a few with whom s/he can discuss the details of the requirement, have two-way interaction on its full implications, do cost / requirements trades and mutually come to a complete and total understanding of the acquisition.

Another key factor underlying the problems of the 1980's was the heavy emphasis the Government placed on "instant" contract price as a competitive selection factor for fixed-price R&D contracts. This had the effect of prompting offerors to propose overly aggressive prices and schedules to match. Of course, this is not a problem unique to firm-fixed-price R&D contracts. Even today, the heavy emphasis on instant contract price for cost-reimbursable R&D contracts is probably as responsible as any other factor for unrealistic contractor bids. There is a long-held paradigm that the Government must heavily weigh instant contract price as part of a stewardship responsibility to the taxpayer – a paradigm that seems to hold regardless of whether the contract price is realistic or not. Finally, the offeror often feels compelled to bid to fit within a budget that is itself unrealistic because it did not adequately account for the risks and magnitude of the effort.

Recommendations

1. The Deputy Under Secretary of Defense (Acquisition Reform) request from Congress pilot test authority to implement the multi-phase source selection process and identify acquisition programs from all Services and a select number of Defense Agencies to validate the approach.
2. Increase the awareness of an existing source selection process, the phased down select, and encourage its use, where appropriate.
3. Establish a written policy that elevates the importance of an offeror's past performance to be at least equal to the highest ranking factor in every source selection valued at greater than or equal to $1 million unless waived by the Head of the Contracting Activity (HCA).
4. Establish "pilot" authority for substantially reducing instant contract price as a weighted source selection factor. For these programs, the Source Selection Authority (SSA) should explicitly assess the weighting of instant contract price against other evaluation criteria and the effect it will have on contractors' motivations.

Recommendation 1

The Deputy Under Secretary of Defense (Acquisition Reform) request from Congress pilot test authority to implement the multi-phase source selection process and identify acquisition programs from all Services and a select number of Defense Agencies to validate the approach.

Discussion

Every recommendation in this section is in some way designed to control or mitigate the risk associated with DoD procurements. The methodology used to select the supplier is no exception.

A major contributor to program risk is a lack of meaningful communication between the Government and supplier. The result – solicitations containing unrealistic program descriptions and expectations, with little or no consideration given to the cost and/or risk implications associated with the requirements. At what point in an acquisition are the Government and supplier most likely to engage in serious discussion? The answer – during the source selection process. Unfortunately, we believe the FAR Part 15 rewrite has not gone far enough in the area of information exchange between the Government and supplier. It has not solved the problem of an offeror being wary of jeopardizing its competitive position. Nor has it eliminated the number of serious misunderstandings between the Government and supplier concerning program requirements. We believe there is significantly more that can and should be done.

We are recommending a source selection strategy that opens the door to the maximum extent possible to full and open communication between the Government and supplier. This strategy, the multi-phase source selection strategy, should be considered whenever

the requirement is fluid and is likely to change significantly after information has been exchanged with potential sources and there are two or more sources expected to be capable of meeting the requirements.

This source selection strategy provides the opportunity to work with a select number of sources to gain a clear understanding of how much of the effort can realistically be met with existing technology and how much must be developed. This strategy also emphasizes early planning, and continuous dialog in order to reach a detailed understanding of how a proposed approach links to the requirement. These discussions are held with only those sources that have received the highest past performance ratings and have demonstrated the capability to perform. In addition, the discussions are unique to each offeror (i.e., it is not necessary to share the same information with all offerors as long as all offerors are treated fairly). Because the number of potential sources, with which the Government is conducting detailed discussions, is limited, the Government team will be encouraged to be more open in their communications. Limiting the number of offerors will be a strong incentive for them to work with the Government Integrated Program Team (IPT) (including the user community) to develop high-value solutions to meet the requirement. The ultimate goal is for the Government and offeror to reach agreement on a firm price for the effort – it is an opportunity to move away from cost-based to price-based acquisition. Without changing the current source selection process to allow for detailed discussions leading to performance/schedule/price trades it is highly unlikely that research and development efforts will make any major progress towards the goals associated with the increased use of price-based acquisition.

This process of successive negotiations in competitive procurements is similar to that used by commercial industry today. Commercial industry seldom uses cost-type contracts. Rather, they negotiate until an agreement on risk sharing can be made and a firm price set. Figure 7 depicts a multi-phase source selection process.

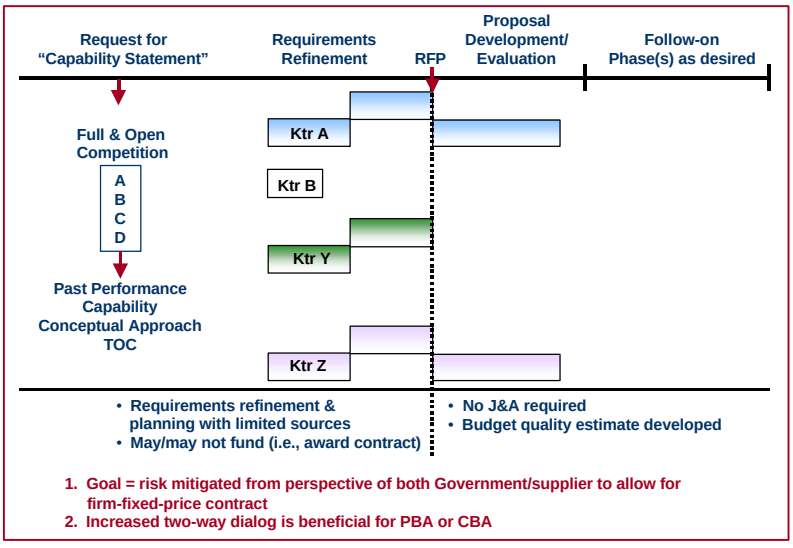

Figure 7. Multi-phase Source Selection Process

The requiring activity initially selects those sources determined to be the most qualified by evaluating each “Capability Statement” provided in response to a notice issued by the Government. The “Capability Statement” includes limited information such as:

- past performance of the contractor for the same or similar work,
- ability to perform the required work,
- conceptual approach to performing the work,
- rough order of magnitude price estimate for the conceptual approach, and
- other information that the procuring contracting officer may consider relevant to the acquisition.

It is important that the initial decision to eliminate sources from further consideration be largely based on past performance and evaluation of the conceptual approach. Refer to recommendation 3 in this section for further information concerning the use of past performance as an evaluation criteria in source selections.

The Government selects from among those sources responding to the notice a limited number of the most promising sources. The Government then works with each of those sources to refine requirements, initially stated as objectives, with major consideration given to reducing the risk to the program and taking maximum advantage of commercially available technology. Trades between performance, schedule, and cost are made in light of the proposed conceptual approach.

A dedicated Government team can be formed, assigned to each contractor team, and charged to work with and support the source’s efforts to develop the Government’s requirements further. The decision to establish separate Government teams to work with each source selected to participate in the requirements development phase must be evaluated in terms of the benefits and costs of using Government teams in this manner. One reason for having a separate Government team to work with each source is to ensure that innovative ideas developed by one source are not inadvertently transferred to competing sources. While the experience to date with these Government teams has been very positive there are certainly circumstances where they may not be appropriate.

Depending on the length of time and effort it is expected to take to complete the phase, the Government **may** fund this phase in part or whole. This process of requirements refinement may be done through one or more successive cycles and continues preferably until the requirements are understood and the risks are bound sufficiently to allow sources participating in the process to propose a firm-fixed-price contract for performance of the work. With each successive cycle, the Government may elect to further reduce the number of sources.

In the proposal development and evaluation phase, the Source Selection Authority (SSA) will conduct a competitive process in which the only sources eligible to participate are those sources selected to do so on the basis of their initial submission or, if a requirements development phase is conducted, on the basis of their participation in that phase. There is no Justification and Approval (J&A) required since the proposed

statutory language associated with this recommendation allows for the award to limited sources without reopening the competition.

The SSA will provide a solicitation to each offeror selected to participate in this phase. The requirements and terms and conditions included in the solicitation may be stated as objectives and the Government may continue to evolve its requirements during this phase. The solicitation will provide notice to the offerors of the extent, if any, to which the Government may reserve the right to negotiate requirements or terms and conditions different from those stated in the solicitation without amending it. The award can be made to single or multiple offerors and following receipt of proposals, the SSA may eliminate one or more offerors during the course of the evaluation.

Follow-on phases can be conducted using a similar process, if necessary.

There are many advantages for both the Government and industry to be gained from using this multi-phase approach. First, the multi-phase process allows the competition to be maintained as long as practicable thereby offering an incentive to the contractor to be innovative and efficient, encourage best efforts to be put forward, and to ensure the Government receives good value for its money.

Second, this source selection strategy establishes an approach whereby firms with capability that can be applied to meet both defense and commercial needs are encouraged to participate in defense procurements because:

1. The process avoids requiring sources to commit substantial resources before they are informed they are among the limited number selected to participate in phases requiring substantial investment of time and money;
2. Sources selected to participate in the Rquirements Refinement Phase will participate in robust communications with Government personnel in order to understand the nature of the problems to be solved, the risk involved, and the opportunities to bring existing capability to bear in order to reduce those risks;
3. Any advancement in the source's capability that results from participation in Government procurements, regardless of whether they receive production contracts, can be used to advance the firm's commercial endeavors as well, and better prepares the firm to compete in future defense procurements.

Third, this strategy provides the means for the Government to benefit from technological innovations with the possibility that little money, if any needs to be invested in the requirements refinement process. The motivation for a source to invest their own funds in the requirements refinement process results from two changes. First, the Government is limiting the number of sources. Second, the new process of open discussion and negotiations provides each source an opportunity to influence the requirement process in such a way that the advantages associated with their conceptual approach are given maximum consideration.

Fourth, this strategy results in significant streamlining and efficiency in the acquisition process by allowing:

1. Continuous detailed discussions to occur only between the Government and those sources considered highly qualified;
2. Technical, cost, and programmatic trades to be discussed and agreed upon early in the acquisition process;
3. Increased emphasis to be placed on the planning process; and
4. The Government to have continual access to alternative, viable sources.

The multi-phase source selection strategy can be used in combination with price-based acquisition strategies and has been designed to allow for maximum flexibility so that it can effectively be used for any research and development effort, major weapon system, or sub-components buy.

Implementation

We believe the best way to validate this multi-phase source selection strategy is to use the approach on a variety of new programs, with at least one a major acquisition program. The Deputy Under Secretary of Defense (Acquisition Reform) will need to prepare and staff the request for pilot test authority and determine which programs will serve as pilot programs.

Institutionalizing the multi-phase source selection strategy requires a change to Title 10, United States Code.

Recommendation 2

Increase the awareness of an existing source selection process, the phased down select, and encourage its use, where appropriate.

Discussion

This phased down-select process is similar in intent to the multi-phase source selection process. That is, to ensure full and open communications between the Government and offerors prior to awarding multi-million dollar contracts, obtain maximum benefits from this open dialogue, and place increased emphasis on up-front planning. These communications are intended to ensure a better understanding of the nature of the problem to be solved, the risk involved, and the opportunities to bring existing capability or commercially-available technology to bear against those risks, thereby permitting the use of a firm-fixed-price contract.

As with the multi-phase source selection strategy, we recommend that the initial selection of highly rated offerors be based on an evaluation of the capability statement that includes limited information such as:

- past performance of the contractor for the same or similar work,
- ability to perform the required work,
- conceptual approach to performing the work,
- rough order of magnitude price estimate for the conceptual approach, and
- other information that the procuring contracting officer may consider relevant to the acquisition.

There are two significant differences between this source selection strategy and the multi-phase approach. First, refinement of the requirement and the entire source selection process is limited to that allowed under FAR Part 15; and second, the strategy can be used today.

If this strategy can be used today, why are we including it as a recommendation? Because, we believe there are many acquisitions where it is not being used, acquisitions where it may very well be appropriate. The purpose for including this recommendation is to raise the consciousness level of the acquisition community.

What limits does FAR Part 15 place on the process? One in particular should be noted. This strategy cannot easily be used for acquisitions where the requirement is highly fluid. Any trades between performance, schedule, and cost are generally made within the boundaries of the requirement and in accordance with FAR Part 15. If a change is made in the requirement, it must be immediately communicated to all offerors, and if significant, offerors not within the competitive range must be given the opportunity to revise their offers.

This strategy includes mandatory down-selects and a restriction on the offerors given the opportunity to respond to the solicitation. Discussions then, between the Government and offerors, are confined to a select number of highly rated sources. So, in issuing the initial notice, the Government must make it clear that the approach is phased acquisition with mandatory down-selects a major part of the process. In order to limit the number of offerors that will be given the opportunity to respond to the solicitation issued in the proposal development and evaluation phase, the contracting officer must prepare a J&A for limited competition. It is highly suggested that this J&A be prepared at the time the initial notice is issued. As a minimum, this J&A must be approved prior to entering the second phase. This J&A is an integral part of this source selection strategy.

The Government follows a process similar to that described in the multi-phase source selection strategy in making trades between performance, schedule, and cost. However, these trades are made within the boundaries of the requirement and in accordance with FAR Part 15. Discussions with the offerors may be done through one or more successive cycles. From a pure PBA perspective, the intent is that discussions continue until the offeror believes a firm-fixed-price proposal can be submitted.

As with the multi-phase strategy, it is strongly suggested that for major programs a dedicated Government team be formed, assigned to each contractor team, and charged to work with and support that contractor's efforts to "win" the contract. It is at this point

that the Government IPT also begins working with the offeror to develop a budget quality cost/price estimate and to lay the groundwork for the contract baseline. This joint effort will significantly reduce the effort and time needed to evaluate the formal proposals submitted in response to the solicitation.

The SSA will conduct a competitive process in which only sources selected to participate in the requirements refinement phase are eligible to submit a proposal. The SSA will provide a solicitation to each offeror selected to participate in the proposal development and evaluation phase and conduct the source selection in accordance with FAR guidelines. The requirements and terms and conditions included in the solicitation are firm. The solicitation will provide notice to the offerors of the extent, if any to which the Government may reserve the right to negotiate requirements or terms and conditions different from those stated in the solicitation. The award can be made to single or multiple offerors and following receipt of proposals, the SSA may eliminate one or more offerors, through the Competitive Range process, during the course of the evaluation.

Implementation

This phased down-select strategy can be implemented within existing regulations and statutes. However, the intent of including this recommendation is to educate the acquisition workforce about its possible use.

Recommendation 3

Establish a written policy that elevates the importance of an offeror's past performance to be at least equal to the highest ranking factor in every source selection valued at greater than or equal to $1 million unless waived by the Head of the Contracting Activity (HCA).

Discussion

This policy will be an enormous enabling strategy to both expand the use of price-based acquisition and move toward more commercial buying practices. Considering that implementing it requires no change in statute, adopting this recommendation will be one of the most immediate acts DoD can take to achieve these ends. It is also important to note that this approach corrects one of the major contributors to the problems of the 1980's – a problem where successful offerors tended to suffer no long-term business impacts from deliberately under-pricing or making too many promises.

Today DoD evaluates past performance much the same way for all acquisitions. The evaluation process relies on a number of inputs: a buyer-generated database of "Contractor Performance Assessment Reports" (CPARs), phone calls to current and previous customers, mail surveys, etc.

These may be entirely adequate means if the performance elements are simple (e.g., quality of product, delivery time, etc.). But do they provide discrimination? Many times

they do not. A past performance evaluation may eliminate a consistently poor performer, but it almost never discriminates among offerors who are otherwise responsive. A lot of reasons exist as to why this is so, not the least of which is the low weighting of past performance in the overall decision. Also the fear of protest probably plays a role. However, even if past performance had a much more significant role as recommended, the fundamental way DoD evaluates past performance has to change dramatically, particularly if it is going to apply the policy to all acquisitions and not just simple ones.

Today, most evaluations take such a broad, comprehensive look at past performance that the results invariably turn out to be irrelevant regardless of weighting. This is because the evaluators look at the evaluation as a way to see if anything stands out rather than as a way to draw inferences about future performance. There is usually no effort devoted to ascertaining what particular past performance is most relevant to the new acquisition. In fact, the availability of data often determines what an evaluator looks at for any particular offeror. Evaluators have a difficult time deciding what to evaluate at the macro level. If an offeror's performance on hardware reliability has been consistently bad, is it relevant if the current acquisition is for software development? When performance on a particular contract appears either good or bad, is it possible to fully understand why? Who was really culpable in the "bad" performance? What role did the Government play? Was the poor performance due to unstable requirements or funding? Is the buyer trying to send the supplier a message by giving him a "bad report card"? Was the task so hard that no one could have succeeded? If the performance was good, why was it good? Was it because the contractor had a good planning process? How much did the existence of head-to-head competition play in this good performance? Was the task relatively simple? Were high marks given for past performance because of the relationship with the program office? Or was it just plain luck? What if an offeror performed poorly, but took corrective action? How can the evaluation team assess commercial offerors who have had no track record with DoD?

It should be evident that this policy will have some profound implications on future source selections. One recent example of a major system acquisition where offeror past performance played a substantial role was in the Joint Air-to-Surface Standoff Missile program. This example is included in Appendix K.

The foregoing discussion infers that implementing the policy we recommend will not be easy. We agree. Our traditional suppliers will be nervous. The acquisition workforce will have to learn something that is entirely new and difficult. Training will have to be immediate and intense. There will be some mistakes and probably several protests at the outset. However, this is a case where we believe the "pain is worth the gain."

There are doubtless, exceptional circumstances where it might not be appropriate to elevate past performance to the importance we recommend. For those cases, we include provisions in our recommendation for the Head of the Contracting Activity to waive or modify the general policy when either:

- There is compelling evidence that past performance will not be a good indicator of future performance (e.g., an offeror is in bankruptcy proceedings or is

venturing into an entirely new business area). (Note: A company's changing ownership/management or implementing action to correct previous performance problems are not compelling evidence.)
- It is impractical to evaluate past performance because of lack of data.
- There is compelling evidence that there will be no discrimination among the offerors from their past performances.

Implementation

No statutory change is required to implement this recommendation. Initially, this recommendation can be implemented through policy letter. However, in the long run, regulatory changes are required to institutionalize the practice (e.g., DFARS).

It is also imperative that training be provided to the acquisition workforce on how to conduct a complete and comprehensive past performance evaluation for complex products and services.

Recommendation 4

Establish “pilot” authority for substantially reducing instant contract price as a weighted source selection factor. For these programs, the Source Selection Authority (SSA) should explicitly assess the weighting of instant contract price against other evaluation criteria and the effect it will have on contractors’ motivations.

Discussion

We are not suggesting that instant contract price be minimized in every situation or even most situations. However, when there is substantial risk ("substantial" meaning anything other than very low) and when the instant contract price is a relatively small fraction of the overall dollars the Government will eventually pay the successful contractor, it seems reasonable to highlight other factors in favor of obtaining more realistic bids. In these situations an alternative approach is to consider price reasonableness and realism given the magnitude of the effort rather than the absolute price. Price reasonableness and realism then become qualifying or disqualifying factors in these cases. Evaluation can also be made using Total Ownership Cost, to the extent it can be estimated, vice focusing on instant contract price. Where it is not possible to estimate Total Ownership Cost it is possible to achieve the same effect by considering instant contract price as a general consideration.

De-emphasizing instant contract price may or may not contribute to a move toward PBA. Whether it will in any particular acquisition depends upon whether or not there is a basis for a TINA waiver. However, it will certainly remove the motivation that a contractor now has to be overly optimistic in its bidding strategies for competitive R&D contracts. It will also allow for a more open pre-award interchange between the Government and the offerors concerning cost, risk, schedule, manpower projections, and similar factors.

An example is included in Appendix K.

Implementation

It is possible to implement this recommendation today using a FAR waiver for price as a factor. Institutionalizing this change requires a FAR change on using price as a factor.

This recommendation may be implemented in conjunction with the "pilot programs" selected under the multi-phase source selection recommendation. However, implementation of this recommendation should not be delayed to coincide with the source selection recommendation.

We believe that many people in the acquisition workforce are not aware of the unintended consequences resulting from heavily weighing instant contract price in high-risk R&D efforts. This awareness needs to be part of a PBA training objective.

Establishing the Business Arrangements

Establishing the Business Arrangements

Truth-in-Negotiations Act

Cost Data in FFP Competitive Contracts

Pricing Methodologies

Contract Types

What do the recommendations included in this group have in common? They all focus on the program team's efforts to build an effective business case around the given acquisition in a PBA environment. By business case, we are referring to all of the business-related decisions that must be made to award a contract and then see that it is executed according to its terms and conditions. We look at the impediments as well as tools that can be used to support the process.

Although business case development encompasses both pre- and post-award activities, our focus in this group of recommendations is largely on pricing methodologies and contract types, although we do address two Government-unique requirements, based in statute, that if not changed, will affect the extent to which PBA can be implemented. These are the requirement to obtain certified cost or pricing data under the Truth-in-Negotiations Act and specific rules associated with the Cost Accounting Standards (CAS).

We then turn our attention to pricing in a price-based environment (i.e., determining a fair and reasonable price without obtaining supplier cost data). We include five recommendations related to pricing methodologies. We also discuss existing tools and changes needed to ensure the acquisition workforce has a better understanding of their appropriate use.

The final section includes a description of two contract types we believe will greatly increase the use of PBA. A third recommendation addresses the commercial practice of using a Time and Material (T&M) provision for maintenance and overhaul contracts, a practice that is not available to the Government today in FAR Part 12 contracts. The final recommendation addresses the use of Undefinitized Contract Actions (UCAs), a practice that is itself an impediment to PBA.

Truth-in-Negotiations Act (TINA)

Findings

Numerous industry studies have identified the requirement to obtain cost or pricing data under the TINA as a significant impediment to doing business with the Government, especially for commercial firms.[18] Obtaining certified cost or pricing data is a unique Government practice. According to information provided at the Industry Roundtable, industry most often uses any supplier cost data it obtains only for the purpose of identifying and reducing cost drivers.[19] Industry is not normally concerned with how much profit its suppliers make. In the Government, a problem with focusing on cost is that because profit is calculated on cost, reducing cost also reduces the supplier's profit. A second issue for industry associated with the requirement to provide cost or pricing data is the expense and legal liability associated with "sweeping" negotiation data to make sure it is current, accurate, and complete. A third issue is that many firms consider their cost data proprietary and are not comfortable releasing it.

We are also aware of several instances where TINA waivers were not pursued due to the time involved with writing the justification and getting requisite approvals. These examples are further substantiated by research done by Douglas J. Mrak in his Naval Postgraduate School thesis entitled, " How waivers to the Truth-in-Negotiations Act May Improve the Naval Aviation Acquisition Process." The statutory terms of TINA, which require the approval of the Head of the Contracting Activity to obtain a waiver to the TINA requirements, has resulted in a process that is not timely and therefore discourages waivers, especially on smaller dollar value items. In addition, the statute specifies the waiver approval cannot be delegated below the HCA. In most DoD buying commands the HCA is a 3-Star Flag Officer or higher.

Recommendations

1. Streamline the TINA waiver process to allow for approval at a lower level.
2. Raise the TINA threshold from $500K to $1M.

Recommendation 1

Streamline the TINA waiver process to allow for approval at a lower level.

[18] Coopers and Lybrand, "Acquisition Reform Implementation, An Industry Survey", October 1997 and Program Manager Jul/Aug 1998, "Using Commercial Suppliers—Barriers and Opportunities, Michael Heberling, J. Ronald McDonald, R. Michael Nanzer, Eric Rebentisch, Kimberly Sterling.
[19] "Price Based Acquisition Industry Roundtable", coordinated by Arthur Anderson Government Services, December 15, 1998.

Discussion

Currently, there is a statutory requirement in 10 U.S.C. 2306 a (b)(1) that describes the waiver authority to TINA as the HCA. This authority cannot be delegated. Obtaining approval for a TINA waiver requires a lot of paperwork and is time consuming. As the HCA is often, at minimum, a 3-Star Flag Officer in the Services, contracting officers are often discouraged from requesting TINA waivers especially on smaller dollar actions (e.g., less than $1M). This conclusion was also reached in the aforementioned thesis. The author also recommended lowering the approval authority to a level more commensurate with other empowering acquisition streamlining changes.

Implementation

10 U. S. C. 2306a(b)(1) will need to be amended to permit delegation of waiver authority below the HCA level by deleting the words "without re-delegation". We recommend that the waiver authority be implemented within the Service supplements to the FAR as the Business Clearance Approval Authority. Continuing to require a waiver at a lower approval level ensures a review but reduces the cycle time associated with it. Delegating TINA waiver authority to the Business Clearance Approval Authority also places it at the approval level where all aspects of the business arrangement are reviewed, including the pricing methodologies used to establish that the negotiated price is fair and reasonable.

Recommendation 2

Raise the TINA threshold from $500K to $1M.

Discussion

Analysis of information supplied by the Defense Contact Audit Agency (DCAA) demonstrates that very little money is recovered on smaller dollar contract actions. About 90% of all savings occurred on contract actions valued at over $10 million.[20] Less than 5% of the savings occurred on contracts valued at less than $5 million.

Additionally, DCAA internal procedures state that post-award audits will not be conducted on cost-type contracts less than $10 million unless there is a specific request to do so. On cost-type contracts, since incurred costs are reimbursed, any defective pricing would result only in savings in the fee paid. Thus, it would be a reasonable management control not to focus on smaller dollar contracts, especially cost-type contracts. Additionally, the DCAA data does not include the costs incurred by Contracting Officers and their teams in addressing defective pricing issues. Nor does the DCAA data consider the schedule impact associated with receiving prime and subcontractor proposals and post-negotiation "sweeps" that comply with TINA.

[20] DCAA Excel Spreadsheet, "FY 1997 TINA Savings vs. Costs, provided via e-mail March 25, 1999

Implementation

A change to 10 U.S.C. 2306a(b)(1) is required to insert $1,000,000 in lieu of $500,000.

Cost Data in Firm-fixed-price Competitive Contracts

Findings

FAR Part 15.305, Cost Realism, requires a cost realism analysis on cost contracts and allows it to be conducted on fixed-price-incentive and certain firm-fixed-price contracts. Cost Accounting Standards (CAS) are invoked on FFP competitive contracts if "cost data" is requested. The term "cost data" is undefined in the FAR, but has been interpreted in a court case to include requests for labor hours. The need to validate "cost realism" and to populate Government cost models has led to requests for some limited cost data in FFP competitive source selections. The negative impact that this has on acquisition is that the Government request for cost data invokes CAS for that contract. CAS inclusion is not acceptable to most commercial firms due to Government-unique requirements that are also imposed as a result.

Recommendation

Change CAS law to exempt from coverage firm-fixed-price contracts awarded on the basis of adequate price competition without the submission of certified cost or pricing data.[21]

Discussion

Occasionally, limited, but not certified cost data, may be asked for on fixed-price, competitive contracts to help determine cost realism. In other words, without this recommended change being implemented, CAS applies if the supplier is asked to provide **any** cost data, even if the contract was awarded on the basis of adequate competition.

This could apply on a service contract where a new or small business is expected to propose and the Government wants to ensure the offeror understands and has bid all of the requirements. In this instance, CAS would apply because the Government asked for additional cost data, even though at a high level.

In Aydin Corporation vs. Widnall, it was held that the submission of informal cost data was considered to be any cost data, even if such data was obtained to check for mistakes or omissions and not to negotiate price.[22] Prior to the recent statutory change, the CAS rule discouraged commercial companies from doing business with the Government because CAS was invoked if the Government asked for any "cost data" beyond price.

[21] Federal Contracts Report, Volume 72, No. 7, page 203.
[22] F.3d 1571 (fed. Cir. 1995)

Implementation

Section 802 of the National Defense Authorization Act for Fiscal Year 2000 streamlined the applicability of CAS such that CAS no longer applies to FFP contracts or subcontracts awarded on the basis of adequate price competition without the submission of certified cost or pricing data. This recommendation is therefore considered implemented.

Findings

Cost-based acquisition often leads to the gathering of substantial amounts of contractor cost data to prepare a Government position from which to negotiate a fair and reasonable price. This technique has long been the norm for sole source acquisitions above $500K. On the other hand, competitive source selections utilize cost information primarily in making determinations of realism, as input to Government cost models for budgeting, and to develop total ownership cost estimates (i.e., R&D, production, and Operating & Support).

In contrast to CBA, PBA does not rely on substantial amounts of contractor cost data to determine a fair and reasonable price. However, unless a contract is a commercial FAR Part 12 award, PBA also does not prohibit asking for some limited cost data. Asking for limited cost data is an industry practice and is used to identify cost drivers as candidates for cost reduction efforts.

The FAR identifies three PBA pricing techniques to be used as the basis of negotiations in a sole source situation – comparison to similar items, comparison to historical data, or parametric estimating.[23] These techniques are not new. The FAR has historically maintained that price analysis should always be conducted in every selection in determining a price to be fair and reasonable. Where cost analysis is conducted, price analysis is used as a sanity check from which additional inquiry might result.[24] Commercial pricing is a subset of PBA in that it uses price information that is readily available in the marketplace. For example, catalog prices; sales data; and warranty, specification, and delivery information.

It is important to recognize that the goal of both price analysis and cost analysis is to form a basis from which to negotiate a fair and reasonable price. FAR Part 15.404-1(a) states that “the objective of proposal analysis is to ensure the final agreed to price is fair and reasonable.” A reasonable price is what prudent and competent buyers would be willing to pay given market conditions, best value choices, and alternatives.

Markets are generally driven by supply and demand. However, with DoD we recognize that the market is often an “artificial” one. In general, we expect that competition will result in reasonable prices, but the nature and extent of the competition is relevant. In our discussion of the 1980’s, source selection strategies, and past performance, we addressed our concerns with competition resulting in fair and reasonable prices. If the supply and demand of the marketplace is working, then prices should be within a relatively tight range. Differences should be attributable to location, efficiency, pricing

[23] FAR 15.404-1(b)(2)
[24] FAR 15.404-1(a)(3)

strategies, and differences in the product.[25] A high confidence that the fair and reasonable range of prices is relatively tight can occur at opposite ends of the cost and pricing spectrum, namely either through submission of certified cost or pricing data (i.e., CBA) or through the conduct of a true competition. As one migrates toward fewer competitors on one end of the spectrum or less cost data on the other, the degree of confidence in the fair and reasonable price range decreases.

The pricing of contract modifications using price analysis is a challenge in itself. We specifically looked at how commercial firms price changes made after a contract is signed. Industry practices vary depending upon many factors, such as the business relationship between buyer and supplier, relative market power of each party and size of the change. Industry is generally less reliant on cost-based pricing than the Government. Often this is due to the "make knowledge" available within industry. Commercial industry representatives attending the Industry Roundtable noted they often use cost analysis to price purchases.[26] This cost analysis is often generated internally and is based on the company's technical expertise in product manufacturing. While the Government attempts something similar in the form of an Independent Government Estimate (IGE), they are not always adequate for price comparison purposes.

Given this discussion, it is evident that using cost or price data is situational and should be determined based on a number of factors. Currently, there are tools available for conducting both cost and price analysis. However, we believe uncertainty exists in determining whether cost data or price data is most appropriate for any given situation. Therefore we have developed a decision tool to aid this process. We also conclude that where comparison or historical data does not exist, it is much more challenging to conduct price analysis. Collecting market research data, and using Independent Government Estimates and value analysis for pricing purposes needs to be considered for expanded use. Furthermore, we need to change the culture from a single point estimate pricing mentality to one where "best value" is key. Last but not least, training materials need to be more detailed with regard to price analysis.

Recommendations

1. Establish a regulatory definition of fair and reasonable price that highlights the situational aspects that may lead to a range of prices.
2. Implement training on price-based pricing techniques.
3. Provide a tool to determine what data (i.e., cost or price data) should be requested to establish a fair and reasonable price.
4. Whenever possible, use value-based pricing to determine price reasonableness.
5. Encourage greater use of price analysis using Independent Government Estimates and parametric estimating models for contract modifications.

[25] Contract Pricing Reference Guide, AFIT/FAI, Volume 1, p.25
[26] "Price-based Acquisition Industry Roundtable", coordinated by Arthur Anderson Government Services, December 15, 1998.

Recommendation 1

Establish a regulatory definition of fair and reasonable price that highlights the situational aspects that may lead to a range of prices.

Discussion

FAR Part 15.402, Pricing Policy; and FAR Part 15.404-1, Proposal Analysis Techniques, both reference the phrase "fair and reasonable price," but neither defines it. There also exists a mindset that fair and reasonable price is one number. In actuality, "fair and reasonable price" is a range of prices and is dependent on situational aspects of the acquisition and the judgement of the contracting officer. Establishing a definition of "fair and reasonable price" that encompasses situational variables will help facilitate a change in the thinking of the acquisition workforce, that is to think in terms of overall best value and not just price as a point estimate. A good example of price as a situational variable is illustrated in some recent Air Force corporate contracts for spares, which contain pricing schedules that are dependent on delivery terms. For example, a 24-hour turnaround of a spare part delivery justifies a price premium, whereas a 30-day turnaround on delivery has a lower price. These types of arrangements are common in the commercial market place.

Implementation

Amend FAR 15.401 to add the following definition of fair and reasonable price.

"A fair and reasonable price

(1) Reflects uncertainties relative to the purchase through use of an appropriate pricing arrangement/contract type (See Part 16);

(2) Considers,
   a. Costs (can be estimated independently or with supplier furnished information),
   b. Supplier's investment,
   c. Type of market, and
   d. Pricing practices and strategies, including terms and conditions, common to the market and the firm;

(3) Affords the supplier an opportunity to make a reasonable profit;

(4) Attracts new suppliers to DoD business;

(5) Represents the overall best value to DoD given the specific acquisition situation and environment under which the purchase is made. For example,
   a. Urgency,
   b. Cost of acquisition lead time,

c. Delivery and other offered terms,
d. Amount of competition,
e. Financing offered,
f. Order quantity,
g. Warranties obtained,
h. Suppliers past performance,
i. Total ownership costs to DoD,
j. Considers benefits, including intangible benefits, to the Government and supplier beyond the instant sale, or
k. Does not exceed the "value" of the product or service to DoD."

Recommendation 2

Implement training on price-based pricing techniques.

Discussion

FAR Part 15.402(a)(3) prescribes that the contracting officer should use every means possible to ascertain a fair and reasonable price before requesting cost or pricing data. Cost or pricing data identified must be obtained unless one of the exceptions in FAR is met or a waiver is obtained. Most waivers have been approved based upon extensive history with the same item.[27] FAR Part 15.404-1(a)(2) prescribes that price analysis shall be used when cost or pricing data is not required. Price analysis is the process of evaluating a price to determine if it is fair and reasonable without evaluating the elements of cost or profit. A process comparing two or more similar items generally accomplishes this. The comparison needs to include, but is not limited to, market conditions, quantity, complexity, location, economics, extent of competition, technology, warranty, delivery, inspection, and schedule in ascertaining that the comparison results in a viable, meaningful "apples-to-apples" comparison.

The traditional techniques of price analysis are discussed in the Contract Pricing Reference Guide.[28] These techniques are:

1. Prices set by law or regulation,
2. Proposed prices received in response to the solicitation,
3. Previously-proposed prices and contract prices for the same or similar end items, if you can establish both the validity of the comparison and the reasonableness of the proposed price,
4. Commercial prices including competitive published price lists, published commodity market prices, similar indexes, and discount or rebate arrangements,
5. Prices obtained through market research for same or similar item,
6. Comparison with Government estimate,

[27] This is the author's general observation from 1998-1999 waiver examples posted to the Defense Acquisition Deskbook; it includes FY97 Harpoon Production , FY98 Adour Engines, Aegis Weapon System, General Electric Global Engine Fighter Engine Contract, C-130H, F-22 EMD Restructure, and DISA Example Buy

[28] Contract Pricing Reference Guide, AFIT/FAI, Volume 1, page I-36.

7. Parametric modeling (yardsticks) done as single correlation with price (e.g., price-based store frontage or price based upon engine thrust), or
8. Parametric modeling done as a complex mathematical model and based upon historically validated data using cost estimating relationships (CERs), multi-variate relationships, algorithms, and algebraic formulas to calculate cost and price. Commercial models are shown in Appendix L.

Given that all these techniques are documented and available, what are the impediments to price-based pricing? We have concluded from events since the introduction of FARA/FASA that the following issues exist. One, there is a perception that Independent Government Estimates may be good enough for establishing a budget, but not finite enough in many cases to use as a stand-alone price analysis technique. Two, there is a lack of easy access to historical data for other programs within and across Services and Agencies for use as comparison data. Three, many buyers are not market experts and the requirements, technical, budgeting, and pricing expertise are functionally separate.

For these issues, we have recommended in another section of this report that a market research center of excellence be established to provide members of the acquisition community with easier access to more historical and market data.

The next set of impediments pertains to the culture. One, price analysis techniques shift the burden of proof to the Government and cause the Government acquisition community more work. The perception is that in an era of downsizing, the emphasis is on techniques that streamline the acquisition workforce's workload and they are therefore, resistant to an idea, which in their opinion will increase their workload. Added to this, is the fact that since many of the large pricing cases are sole source, most of the contract price analysts are more skilled in cost analysis than price analysis techniques. In the "Bringing About Change" section of this report, we do address bringing about a change in culture through regulatory emphasis of price-based techniques as a preference. Another recommendation addresses the need for functional training.

There may be another impediment to wider use of price-based pricing techniques. In reviewing the five-volume set of Contract Pricing Reference Guides and the specific contract pricing techniques described, it is our conclusion that price analysis needs more comprehensive treatment and training. Book I of the Guide, Price Analysis, primarily addresses price analysis in a competitive environment. Other price analysis tools are listed, but not addressed in any detail or with any in-depth examples. Book II, Quantitative Techniques for Contract Pricing, does not distinguish between the use of the tools in a cost- or price-based environment and is clearly a quantitative introduction for pricing specialists. There is some anecdotal evidence that price analysts as quantitative skills specialists are dwindling and not every contract specialist has the desire or skills to perform the quantitative assessment called for in sole source price analysis (i.e., knowledge and expertise with parametric and regression models). In order to focus on developing price analysis skills in the workforce, modifications need to be made to existing "pricing" courses to ensure comprehensive coverage of the available tools. There also needs to be adequate treatment in the Guide with examples.

Implementation

OSD should be tasked to expand the Contract Pricing Reference Guide on Price Analysis to address sole source application and provide examples and case studies. The Quantitative Techniques for Contract Pricing Guide should also include examples and clearly specify when these tools are used as price analysis tools and when they are used as cost analysis tools. We have provided several tools and a case study in Appendix L.

Another approach is to delete the Quantitative Guide as a stand-alone document and instead include the information in the Price Analysis and Cost Analysis Guides as appropriate.

The current price analysis course needs to be reviewed and modified, changing the emphasis to "price-based tools" vice the current focus of both price and cost analysis with the heavy emphasis on cost-based tools. The course should contain decision tools for using price analysis and describe both competitive and non-competitive applications. This "price-based" course should be required for all contracting specialists.

Recommendation 3

Provide a tool to determine what data (i.e., cost or price data) should be requested to establish a fair and reasonable price.

Discussion

The Cost or Pricing Analysis Decision Assistance Tool (COPADAT) was conceived as an outgrowth of this study.[29] This tool is provided to assist in framing the logic behind decisions to conduct cost analysis or price analysis and what kind of data is required to make an informed decision that the settlement price is fair and reasonable. Using the PBA-CBA Continuum as a starting point, we determined that the key variables that drive this decision are type of item, competition, contract type, performance risks, and cost/price history. A model with more than a handful of variables dilutes the contribution each variable makes to the decision. To that end, financing, complexity, and configuration stability are reflected in performance risk.

The model was tested over a four-month period with approximately 30 contract/pricing specialists and modified based on their input. The model is continuing to be tested on a broader audience and will probably be reformatted to a more user-friendly appearance.

The model is a tool that points to a general course of action and not to a specific decision point, necessarily. Like all tools of this nature, the judgement of the user affects the final outcome. The tool along with instructions on its use is located in Appendix L.

[29] COPADAT was developed and tested by Karl Heiland, AFMC/PKPC.

In addition, we provide two decision trees, one for weapon systems/hardware and the other for services. The tool walks the price analyst through a series of questions in order to determine (on the surface) whether a price-based or cost-based approach may be more appropriate. These decision trees are included in Appendix L.

Implementation

We recommend that the COPADAT tool be included in DAU courses, pricing courses, and departmental/Service web sites as appropriate (e.g., the Deskbook).

Recommendation 4

Whenever possible, use value-based pricing to determine price reasonableness.

Discussion

Value-based pricing is determining the price reasonableness of a product or service based on the quantifiable benefit or utility that a customer derives from consuming it, and is independent of the supplier's actual cost of producing or providing the product or service. The concept of value can be used for pricing some contract changes as the following actual cases illustrate. Some of the specific details are notional.

Value-based Pricing
Scenario #1

The supplier was on contract to produce mobile Global Positioning System receivers light enough to be carried by individual soldiers. These receivers were to be powered by batteries having a seven-day life. The short battery life required soldiers to carry an additional two batteries. The supplier proposed changing the batteries to double their useful life. Although significant investment costs were involved, the supplier offered the change only if cost or pricing data was not required. The Government team evaluated the proposed change by comparing the lifecycle costs of continuing with the current battery design to paying for the change. Using a net present value analysis, the costs of the two alternatives were compared. In addition, the investment payback period was analyzed as were ancillary benefits (e.g., because soldiers needed to carry fewer batteries, they could carry more ammunition and because the batteries lasted longer, fewer batteries needed to be carried in inventory resulting in reduced inventory carrying costs). Based on these analyses, the Government waived TINA requirements and paid for the change to achieve the lifecycle savings.

Value-based Pricing
Scenario #2

The supplier was producing an optical reader for use in sorting mail. The optical reader could not decipher handwritten addresses very well – about 60% required manual sorting.

The supplier proposed a change, an upgrade to the optical reader's capability, whereby only 40% of the handwritten addresses would require manual sorting. The supplier proposed to do this for an extra $20 million. Annual savings were estimated at about $40 million each year. This change was accomplished without cost or pricing data.

Some people might question these two pricing approaches and ask, "Did the change actually cost the supplier what the Government paid?" However, asking this question alone ignores several key points. In these two cases, both the Government and supplier achieved favorable results. In addition, by moving to a more commercial-like practice, the Government provided a profit incentive for these firms to continue innovating and improving their products. Only through continued innovation and application of new technologies will DoD achieve the lifecycle savings it needs. By demanding suppliers accept relatively low profit rates, DoD may achieve exactly the opposite. The use of value-based pricing is obviously not appropriate for all contract changes. However, it is an additional tool to use in the right situations, particularly when the product has commercial derivatives.

This approach avoids the need for DoD to obtain cost or pricing data. More importantly, it provides incentive for supplier innovation and technology insertion. Attention is focused on lifecycle costs rather than instant acquisition costs. It is not a "one-size-fits-all solution" and care should be exercised to prevent inappropriate application.

Implementation

Statutory changes are desirable. Implementing regulatory coverage will be required.

Recommendation 5

Encourage greater use of price analysis using Independent Government Estimates and parametric estimating models for contract modifications.

Discussion

The contracting officer is the person who must be comfortable that the price analysis performed is adequate to serve as the basis for determining price reasonableness. If this is achieved, there is no need to obtain and analyze suppliers' cost or pricing data, except for TINA requirements. The use of price analysis, in lieu of cost analysis, should reduce acquisition lead-time.

Implementation

Skills to develop IGEs exist in pockets within the Government, often in those areas where cost estimates are used for budgeting purposes. DoD needs to develop this skill in the contracting, program management, or contract administration offices.

Statutory changes are necessary to allow price analysis alone to be performed for actions subject to the TINA requirements. Implementing regulatory coverage will be required.

Contract Types

Findings

The Government currently employs a range of contract types pursuant to FAR Part 16. These are normally selected based on a number of factors discussed in the FAR, including type and complexity of the requirement and period of performance. Commercial industry primarily uses fixed-price contracts, but focuses on long-term relationships and cost reduction.[30] Commercial industry does not have to be concerned with full and open competition or their vendor's profit rate.

Recommendations

1. USD(AT&L) issue a DoD-wide policy making Fixed-price, Variable Outcome the preferred approach for all Science and Technology (S&T) and risk reduction contracts, and other contracts where a range of plausible outcomes is possible and acceptable.
2. Establish two pilot programs under which each Service and a DoD Agency nominate several programs to use share-in-savings contracts. Strong preference should be given to programs that plan to use share-in-savings contracts to achieve significant TOC reductions. Under one pilot program, the nominated programs would be granted a waiver from "color of money" laws and regulations. The other pilot program would include a program for which "color of money" issues are not relevant.
3. Amend statutory coverage on commercial contracts to allow for time and material line items.
4. Establish an interagency team to explore ways of purchasing supplies and services without resort to Letter Contracts or other Undefinitized Contract Actions (UCAs).

Recommendation 1

USD(AT&L) issue a DoD-wide policy making Fixed-price, Variable Outcome the preferred approach for all Science and Technology (S&T) and risk reduction contracts, and other contracts where a range of plausible outcomes is possible and acceptable.

Discussion

The Fixed-price, Variable Outcome (FPVO) contract depends upon a decision-maker or a decision process (e.g., budget allocation) to determine the value of an acquisition. FPVO can be a useful strategy for fixed-price purchases of engineering services, maintenance, studies, research, risk reduction, and other activities where the procurement is essentially an investment and results other than a well-defined end product are acceptable. One

[30] USD(AR) Industry Roundtable, December 15, 1998.

can think of this strategy as a variant of Cost as an Independent Variable (CAIV). The price is set, but the outcome of the procurement can vary depending upon how many unexpected problems arise, the quality of the people doing the work, the “state of nature”, the amount of investment the seller may be willing to make, and other factors.

As an illustration imagine that you have an aging automobile with several mechanical problems. Your goal is to get as many of the problems fixed as possible, but you only have $500 to spend on repairs. You know that this is not enough to fix everything. You go to a mechanic and describe the symptoms of the problems. You also tell the mechanic that you have a $500 budget limit. You tell him to fix the most critical things first, but not to exceed the $500 limit. You tell him that you may come back and fix the remainder of the problems when you have more money to spend provided that you are satisfied with what he has done. This is a consumer example of FPVO. So how do we extend this to DoD?

This type of strategy is common practice within DoD today, except that the implementation uses cost reimbursable instead of fixed-price contracts. Thus, the implementation carries with it all of the barriers to new entrants and the infrastructure and administration costs that are inherent in cost reimbursable contracts. This is particularly troubling because many of these types of contracts are primary entry points for the new suppliers DoD is trying to attract. Examples include R&D studies, laboratory technology developments, preliminary design and risk reduction efforts, and many service contracts. Virtually every acquisition that has both a fixed budget constraint and a multitude of acceptable outcomes is amenable to a FPVO contract. The FPVO presumes that, within the total amount of funds available, what the contractor actually does is a “best effort” geared toward achieving a mutually agreeable goal. The prevailing use of the cost reimbursable contract instrument for these situations is because many believe that variable outcomes are not compatible with firm-fixed-price arrangements. We believe they can be. How? It is possible, we assert, to implement a FPVO contract within current regulations by requiring a firm deliverable (such as a report) and by describing the work effort in terms of goals or desirable outcomes rather than completed tasks.

A central question about the FPVO contract is how to motivate a contractor to perform? When there is no guarantee of a final product as with a typical firm-fixed-price arrangement, how does DoD preclude the contractor from taking its money and giving little or nothing in return? In many ways the answer to this question is the same regardless of whether DoD awards a firm-fixed-price contract or a cost-reimbursable one.

First, there is an affirmative obligation that the buying office has to monitor progress regardless of contract type. Use of performance-based payments in conjunction with program reviews can provide a vehicle for monitoring contract performance.

Second, the ideal way to implement this strategy is via multiple awards and side-by-side competition. That way each competitor will be motivated to maximize its accomplishments particularly when there is a follow-on program and the accomplishments of the FPVO contract will play a major role in selecting the winner for

the follow-on effort. Even with a sole source award or a single award following from a competitive process, there are performance incentives that the contracting officer can use. These include traditional award fees and, where appropriate, a term-incentive, described in the “Maintaining Competitive Incentives” section of this report.

Third, and perhaps most importantly, is the use of the past performance tool. The FPVO contract should only be used when there is a positive assessment of a contractor’s recent, relevant past performance. That assessment can be as part of a competitive source selection process in which recent, relevant past performance is as high in importance as any other factor. It can also be as part of a single contractor past performance assessment prior to a sole source award. In either event, the past performance assessment must give the buying office a high degree of confidence that the contractor will give the Government good value for the dollars expended. The prospect that a contractor’s performance relative to the buyer’s expectations can dramatically affect future business with DoD (positively or negatively) is a powerful incentive – perhaps more powerful, in some cases, than an immediate profit incentive might be. This prospect does not exist today. However, by implementing our recommendation related to past performance, it will.

Two examples for using the FPVO strategy are included in Appendix M. As this is a relatively new approach, these examples are generally hypothetical, although one is based on a modification of an on-going program.

Implementation

We believe it is possible to implement FPVO strategies today by defining the outcome of an effort as something palpable such as a report or study. However, we do not believe that the strategy is a viable one without also implementing our recommendation on past performance.

Recommendation 2

Establish two pilot programs under which each Service and a DoD Agency nominate several programs to use share-in-savings contracts. Strong preference should be given to programs that plan to use share-in-savings contracts to achieve significant TOC reductions. Under one pilot program, the nominated programs would be granted a waiver from "color of money" laws and regulations. The other pilot program would include a program for which “color of money” issues are not relevant.

Discussion

Share-in-savings contracting requires the Government to identify a pool of potential benefits it may achieve through the successful implementation of a contractor's efforts. Under a share-in-savings contract, the contractor is paid out of that benefits pool a proportion of the benefits the contract delivers to the Government. The proportion to be

paid is negotiated between the Government and the contractor. The higher the value of actual benefits to the Government, the more the contractor is paid. If no benefits are achieved, the contractor may not be paid at all. The Government pays only for results.

Share-in-savings contracting may be appropriate any time a contractor's activities generate benefits for the Government. Program stability should be a criterion for using share-in-savings contracts. We believe that DoD's current thrust to reduce total ownership cost (TOC) on its programs will provide many opportunities where share-in-savings contracts will be an ideal contractual vehicle through which to achieve the desired TOC reduction objectives. Examples include incorporation of an engineering change that greatly enhances reliability, and modernization of business processes such as logistics, maintenance, or the disposal of excess property, where more efficient business processes consume fewer DoD resources or generate more resources for DoD. Share-in-savings contracts are also appropriate for a wide range of contracts involving business process reengineering of in-house operations. Usually such initiatives involve information technology-based solutions. An example is the implementation of an enterprise resource planning (ERP) tool, where the savings are a reduction in internal operating costs.

Share-in-savings contracting is a price-based approach because payments to the contractor are based on benefits achieved by the Government, not contractor costs. No audits of contractor costs will occur. Indeed, contractor costs are not relevant to the payments made to the contractor. Only benefits achieved for the Government provide a basis for payment. Often, share-in-savings contracts will be long-term in nature. Up-front investments by the contractor will generate savings downstream, such that the contractor incurs costs not reimbursed in the early years of the contract but is paid using the benefits generated in the later years of the contract.

It is important to stress that it would violate the intent of share-in-savings to terminate a contract to avoid paying savings in excess of the original estimates. What happens in the event of a termination should be addressed as part of the share-in-savings contract provisions. This is even more critical when the contractor is making an up-front investment using its own funds.

The benefit of share-in-savings contracts is that there is a very powerful incentive for contractors to perform well. DoD pays for performance. It is a tool to rapidly insert TOC reduction initiatives with payment occurring only when DoD begins to realize the benefits. These contracts can also be used to avoid the risk associated with some level-of-effort contracts where effort is paid for, but the expected benefits do not occur. Finally, commercial companies will be encouraged to bid on contracts because this contract type will not invoke many of the business system requirements unique to Government contracting.

DoD may risk being perceived as having "overpaid" a contractor where, if highly successful in achieving the anticipated results, significant earnings accrue.

Similarly, in share-in-savings contracts where the contractor invests in the early years with payments expected in future years, assuming successful performance, DoD may risk being perceived as overpaying in these future years. Finally, small businesses may be reluctant to bid on these riskier contracts and may have difficulty getting the financing to fund any up-front investment required. However, a share-in-savings contract variation discussed below will mitigate this issue for small businesses.

Share-in-savings contracts can take a variety of forms. In some, the contractor's payment may be based entirely on receiving a proportion of the benefits that accrue to the Government. If no benefits result, the contractor is paid nothing. Alternatively, the contractor may be paid a fixed price plus a percentage of the savings. In this case, the reduced risk to the contractor will result in a lower percentage of the savings being shared with the contractor. This latter alternative may be more appropriate for small businesses so they are not required to make significant investments up front in anticipation of a revenue stream in later years.

The Government must have a cost baseline, and a methodology for calculating improvements, against which benefits can be calculated. It is crucial to note that the cost baseline and methodology need not be perfect, as long as they are specified in advance when contractors bid on the requirement. Examples include a comparison between a program's system to track TOC reductions from an established TOC baseline or in-house cost of performance to the projected reduced cost arising from a contractor's business process reengineering efforts. Although the Government may not know all of its "true" costs (e.g., exactly how to deal with all indirect costs), as long as it expresses, in advance, the methodology it will use for calculating costs both before and after contract performance, the comparison is "apples-to-apples" (even if neither "apple" is perfect). Often, the Government may need to conduct a study to establish its baseline before a share-in-savings solicitation is released. In this manner, contractors will understand the Government’s expectations and the methodology to be used to determine how much the contractor will be paid.

The amount of savings to be shared must be negotiated. From the Government’s perspective, it will be better if this is done in a competitive environment, where one of the elements in an offeror's proposal is the percentage of benefits it seeks. In a sole source environment, the Government will need to conduct research regarding expected returns on investment for a similar project, typical share-in-savings amounts for similar efforts, etc., in order to determine a fair and reasonable amount of savings to share with the contractor. This analysis will be documented in the business clearance memoranda.

Share-in-savings contracts that involve up-front investments that generate payments to contractors in future years will require termination liabilities in the event of premature cancellation. A July 1998 Office of Management and Budget (OMB) memorandum, regarding energy savings contracts, states that up-front funding of termination liabilities in share-in-savings contracts is not required.

DoD programs and activities that generate savings through use of share-in-savings contracts should have some ability to use those savings to benefit the activity or program that generates those savings. The willingness to pursue TOC reduction or business process reengineering initiatives will be degraded unless DoD provides a means for these programs and activities to keep a portion of the savings to fund weapons modernization or other program objectives in their cognizant programs or activities.

The most current examples of share-in-savings contracts are the Department of Energy's "Super Energy Savings Performance Contracts".[31] Under these master contracts, commercial firms invest in energy-saving measures at federal agencies and split the accrued energy savings with those agencies. DoD has also made extensive use of share-in-savings contracts via its Energy Savings Performance contracts.

Appendix M includes two hypothetical examples that illustrate the use of share-in-savings contracts.

Implementation

The Clinger-Cohen Act includes language urging the Government to experiment with the use of share-in-savings contracting. Depending on fiscal considerations, statutory or regulatory changes may not be required to use this form of contract. However, statutory and regulatory relief is required in some cases to address "color of money" issues. This relief is needed in instances where savings may be generated in an account other than the account out of which payments to the contractors are to be made. Also, in the case of a share-in-savings contract where the contractor provides up-front investment, payments in future years may be paid out of an account different from the account that the Government would have used if it had made the up-front investment instead of the contractor making the investment.

In other instances, there is no “color of money” issue. Examples include programs funded with working capital or foreign military sales funds or programs where the savings accrue in the same account that will be used to pay the contractor its share of those savings. Also, if the contract is a long-term one, with savings, and hence payments to the contractor in future years, there should be time to redirect the appropriations among accounts as part of the normal budget preparation cycle. Finally, some projects may be small enough to be below reprogramming thresholds and therefore, it is relatively easy to address the “color of money” issues through activity reprogramming.

Recommendation 3

Amend statutory coverage to allow time and material line items on commercial contracts.

[31] “DOE Sets Deal to Cut Energy Costs”, The Washington Post, March 3, 1999.

Discussion

Section 8002(d) of the Federal Acquisition Streamlining Act (FASA) of 1994 (Public Law 103-355) states, in part, that: "The Federal Acquisition Regulation shall include, for acquisition of Commercial items – (1) a requirement that firm, fixed-price contracts or fixed-price with economic price adjustment contracts be used to the maximum extent practicable and (2) a prohibition on use of cost-type contracts." FAR Part 12.207 implements this legislation by authorizing the use of only firm-fixed-price contracts or fixed-price with economic price adjustment (EPA) contracts for the acquisition of commercial items. The use of time and material (T&M) or labor-hour contracts is prevalent throughout the commercial aircraft maintenance and overhaul industry. The Government cannot use T&M or labor-hour contracts for its aircraft maintenance and overhaul commercial work because such contracts are not FFP or fixed-price with EPA.

Prices in T&M contracts are fixed-labor rates based on market prices and negotiated hours, with materials reimbursed based on invoices. Restricting the Government to using only fixed-price contracts is not the best business approach for all commercial purchases. The use of T&M or labor-hour contracting in appropriate situations provides a method for both the contractor and the Government to agree on reasonable prices for the risks involved.

The nature of aircraft repair is that not all problems will be identified prior to aircraft induction. There are always repairs that will be unknown at that time. This work is purchased as "over and above" (O&A) effort. Commercial contracts often authorize this work when the need is discovered based upon a negotiated amount of hours and a fixed-labor hour rate with materials billed at invoice, plus a handling fee and profit in some instances.

In order to validate this assertion, one Air Force Air Logistics Center conducted a survey of six commercial airlines/manufacturers and every one of them used a T&M type contract for O&A effort. As a matter of record, the director of contracting of one of these companies sent an email to the Director of Commercial Item Streamlining at OSD expressing concern over the fact that T&M line items are prohibited on commercial contracts. In addition, a recent Air Force study of DD350 data revealed that a recurring reason for not using FAR Part 12 was the prohibition against T&M line items. Currently for O&A work on commercial items, buyers have three choices: 1) write a separate non-FAR Part 12 contract for the time and materials work; 2) write a hybrid FAR Part 12 and Part 15 contract; or 3) fix price the O&A work on a FAR Part 12 contract.

The intent of the law is that the commercial work be bought using the commercial practice, in this case, time and materials for O&A work. There is no issue about the work being commercial in nature. Writing separate or hybrid-contracts goes against all streamlining initiatives, wastes resources, and increases cycle time. Writing fixed-price contracts for O&A work, forces pricing for "worst case" scenarios since the repairs are unknown at award. The result is that the Government may pay too much.

Implementation

A statutory change will be required that allows time and material line items on commercial contracts.

Recommendation 4

Establish an interagency team to explore ways of purchasing supplies and services without resorting to Letter Contracts or other undefinitized contract actions (UCAs).

Discussion

An undefinitized contract action, such as a letter contract, authorizes a supplier to begin manufacturing supplies or performing services prior to agreement on all contract terms such as price or delivery schedule. UCAs are used when DoD's interests demand that a supplier be given a binding commitment so that work can start immediately (i.e., when there is not enough time to negotiate a definitive contract to satisfy the urgent requirement). The Defense FAR Supplement (DFARS) puts limitations on the use of UCAs including a goal for timely definitization.

Despite the regulatory limitations placed on using UCAs the approach is prevalent. In FY 98, DoD awarded over 1,300 letter contracts valued at about $5.6 billion.[32] Other types of UCAs (e.g., provisioned items orders, unpriced delivery orders) are also common. Table 2, which includes data provided by the Defense Contract Management Command (DCMC), illustrates the magnitude of this issue. Note that this information reflects only those UCAs delegated to DCMC for definitization, (i.e., actions retained by the buying offices for in-house definitization are not included in the figures below).

Type of UCA	On-hand #	On-hand ($M)
Unpriced Delivery Orders	1,683	253
Provisioned Item Order	298	204
Letter Contracts	82	28
	2,063	485

Table 2. DCMC Workload Data (May 1999)

The DFARS requires that UCAs contain a definitization schedule that provides for definitization within 180 days after issuance of the UCA or 180 days after receipt of the suppliers qualifying definitization proposal. Six months is a long time. The DFARS does not require definitization within that timeframe if the supplier has not yet submitted its definitization proposal. Indeed, the argument can be made that there is no mandatory definitization deadline – all that is required is a schedule for doing so.

[32] DD 350 database data provided by Litton/TASC.

Notwithstanding that UCAs are high transaction cost instruments for the Department, the issue for price-based acquisition is that these actions are generally priced on the basis of incurred costs, very much like a cost-type contract. Further, the use of UCAs, or anything like them, is rare in commercial transactions. Commercial firms settle terms and prices before awarding contracts. Arthur Andersen's review did not find a single example of a company using this type of contract.[33]

The British Ministry of Defense (MoD) used to rely heavily on UCAs. About five years ago, the MoD changed this practice with a concept termed "NAPNOC" meaning "No Acceptable Price, No Contract." According to MoD representatives, no significant changes were made in the acquisition process to facilitate this initiative. It just became extremely difficult to obtain the high level approvals necessary to issue UCAs. When the initiative was unveiled, many in the acquisition community believed it impossible to do business without the use of UCAs. Now, few in that same community see a need to issue contracts without definite terms. Of course, UCAs are issued on occasion, but according to the British MoD representatives they are "rare" events.

There is already regulatory language (based on statute) that discourages the use of UCAs. We had considered recommending that the approval authority to issue UCAs be elevated to the Service Acquisition Executives one year after notification of this change. The intent was not to prohibit the use of UCAs in all cases; UCAs should be allowed, but only when absolutely required. The one year period would have afforded contracting activities the opportunity to develop alternate ways of doing business that preclude the necessity to use UCAs. And we believed that the contracting activities would have been able to do so (as did the British MoD).

However, that solution was ultimately considered too sweeping. Reliance upon the use of UCAs varies tremendously across the different buying activities. For this reason, we are recommending that the Department establish an interagency team to explore ways of purchasing supplies and services without resort to UCAs.

We also note that many UCAs are issued simply because there is not enough time for the supplier to assemble and submit, and the contracting officer to analyze, cost or pricing data. If DoD could price efforts with price analysis using IGEs, and use the TINA waiver authority, administrative lead-time can be reduced and the need for issuance of a UCA eliminated in many cases.

Implementation

Implementation consists primarily of tasking a component to assemble and lead the interagency team. The results of the team's work should be captured in future training packages.

[33] "World Class Commercial Buying Practices Review for Defense Contract Management Command," Arthur Anderson Government Services, September 17, 1998.

“Sustaining the PBA Environment after Award”

Sustaining the PBA Environment after Contract Award

Financing

Terminations for Convenience

Contract Modifications and Changes

Value Engineering

Program Progress

Government Furnished Property

Waivers and Deviations

Wage Determinations

Cancellation Charges for Multi-year Procurements

Claims

What do the recommendations included in this group have in common? They all focus on post-award activities and DoD's ability to sustain a PBA environment through the life of the acquisition.

In many ways, sustaining PBA post-award is a more formidable challenge than using a PBA approach during the initial stages of the acquisition. It is critical to consider post-award activities during the up-front planning of any acquisition or an otherwise PBA approach can revert back to CBA after contract award.

Our emphasis is on changing current processes so that post-award activities can be performed without obtaining supplier cost or pricing data. Several recommendations evaluate the practicality of pricing post-award activities up-front, as an extension of the negotiation process.

We also discuss the need to investigate whether Earned Value Management (EVM) information, if a contract requirement, can be used to support post-award activities such as financing payments or negotiations of contract modifications.

One recommendation acknowledges the needs of the cost community to obtain historical cost data for some very specific purposes. However, we strongly recommend that the cost community re-evaluate when and how much cost data should be requested.

We close this group recommending, where possible, the use of Alternative Disputes Resolution (ADR) to settle claims in a timely manner and without cost or pricing data.

Financing

Findings

Financing of a supplier is rare in commercial transactions. Other options such as buying commitments are preferable. When financing is offered, it is generally in the form of loans or advance payments. Loan or equity options come with audit rights.[34]

So, why offer financing to our suppliers? Per the FAR, the Government offers financing to expedite the performance of essential contracts.[35] This means to:

- Reduce contract costs by avoiding financing "at unreasonable terms", and
- Promote competition and level the "playing field" by not treating the need for contract financing as a handicap for contract award.

Progress payments were first instituted in the 1920's to assist the fledging aircraft industry that was unable to secure loans at reasonable rates. Today, this is not a problem. DoD has a lower cost of capital than its suppliers do and it can be argued that by providing financing, DoD receives more favorable prices than it would if suppliers had to obtain financing from private sources. Accepting this argument translates to net savings to DoD of roughly, but very conservatively, $1 billion each year.[36] Therefore, we rejected the idea of eliminating DoD financing entirely.

DoD currently has the following forms of contract financing available:

- Advance payments,
- Progress payments based on cost,
- Partial payments for accepted supplies and services (but usually treated as a method of payment and not a method of financing),
- Progress payments based on a percentage or stage of completion,
- Performance-based payments, and
- Commercial financing.[37]

Table 3 shows the relative frequency with which DoD in FY98 used the different types of financing.[38]

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[34] "World Class Commercial Buying Practices Review for Defense Contract Management Command," Arthur Anderson Government Services, September 17, 1998, p. 17.
[32] FAR 32.104(a).
[36] The DD350 data provided by Litton/TASC showed that about $28 billion was financed in FY 98. Application of the difference between the Prime Rate and the interest rate payable on Treasury Bills to that amount yields about $1 billion.
[37] FAR 32.102, "Description of Contract Financing Methods," (current through FAC 97-9).
[38] DD350 Database data provided by Litton/TASC.

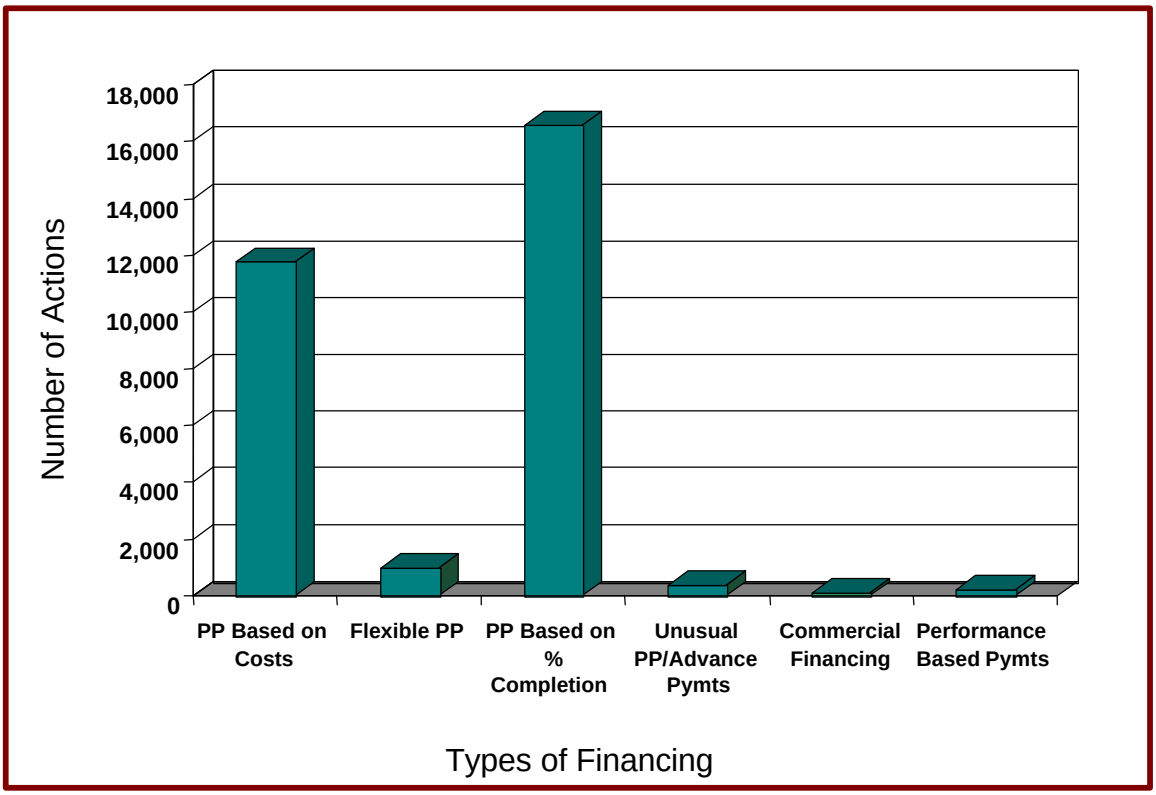

Table 3. Number of Actions by Types of Financing

Progress payments based on a percentage or stage of completion are the most common form of financing (i.e., used in 55% of the FY 98 actions for which financing was offered). This type of financing is used predominantly in construction and shipbuilding. Progress payments based on cost were the second most common type of financing (i.e., used in 39% of the actions). As readily seen in Table 3 no other form of financing was used regularly. Performance-based payments were employed in less than 1% of the cases (i.e., only 216 of the 29,930 actions were financed in that way).

Looking at the relative frequency of the type of financing employed in FY 98 for DoD purchases based upon the amount of dollars financed tells a different story. Refer to Table 4.[39]

[39] DD 350 Database data provided by Litton/TASC.

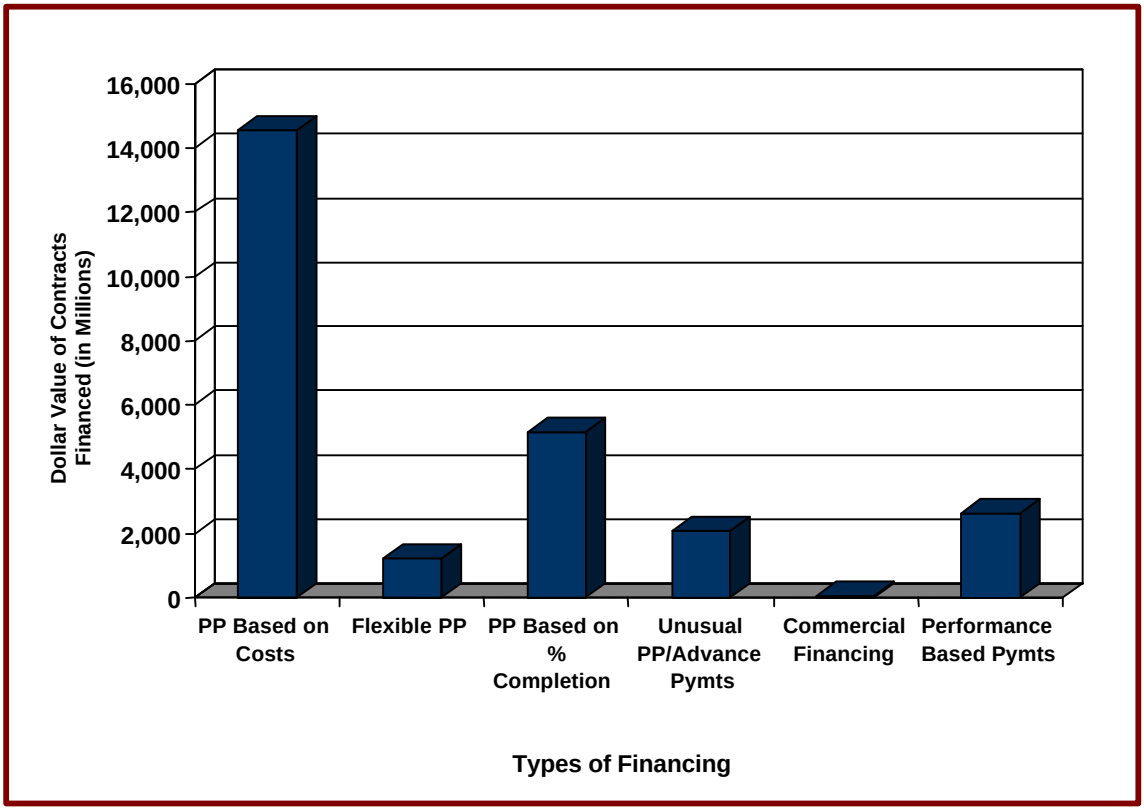

Table 4. Value of Contracts by Types of Financing

Progress payments based on cost are by far the most common form of financing (i.e., used for 57% of the total dollars financed). This form of financing partially reimburses suppliers for costs as they are incurred. Since DoD must verify the costs have actually been incurred, this type of financing requires a lot of audit and administrative effort. Progress payments based on cost require that a supplier fully open its books and records to DoD.

Performance-based payments, used less than 1% of the time, accounted for 10% of the dollars financed. Since this form of financing is best suited to large weapon systems contracts, it is not surprising that it is used so infrequently. The fact that it accounts for 10% of the dollars financed is encouraging given that, although favored by regulation, it is a relatively new financing option.

We evaluated a number of different solutions (i.e., ways to finance suppliers that require less administrative and audit effort). A few of the alternatives considered, but not recommended for adoption, warrant some discussion.

- Use only existing price-based methods (i.e., financing methods that are not cost-based such as Commercial Item Purchase Financing and Performance-based Payments). This alternative would eliminate the use of progress payments based upon incurred costs. This alternative was rejected primarily because progress payments based on cost are so prevalent today, widely understood, and automated systems exist to manage them. So, rather than eliminate this form of financing outright, we believe that for reasons of practicality, it is better to minimize their use.

Progress payments will continue to be appropriate during the transitional phase of moving to a new supplier financing method. However, once the new form of financing described in Recommendation 2 is established, the use of progress payments based upon incurred costs should be greatly curtailed by changes to the DFARS.

- Establish a new, separate organization ("DoddieMae") to provide low-interest loans for DoD (or Federal) contracts. This organization would have operated much like FannieMae for home loans and SallieMae for education loans. This idea would simply change the players involved without any significant gain – and would probably result in a net loss since investors would likely demand a greater return on Defense supplier loans than treasury bills.

In addition to evaluating different financing options, we also discussed the opportunity that new technology provides in simplifying and streamlining the payment process. While the Defense Finance and Accounting Service (DFAS) has undertaken significant efforts towards paperless contracting, there are more efficiencies that can be subsequently achieved through shared or integrated databases. The pace of technological change allows pursuit of paperless processes that were not technically feasible in the past. For example, a Smart Card, if made available to the Program Manager, Contracting Officer, and Disbursing Office, could be used to transmit approval for payment from the Program Manager and Contracting Officer to the Disbursing Officer under a performance-based payment contract with no exchange of paper documents. For our recommendations to be most efficiently applied, additional technology applications for paperless contract payments are required.

Recommendations

1. Increase the use of the existing price-based method, specifically performance-based payments, for larger contracts by allowing financing payments prior to the first payment event.
2. Create a new form of financing, price-based financing, for use on low dollar value contracts (those priced at $10 million or less) and larger follow-on or routine purchases.

Recommendation 1

Increase the use of existing price-based methods, specifically performance-based payments, for larger contracts by allowing financing payments prior to the first payment event.

Discussion

This recommendation further encourages the use of the Department's best price-based method for large contracts for military (as opposed to commercial) items. The one improvement recommended is the ability to make advance payments with adequate

security (without the contracting officer having to obtain high level approval). The ability to make advance payments is considered necessary with performance-based payment because the first payment event or milestone is often well after contract award. A primary reason for the continued use of progress payments in acquisitions that could (or should) be financed with performance-based payments is the negative effect on suppliers' cash flow due to the elapsed time from when work is begun to the first payment event. This recommendation offers that financing be extended for that period of time. The recommendation does not necessarily promote up-front payments prior to commencement of the work. Its focus is on recognizing that suppliers often have substantial expenditures prior to the first payment event. These expenditures can be estimated prospectively and a financing schedule built into the contract to cover this initial period of performance. This slight change should promote the use of this financing method.

There are many advantages to this recommendation:

- Administrative efforts and associated costs for the Department and the supplier are reduced from what would have been required using progress payments based on cost,
- These initial payments based upon a validated expenditure profile are in keeping with the philosophy that financing should be need-based and supported with adequate security,
- When contractors need up-front financing, they will not have to obtain it at higher interest rates that can result in higher contract prices,
- Small businesses in need of up-front financing will be viable competitors, and
- The approach is beneficial to all businesses, particularly small ones.

To protect the Department, we suggest that adequate security be obtained for these initial financing payments. However, we recommend that this security be in the form of the supplier’s solid record of past performance coupled with a sound financial profile. The initial payment(s), while likely large in an absolute dollar sense, will normally be relatively immaterial in relation to the amount of the entire contract. Since performance-based payments are best suited to large contracts, any additional risk assumed by the Department in offering these initial financing payments on such contracts is insignificant.

Implementation

An amendment to 10 U.S.C. 2307 and implementing regulatory changes will be needed to permit initial payments under contracts financed with performance-based payments. This particular legislative change may not be too difficult to obtain since it is similar to advance commercial payments.

Recommendation 2

Create a new form of financing, price-based financing, for use on low dollar value contracts (those priced at $10 million or less) and larger follow-on or routine purchases.

Discussion

The use of price-based financing is intended to structure financing payments that are based on a realistic forecast of the financing needs for the contract, even though actual costs can vary from the forecast. Prospective suppliers should be required as necessary to submit expenditure forecasts showing anticipated cash flow on the contract and the supplier's investment. DoD will make regular payments at predetermined points based on the supplier's expenditure forecast (% by month) x the contract price x some regulatory percentage (similar to progress payment rates) so that the contractor has some investment during contract performance. The payments will be made according to the schedule in the contract without the need for the supplier to specifically request each payment. DoD will obtain adequate security commensurate with the contract price, supplier's past performance, and financial profile. Periodically, based on risk assessment, the contracting officer may review the supplier's progress on the contract to determine whether the financing payments should be reduced or suspended.

We initially thought this streamlined approach would be best suited for small dollar value contracts. As seen in Table 5, about 98% of the number of the contracts and modifications with financing in the form of progress payments based upon costs were valued at less than $10 million.[40]

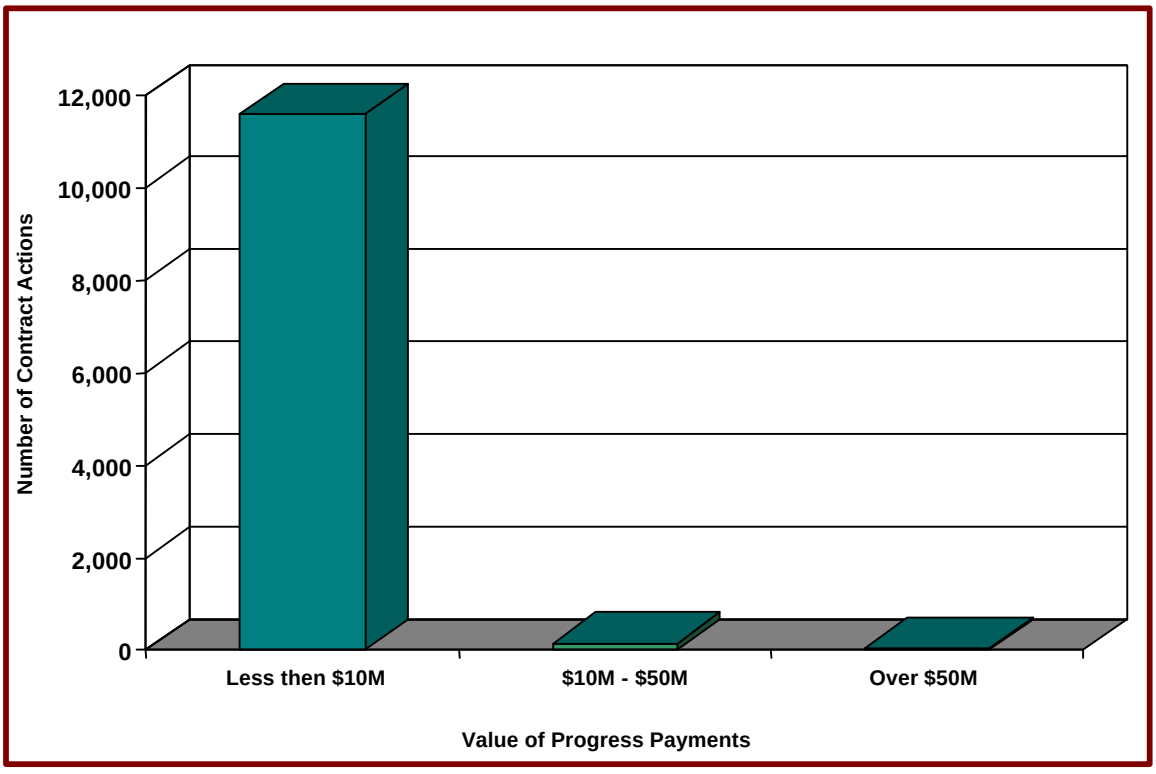

Table 5. Number of Contract Actions with Progress Payments

[40] DD 350 Database data provided by Litton/TASC.

Table 6 shows the distribution of the value of the contract actions financed with progress payments. In this case, roughly half of the total dollar value of the contracts and modifications with this type of financing was valued at less than $10 million.[41] The $10M threshold included in the recommendation was selected based on this data.

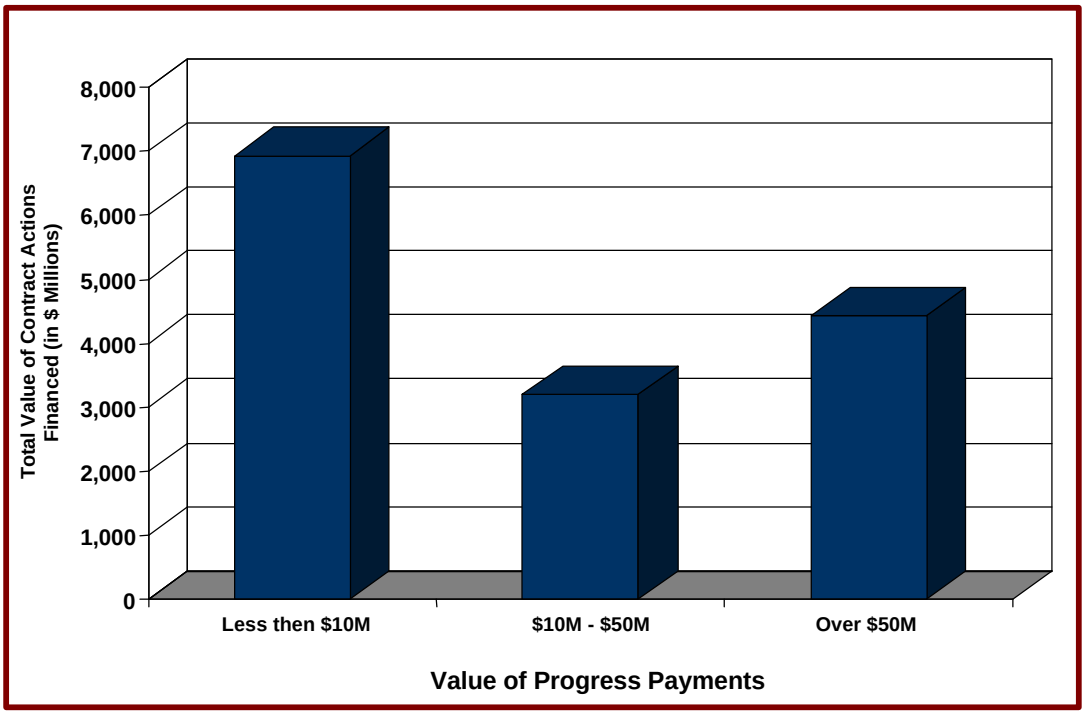

Table 6. Distribution of Progress Payments Based on Cost

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After some discussion, it became clear that dollar value alone is not the only basis for using this financing option. For example, expenditure profiles for follow-on production of major weapon systems should normally be sufficiently reliable to use this approach. We recommend this new approach be used for both lower dollar value contracts as well as those for which there is little performance risk and realistic expenditure profiles can be developed. (Of course, it is not our intention that other forms of financing, particularly performance-based payments be precluded in these situations.)

There are numerous advantages with this approach. First and foremost, this type of financing will be easy to administer. As no proprietary cost information is required from the supplier, this type of financing may well provide an incentive for attracting commercial suppliers to do business with the Department. The payments will be fairly close to what would have been paid under progress payments. Contract prices will not be inflated due to the necessity to obtain outside financing at higher interest rates. Finally, the approach is advantageous to small businesses that have traditionally been unable to take full advantage of progress payments based on cost for lack of acceptable labor accounting

[41] DD 350 Database data provided by Litton/TASC.

systems. A similar approach was used some years ago on Boeing's Navigator Trainer and it reportedly worked well.

Implementation

It is important that automated payment systems be able to accommodate this new type of payment before it is introduced or very soon thereafter. Since DFAS is currently designing its future systems, now is a good time to add this functionality to the requirements. Obviously there will be infrastructure savings at DCMC and the Defense Contract Audit Agency (DCAA) as a result of implementing this recommendation. However, the extent of these savings needs to be determined.

An amendment to 10 U.S.C. 2307 is required to create this new form of financing. The statute will need to address potential problems with financing payments in excess of incurred costs (that might appear to be advance payments) and security. A draft legislative proposal for this recommendation is included in Attachment F.

An important part of this new approach is that the supplier need not request a financing payment each time one is due since it is already provided for in the contract. The fact that the contract provides for such payments should suffice to allow the payment office to make such payments. This may require a statutory or regulatory change. 31 U.S.C. 3325 requires that payments be made only upon receipt of a certified voucher. Treasury regulations have expanded the term voucher to include vendors' invoices, bills, or statements of account. This issue needs to be researched further upon approval of this recommendation. The draft legislative proposal for this recommendation does not address this specific issue. In addition to the statutory change, implementing regulatory coverage will be required.

Terminations for Convenience

Findings

The purpose of DoD's Termination for Convenience Clause and process is to provide fair compensation to contractors when the Government terminates a contract for its convenience. The FAR policy states that settlement should compensate the contractor fairly for the work done and the preparations made for the terminated portions of the contract, including a reasonable allowance for profit. Cost and accounting data may be guides, but are not required measures, for ascertaining fair compensation. The FAR also encourages "no cost" settlements when the Government and contractor agree.

For commercial items, the Government pays the percentage of contract price reflecting the percentage of the work performed plus reasonable charges resulting from the termination. For everything else, DoD requires contractors to provide and certify settlement proposals.

Terminations for convenience take a long time to settle – on average about 450 days from the notice of termination.[42] There is no significant difference in the cycle time regardless of the dollar value.

Most terminations are of a relatively small dollar amount as seen in Table 7. About 42% of the terminations currently being worked by DCMC are valued at less than $5K, about 75% are less than $100K, and about 86% are less than $500K.

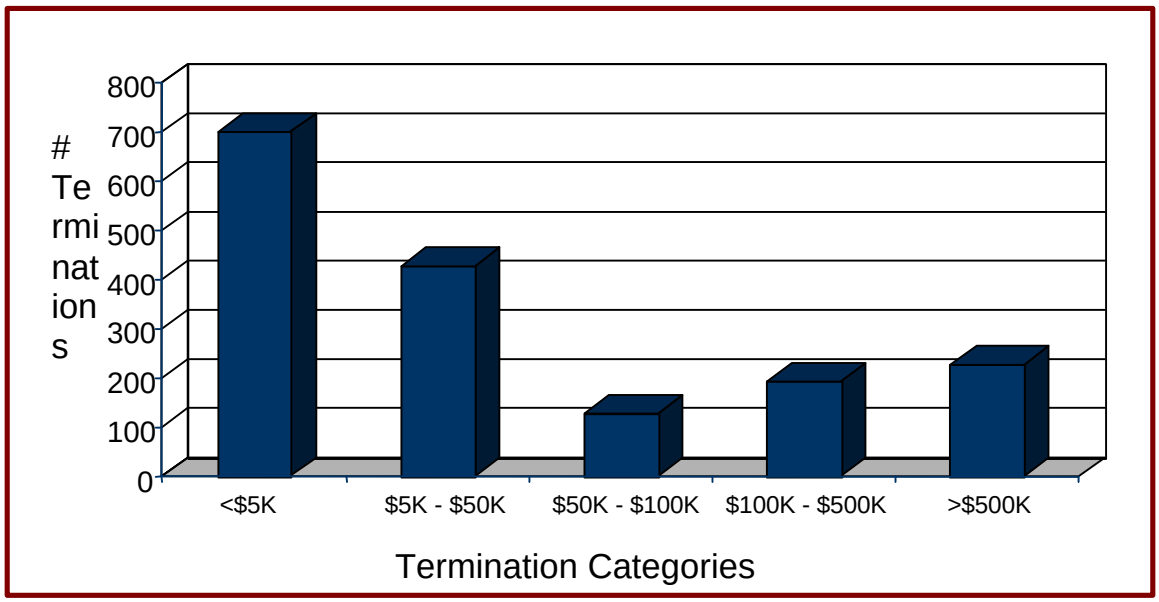

Table 7. Number of Termination Actions by Dollar Amount

[42] DCMC internal performance data.

A look at the total dollar value of the termination actions on-hand by the same stratification reveals a similar, but even more pronounced, pattern. All of the terminations valued at under $1 million (i.e., over 99% of the total number, account for less than 1% of the dollar value). In fact, the 1,256 terminations valued at less than $100K each, representing about 75% of DCMC's termination docket backlog, amount to less than $19 million in aggregate as seen in Table 8.

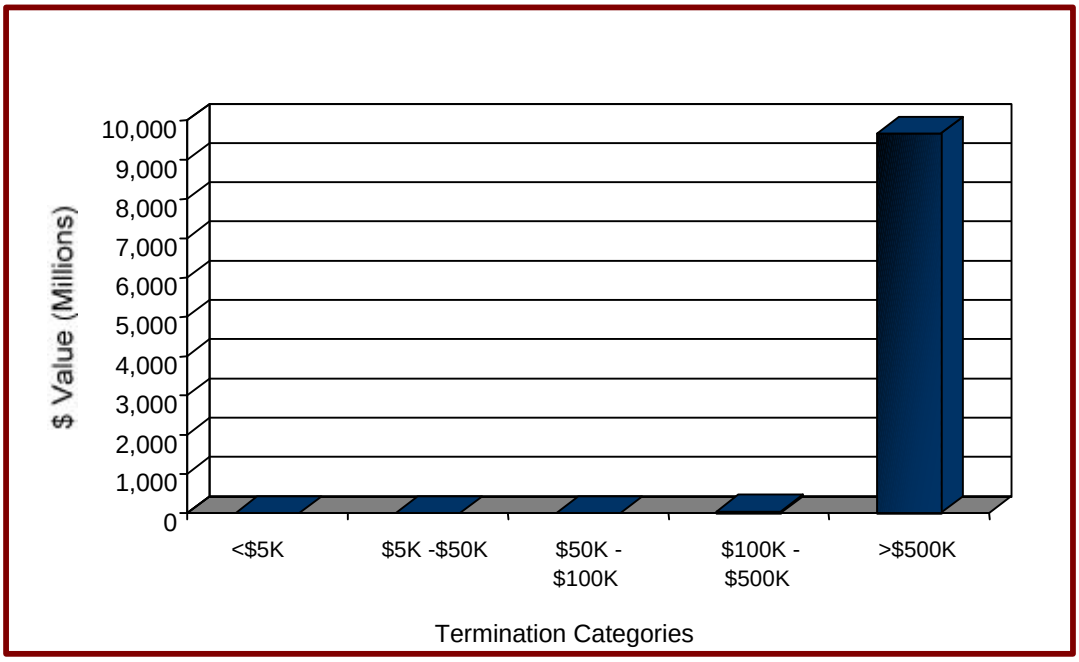

Table 8. Value of Terminations by Category

We believe that low dollar value terminations for convenience are a prime area of opportunity.

Industry, at least large firms, commonly include a Termination for Convenience Clause in their contracts with incurred cost audit rights to facilitate the settlement process. We understand they rarely use the audit provision. At the Industry Roundtable a representative from a large commercial firm remarked that his company would not audit a supplier that it ever wanted to do business with again.[43]

We also suggest retaining the existing Termination for Convenience Clause for large contracts that will not use performance-based payments. In these cases, the existing Clause provides greater assurance that the supplier is paid only what is "fair." The process is slow and consumes extensive audit and negotiation resources but these contracts represent only a fraction of the termination for convenience universe.

[43] "Price Based Acquisition Industry Roundtable", coordinated by Arthur Anderson Government Services, December 15, 1998.

Recommendations

1. Create a new termination clause, similar to the termination clause used in contracts for commercial items (52.212-4), for use in smaller contracts and partial terminations of larger contracts (i.e., those valued at less than $100K).
2. For larger contracts for noncommercial items, establish a termination schedule up-front (i.e., establish certain milestones and specify the termination charges applicable at each).

Recommendation 1

Create a new termination clause, similar to the termination clause used in contracts for commercial items (52.212-4), for use in smaller contracts and partial terminations of larger contracts (i.e., those valued at less than $100K).

Discussion

Under this new clause, the Department would pay the percentage of the contract price reflecting the percentage of the work performed prior to termination notice plus reasonable charges that resulted from the termination. A $100K threshold appears reasonable based on the information presented above. The advantages of this approach include that no cost data is necessarily required, infrastructure savings, and improved cycle time. It should not be difficult to judge the success of this new approach by assessing number of days to negotiate settlements, infrastructure savings, etc. We recognize that negotiation will still be necessary and that it will be difficult to agree on the percentage of the work completed in some cases.

This new clause will be used for partial terminations (not exceeding $100K) of larger contracts as well as for contracts valued at or below $100K. So, larger contracts will include two termination procedures – one for partial terminations below $100K and another (whether one of the existing termination clauses or the termination liability schedule discussed in Recommendation 2 below) for larger partial or full terminations.

Implementation

An amendment to FAR Part 49 will be required.

Recommendation 2

For larger contracts for noncommercial items, establish a termination schedule up-front (i.e., establish certain milestones and specify the termination charges applicable at each).

Discussion

This recommendation is most applicable to large contracts financed with performance-based payments. If the payment events or milestones contained in such contracts equate to decision points, then this information can be of great help in making that decision. (Ideally, each milestone would have both a payment amount and termination amount associated with it.) Given the time already invested for establishing payment events under performance-based payments, this added negotiable factor (termination charges) probably will not have any significant impact on procurement administrative lead-time. The advantages of this approach include: 1) no additional cost data is necessarily required to settle the termination, 2) infrastructure savings, and 3) improved cycle time. The one disadvantage is that it complicates pre-award actions to some degree. However, since we did not recommend that use of this approach be mandatory, should negotiation stall over this point, a traditional termination clause could be used instead.

Implementation

An amendment to FAR Part 49 will be required.

Findings

On contracts for major weapon systems, it is not uncommon for hundreds of modifications to be issued after contract award. Although many modifications are administrative in nature and do not require pricing, many others require the negotiation of a price. For example, in FY 98 DoD awarded about 62,000 definitive contracts and issued about 7,400 change orders, valued at about $4.4 billion.[44] DoD needs to find ways to minimize the number of contract changes after award. The advantages would include lower product costs, quicker product delivery, better product quality, and reduced DoD infrastructure costs. While not a formal recommendation, it is suggested that DoD conduct a study of the cost/schedule/quality implications of changes during design and production. However, the issue before us was simply how to price those changes without complete dependence upon supplier furnished cost information (or cost or pricing data).

Contract modifications are subject to the same TINA rules as basic contract awards. This means that contract changes, even if the basic contract was awarded on a price basis, (e.g., on the basis of adequate price competition or sealed bidding), the modification may require cost-based pricing if the change exceeds the TINA threshold. Other contract terms, such as the Changes Clause (FAR 52.243-1) and the Pricing of Contract Modifications Clause (DFARS 252.243-7001) bring the cost principles to bear on contracts to which they did not previously apply.

Contracts for other than commercial items awarded without adequate price competition generally require initial compliance with the TINA. Finding ways to price modifications to these contracts without reliance upon the supplier's internal cost information should allow DoD and its suppliers to reduce infrastructure costs and administrative lead-time. But the TINA rules for modifications may pose a larger problem for DoD as it attempts to attract non-traditional suppliers, including those participating at the subcontract level. For example, suppose a new supplier bids and wins a $25 million contract. The company was not required to comply with TINA or furnish cost information since the award was made competitively. One month after award the firm receives direction from the Government to make a change in the design of the product. The company must comply since the Changes Clause is included in the contract. The Contracting Officer will make an equitable adjustment in the contract price to adjust for the work change, but first the supplier must submit cost or pricing data and certify that it is complete, current, and accurate. The final adjustment is $500K or about 2% of the basic contract price.

The TINA rules are designed to facilitate the negotiation of a fair and reasonable price by ensuring the Government has access to the same factual information as the supplier when negotiating changes to contracts. In many cases, it may be helpful, but, in others, such as the example above, it is damaging to the business relationship and often of little

[44] DD350 Database data provided by TASC.

consequence given the relative value of the price increase to the basic contract. The most common exception to TINA (i.e., adequate price competition) does not work well for modifications and changes.

Although there is little observed payback on post-award audits of smaller contracts, there is possibly a “deterrent effect” that can be attributed to the potential of finding defective pricing in a post-award audit.

How do commercial firms handle changes after award? Industry practices vary depending upon many factors, such as the business relationship between buyer and supplier, relative market power of each party, and size of the change. Industry is generally less reliant on cost-based pricing than the Government. Often this is due to the "make knowledge" available within industry. Commercial industry representatives attending the Industry Roundtable noted they often use cost analysis to price purchases.[45] This cost analysis is often generated internally and is based on the company’s technical expertise in product manufacturing. While the Government attempts something similar in the form of an Independent Government Estimate (IGE), they are often not adequate for price comparison purposes.

Generally, commercial firms make fewer changes after award. Although in DoD some changes are inevitable given the types of supplies and services bought, concerted effort to minimize changes needs to be made. Accepting this gives rise to a possibility for streamlining the process. Low dollar value changes can be built into the contract price based on historical experience. If small changes on aircraft programs typically add 5% to the aircraft price during the initial production lot, an allowance can be made for this and an agreement reached whereby these small changes will be incorporated at no additional cost to DoD. Clauses, categorized as "Advance Change Adjustment Agreements," have been used on some major weapon system contracts. These clauses generally provide that contract changes under a specified dollar threshold, typically $50K to $100K, will be effected at no change to the contract price. However, for fixed-price contracts these thresholds have generally been quite low due to the risk the supplier assumes in potentially accepting a greater number of small dollar value changes than historically experienced.

Recommendations

1. Revise the TINA waiver language to encourage granting waivers for low-dollar value contract modifications, especially those made to contracts initially awarded without cost or pricing data. This can be done explicitly or by expanding the existing waiver provision.
2. Encourage the use of clauses such as “Advance Change Adjustment Agreements,” whenever practicable.

[45] “Price-based Acquisition Industry Roundtable”, coordinated by Arthur Anderson Government Services. December, 15, 1998.

Recommendation 1

Revise the TINA waiver language to encourage the granting of waivers for low-dollar value modifications, especially those made to contracts initially awarded without cost or pricing data.

Discussion

This recommendation will allow contracting officers to concentrate their attention on those actions with the most impact on resources – the high dollar value changes. It will reduce the administrative costs associated with the submission and review of cost or pricing data.

Implementation

Statutory changes are desirable but this can likely be accomplished by regulation. Ideally, the Truth-in-Negotiations Act (10 U.S.C. 2306a) should be changed to add an exception for low dollar value modifications. However, the legislative proposal to expand the use of the waiver provision should suffice to allow implementation of this recommendation. Implementing regulatory coverage will be required.

Recommendation 2

Encourage the use of clauses such as "Advance Change Adjustment Agreements," whenever practicable.

Discussion

These clauses eliminate the need to negotiate relatively small dollar changes thereby reducing acquisition lead-time and allow for reductions in both the Government's and the supplier's workforce. The utility of this recommendation will vary with contract type. On fixed-price contracts, suppliers may want relatively low dollar value thresholds in the clause. While this will serve to lower the number of change proposals processed under the clause, it is still valuable. We expect that smaller suppliers will be less interested in including the clause, but these suppliers will also be less likely to have contracts in which the clause will be useful.

Implementation

No statutory or regulatory changes are required, although regulatory coverage identifying this approach as a valid method of expediting change order processing may be useful. It would also be beneficial for the DFARS to contain a standard clause for this purpose.

Value Engineering

Findings

DoD's Value Engineering (VE) program provides a way for suppliers to submit ideas for reducing the costs of products and services being acquired by DoD and to share in the resultant savings through the Value Engineering Change Proposal (VECP) process. The connection to price-based acquisition is that the savings resulting from suppliers' ideas are quantified through detailed audits of actual or estimated costs. Non-traditional Government suppliers will likely find this approach contrary to their experiences with commercial suppliers. Further, this cost-based methodology significantly lengthens the VECP review and approval process thereby reducing current suppliers' interest in participating in the program. Although, it is this issue that warranted inclusion of this topic in the PBA study, there are other problems with the program. (Note that in addition to the supplier-based VE program, the DoD in-house VE program supports the acquisition process before contracts are awarded. We examined only the supplier-based VE program improvements.)

In 1996, the Principal Deputy Under Secretary of Defense (Acquisition, Technology & Logistics) chartered the DoD Value VECP Process Action Team (PAT) in response to VE savings falling below expectations. The VECP PAT found substantial barriers to the use of VE within both the DoD program management and supplier communities. Their report, released in July 1997, identified the barriers listed below.

From the Program Manager's viewpoint:

- The VECP process is too lengthy, complex and resource intensive,
- The VECP process puts a funding burden on the program manager by requiring that they fund the implementation costs and the contractor's share of collateral savings,
- There is little motivation for the program manager to aggressively pursue the development of VECPs because any savings are likely to be taken from future budgets,
- For most acquisition programs, cost reduction is not a program requirement, and
- Lack of top-level management attention to VE decreases the program manager's attention as well.

From the Supplier's viewpoint:

- The program manager's negative attitude toward VECP development overshadows the current limited incentives for submitting a VECP,
- The VECP development is viewed as a high risk investment, which often has insufficient return on investment to justify the initial investment,
- The excessive complexity of the VECP process consumes resources, delays payment, and decreases the opportunity for significant return on investment, and

- The Federal Acquisition Regulation (FAR) and other VE guidelines are perceived as inflexible and too restrictive in their incentive guidelines.

The VECP PAT made seven major recommendations to minimize the obstacles to VE. Some of the recommendations have already been implemented and others are presently being worked. For example, a draft final rule to change the sharing periods and rates for individual VECPs was recently agreed to by the Defense Acquisition Regulations Council and forwarded to the Civilian Agency Acquisition Council on March 3, 1999. Another VECP PAT recommendation that is being implemented is to make the Reliability, Maintainability, and Sustainability (RM&S) Program a ready source of funds for VECPs. Since a single VECP typically requires funds from multiple appropriations, the strategy is to increase the funding flexibility of the existing RM&S program. This increased flexibility is being addressed by a legislation language insertion. Another recommendation called for the appointment of VE advocates within each Service and Defense Agency. Several of the other recommendations dealt with streamlining VECP processing.

Similar cost reduction programs are common throughout industry. While the results from such programs are likely to vary tremendously, some companies report great success. One major American automobile maker claims to have saved several billion dollars over the past five years through such a program. This particular company claims the speed and feedback designed into its incentive system are the reasons for its success.

Recommendation

Strengthen the DoD Value Engineering Incentive Program.

Discussion

We believe DoD should strengthen the existing VE program by making it easier for suppliers to profit (and, of course, DoD along with them) from their beneficial suggestions. The program needs to promulgate the availability of incentives for all good ideas, including suggestions to delete work that, although ordered, is unnecessary.

The prevalent thinking for the VECP scope is that the VECP process can only be applied to hardware modifications. Current contract clauses allow for non-hardware applications, however, this application is not readily apparent so there is a need to clarify and refine these VE contract clauses.

Reinvesting the savings with the program that generated the savings will greatly motivate program managers to pursue cost reduction (as noted by the VECP PAT report). Where possible, the calculation of savings and amount due the supplier should be based on benefit or value to the Government rather than on an audit of the supplier's records. Several, real examples of how this concept has been applied are provided in the "Pricing Methodologies" section of this report.

To increase attention to and interest in the VE program, responsibility for the overall program should be vested in a single office, akin to the “lead agent” concept. This recommendation is similar to the DoD VECP PAT Team’s recommendation regarding their “VE Advocate” concept. It is also essentially what DoD did with a similar program, the Single Process Initiative (SPI). The SPI program should also be one of the models reviewed and considered when developing the lead agent concept that centralizes the management of cost reduction efforts.

Implementation

This recommendation requires resources (i.e., a team dedicated to strengthening the current DoD VE program, including a budget for marketing, travel, automation, etc.). The team must consist of multi-disciplined experts to include VE and contracting subject matter experts. Initially, implementation and operating costs are roughly estimated at $2 million per year.

This same team, as an integral part of overall program design, should pursue statutory changes (including new TINA exceptions) and regulatory changes to FAR Part 48, FAR Part 52, and associated contract clauses. Changes to FAR Parts 48 and 52 should clearly show that VE could be applied to any element of the contract where cost reduction can be realized. We have not developed the language for statutory or regulatory changes as a part of this PBA Study because it is best left to a dedicated VE team.

Program Progress

Findings

We see program progress as encompassing two broad areas: 1) additional uses for contract performance data (i.e., Earned Value Management information) if it is being provided to the Government during contract execution, and 2) the amount and level of historical data needed by the cost community to ensure they are able to maintain databases, models, etc. and provide required services.

While the Earned Value Management System (EVMS) concept has been around for decades, its use as a management tool (versus a reporting tool) is really a recent practice in the defense industry. Where this practice has been instituted, it can aid in the establishment of a price-based Government/contractor relationship.

EVMS is a criterion-based management approach that has only recently evolved into an industry standard, incorporating guidelines that follow best business practices for project management systems. The processes include planning and control disciplines and techniques that integrate program scope, schedule, and cost objectives, and provide a sound basis for problem identification and management decisions.

EVMS disciplines combined with integrated cost, schedule, and technical performance metrics also provide commercial firms with requisite tools for cost control and necessary insight into supplier performance. The extent to which Earned Value Management is applied varies from company to company and can be dependent on the dollar value, risk, and complexity of the project. Commercial firms have also expanded the use of the EVMS tools and techniques to firm-fixed-price contracts to ensure quality products while maximizing their return on investment.

As DoD transitions to more commercial-like business processes, expands the use of PBA techniques, and increases the number of firm-fixed-price contracts, it is incumbent upon DoD to find ways to minimize, if not outright eliminate the requirement for suppliers to provide cost or pricing data. To a large extent, it is the cost community that needs to re-assess the requirements imposed on contractors for providing detailed, historical cost data, on firm-fixed-price contracts.

Recommendations

1. Establish a team to investigate uses for EVM data beyond its current program management mission. The scope should include using EVM data in support of financing, termination assessments, contract negotiations, source selections, PPBS, and continuous process improvements.

2. Require the OSD Cost Analysis Improvement Group (CAIG) to work in cooperation with the larger DoD cost community to review current cost reporting requirements, including Contractor Cost Data Reporting (CCDR), in order to establish a minimum level of cost data needed from suppliers to ensure effective risk management in FFP contracts.

Recommendation 1

Establish a team to investigate uses for EVM data beyond its current program management mission. The scope should include using EVM data in support of financing, termination assessments, contract negotiations, source selections, PPBS, and continuous process improvements.

Discussion

EVMS data has been used to support activities beyond program management (i.e., cost/schedule/performance management) such as contract negotiations. We believe that more extensive use should be considered. For example, the information can be used to ensure that adequate progress has been made in order to justify financing payments.

Implementation

A process action team will have to be established to explore additional ways that EVM data can be used. The team should be comprised of both Government and industry personnel.

Recommendation 2

Require the OSD Cost Analysis Improvement Group (CAIG) to work in cooperation with the larger DoD cost community to review current cost reporting requirements, including Contractor Cost Data Reporting (CCDR), in order to establish a minimum level of cost data needed from suppliers to ensure effective risk management in FFP contracts.

Discussion

The requirements established must address the need for determining cost realism, developing Independent Government Estimates, budget development and long range planning projections, subsequent substantiation during Congressional review, total ownership cost determinations, and DoD access to current contractor provided cost data in order to maintain various cost databases and parametric models.

The Contractor Cost Data Report is a primary means used by the Government to collect historical cost data incurred by contractors in the performance of contracts. This data is used to develop cost estimates for programs that have an Acquisition Category (ACAT)

designation and for other analytical requirements.[46] Unless waived by the CAIG Chair, reporting is currently required on firm-fixed-price contracts or subcontracts when those contracts represent a major share of the R&D or production of a Category I program or component of a Category I program.

We recognize the need to require CCDRs or other means of collecting cost data in cost contracts. However, the definition for PBA, contains a fundamental principle that risk has been sufficiently mitigated such that a firm-fixed price contract can be used to appropriately allocate risk between the Government and the contractor. Therefore, in such cases, limited cost data should be required in order for the acquisition team to allow the contractor to perform without undue oversight of their cost performance.

Implementation

Changes may be required to the DoD 5000 series regulations if DoD is to minimize the need for cost reporting on firm-fixed-price contracts.

[46] DoD 5000.2-R Mandatory Procedures for MDCAPs and MAIS Acquisition Programs.

Government Furnished Property (GFP)

Findings

We were specifically asked to look at the pricing of equitable adjustments to contract price in the event the Government decreases or substitutes Government Furnished Property (GFP), delays furnishing the property, or furnishes property that is not suitable for its intended use. There are many other issues relative to Government property that we will not discuss as they are being worked by the FAR Part 45 Rewrite Team.

The current Government Property Clause (FAR 52.245-2) requires the adjustment be made in accordance with the procedures of the Changes Clause of the contract. The adjustments are cost-based and, if the contract modification exceeds the TINA threshold, cost or pricing data will be required. Changes to GFP are treated like any other equitable adjustment, such as equitable adjustments requested in response to a DoD directed change, with the goal to deal with contractors fairly. The basic, underlying premise is that DoD promised the supplier that it would provide some equipment or material necessary to perform the effort and failed to do so in accordance with the agreement.

Recommendation

When appropriate, establish a liability schedule when initially pricing the contract that lists the damages due the supplier for DoD changes to, and delays in, furnishing property.

Discussion

We believe DoD handles the situation, changed or late GFP, in a manner similar to a commercial firm that happens to find itself in the same situation. We did not find an all-encompassing solution for pricing these equitable adjustments. Although the issue is similar to equitable adjustments made for changes after award, it is different in that DoD is not receiving benefit. DoD is only compensating its suppliers for breached contract terms. Our only feasible idea is to establish a liability schedule when initially pricing the contract. This schedule will identify the damages due the supplier if DoD changes or causes a delay in furnishing property. Obviously, it will be impractical, if not impossible, to price every possible contingency. We recommend this practice be done only when considered beneficial and cost effective. For example, this approach can be used for those items where, in the past, DoD had difficulty providing the property. Or it can be limited to a few high dollar pieces of equipment. Further, this one negotiable factor should not lead to protracted negotiations. If the parties cannot agree, the issue can be dropped and handled traditionally on an after the fact basis.

The recommendation may yield some infrastructure savings (albeit relatively small) by eliminating the need for cost-based pricing, including TINA submissions, for these

equitable adjustments. Negotiation of the damages up-front should be easier since there are many other negotiable issues on the table.

Care must be taken to ensure that the supplier is not “unjustly” enriched by being compensated for damages that are not in fact incurred (e.g., the supplier could be so far behind schedule that late receipt of Government property does not affect its operations). Language governing the Damages Schedule could be crafted to prevent this. Nevertheless, the damages paid the Government under this approach will almost certainly be more, or less, than what would be paid using the traditional, resource intensive audit and negotiation approach.

Implementation

Regulatory changes to procedures and clauses will be necessary.

Waivers & Deviations

Findings

The pricing of equitable adjustments due suppliers is discussed in two sections of this report, Contract Modifications and Changes, and Government Furnished Property. In regards to waivers and deviations the situation is reversed. The supplier is in effect seeking a modification to the contract, whether a waiver, a deviation, or a delivery schedules extension. In this case, DoD is owed an equitable adjustment. The current practice in DoD is to negotiate consideration on a case-by-case basis.

Typically, the amounts involved are not large, but there are exceptions. When suppliers seek an equitable adjustment they are often required to support the amount with cost or pricing data. With the roles reversed, does DoD submit cost information to the supplier to facilitate negotiation of the equitable adjustment? No. In fact, the supplier may be required to submit cost or pricing data to justify the amount of DoD's equitable adjustment.

Recommendations

1. When practical, establish a deduction schedule or curve when initially pricing the contract for waiver and deviation requests.
2. When practical, price delivery schedule extensions when initially pricing the contract (liquidated damages clause).

Recommendation 1

When practical, establish a deduction schedule or curve when initially pricing the contract for waiver and deviation requests.

Discussion

In looking for ways to manage waivers and deviations using a price-based approach, we experienced the same difficulty that occurred with equitable adjustments for GFP – there is no simple, all-encompassing solution. Initially, recommending the same approach (i.e., to price waivers and deviations up-front) appeared impractical. There are too many different scenarios possible. However, there is a way to do this. Although it is impossible to predict exactly from which requirements the supplier will require waivers or deviations, a schedule could be included in the contract that specifies a charge for each minor waiver or deviation (i.e., those not affecting form, fit, function, or performance). Or, based upon prior experience, knowing that a supplier will require some number of waivers or deviations, this contingency can be priced as part of the basic contract with the proviso that such waivers and deviations when granted shall be at "no cost."

This recommendation streamlines post-award administration and eliminates the need for cost information (or cost or pricing data) when obtaining consideration for waivers and deviations granted. Obviously, this is not an across the board solution. It is best suited to large contracts. Further, this one negotiable factor should not lead to protracted negotiations. If the parties cannot agree, the issue can be dropped and waivers and deviations handled traditionally on a case by case basis.

Implementation

It is advisable to provide both regulatory guidance and a clause, although it is not absolutely necessary.

Recommendation 2

When practical, price delivery schedule extensions when initially pricing the contract (liquidated damages clause).

Discussion

An approach similar to that described above for waivers and deviations can be used (i.e., a liquidated damages clause can be included in the contract for delivery schedule delays). In the past, DoD has been limited in its use of liquidated damages clauses; however, with the current emphasis on adopting more commercial practices, this issue warrants renewed consideration.

This approach will provide an incentive to the contractor to deliver the product or service on time and may increase the amount of consideration the Government collects. No cost information will be required.

Implementation

It is advisable to provide both regulatory guidance and a clause, although it is not absolutely necessary.

Wage Determinations

Findings

DoD must comply with Federal statutes that mandate minimum wage rates on contracts for services or construction. The purpose is to ensure fair wage rates. Contracts subject to the Davis-Bacon Act or the Service Contract Act contain wage determinations provided by the Department of Labor. Contractors must comply with these determinations. Changes to wage determinations during contract performance can result in cost-based negotiations. In FY 1988, DoD actions of $100K or more accounted for 95.0%, 93.6%, and 93.1% of the dollars subject to the Walsh-Healey Act, Service Contract Act, and Davis-Bacon Act respectively.[47]

In commercial contracts, the market, or collective bargaining agreements, generally determine wage rates, subject to statutory minimum wage requirements. The most effective solution is to repeal the Davis-Bacon and Service Contract Acts and adopt a more "commercial" approach. This would eliminate the need to negotiate wage rate changes during contract performance thereby reducing administrative costs for DoD and its suppliers. According to the Section 800 Panel Report, the Davis-Bacon and Service Contract Acts increase costs and administrative burdens for small businesses. We believe this recommendation would likely face considerable opposition. So, instead we took a more tempered approach recommending a higher threshold. Note that simply accounting for inflation alone would justify raising the $2,500 Service Contract Act threshold, set in the 1930's, to approximately $60K.

Recommendation

Raise the thresholds for applicability of the Davis-Bacon Act and the Service Contract Act to the Simplified Acquisition Threshold, currently $100K.

Discussion

This change offers the following benefits:

- The number of contracts subject to compliance with these Acts are reduced, while contracts that account for the great majority of Federal contracting dollars spent are still covered,
- Infrastructure costs are reduced,
- Contract prices are likely to be lower, and
- The number of small and small disadvantaged businesses competing for Federal contracts may increase**.**

[47] http://web1/whs.osd.mil/peidhome/progstat/p08/fy1998/p08.htm

Implementation

Amendments to 41 U.S.C. 254c and 10 U.S.C. 2306b may be required. Implementing regulatory coverage will be required.

Cancellation Charges for Multi-year Procurements

Findings

Multi-year contracts are used to acquire known requirements for up to five years even though all funds are not available at contract award. Multi-year contracts can:

- Lower costs,
- Enhance production or performance continuity,
- Stabilize a contractors workforce,
- Broaden the competitive base by providing opportunities for firms to compete who are not willing or able to participate for lesser quantities, and
- Provide incentives to contractors to improve productivity through investment in capital facilities, equipment, and technology.

Multi-year contracts are required to include a cancellation ceiling for every program year subject to cancellation. Upon cancellation, the contractor is paid a cancellation charge, to be determined through negotiation, not over the cancellation ceiling. The contractor submits a claim for a cancellation charge as if the claim were being made under the Terminations for Convenience Clause. The cancellation charge covers only costs incurred that are reasonably necessary and that would have been equitably amortized over the entire multi-year contract period, but because of the cancellation are not so amortized. A reasonable profit or fee on the costs is also covered.

Negotiation of the cancellation charge takes a long time since it is based on exhaustive cost analysis. The supplier must provide cost or pricing data. Since so few multi-year contracts are awarded, this is not a significant issue or barrier to adopting a price-based approach to acquisition throughout DoD.

Recommendation

When practical, consider, for each multi-year contract, negotiating firm cancellation amounts, rather than ceiling amounts, for each year of the program.

Discussion

Multi-year contracts are used for high dollar value programs. The pricing of these contracts up-front is complex. Given the knowledge of the program possessed by the negotiation team, it will probably be possible to agree on firm cancellation charges while negotiating all other aspects. We did not contemplate making negotiation of firm cancellation charges mandatory, just that the parties consider doing so. Given the length of time it takes to negotiate these major weapon systems contracts, the time invested to agree upon cancellation charges will almost certainly be insignificant compared to total procurement administrative lead time. Further, should this issue become an obstacle to

reaching agreement on contract price, it can be taken off the table and handled in the traditional fashion.

Negotiating firm cancellation charges will certainly expedite resolution should the future years of the contract be cancelled. The recommendation is akin to the "termination liability curve", recommended for termination for convenience settlement agreements. Benefits include reduced administrative costs for Government and industry. Also, cost information will not be required to settle cancellation charges at the time of cancellation.

The recommendation may lead to the possibility of higher cancellation charges. It is reasonable to assume that suppliers will insist upon firm cancellation charges that approximate the cancellation ceilings negotiated today. On the other hand, it is likely to be easier to negotiate these charges up-front when the parties are optimistic and excited about the program than after the program has been cancelled.

Implementation

Changes to 41 U.S.C 254c and 10 U.S.C. 2306b may be required. Implementing regulatory coverage may also be required.

Claims

Findings

The Defense Science Board report recommended addition of a special clause calling for all claims covered under the Contract Disputes Act of 1978 (CDA) to be priced on the basis of the "damages theory" or in effect, common law contract changes.[48] After reviewing the CDA process, we concluded no change is necessary because proof of damages in CDA litigation is consistent with the legal theory employed in non-Government litigation wherein contractors are expected to prove damages by submitting the best available or most reliable evidence in the circumstances. The evidence can be actual cost data or other information including estimates, expert testimony, and statistical methods.

We evaluated whether the process should be streamlined by eliminating the Contract Disputes Act certification requirements. If made, this change would reduce suppliers' compliance requirements for submitting a claim and also promote adoption of commercial practices that require no certification of a claim. However, certification heightens a contractor's awareness of the need for accurate and complete supporting data. Failure to provide accurate and complete supporting data is often an issue of contention between contractors and Government personnel. Thus, the certification can save time in settling the claim. Certification also helps provide a clear signal to the parties of a contractor's intent to submit a CDA claim. While there could be some reduction of supplier's administrative burden, it would not be significant. DoD infrastructure costs could also increase because of added effort on the part of Government personnel to obtain accurate and complete data in support of the claim.

We concluded from inputs at the industry roundtable that litigation is a last resort, in any case, for commercial industry.[49] That led us to our recommendation concerning use of an alternative disputes resolution (ADR), as a more commercial-like practice. Having an ADR agreement in place facilitates its use when controversies arise.

Recommendation

USD(AT&L) establish a policy that every ACAT 1 and II Program consider an alternative disputes resolution procedure and that these procedures be highly encouraged for other programs below these thresholds. This can be implemented through a contract clause or Memorandum of Agreement. In addition, we recommend that the current working group pursue a statutory change establishing a five-year pilot project that would allow access to

[48] Defense Science Board Report, March 1998.
[49] "Price-based Acquisition Industry Roundtable, coordinated be Arthur Anderson Government Services, December 15, 1998.

the Department of Justice's Judgment Fund for claims settled via ADR under specified circumstances.

Discussion

ADR processes should continue to be promoted for use in resolving disputes. This is a common commercial practice used to avoid or reduce costly litigation. Existing statutes and regulations already support the initiative. These include the Administrative Dispute Resolution Act of 1996 (ADRA); DoD Directive 5145.5, Alternative Dispute Resolution, 22 April 1996; and FAR 33.204 policy.

The Air Force has recently implemented an initiative that requires inclusion of either an ADR clause or Memorandum of Agreement concerning ADR in every ACAT I or II program. We believe this policy makes sense for the other Services as well. Litigation should always be the last resort. Further, already having ADR procedures in place, on a program or contract when a controversy arises, facilitates using that procedure as opposed to submission of a contract claim. It is consistent with the teaming philosophy that DoD has employed with the Integrated Product Team process.

In addition to promulgation of a policy that promotes use of ADR procedures in contracts, we believe that DoD being able to access the Judgment Fund will also encourage the use of ADR by making settlement funds more readily available. Administrative settlements must be funded from Agency appropriations. DoD expired appropriation account balances in certain appropriation accounts are likely to be insufficient to fund administrative settlement agreements, thereby forcing DoD to litigate certain contract controversies. Litigation is not consistent with the Government’s policy of teaming or encouraging resolution of controversial contract issues through mutual agreement at the contracting officer’s level.

An alternate suggestion is that a small fund be established and controlled by DoD for settlements of claims of less than $10M.

Implementation

Requiring the inclusion of an ADR procedures clause or Memorandum of Agreement in every ACAT I and II program only requires that policy be written. We also suggest that these same procedures be highly encouraged for other programs below these thresholds. A current OSD team has been working the alternative disputes resolution issue. We encourage this group to pursue common policy language for implementing this recommendation across the Department.

Use of the Judgement Fund will require drafting and supporting a legislative initiative that seeks to establish a five-year pilot project to test the concept. The intent of this legislation is to supplement existing DoD authority. The legislation should require the following conditions in order for DoD to access the Judgement Fund. DoD should be required to use a sitting Board of Contract Appeals judge in an ADR settlement process.

Access to the Judgement Fund should only be authorized if the Board judge concludes the settlement is “within the zone of reasonableness” and the total amount of the contemplated payment does not exceed $250 million for each compromise settlement. If payment were made by the Judgement Fund pursuant to this proposal, reimbursement of the Fund should be required by the end of the third fiscal year after the compromise settlement is made. Finally, this provision should require DoD to track the use of this new authority so that the results of the pilot project can be reported to Congress. Again, we recommend that for purposes of consistency across the Department that the current OSD team be tasked to consider this recommendation in their findings.

Legislative language for the alternate suggestion of a small fund controlled by DoD would need to be drafted by the OSD team.

Bringing About Change

Bringing About Change

The Catalysts

Commercial Firms, Non-commercial Products

Metrics – Measuring Success

What do the recommendations included in this group have in common? They all focus on how to bring about the change desired, that is, significantly increasing the use of price-based acquisition, particularly in non-traditional areas (e.g., Science and Technology, development programs, and many service areas such as contracting for Engineering Services).

We recognize that change does not come about just because we desire it. A move toward price-based acquisition affects the entire acquisition workforce and their counterparts in industry. Bringing about a change in culture often requires a catalyst. Successfully institutionalizing a major change such as PBA generally requires a push from several simultaneous points. Changes that have been most successful have:

- Emphasized the change through regulatory policy,
- Provided early and comprehensive training,
- Used incentives to encourage the change, and
- Emphasized support from the top on down, the executive level to the working level.

We address six specific catalysts we believe will encourage the change desired. Three involve regulatory changes. Two discuss the critical requirement to provide training to the workforce prior to implementation, the type of training required, and the organization responsible for providing this training. The final recommendation in "The Catalysts" section specifically calls for a forum for sharing lessons learned.

In order to further expand the use of PBA and facilitate civil-military integration, we offer one recommendation that requires re-evaluating how DoD does business with "commercial firms" which provide non-commercial products to the Government. The goal is to determine whether FAR Part 12 can be expanded to include these non-commercial products as well.

DoD also needs to be able to measure whether it is successful in meeting its goals. To this end, we recommend six metrics. The difficulty in measuring the success of PBA is that few acquisitions will fall within the definition of "pure" PBA. Most will have both CBA and PBA attributes as described in the introduction to the Continuum. This fact, combined with the understanding that there are a number of acquisition reform initiatives underway, makes it difficult to attribute an outcome directly to PBA. As a result, the metrics we are recommending are indirect measures (i.e., ones that allow us to draw inferences, but not ones that lead to definite conclusions).

Findings

There appears to be enormous resistance to moving further along the continuum towards price-based acquisition. Why? One, only a small percentage of the workforce really understand the objectives of PBA or what PBA is and is not. Many do not know there are tools and methodologies already in existence that can be used to support their efforts to use a price-based approach. Two, there are some people that have concluded that PBA is only about re-instituting firm-fixed-price contracting of high-risk development projects without changing the process (i.e., to repeat the mistakes made in the 1980's).

Although many of our recommendations expand the use of processes used today in pockets throughout DoD, we believe that there is not a consistent understanding of what can and cannot be done today – i.e., training on new initiatives and methods are not reaching the acquisition workforce to the extent needed. For example, many do not understand recent changes in the FAR and how these have changed the acquisition process and affect PBA in particular. We have seen other new, far reaching, initiatives implemented before the acquisition community was prepared. Take the implementation of the Federal Acquisition Streamlining Act (FASA) of 1994 and the Federal Acquisition Reform Act (FARA) of 1996. Congress enacted FASA on 13 October 1994 and FARA on 10 February 1996, with the implementation taking affect approximately one year after enactment. Defense Acquisition Workforce Improvement Act (DAWIA) courses were updated to reflect these changes about a year after the regulatory changes were made.

In the past, delays in training the acquisition workforce on how to use new procedures and guidance has also been a contributing factor in less than optimal application of tools and techniques.[51] A recent General Accounting Office Study concluded that DoD training has not been a catalyst for implementing best practices. The primary reason for this is that training has not been provided in a timely manner, nor did it reach the right people when needed and contain the depth or practical insights the workforce needed to implement these practices.[52] We could not agree more. It is very demoralizing for the acquisition workforce to have procurement reform instituted without the needed explanation and training. To illustrate, look at the difficulty experienced by one Program in implementing another major initiative, Cost as an Independent Variable. In 1995 CAIV became the official Department policy. About this same time the Joint Air-to-Surface Standoff Missile (JASSM) was designated as one of the Department's "Flagship

[50] Telephone conversation with Dr. Lenore Sack, Director for Academic Affairs, Defense Acquisition University, on March 16, 1999.
[51] DoDIG Report No. 98-064, "Commercial and Noncommercial Sole Source Items Procured on Contract N000383-93-G-M111" dated June 24, 1998, and USD(AT&L) Memorandum dated January 13, 1998 providing comments on the subject DoDIG Report.
[52] GAO Report 99-206, "DOD Training Can Do more to Help Weapon System Programs Implement Best Practices", August 1999

Programs" for CAIV. JASSM began to immediately implement the concept. Unfortunately, the JASSM program office received the first "official" training on CAIV in March 1999, four years after the need date.

When training is delayed, it only increases the natural tendency to resist change. This resistance seems to then increase exponentially whenever the change is big, as with PBA, and the people being asked to change do not understand the reason for the change, nor have been given the tools and techniques they need to achieve the desired end result. How can we expect the acquisition community to implement a PBA approach appropriately and to its widest potential without this knowledge?

The GAO Report mentioned earlier notes that leading commercial firms have a strategic approach to training that DoD does not.[53] Specifically, the Report notes that leading commercial firms' training has four common elements.

1. Front-end analysis of trainee needs and requirements,
2. Involvement of trainees in key training decisions,
3. Customized training to meet specific needs, and
4. Targeted training for the implementation of specific practices.

We believe that the commercial model would be a good one for DoD to emulate.

We have grouped these six diverse recommendations in this Section as they are intended to encourage a change in the way the acquisition workforce operates.

Recommendations

1. Amend the Defense Federal Acquisition Regulation Supplement (DFARS) to express a clear preference for price-based acquisition.
2. Amend the Defense Federal Acquisition Regulation Part 207 and DoD 5000 series regulations to require that efforts to use PBA techniques be addressed in the Acquisition Plan or similar documents.
3. Amend the Defense Federal Acquisition Regulation Supplement to lower the approval level for a determination to use a firm-fixed-price contract for Research and Development from OSD to the Service Acquisition Executives (SAEs), re-delegable, not below Flag Officer/Senior Executive Service (SES).
4. Train acquisition teams and their industry counterparts in price-based acquisition prior to issuance of **any** policy changes. There are three sub-components of this training.
   - Overview PBA training,
   - Follow-on, "how-to" training, and,
   - PBA modules in all Defense Acquisition Workforce Improvement Act (DAWIA) acquisition and program management courses.

[53] GAO Report 99-206, "DOD Training Can Do more to Help Weapon System Programs Implement Best Practices", August 1999

5. Require the DUSD(AR) to develop and maintain a forum for sharing PBA lessons learned.
6. USD(AT&L) sign and issue two memorandums, one to the acquisition workforce to introduce PBA, and the other to the Defense Acquisition University requiring development of “rapid insertion” PBA overview training.

Recommendation 1

Revise the Defense Federal Acquisition Regulation Supplement (DFARS) to express a clear preference for price-based acquisition.

Discussion

Placing emphasis on the desired change through regulatory or statutory language often encourages its institutionalization. It was to this end that we recommend DFARS be revised to express a clear preference for PBA.

Implementation

This recommendation requires changes to the DFARS. We have drafted proposed regulatory changes.

Recommendation 2

Amend the Defense Federal Acquisition Regulation Supplement Part 207 and DoD 5000 series regulations to require that efforts to use PBA techniques be addressed in the Acquisition Plan or similar documents.

Discussion

Placing emphasis on the desired change through regulatory or statutory language often encourages its institutionalization. It was to this end that we recommend DFARS and the DoD 5000 series regulations be revised to require the discussion of PBA methods in acquisition planning documents.

Implementation

This recommendation requires changes to the DFARS and DoD 5000 series regulations. We have drafted proposed regulatory changes.

Recommendation 3

Amend the Defense Federal Acquisition Regulation Supplement to lower the approval level for a determination to use a firm-fixed-price contract for Research and Development

from OSD to the Service Acquisition Executives (SAEs), re-delegable, not below Flag Officer/Senior Executive Service (SES).

Discussion

The DFARS currently requires a determination approved by OSD in order to award a firm-fixed-price contract for R&D projects. A fundamental principle for the correct application of PBA is that risk has been sufficiently mitigated such that a firm-fixed-price contract type can be used to appropriately allocate risk between the Government and the supplier. Requiring that a determination be obtained at such a high level discourages use of FFP R&D even if appropriate circumstances exist. Lowering the approval level still requires justification and maintains insight while streamlining the process.

Lowering the approval level facilitates the idea that FFP may be appropriate for R&D if risk has been sufficiently mitigated.

Implementation

Draft language to amend the DFARS.

Recommendation 4

Train acquisition teams and their industry counterparts in price-based acquisition prior to issuance of **any** policy changes. There are three sub-components of this training.

- Overview PBA training,
- Follow-on, "how-to" training, and,
- PBA modules in all Defense Acquisition Workforce Improvement Act (DAWIA) acquisition and program management courses.

Discussion

We strongly believe training the acquisition workforce and industry counterparts should be a prerequisite for PBA implementation. Price-based acquisition in itself is not a new concept. What is different is the emphasis now being placed on PBA and the fact that DoD is trying to greatly expand its use. Many tools and methods for PBA already exist. What does not exist is a consistent and global understanding of the goals of PBA and how to apply the tools available. This type of understanding often comes by providing examples of "success stories". Establishing a forum for sharing these success stories is a critical part of training the workforce and instituting change. Recommendation 5 in this section addresses this forum in further detail.

Not everyone in the acquisition workforce needs to receive the same level of training. It is dependent on their specific job and the timing of events. Therefore, we have suggested the three-tier approach to training. PBA overview training should be conducted at all major DoD buying commands for acquisition teams and their industry

counterparts within 180 days of USD(AT&L) making the decision to proceed with the recommendations contained in this report. We strongly believe this training must be face-to-face, interactive, and conducted by individuals with strong, recent operational experience and a zeal for PBA. Why is this important?

First, PBA is a complex topic involving the interplay of a number of factors. Second, to successfully use these additional strategies, tools, and methods that will be added to their acquisition "toolbox", requires extensive planning and sound judgement on the part of the workforce. This demands that the workforce see the trainers as credible and sensitive to the problems they will face in implementing PBA on the "front lines."

First-tier training should review the PBA philosophy and cover PBA acquisition strategies, pricing methods, and contract terms and administration. There should be many illustrative examples of how to apply PBA techniques to hardware, services, and RTD&E procurements, as well as hypothetical situations in which the students must determine if PBA applies and if so which techniques to use. **Perhaps, just as important, a required outcome of the initial PBA training must be to instill a passion for trying something new and unfamiliar even at some risk of failing. We see this as critical to successful implementation of PBA.**

The second-tier is follow-on training specifically focused on how to use and apply PBA methods. This training should be available within 240 days of USD(AT&L) making the decision to proceed with the recommendations. Such training should be provided just in time for the planning of specific acquisitions and should be oriented to various functional specialties such as contract price and cost analysts, negotiators, program managers, both Government employees and their industry counterparts. This follow-on training should provide much greater detail on PBA methods, include many illustrative examples, and require students to apply PBA techniques in various practical exercises. Dedicated trainers are required to implement this follow-on training. Computer-based training (CBT) should also be explored for use in providing such training.

For the third-tier, PBA modules should be added to all DAWIA acquisition and program management courses (e.g., PMT 302, CON 104, and CON 202) within a year of the recommendations in this report being accepted. This training is intended to build on the overview training provided in the first-tier. However, the specific audience for each DAWIA course should drive the specific aspects of PBA emphasized. For example, PMT 302 would focus more on PBA strategies, whereas CON 104 would address PBA pricing methods at length and CON 202 would cover PBA contract administration topics in detail.

Implementation

The Defense Acquisition University must take the lead in developing appropriate training for the three tiers described above.

Recommendation 5

Require the Deputy Under Secretary of Defense (Acquisition Reform) to develop and maintain a forum for sharing PBA lessons learned.

Discussion

Although many tools and methods for PBA already exist there is no central forum for sharing them or "success stories" about their application. New tools and methods are often developed to address a specific challenge. These new approaches may have wider application than originally intended, but without a forum for sharing these new ideas, many will not be used to their fullest extent. Another reason for sharing both successes and failures is to enhance the training of the workforce. Establishing a forum for sharing ideas is a critical part of training the workforce and instituting change.

Implementation

DUSD(AR) should be challenged with determining the best forum and with its implementation.

Recommendation 6

USD(AT&L) sign and issue two memorandums, one to the acquisition workforce to introduce PBA, and the other to the Defense Acquisition University requiring development of "rapid insertion" PBA overview training as discussed in Recommendation 4 above.

Discussion

To spur a cultural change within DoD, we recommend that USD(AT&L) issue a memorandum to the entire acquisition workforce that explains the objectives of PBA and supports its implementation to the maximum extent possible (i.e., where risk has been sufficiently mitigated).

A second memorandum for the signature of USD(AT&L) has been drafted. This memorandum directs the Defense Acquisition University to execute "rapid insertion" PBA overview training within 180 days from the date of signature at all major DoD acquisition commands.

Implementation

USD(AT&L) staff will be responsible for ensuring the memoranda are signed and distributed.

Commercial Firms, Non-commercial Products

Findings

To further expand the use of PBA, it was our intention to recommend a study group be chartered to evaluate the feasibility of applying FAR Part 12 to "commercial firms" providing non-commercial products to the Government. It is our belief that the application may vary with the type of industry and product manufactured, rather than be based only on criteria such as percent of defense-related sales to total sales.

Just prior to this report being released, we were told that an OSD team is currently evaluating a similar concept, perhaps on a smaller scale, for the purpose of facilitating civil-military integration. Their concept, as we understand it, is that companies with specific plants having only a small percentage of defense-related sales could have these plants designated as commercial plants. The concept is that there will no longer be commercial item designations associated with each product, rather all products purchased by the Government from a "commercially-designated" plant would be subject to FAR Part 12 provisions. We understand there are a number of other issues being considered in conjunction with this concept including, but not limited to, quality and inspection procedures, pricing risk, criteria for establishing and monitoring the designation, and overall pros and cons of the concept.

Although we were unable to obtain a great deal of information about this particular study group, we believe there may be an opportunity to modify the study objectives in order to evaluate the concept from the larger perspective of PBA as well.

Recommendation

Expand the objectives of the OSD "Commercial Items" Study Group to include an evaluation of the commercial plant concept from the larger perspective of PBA, as well as facilitating civil-military integration. Request the Study Group evaluate whether the criteria for obtaining a "commercial plant" designation should vary by type of industry/product provided vice a simpler "one-size-fits-all" approach. Authorize a commercial plant to test the recommendations and provide lessons learned. This test program may require statutory authorization.

Discussion

The purpose of FARA/FASA is to make it more attractive for commercial firms to do business with the Government by streamlining the contracting process for commercial items. However, if a commercial firm desires to bid on a military-unique item, it would be subject to FAR Part 15 requirements. Many commercial firms find these requirements onerous, at best. The next step for civil-military integration and to further expand the use

of PBA may be to apply a commercial approach to non-traditional defense firms desiring to bid on these military-unique products.

Implementation

We believe it is within OSD's authority to expand the scope of the study, but authorization of the test program may require statutory changes. If it is not practical to expand the objectives of this current Study Group, OSD should charter a different group to proceed with this recommendation.

Metrics – Measuring Success

Findings

Metrics should be a feedback mechanism that measures our progress toward goals. Ideally metrics should also be motivational when combined with some sort of stretch goal. In the case of PBA, we had a difficult time conceiving what metrics to recommend. First, as we have acknowledged, a total transition to PBA is neither possible nor desirable. Second, because there are so many factors at work, it is difficult to directly attribute any particular outcome to a specific management action. Thus, all the metrics we conceived are indirect metrics – ones that allow us to draw inferences, but not ones that lead to definite conclusions.

Increased access to commercial technology clearly implies civil-military integration. For this reason, we believe a primary metric for PBA should deal with measuring the participation of commercial suppliers in the military marketplace. A straightforward approach would be to track, over time, any increased participation of non-traditional DoD suppliers as either prime or subcontractors. The DD350 is one tool that can capture commercial contracts (FAR Part 12) at the prime contract level. However, the DD350 database does not capture commercial contracts at the subcontract level. For many of our large, military-unique systems (F-22, F/A-18, etc.), the commercial acquisition opportunities will be at the subcontracting levels – the first-, second-, and lower-tier levels. Today there is no real way of measuring that participation either by contractor or by dollars. To really measure how many commercial dollars are on Government contracts we need data to measure commercial subcontract dollars on FAR non-Part 12 prime contracts. The problem of how to capture this data without an undue burden on contractors is a challenge.

Another civil-military integration metric could come from targeting products/services by Federal Supply Class where there appear to be opportunities that have not been exploited for commercial, FAR Part 12, acquisitions. Based upon data we received during this study, there appear to be many of these opportunities. We reached this conclusion by noting many instances where apparently very similar products and services were purchased using either price-based or cost-based acquisition depending upon the buying activity.

Measuring directly any reduction in acquisition infrastructure due to more widespread use of PBA is a difficult challenge. There are too many other influences on acquisition infrastructure to isolate the effects of PBA. However, we believe it is possible to capture reductions indirectly by measuring the decrease in number and dollar value of cost-based contracting actions over time. We believe it is reasonable that the portion of the acquisition infrastructure devoted to auditing and accounting for costs should decline in proportion to any decline in CBA. Furthermore, to the extent that there is a leadership commitment to expanding the use of PBA, there should be a stretch goal for this metric.

Finally, we believe there needs to be a metric to assess the degree that more widespread use of PBA saves money. This assumption is quite controversial because there are many who believe that moving toward PBA will cost, not save, money. We believe the best means to determine whether implementing PBA results in cost savings (or costs) is to target specific price-based acquisitions that would have historically been cost-based. Using these selected acquisitions, we suggest a comparison be made of a program's cost estimate developed using traditional CBA methods (e.g., historical analogies) to actual (negotiated) costs under the PBA approach in order to draw an inference about these savings (or costs).

Recommendations

1. Establish a metric that measures the participation of primarily commercial suppliers as competitors for either prime or subcontractor roles in non-FAR Part 12 contracts.
2. Establish a metric that measures the change in FAR Part 12, commercial prime contracts and contract dollars over time. The measure would be as a percentage of total number and dollar value of all contracts (or possibly contracts within a class).
3. Establish a metric that measures the annual dollar value of commercial subcontracts when procuring non-commercial items. This measure would be as a percentage of total number and dollar value of all subcontracts (or class of subcontracts).
4. Require each Service to identify FSC codes included in the DD350 database that are targets of opportunity for increasing commercial buying. After an initial benchmarking, the metric would be to track (by percentage) progress toward more commercial buying in these FSCs.
5. Establish a metric that measures over time the decline in number and dollar value of cost-based acquisitions as a percentage of all acquisitions. For purposes of this metric a cost-based acquisition would be any one where the Government obtained certified cost or pricing data. This metric could have a stretch goal associated with it.
6. Identify a set of acquisitions within each buying Agency that will be price-based pilots. These pilot acquisitions should be ones that have historically would have been cost-based (e.g., sole source production contracts). The metric will be to compare the actual price for each of these pilot acquisitions to a pre-award independent estimate.

Recommendation 1

Establish a metric that measures the participation of primarily commercial suppliers as competitors for either prime or subcontractor roles in non-FAR Part 12 contracts.

Discussion

This metric will be a good measure of increased civil-military integration. Unlike a contract award-centered metric (e.g., Recommendation 3) this competitor-centered measurement will be one that will capture increased access to the commercial marketplace.

Implementation

This metric will conceptually be an annual summation of primarily commercial suppliers who offered to supply goods or services to the DoD as either a prime contractor or first/second tier subcontractor for one or more non-commercial contracts. A time wise comparison will provide the measure.

An essential element to implement this metric will be to define what a "primarily commercial supplier" is. Refer to our discussion of commercial suppliers in the previous section, “Commercial Firms, Non-commercial Products” for further information.

There is no question that collecting this data will be an administrative burden for Government buying offices and prime contractors. It is possible that some of the burden could be lessened by looking only at contracts or subcontracts valued at more than $500K.

Recommendation 2

Establish a metric that measures the change in FAR Part 12, commercial prime contracts and contract dollars over time. The measure will be as a percentage of total number and dollar value of all contracts (or possibly contracts within a class).

Discussion

We believe that educating the workforce in the use of FAR Part 12 contracts could have enormous payoff over time. With education, we believe there will be added opportunities for commercial firms to participate in the DoD marketplace via FAR Part 12 contracts.

Implementation

Implementing this metric should be relatively easy using DD350 data. The metric could be viewed at the DoD level and broken down by Agency, by Command, or by buying location.

Recommendation 3

Establish a metric that measures the annual dollar value of commercial subcontracts when procuring non-FAR Part 12 items. This measure would be as a percentage of total number and dollar value of all subcontracts (or class of subcontracts).

Discussion

This recommendation has sweeping implications across the entire DoD procurement system. More and more of our complex systems are comprised of increasingly greater numbers of commercial components. This is in addition to the larger number of entirely

commercial systems (VC-32, C-21, etc.). Moreover, a transition to more price-based acquisition for prime contracts should produce more price-based subcontracts and, thus, more commercial subcontracts.

Implementation

Similar to the tracking of Small, Small Disadvantaged and Women-owned Business subcontracting goals, the DoD could establish a requirement for contractors to track their commercial subcontracting. This will require the construction of DFARS language to require tracking within the commercial subcontracting reporting system. Prime contractors already have the ability, via FAR 52.244-6, to award "commercial subcontracts" in the performance of their non-commercial prime contracts. In fact, FAR 52.244-6 (b) states: "To the maximum extent practicable, the Contractor shall incorporate, and require its subcontractors at all tiers to incorporate, commercial items or non-developmental items as components of items to be supplied under this contract." As with the tracking and validation of small business goals, the responsibility for monitoring the commercial subcontracting opportunities could be accomplished by DCMC. The downside to this metric is that it would establish another Government-unique requirement for contractors and have an administrative cost impact for the Government and contractors. Without a metric that captures commercial data at the subcontract level, we do not have a true picture of what percent of the dollars is commercial non-FAR Part 12 contracts.

Recommendation 4

Require each Service to identify FSC codes included in the DD350 database that are targets of opportunity for increasing commercial buying. After an initial benchmarking, the metric would be to track (by percentage) progress toward more commercial buying in these FSCs.

Discussion

Today's reality is that not all contracts are candidates for commercial-item contracting because they are not and will never be commercial items. The Litton-TASC study identified that increased opportunities for commercial contracting exist in the service contracting and specific product areas.[54] Refer to Appendix B, "Targets of Opportunity", for further details. However, each Service needs to study what areas should be considered for increased commercial contracting within that Service. This involves identifying and working impediments as to why certain contracts that appear to be candidates for commercial FAR Part 12 contracts were not awarded as commercial contracts. Once the Services identify these areas, they need to benchmark them, work the impediments, set goals, and begin to track improvements.

[54] "The Potential Impact of Price-Based Acquisition, A Supplementary Study to the Section 912C Panel"; Interim Report; by Litton-TASC; April 1, 1999.

Implementation

Currently, a DoD IPT has been studying commercial data and has made some strides in identifying commercial impediments. The Services should leverage this IPT to develop their targets for improving the amount of commercial contracting. This could be measured using the DD350 blocks for FSC, FAR Part 12, type of contracting action, and dollars obligated.

Recommendation 5

Establish a metric that measures over time the decline in number and dollar value of cost-based acquisitions as a percentage of all acquisitions. For purposes of this metric a cost-based acquisition would be any one where the Government obtained certified cost or pricing data.

Discussion

In 1998 there were more than $66 billion worth of acquisitions where the Government required cost or pricing data to establish a fair and reasonable price. There is some level of Government acquisition infrastructure (e.g., people) associated with this level of CBA. Tracking a decline in these actions over time (beginning with a 1999 baseline) will provide a measure of the reduced need for this infrastructure. A stretch goal for this metric may also be appropriate as it could provide a powerful catalyst for change.

Implementation

Implementing this recommendation requires first establishing a baseline using 1999 data. Tracking the change in the metric over time would provide the indirect measure we seek. If a stretch goal is established, it will require DAE approval, followed by dissemination to the workforce. Our belief is that DUSD(AR) should assume the responsibility for this metric.

Recommendation 6

Identify a set of acquisitions within each buying Agency that will be price-based pilots. These pilot acquisitions should be ones that would have historically been cost-based (e.g., sole source production contracts). The metric will be to compare the actual price for each of these pilot acquisitions to a pre-award independent estimate.

Discussion

Until there is some data (and probably afterward) arguments about whether or not PBA will result in lower prices will continue. There is no easy way to determine savings because so many factors affect actual prices. However, we believe that a reasoned

approach is to collect actual price data on a sampling of pilot acquisitions. The pilots would be those PBA acquisitions where a CBA approach would have been customary. By comparing the actual price to a pre-award price estimate one should be able to make experimental inferences about whether PBA saves money (or does not).

Implementation

Implementing this recommendation requires buying Agencies to identify specific acquisitions that have used or will use PBA in a non-traditional circumstance (e.g., sole source production). Once identified, the metric will be the actual (negotiated) price compared to a tightly constrained, pre-award independent price estimate – a price estimate that relies on data from analogous cost-based acquisitions and does not require the supplier to provide cost data.

Unique Markets

Price-based Acquisition and Sole Source Procurements

Introduction

There are many people who believe that PBA cannot or should not be used in a sole source environment. It seems this is of particular concern when it comes to the acquisition of large weapon systems. This section will discuss how PBA can be applied in sole source procurements using several tools and methodologies described in previous sections. The tools and methods we describe are not exhaustive. Our intent is to demonstrate that PBA is feasible in a sole source environment and to provide examples that illustrate the point.

Probably more so than with competitive procurement, using PBA in sole source procurements requires the buying activity to be knowledgeable of the particular product or service and the market conditions that may affect the price. Refer to our recommendation on the Market Research Center of Excellence for more information.

Using a pure-PBA approach also does not mean the buying activity cannot use cost data already in its possession. As long as the data is valid, it can and should be used as one means to establish a fair and reasonable price from the Government's perspective. We recognize there will be many companies that must still operate under a CAS-compliant system, having existing cost-type contracts with the Government. This fact should not drive decisions about new procurements. Because a company has an accounting system that allows the Government to obtain detailed cost data does not mean it should be requested as a routine business practice. In other words, the choice of PBA or CBA should not be driven by the accounting system, a practice that will tend to occur with sole source procurements.

In the "Introduction" of this report we clearly stated that the use of PBA or CBA is dependent on many factors. We also implied that any move on the continuum towards PBA, in its purest form, should be considered a success. This is probably even more important in the sole source environment.

A Typical Scenario – Mixed Approach

To illustrate a concept, we will start with a hypothetical example for a major weapon system program where the buying activity intends to pursue a PBA approach for future procurement lots although initial contracts were established using a mixed approach, CBA and PBA. The company operates a CAS compliant system. In this example a Fixed-price, Variable Outcome contract was used in the early stages of development (e.g., Concept Exploration, Program Definition and Risk Reduction). A cost contract was awarded for EMD and is close to completion. A Fixed-price Incentive Fee contract will be used for two lots of Low Rate Initial Production (LRIP), with follow-on Full Rate production

being procured using a firm-fixed-price contract. The company has provided to the Government cost data for EMD. Cost data will also be provided by both lots of LRIP. A depiction of this hypothetical example is shown in Figure 8.

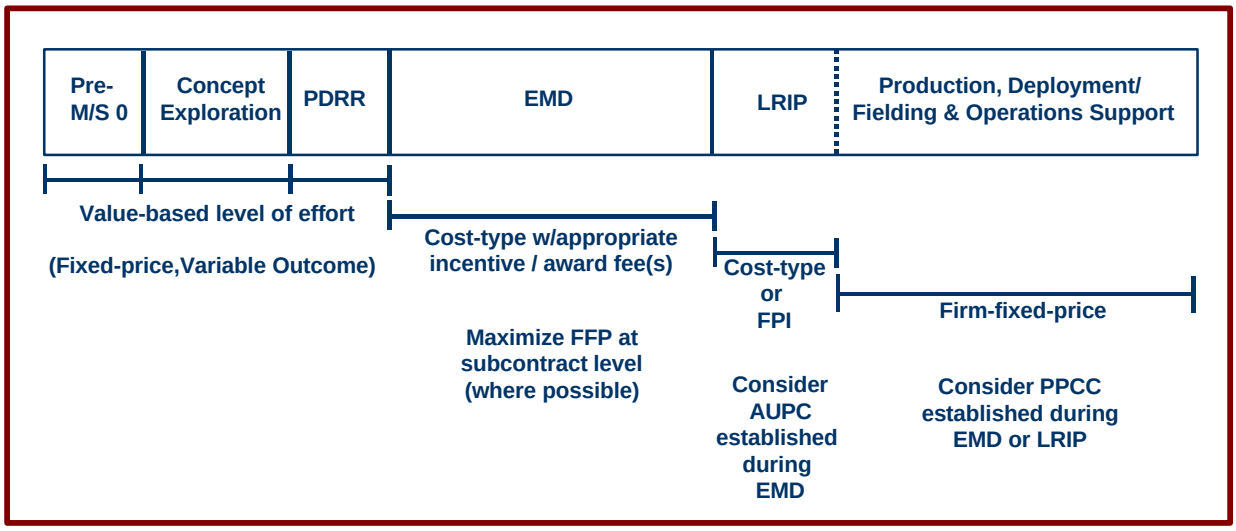

Figure 8. Mixed Approach over the Lifecycle

Maintaining Competitive Incentives - PPCC

Continuing with this example, as the program enters LRIP, the buying activity begins to move along the continuum toward a PBA approach. The two LRIP lots will be awarded using a Fixed-price Incentive Fee contract, with additional incentives available for meeting (or besting) the average unit production cost (AUPC) for each LRIP lot. This AUPC is negotiated and documented through a contract clause. The payment of the incentive fee is based on the company meeting (or besting) the agreed to AUPC.

The buying activity intends to use a PBA approach to procure all follow-on full rate production lots. So, at the same time the AUPC is being negotiated, the Government and contractor will establish a production price commitment curve (PPCC) for future production lots. The PPCC becomes the basis for FFP contracts. This is depicted in Figure 9.

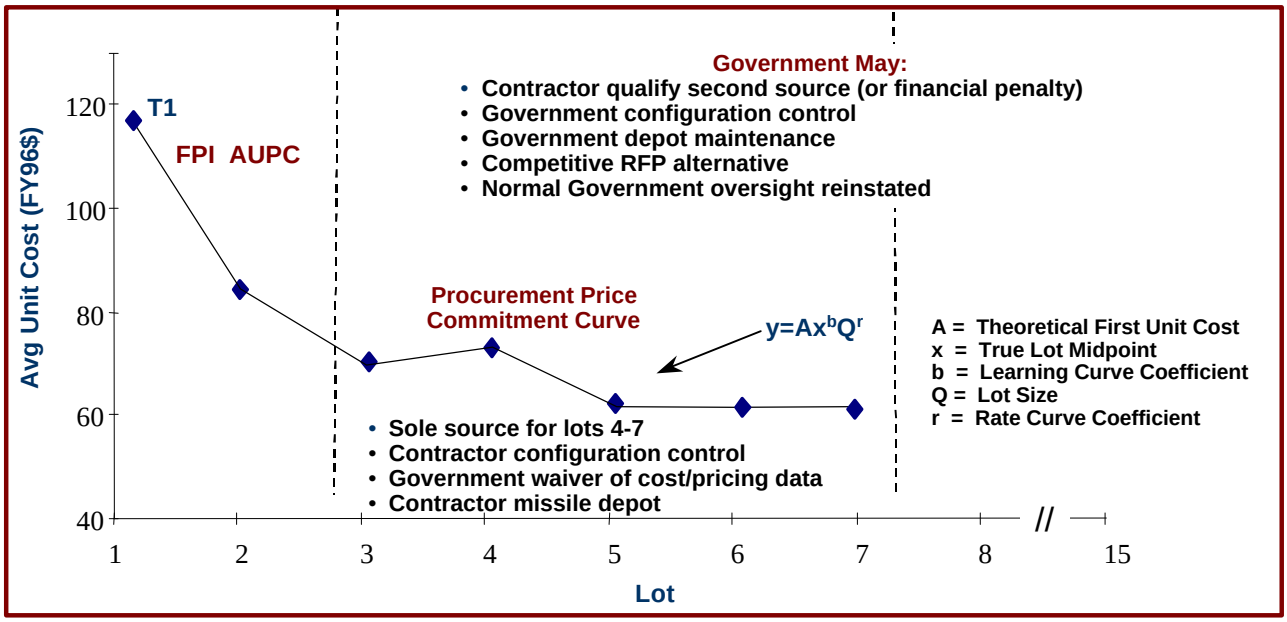

Figure 9. Procurement (Production) Price Commitment Curve – a Depiction

There are many incentives (and disincentives) associated with the PPCC which are documented in a contract clause. For example, if the contractor in submitting a proposal for full rate production lots meets (or bests) the PPCC, the Government may waive the requirement for certified cost or pricing data and contract award will be based on price analysis. Any cost data requested will be limited to the express purpose of identifying those components that are significant cost drivers in order to work in a collaborative manner to reduce these costs – in other words, to use a commercial approach. Another major incentive could be that the Government reserves the right to require the contractor to qualify a Government-approved second source if the proposed price for production lots exceed the PPCC. In this example, neither the procuring activity nor the contractor has a complete data set to work with. However, at the time the AUPC and PPCC are negotiated both will have access to historical cost and technical data from EMD. So both are in a position of having to establish a fair and reasonable price for full rate production with limited data. This is where additional information about similar programs and about current market conditions becomes critical.

To succeed in the end, the risks associated with the program must be equitably distributed between the Government and contractor so that the Government obtains a fair and reasonable price and the contractor has the opportunity to earn a reasonable profit.

Appendix J includes this AUPC/PPCC contract clause, slightly modified, as used in a "real" acquisition. This real program followed a similar scenario as described in this example (i.e., initial program phases were competitive and used a CBA approach).

A Variation, Using a PBA Approach Early in the Process

A variation of the hypothetical example depicted in Figure 8 could involve a FFP EMD contract. This assumes that a risk-mitigation acquisition strategy such as Evolutionary and/or Incremental Development is used. These strategies are valid whether the acquisition is sole source or competitive. Whether price-based pricing techniques can be used will dependent on the Government's ability to determine a fair and reasonable price without obtaining supplier cost data. Our next example will demonstrate that price-based pricing methodologies can be used for development as well as production programs.

Maintaining Competitive Incentives - Dissimilar Competition

Another approach that may be particularly useful in a sole source environment is dissimilar competition. A discussion of this approach is included in the "Maintaining Competitive Incentives" section of this report, with examples included in Appendix O. Depending on how dissimilar (or similar) the alternatives are, will affect whether this approach can be used to determine a fair and reasonable price for the given program or if it can only be used to increase pressure on a contractor to control costs and remain competitive.

The example below builds on one of the **hypothetical** examples included in Appendix I and is depicted in a pictorial fashion. The first step, shown in Figure 10, shows hypothetically how the Navy might use the F/A-18E/F Program to maintain competitive pressure on the Joint Strike Fighter (JSF) Program (and visa versa). In this particular example, we assume the Navy will procure both the F/A-18E/F and the JSF. What might vary is the total quantity of each.

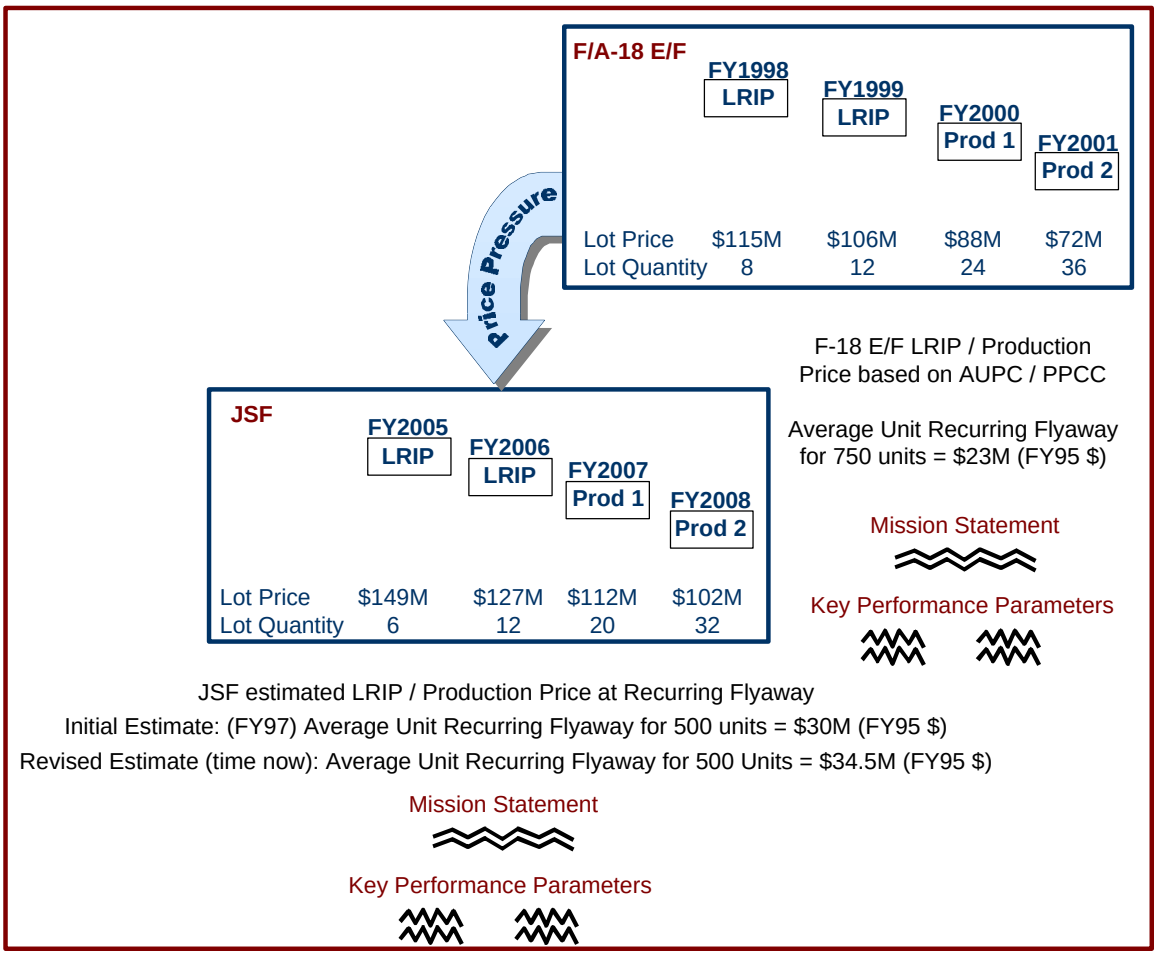

Figure 10. Dissimilar Competition (A Simple Scenario)

How might this work? The Navy and Air Force have established a target unit production price for this joint program, the JSF while it is still in EMD. The target price is based on buying a specific number of aircraft. Let us assume that the projections of this unit price grow as the EMD program progresses. The Navy is currently buying F/A-18E/F aircraft from the Boeing Corporation (i.e., low rate initial production aircraft). Again, price is based on the Navy procuring a specific number of aircraft over the life of the program. For this example, we will assume the F/A-18E/F pricing remains on target. The Navy is now in a position to put pressure on the JSF contractors to control the growth of the expected unit production price of the aircraft by showing a willingness to change the mix of total aircraft procured. For example, let us assume the original buy of JSF production aircraft is 500, with an expected average unit recurring flyaway price of $30M (FY95$), while the total quantity of F/A-18E/F aircraft is 750, with an expected average unit recurring flyaway price of $23M (FY95$). Now assume, the price of the JSF has increased by 15% to $34.5M, while the F/A-18E/F price remains constant. So the Navy decides to consider changing the mix of aircraft, decreasing the JSF by 10% to 450, and increase the quantity of F/A-18E/F's to 800, an addition of 50.

The first step is to communicate this to the JSF contractor. For the approach to work (i.e., to place pressure on the contractor to gain control of cost growth), the Government must allow the contractor time to solve the problem.

Are there potential drawbacks? Definitely, and they need to be understood before embarking along this path. But first, before we look at the drawbacks, it must be noted that the benefits, if the approach is successful, can far outweigh these drawbacks.

First, in this example, if the JSF contractor is unable (or unwilling) to control cost growth, reducing the number of JSF aircraft will have an immediate affect of increasing the unit price even further (i.e., it is a matter of economic order quantity and rate affect). To use this strategy, the Government must acknowledge that this is a possibility. Contingency plans are required, and if the problem is severe enough, a program may have to be terminated.

Second, the two alternatives, in this case the JSF and F/A-18E/F must be similar enough in terms of mission performance, so that this type of trade in quantity can be reasonably made. If this is not the case, the dissimilar alternative may actually be a combination of systems.

Third, contractors must believe that such a decision would be made and carried out.

Fourth, there are political considerations that may support or hinder such a move.

A situation, such as the one portrayed in this hypothetical example, is likely to be much more complex in the real world. We build on this hypothetical example to illustrate. There is other weapon systems that may also warrant consideration in the decision-making process. For example, the Air Force may also being using a similar acquisition strategy between the JSF and F-22, and the F-22 and an F-15 Upgrade. The Navy may also have an F/A-18C/D Upgrade program on-going specifically to maintain pressure on F/A-18E/F program pricing. Another possibility could have been continuation of the F/A-18C/D production line to meet Foreign Military Sales or to maintain competitive pressure. The more alternatives and Services (or Agencies) that play into the overall strategy, the more complex the situation. Figure 11 illustrates this more complex Dissimilar Competition approach.

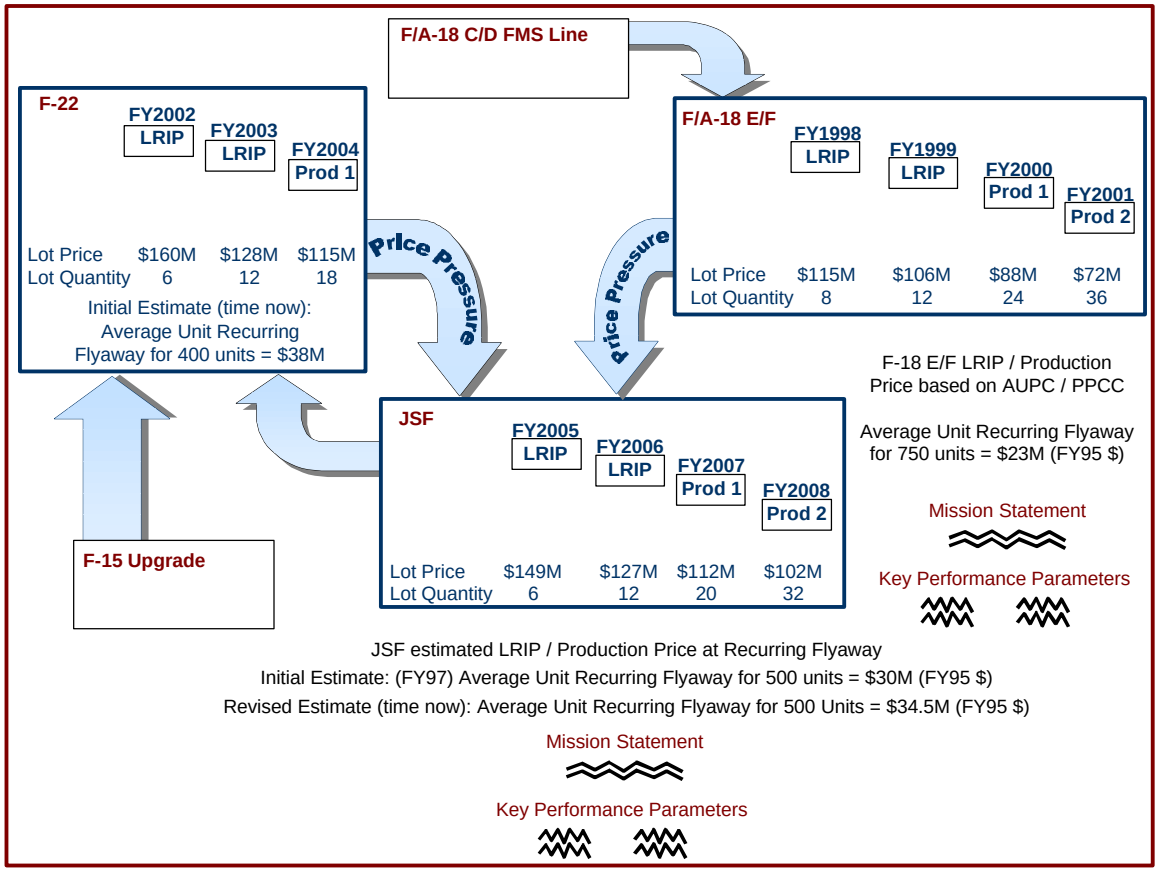

Figure 11. Dissimilar Competition (A Complex Scenario)

Tools and Methods - A Focus on Parametric Pricing

We have found a number of examples where parametric pricing was used to develop estimates for programs entering development, in most cases EMD. Many people do not want to include parametric estimating as a price-based tool as most parametric equations are developed from detailed cost data. Others believe, that as long as the data is historical cost data from multiple programs and the contractor for the current program is not being asked to provide cost data to justify its proposal, then parametric estimating should be considered as a price-based tool. We do not intend to argue the merits of this issue one way or another, but do agree this is an area that warrants research in terms of how DoD should adjust parametric estimating to work at a price level vice using detailed cost data. However, in the introduction to this section, we did state that using a PBA approach does not mean the buying activity cannot use cost data already in its possession. As long as the data is valid, it can and should be used as one means to establish a fair and reasonable price from the Government's perspective.

The first two examples, where parametric estimating is used to establish a fair and reasonable price, are both associated with a program managed by the Naval Air Systems

Command (NAVAIR). The first example dates to December 1997. Although the contract type was cost-based, the pricing methodology had price-based qualities. The intent was to minimize, if not eliminate the need for the contractor to provide a detailed cost proposal. In this example the Naval Center for Cost Analysis (NCAA) used parametric equations to develop an Independent Government Estimate for the program. Excerpts from the memorandum documenting the estimate are included in Appendix O. Cost/price information is disguised or removed to protect the proprietary nature of the data.

The second example, using this same program, dates to May 1998. At this time, the program had been modified to better reflect budget realities. The example specifically relates to the Contracts Department requesting a waiver to the requirement for submission of prime and subcontractor certified cost or pricing data in support of the EMD procurement. The excerpts included in Appendix O for this example are largely focused on the reasons for not requiring certified cost or pricing data and not on the description of the parametric estimate used in the justification.

We have included another example where a waiver from the requirement to obtain certified cost or pricing data was requested for another Navy-managed program, but this time the emphasis is on the method used to develop the Government's position of fair and reasonable price. In 1997, the program was in its twenty-first year of production, with approximately 6,500 units already procured. Again, this is a program where considerable historical data is available. Both the contractor and Government mutually agreed to use regression analysis to determine cost for both the primary units and spares. The analysis was largely conducted at the sub-component level. Appendix O includes excerpts from the Business Clearance Memorandum that describes in detail how the analysis was completed.

The examples presented so far have not reached price analysis to the extent that we might see in the commercial market, in other words at the total price level. In the example above, regression analysis was used to estimate "factory costs" while level of effort tasks were based on analogy from an earlier procurement (i.e., FY 1994). General and Administrative (G&A) costs were based on the Forward Pricing Rate Agreement in effect at the time. Profit was then added to the bottom line, based on the Government's estimate of a reasonable profit to reflect the maturity of the program and shared savings. The purpose for raising this point is not to detract from the excellent work performed by these various programs, it is only to highlight that there are still opportunities to move further along the CBA-PBA Continuum.

This next example is included to show how the acquisition community is continuously developing new tools that can lead to efficiencies in the process. For example, a study that includes the development of Cost Estimating Relationships (CERs) for both EMD and production is available for engines.[55] As with all parametric equations, there are strengths and weaknesses associated with the CERs developed. It is not surprising that

[55] Aircraft Gas Turbine Engine Acquisition Cost and Characteristic Database, dated 5 June 1997. The study was sponsored by the Naval Air Systems Command Cost Department and the Air Force Cost Analysis Agency; and developed by Ketron, a Division of the Bionetics Corporation.

development CERs often have higher levels of standard error. For this particular engine study, the developer's assessment states it best. "The development of credible EMD CERs is always difficult. Given the inherent unique aspects of individual programs, the predictive capability of parametric relationships derived using regression analysis is dubious at best. However, the team thinks that even with all of the discussed limitations, the EMD CERs generated have reasonable residual benefit to the Government. Although most of the EMD CERs are dependent upon …, *the relationships should help analysts estimate EMD cost of a future engine with a reasonable level of confidence* (italics added). At a minimum, they provide a sanity check … for Milestone II decision [56]

Yes, it is important that we understand the strengths and weaknesses associated with any pricing tool that is used. **The question always comes back to level of confidence and how much pricing risk is acceptable**.

In this same study, the CERs developed to predict production costs were highly rated. The developer states, "All of the CERs presented possess outstanding statistical properties. The results are not surprising since the manufacturing process across different engines is very similar."[57]

The EMD and production correlation matrices and sample CERs are included in Appendix O. Also included is an example of the CERs being used to predict an historical program – an assessment of accuracy and a showing of strengths and weaknesses of the method.

We include one final example of parametric estimating, regression analysis, and CERs, to estimate production cost. This example relates to aircraft recurring flyaway (cum average at unit 400), and is based on a simple CER, dollars per pound of empty weight plotted against the year of Initial Operating Capability (IOC). The data set includes attack and fighter aircraft, Air Force and Navy. Because the data contained in such a regression plot is proprietary, rather than identify a specific aircraft with its dollars/pound, the data in Figure 12 is disguised, although the relationships are real.

[56] ibid, paragraph 7.4 Assessment, pg. 41.
[57] ibid, paragraph 8.1 CERs Using Physical and Performance Characteristics, pg. 52.

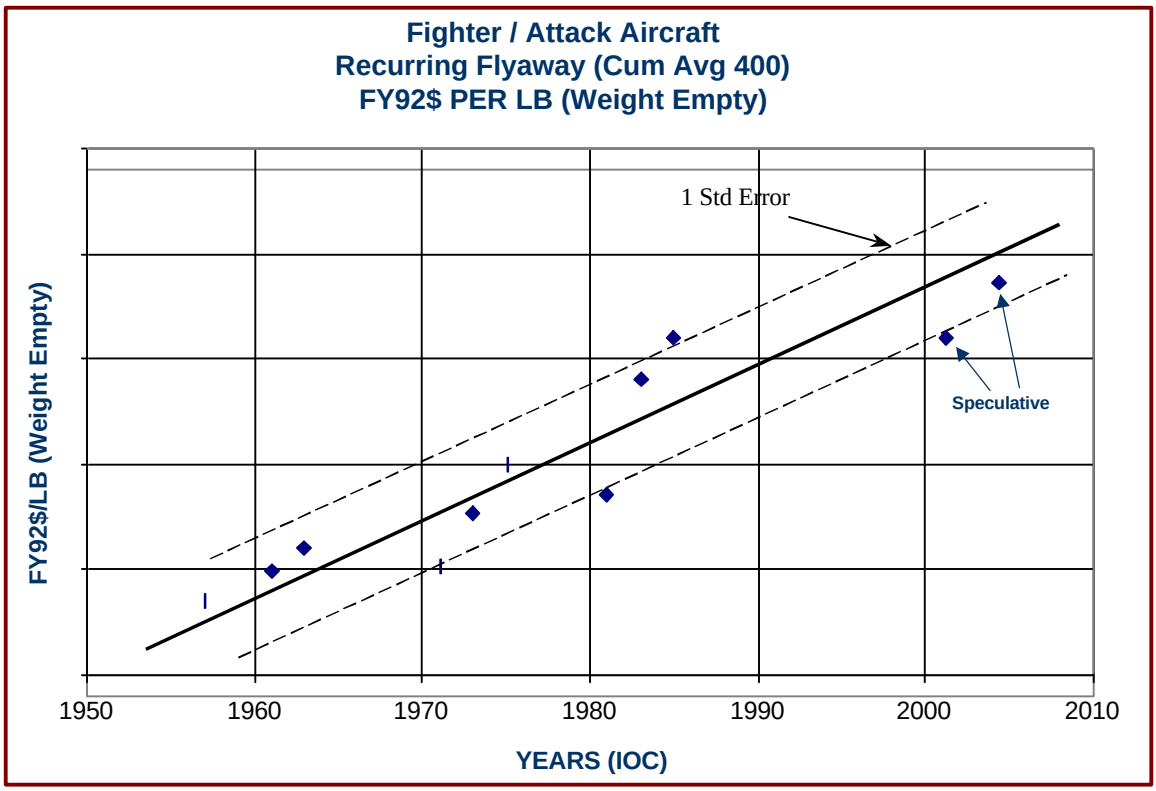

Figure 12. A Regression, Recurring Flyaway (Cum Average 400)

Can this data be used to determine if a proposed price for a new aircraft scheduled for production in future years, with unit 400 in FY2006, is fair and reasonable? With an estimate of weight empty and the proposed price, an analyst can make comparisons to historical data. Trend analysis shows a steady growth in dollars/pound, but this trend may not necessarily continue into the future. This type of summary-level information is best used to establish an initial position. For example, if the proposed price is not within one standard deviation (or any other boundary set to determine reasonableness), questions need to be asked before an initial position is established. It is highly recommended that this particular tool be only one of several used to determine whether the price is fair and reasonable for sole source procurements. It is important for any analyst to understand that changes in design and manufacturing processes, business operations, etc. that are not reflected in the historical data depicted be adequately researched and considered to ensure price is truly fair and reasonable.

Another NAVAIR-managed program provides us with another example of a parametric pricing tool, commonly known as an amoebae or spider chart.[58] Figure 13 shows this particular format.

[58] Data and analysis provided by the Naval Center for Cost Analysis in cooperation with the NAVAIR Cost Department.

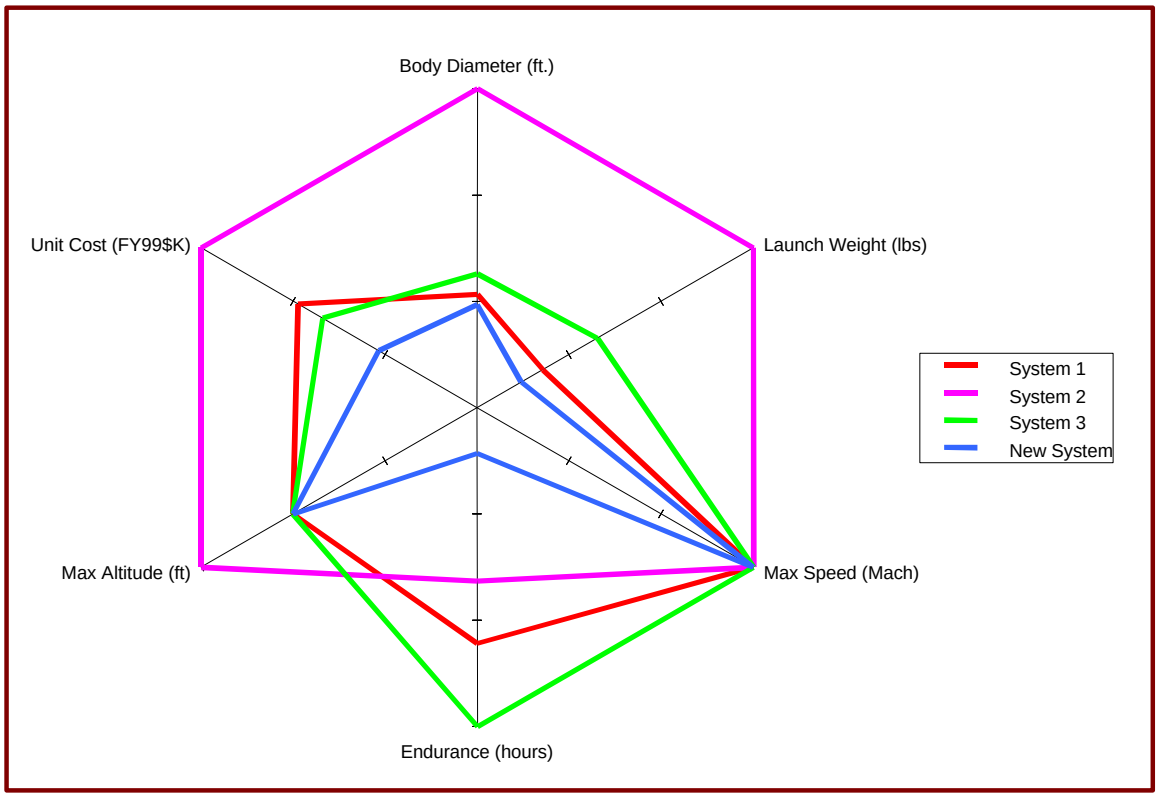

Figure 13. Amoebae / Spider Chart

This technique was actually used as a basis to establish a fair and reasonable price without the Government developing an independent cost estimate or the contractor providing a detailed cost proposal. Details are included in Appendix O. The analysis did find that the new system's performance was comparable to several historical programs, at a lower cost.

The Engine Study[59] also documents this approach. Appendix O includes additional excerpts from this study. Again, the historical relationships between acquisition price and physical/performance characteristics have been graphed. The intent behind these graphs is to show that engine performance and price is directly related.

This tool may be used as a crosscheck, or even possibly as the primary means to determine if a proposed price is fair and reasonable. Again, it is a matter of plotting appropriate technical/performance characteristics against price.

The Simple Learning Curve

Probably one of the simplest tools to use in price analysis is the learning curve combined with extrapolation of actuals. This method is an excellent tool in a sole source environment because the data used in the analysis is generally company specific and

[59] Aircraft Gas Turbine Engine Acquisition Cost and Characteristic Database, dated 5 June 1997.

reflects that company's operating procedures. Learning curve analysis can be used at a summary level (i.e., total price) or can be applied at lower levels (i.e., sub-components). This theory is generally used in developing the AUPC / PPCC discussed earlier in this section.

The basic theory is that as quantities are doubled (e.g., from unit 1 to unit 2; unit 50 to unit 100; unit 1000 to unit 2000) the price will drop by a specific percent. For example a 90% learning curve indicates that price will be reduced by 10% every time quantity is doubled, all other factors being equal. In fact, the acquisition world is seldom this simple – there are other factors such as escalation, business base changes, and variations in quantities between production lots that must be considered. The simple learning curve when combined with additional tools, such as the rate function to evaluate the affect of quantity variations, is a very powerful estimating tool. It is widely used today.

For example, we asked the cost estimator for three production programs what percentage of their models were estimating using the learning and/or learning/rate curve. For the Joint Stand-Off Weapon (JSOW), 60% of total cost is estimated at a price level. Approximately 75% of F/A-18E/F program costs are estimated at the price level. The AIM-9X comes in at approximately 80%.

Appendix O includes a simple example of both the learning curve and learning/rate methods using real data. These analysis (i.e., extrapolation of actuals) can be used to estimate future lot costs.

Program Unique Methods

As previously stated, we strongly believe that PBA can be applied in sole source procurements. We have described some generic tools, common to many acquisition programs, while providing "real" examples to support the concepts. We must also recognize that methods are often developed within a program team specifically to deal with unique issues of their program. It is these examples that need to be shared across the acquisition community. From these examples will come the development of new generic techniques. What these examples also illustrate is that a program can shift towards a PBA approach no matter where it is in its lifecycle.

We include one example of a program-unique approach – an Army-managed program. The example is a "spiral modernization" program that incorporated best practices developed within commercial industry. The program has implemented a modernization approach that leverages commercially developed and produced components. The business strategy used was designed to foster and benefit from this commercial environment, implementing improved or lower cost components into production as continuous changes. An overview of the program along with a brief description of the method used for pricing changes is included in Appendix O.

Conclusion

We believe we have demonstrated that a price-based approach is compatible with a sole source environment. As mentioned, many of the examples included in this section are not using price analysis to the extent that we might see in the commercial market, in other words at the total program or total price level. However, we have seen excellent progress in implementing the goal as specified in FAR Part 15.802 – "the Contracting Officer should use every means available to ascertain a fair and reasonable price prior to requesting cost or pricing data". We should take time to acknowledge this excellent work and to celebrate these successes, while recognizing there is still progress to be made. We need to continue our push to move further along the CBA-PBA Continuum.

PBA and Subcontracts

To maximize the benefits of PBA for both the Government and contractors (both the prime and its subcontractors), we strongly encourage that the prime use a PBA approach with their subcontractors to the maximum extent possible, regardless of the arrangement the Government has with that prime contractor.

In fact, it is not necessary for the Government to have a firm-fixed-price contract with the prime contractor in order for the prime to have an FFP contract with its subcontractors. Nor must the Government use a price-based pricing methodology with the prime for it to be used at the subcontract level.

It is our belief that, at least initially, the uses of and benefits from PBA will be realized to a greater extent at the subcontract level. This may be true for several reasons. One, bringing commercial technology into military weapon system procurements is more likely to occur at the subcontract level. Many of these commercial companies will not do business with contractors in the military-industrial complex unless they can continue to operate as a commercial firm (i.e., they will not accept a "flow down" of Government cost-based requirements).

Two, many people believe it will be "easier" to manage the risk associated with developments at the subcontract level, vice at total program.

Three, it will be a way for contractors who are almost exclusively Defense-based to reach into and understand the commercial market place. Hopefully, this will foster additional non-Defense business that will mutually benefit both the Government and contractor by strengthening a company's business base and increasing knowledge of market-based business strategies.

Four, contractors may find it much easier to use PBA techniques as there are procedures already in place to facilitate doing so (e.g., FAR Part 12). There are also fewer restrictions currently in place that prevent a PBA approach from being used (e.g., no requirement for a subcontractor to provide certified cost or pricing data or obtain a waiver).

Using a PBA approach for subcontracts will likely require a major change in the way business is conducted. In order for PBA to be successful, the Government needs to be an informed buyer, while contractors (both prime and subcontractors) need to be informed suppliers. To do this, communication is key. PBA does not equate to a contractor "shutting the Government out", or to saying "we gave you the price, now we will do it our way and we do not want to be bothered with Government people in our plant." It means working together and in many cases it will mean a prime/Government team working together with the subcontractor. Successful use of PBA means understanding the risk associated with a program and working together to control (or mitigate it). Understanding risk requires communication.

We realize that for many of the contractors who do business with the Government today, adopting a PBA approach will require a significant cultural change within their organizations and resistance will likely be high. It is for this reason, that we believe our recommendations regarding training of the acquisition workforce apply equally to contractor personnel.

Summary

Summary

We have offered recommendations that we believe have met the terms of our Charter. They are sweeping and, certainly to some, radical. Although we did not go as far as the Defense Science Board by, in essence, mandating PBA. We do not believe that a gentle bias toward more PBA techniques or some modest workforce training will produce the positive results possible with a dramatic change in how DoD buys.

Our recommendations are also sweeping in the sense that they suggest major changes in the entire acquisition process – not just the portion of the process where the Government decides whether or not to get cost or pricing data to determine price reasonableness and fairness.

We recognize that there will be a strong tendency to want to pick and choose among our recommendations. Some people will want to pick only those that are least controversial, those that are easiest to implement, those not requiring statutory change, those that appear to have negligible risk, or those that fit their pre-dispositions. Succumbing to these tendencies would be a mistake, we believe. Our recommendations are synergistic and, in many cases, interdependent. So, picking only a few is likely to have negligible results.

Finally, we understand that any substantial movement toward PBA will be difficult. There will be some miscues and some, not insignificant, risks. Training will be costly and time consuming. Many people within both the Government and the military contractor community will resist any meaningful change. However, in the end, we believe the prospect of these should not deter moving aggressively forward to harvest the benefits that PBA surely offers to both the DoD and the nation.

Acronyms

AAAV	Advanced Amphibious Assault Vehicle
ACAT	Acquisition Category
ADR	Alternative Dispute Resolution
ADRA	Administrative Dispute Resolution Act of 1996
ATRB	Award Term Review Board
AUPP	Average Unit Production Price
AUPPR	Average Unit Production Price Requirement
BCA	Board of Contract Appeal
CAIG	Cost Analysis Improvement Group
CAIV	Cost as an Independent Variable
CAS	Cost Accounting Standards
CBA	Cost-based Acquisition
CBT	Computer-based Training
CCDR	Contractor Cost Data Reporting
CDA	Contract Disputes Act of 1978
CER	Cost Estimating Relationship
CINCs	Commanders in Chief
CO	Contracting Officer
COCOMO	Constructive Cost Model
CODSIA	Council of Defense and Space Industry Associations
COPADAT	Cost or Price Analysis Decision Assistance Tool
COSSI	Commercial Operating and Support Savings Initiative
COTS	Commercial-off-the-Shelf
DAE	Defense Acquisition Executive
DAWIA	Defense Acquisition Workforce Improvement Act
DCAA	Defense Contract Audit Agency
DCMC	Defense Contract Management Command
DFARS	Defense Federal Acquisition Regulation Supplement
DFAS	Defense Financing and Accounting Service
DSB	Defense Science Board
DoD	Department of Defense
DUSD(AR)	Deputy Under Secretary of Defense (Acquisition Reform)

ECP	Engineering Change Proposal
EMD	Engineering and Manufacturing Development
EPA	Economic Price Adjustment
ERP	Enterprise Resource Planning
ESG	Executive Steering Group
EVM	Earned Value Management
EVMS	Earned Value Management System
FAR	Federal Acquisition Regulation
FARA	Federal Acquisition Reform Act of 1994
FASA	Federal Acquisition Streamlining Act
FFP	Firm-fixed-price
FPI	Fixed-price-incentive
FSC	Federal Supply Code
FY	Fiscal Year
GFP	Government Furnished Property
GS	General Service
HCA	Head of the Contracting Activity
IGE	Independent Government Estimate
IPT	Integrated Program Team
IRR	Internal Rate of Return
J&A	Justification and Approval
JASSM	Joint Air-to-Surface Standoff Missile
JDAM	Joint Direct Attack Munitions
JROC	Joint Requirements Oversight Council
JSF	Joint Strike Fighter
KPP	Key Performance Parameter
MCOE	Market Center of Excellence
M/S	Milestone
NAPNOC	No Acceptable Price, No Contract
NASA	National Aeronautics & Space Administration
NAVAIR	Naval Air Systems Command
NCCA	Naval Center for Cost Analysis

NDAA	Non-developmental Airlift Aircraft
OFPP	Office of Federal Procurement Policy
OMB	Office of Management and Budget
OSD	Office of the Secretary of Defense
ORD	Operational Requirements Document
PAIV	Price as an Independent Variable
PAT	Process Action Team
PATS	Product and Technology Surveillance
PBA	Price-based Acquisition
PDRR	Preliminary Design and Risk Reduction
PEO	Program Executive Officer
POC	Point of Contact
PP	Progress Payments
PPCC	Production Price Commitment Curve
PPCC	Procurement Price Commitment Curve
R&D	Research and Development
RFP	Request for Proposal
RMS	Reliability, Maintainability, and Sustainability
ROI	Return on Investment
SAE	Service Acquisition Executive
SASET	Software Architectural Sizing and Estimating Tool
SIC	Standard Industrial Code
SOW	Statement of Work
SPI	Single Process Initiative
SSA	Source Selection Authority
S&T	Science and Technology
TACOM	Tank and Automotive Command
TDO	Term Determining Official
TINA	Truth-in-Negotiations Act
TOC	Total Ownership Cost
UCA	Undefinitized Contract Actions
USAF	United States Air Force
U.S.C.	United States Code

USD(AT&L)	Under Secretary of Defense (Acquisition, Technology & Logistics)
VE	Value Engineering
VECP	Value Engineering Change Proposal

Appendix A
Charter

CHARTER FOR THE PRICE-BASED APPROACH TO ACQUISITION
STUDY GROUP

INTRODUCTION AND BACKGROUND

In order for the Department to continue its Revolution in Business Affairs, DoD must eliminate or reduce the differences between the Department and commercial buyers in obtaining goods and services from the national industrial base. DoD needs to do this in order to reduce the price of military products by enabling Defense companies to integrate their military business with their commercial business or potential commercial business, and to ensure greater access to commercial products, technology and services. This will provide the warfighters with the best value goods and services they need to perform their mission.

We have already begun to eliminate the differences by changing the way in which we describe our needs from the use of military specifications and standards to the use of the performance specifications for all new acquisitions. We also have begun to change the way in which we administer contracts that have already been awarded through the Single Process Initiative. The next step is to determine how price-based acquisition (outcome oriented) works in the commercial environment, as opposed to cost-based acquisition (input oriented) and how it can best be used in the DoD environment.

Cost-based acquisition, i.e., contracts that are based on costs incurred or projected to be incurred by the contractor, require the tracking and allocation of costs, often in Government-unique accounting systems, governed by Federal Cost Accounting Standards (CAS) and that an offeror often provides certified cost or pricing data. Both the Government and industry have created and maintained infrastructures to administer the process of determining the allowability and allocability of all contractor costs and compliance with CAS. Defense contractors must maintain a cost accounting system, frequently different from a commercial cost accounting system based on generally accepted accounting principles, in order to meet the CAS requirements. In addition, there is a need to understand what accounting practices commercial firms use to account for costs and track cost/schedule status and how these practices might fit DoD acquisitions.

Price-based acquisition is the establishment of contractual relationships using price instead of cost. Price may be established by comparisons to prices of other offers, market prices, competitive alternatives, and parametric analysis based on prices, rather than cost. Price-based acquisition is a well-established approach in the commercial world.

AUTHORITY AND DIRECTION

The Deputy Under Secretary of Defense (Acquisition Reform) is directed to establish a study group to analyze implementation of a price-based approach to acquisition. The study group membership shall include representatives from the Office of the Secretary of Defense staff (including Defense Procurement, the CAIG, Small and Disadvantaged Business Utilization, and the Comptroller), the Military Departments, the Joint Staff, DoD/Inspector General, the Defense Contract Management Command, and the Defense Contract Audit Agency. The Defense Finance and Accounting Service shall review issues that may have major impacts on the financial accounting and contractor payments in order to identify any costs that may be incurred in moving to price-based acquisition. Finally, industry representatives shall be asked to provide their views as part of the study process.

STUDY OBJECTIVES

The study group shall determine how to implement a price-based approach to acquisition within DoD. The study group shall be guided by, but not limited to, the following objectives:

- Develop a set of attributes that would be used to determine value in terms of the performance DoD requires. Develop a methodology that describes how those attributes would be managed to support a

price-based value determination. Consider how cost as an Independent Variable or Price as an Independent Variable should be addressed.

- Determine how to price alternative solutions based upon market alternatives without requiring the supplier to justify its price based upon the component costs of the goods or services being offered and without the need to use cost accounting standards. Determine how to track program progress and estimate future program costs without cost data and cost reports. Include consideration of contract modifications, contract changes, claims, work suspensions/stop work orders, terminations, etc.

- Identify alternative acquisition strategy approaches to use price-based acquisition (e.g., incremental development and risk reduction, modular development, dissimilar competition, etc.). Identify alternative contracting approaches to use price-based acquisition (e.g., share-in-savings contracts, level of effort contracts with incentives based on performance, time and materials contracts with incentives, other transactions, fixed price with non-cost incentives, non-cost task and delivery order contracts, etc.). Identify alternative financing approaches to use price-based acquisition (e.g., milestone billings in place of progress payments, other periodic payments tied to performance, etc.).

- Define “best value contracting” in a price-based acquisition environment and discuss appropriate source selection methodology and approaches.

- Assess the impact of the changes to the Federal Acquisition Regulations resulting from the Federal Acquisition Streamlining Act of 1994 on the number of requests for pricing data versus cost data or cost or pricing data.

- Determine how -furnished property (currently owned or new property) will be handled in price-based acquisition.

- Identify changes needed in statutes, regulations, policies, and practices necessary to implement a price-based approach to acquisition. Provide draft language to implement the necessary changes.

- Identify methods to incentivize the adoption of price-based acquisition and the training needed to change the behavior of the workforce (and industry).

- Identify expected outcomes and metrics for both Government and industry once price-based acquisition is implemented (to include organizational changes, staffing, lead-time, savings, cost of implementation, etc.).

- Develop a schedule and funding requirements, including any DFAS required changes, to move to a price-based environment.

- Determine any risks associated with price-based acquisition and when cost-based contracts are appropriate/required.

- Quantitatively evaluate the projected economic benefits of the price-based approach for different types of contracting actions on different contract types (from services through research and development and production).

- Create examples of how to operate in a price-based environment, including the estimated dollar value of benefits from price-based acquisition, using various types of programs including: development programs (to possibly the Joint Strike Fighter (JSF), Advanced Amphibious Assault Vehicle (AAAV)), a modification program, a non-system component, and a contract for services.

The study group shall report its conclusions and recommendations to the Under Secretary of Defense (Acquisition & Technology) by March 1, 1999. The study group will provide interim reports on its progress to

the Under Secretary of Defense (Acquisition & Technology) each 60 days after the effort begins. A draft report will be prepared for the Under Secretary's review by February 1, 1999.

Appendix B
Targets of Opportunity

Targets of Opportunity[60]

The following chart provides a breakdown of the goods and services DoD procured in FY 1998 by category, sole-source/competition, and contract type.[61]

FY 1998 DoD Procurements (>$25K)	Sole-Source CP*	Sole-Source FP*	Competed CP*	Competed FP*
Supplies & Equipment	7,557,124,800	13,830,988,164	7,403,912,044	20,299,695,148
R&D	5,618,107,197	950,541,337	11,457,685,800	2,076,569,709
Services & Construction	5,401,161,630	2,251,219,769	17,869,810,041	23,422,109,980
Total	18,576,393,627	17,032,749,270	36,731,407,885	45,798,374,837
		Total FY98 DD350	118,138,925,619	

FP* =All firm-fixed-price, CP = all other contracts.
Competed actions include follow-on contracts to competed actions

In supplies and equipment, DoD purchases are less than 50% of total U.S. sales in many markets. As an example, the following illustrates a portion of DoD's FY98 obligations relative to Standard Industrial Code (SIC) areas total sales. These markets include:

SIC	Category	DoD % of Total US Market
3443	Fabricated Plate Work	8%
3699	Electronic & Electrical Equip.	8%
2311	Men's & Boys' Suits & Coats	8%
3764	Space Propulsion Units & Parts	10%
3812	Nav. Guidance Inst. & Equip.	10%
3484	Small Arms	12%
2385	Waterproof Outerwear	18%
3769	Space Vehicle Equipment	18%
2371	Fur Goods	18%
3721	Aircraft	19%
3482	Small Arms Ammunition	23%
3724	Aircraft Engines & Parts	27%
3761	Electron Tubes	31%
3728	Aircraft Parts & Auxillary Equip.	35%

[60] "The Potential Impact of Price-Based Acquisition, A Supplementary Study to the Section 912c Panel", Interim Report, April 1, 1999, by Litton/TASC.
[61] DD350 data (http://web1.whs.osd.mil/diorhome.htm)

3761 Guided Missiles/Space Vehicles 42%

The process used to identify PBA targets of opportunity among DoD supplies and equipment purchases focused on Federal Supply Codes (FSCs) with a substantial number of contracts valued at $500K or more and comprising 80% of the FY98 budget. FSCs with no commercial analogs were excluded. Buying patterns were examined in-depth for certain FSCs where:

- Certified cost or pricing data were required for more than 50% of the FSC value;
- Cost-plus contract types were used in greater than 25% of the FSC value;
- Multiple contract types were employed;
- Cost or pricing data were required for fixed-price competitive and sole-source contracts; and
- Buying strategies were used both with and without cost or pricing data.

Several FSCs are already procured using PBA techniques in that a large number of procurements greater than $500K are awarded using firm-fixed price contracts under competition, and where awards are made sole-source, without certified cost or pricing data. A common denominator among these items is that they all have significant commercial markets. These FSCs are:

4920 - Aircraft maintenance & repair shop specialized equipment
9140 - Fuel oils
9130 – Liquid propellants & fuel
8415 – Clothing, special purpose
7010 – ADPE System Configuration
6830 – Gases, compressed & liquefied
1810 – Space Vehicles

Several other FSCs are PBA candidates because commercial markets exist, particularly in the areas of non-secure and non-specialized equipment. However, even for secure and specialized equipment, there is likely a strong commercial market on an international scale for such militarized items. Additionally, an analysis of the various buying practices discloses, where firm-fixed price sole-source procurements were made, some were accomplished without certified cost or pricing data and others received certified cost or pricing data. Market research and an analysis of the PBA practices employed where sole-source contracts were awarded without certified cost or pricing data would help other buyers transition to PBA where appropriate. These FSCs are:

2840 – Gas Turbines and Jet Engines, Aircraft & Components
5821 – Radio & TV Communication Equipment, Airborne
5841 – Radar Equipment, Airborne
5998 – Electrical & Electronics Boards, Cards and Associated Hardware
5895 – Miscellaneous Communication Equipment
6625 – Electrical & Electronic Properties Measurement & Test Instruments

One FSC which requires further investigation is 7105, Household Furniture. Although not in the top 80% of the FY98 Budget, these items clearly have large commercial markets, yet a great number of firm-fixed-price contracts, sole-source and competitive, required cost or pricing data. This, FSC is clearly a PBA candidate.

Other FSCs were identified that are likely unsuitable for the full range of PBA techniques, due in large measure to the lack of a commercial market. Nevertheless, PBA training and market research would likely assist buyers of these commodities to transition more procurements to fixed-price acquisition strategies and price analysis or parametric estimating techniques for repetitive buys. These FSCs are:

8999 – Food Items for Resale (Due Likely to Set-Aside Requirements)
5810 – Communications Security Equipment & Components

1560 – Airframe Structural Components

In the area of research and development, effort is procured largely through cost-plus contract types with cost or pricing data (certified in the case of sole-source). Only $3B in FY98 R&D was procured using fixed-price contracts or about 15% of all R&D Contracts. Further investigation is needed to understand what factors influenced the decisions to use fixed-price or cost-type contracts in FSCs where large numbers of both are present. The major areas included Basic Research (24%), Engineering & Manufacturing Development (20%) and Demonstration/Validation (17%). Training in PBA strategies and sharing of best practices and lessons learned would facilitate more of this research and development effort being procured using acquisition strategies that mitigate risk sufficiently for firm-fixed price contracts to be appropriately used.

In the area of services, several FSC areas are already using PBA techniques and have very few instances of cost-type contracts or fixed-price contracts with certified cost or pricing data. In all cases, these FSCs have large commercial markets. These FSCs are:

Z – Maintenance, Repair or Alteration of Real Property
Y2 – Non-building Structures
Y1 – Construction of Structures & Facilities
V115 – Vessel Freight
Q201 – General Health Care Services

Of interest, J999 for Non-nuclear Ship Repair (West) procurements are equally split between cost-type and firm-fixed price contracts, of which less than 20% required cost or pricing data. Further research would be needed to share best practices and lessons learned so that risk could be mitigated on more procurements to permit greater use of firm-fixed price contracts without cost or pricing data.

Several services types were identified as having a mix of cost and fixed-price type contracts and a mix of procurements made with and without cost or pricing data. In all cases, there are significant commercial markets for these services. Further investigation

is needed to identify best practices and lessons learned so that risk may be mitigated on a greater number of procurements to transition them appropriately to firm-fixed price contracts without the need for cost or pricing data. Training PBA techniques and share-in-savings contracts would greatly aid this transition. These FSCs are:

Commercial Services

Y300 – Restoration Activities
V124 – Marine Charter for Things
R414 – Systems Engineering Services
R425 – Engineering Technical Services
R706 – Logistics Support Services
R408 – Program Management/Support Services
U099 – Other Education & Training Services
Q503 – Dentistry Services
S112 – Electric Services
R701 – Advertising Services
S216 – Facilities Operations Support Services
S299 – Other Housekeeping Services
S203 – Food Services
S201 – Custodial/Janitorial Services
D399 – Other ADP & Telecommunication Services
D304 – ADP Telecommunications & Transmission Services

Modified Commercial Services

C219 – Other A&E Services
C211 – A&E Services
D307 – Automated Info System Design & Integration Services

Special Skills Services

K015 – Modification of Equipment, Aircraft Structural Components
J015 – Maintenance & Repair of Equipment, Aircraft Structural Components
J016 – Maintenance & Repair of Equipment, Aircraft Components & Accessories
J069 – Maintenance & Repair of Equipment, Training Aids & Devices
J070 – Maintenance & Repair of Equipment/ADP Equipment & Supplies
R799 – Other Management Support Services
R499 – Other Professional Services

Of interest, FSC J019 for Maintenance and Repair of Equipment, Ships – Small Craft-Docks uses cost-type, sole-source contracts for virtually all procurements greater than $500K. Further investigation is needed to determine the cause of this strategy in a service area where there is a commercial market and where it is likely risk could be mitigated sufficiently to permit the use of fixed-price contracts. Similarly, for FSC L014, Technical Representative Services, Guided Missiles, cost-type contracts are used

(competitive and sole-source) without cost or pricing data. Further investigation is needed to determine whether PBA strategies could be employed to mitigate risk sufficiently to award firm-fixed price contracts without cost or pricing data.

In conclusion, by examining DoD buying practices in commodities and services where there are commercial markets, it is clear that there are many targets of opportunity for PBA. Training on PBA techniques, sharing of best practices and lessons learned, strong leadership, and in-depth market research on a commodity basis would greatly aid DoD's transition to a PBA environment.

Appendix C
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Ms. Jeanne Karstens (Group 3)	OSD(C)
Mr. Bob Leach (Group 3)	OUSD(AT&L)API
Dr. Steve Butler (Group 1)	S&TS
Ms. Susan Haley	SADBU
CAPT Paul Rosbalt (ESG)	J8/RAD
Mr. Mike Paysan	J8/RAD
Mr. Mike Gorman (Group 1)	USD(AT&L)DDP
Mr. Bob Bemben (Group 3)	USD(AT&L) DDP
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Mr. Terry Little (Grp 1 co-lead)	Air Armament Center (USAF)
Mr. Charlie Williams	SAF/AQCS
COL Tom Kelly	AF/XORPD
COL Andy Sherb	SAF/FMC
Ms. Bonnie Taylor (Group 2)	AFMC/PKP
Mr. Ken Taylor (Group 3)	AFMC
Mr. Mark Bennington (Group 2)	AFMC/PKPC
Ms. Kathy Watern (Group 2)	ASC/FMCE

Air Force (con't)	
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Mr. Don Poole (Group 2)	AFMC
Mr. Mike Quinlin (Group 2)	AFMC
Maj. Vince Feck	AFMC/PKPC
Mr. Karl Heiland	AFMC/PKPC
Army	
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Mr. James Dorrall (Group 2)	HQ AMC
MAJ Robert Brown	SARDA
LTC R.A. Matthews (ESG)	OASA(RDA)
Ms. Dixie Bennet	AMC
Mr. Andy Yedinak (ESG)	HQ AMC
Mr. Greg Doyle (Group 2)	Army Procurement
Mr. Jack Shifflet	Army
Mr. Jeffrey Hamel	TACOM
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Ms. Dina Hyde (Group 2 co-lead, ESG)	NAVAIR
CAPT Bob Cowley	NAVAIR
LCDR Steve Dollase (Group 2)	NAVAIR
Mr. John Britt	NAVAIR
Mr. Jesse Bendahan (Group 2)	ASN(RD&A) Counsel
Ms. Ellen Klotz (Group 2)	NAVAIR
LCDR Neal McMahon (Group 2)	Navy
Mr. Brian Bradley	ONR
Mr. David Carter (Group 2)	Military Sealift Command
Mr. Todd Hanson (Group2)	ONR
Mr. Elliott Marcus (Group 2)	SSP
CDR Mark Ringlein (Group 2)	SSP
Ms. Frances Sullivan (Group 3)	NAVFAC
Mr. Bill Van Houten (Group 2)	NAVSEA
Ms. Diane Hensley	MSC
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Ms. Jill Pettibone (ESG)	DLA
Ms. Tina Ballard	DLA
Ms. Nancy Cunningham (ESG)	BMDO
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Defense Agencies (con't)	
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Ms. Terry Schneider (Group 3)	DCAA
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Mr. Dave Ricci (Group 3 lead, ESG)	DLA/DCMC
Ms. Jean Marie Faris (Group 3)	DLA (Counsel)
Mr. Greg Plasters (Group 3)	DFAS
Mr. Jerry Gilbart	DLA/DLSC
Mr. Stan Beitsch (Group 1)	DLA/DCMC
Ms. Marolyn Russell (Group 2)	DLA/DCMC
Other Government	
Mr. Nathan Tash	OFPP
Mr. Allan Brown (Group 1)	OFPP
LCOL Chris Hayer (Group 2)	DSMC IASO
Mr. Frank Swofford (ESG)	DSMC Industry Chair
Mr. Tom Luedtke (ESG)	NASA
Mr. Joseph LeCren (Group 2)	NASA
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Mr. Larry Blair	Northrop Grumman Corp. Linthicum, MD
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Appendix D
Checklist Showing How Recommendations Support PBA Objectives

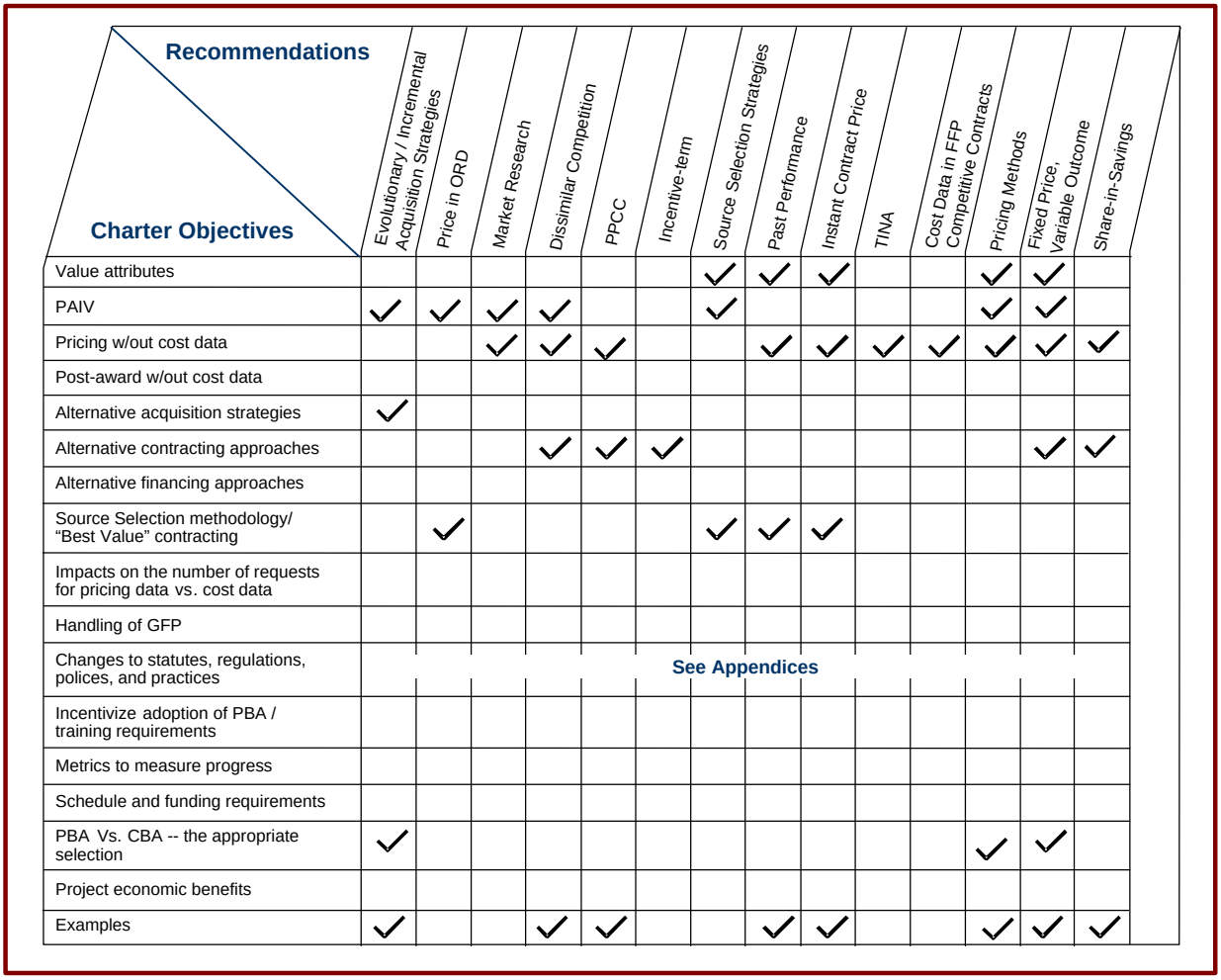
Recommendations	Access to Commercial Technology	Reduce Government Infrastructure	Better Contract Prices
Acquisition Strategies	✓		+
Price Requirement in ORD			+
Market Research	✓	—	✓
Dissimilar Competition	✓		+
PPCC		✓	+
Incentive-term			✓
Source Selection Strategies	✓	✓	✓
Past Performance			✓
Instant Contract Price	✓		+
TINA	+	+	
Cost Data (FFP Competitive)	✓	✓	
Pricing Methods	✓	+	+
Fixed-price, Variable Outcome	✓	✓	+

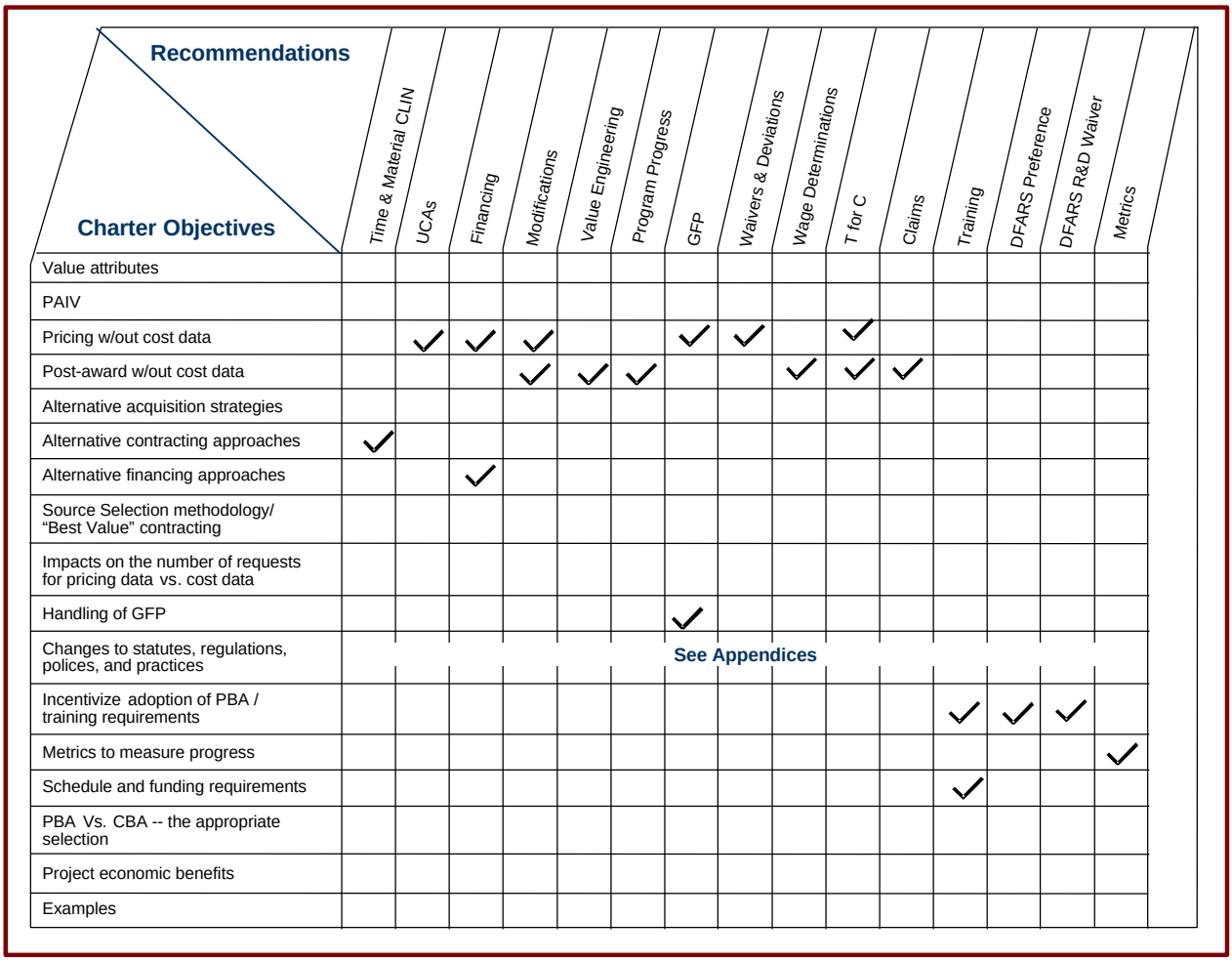
✓ = Supports + = Instrumental — = Impedes ☐ = Neutral

Recommendations	Access to Commercial Technology	Reduce Government Infrastructure	Better Contract Prices
Share-in-Savings	✓	✓	+
T&M CLIN	✓		✓
UCAs	✓	✓	
Financing	✓	+	
Contract Modifications	✓	✓	
Value Engineering			+
Program Progress		✓	✓
GFP		✓	
Waivers & Deviations		✓	
T for C		✓	
Cancellation Charges		✓	
Claims		✓	
Wage Determinations		✓	
R&D Waiver	✓		

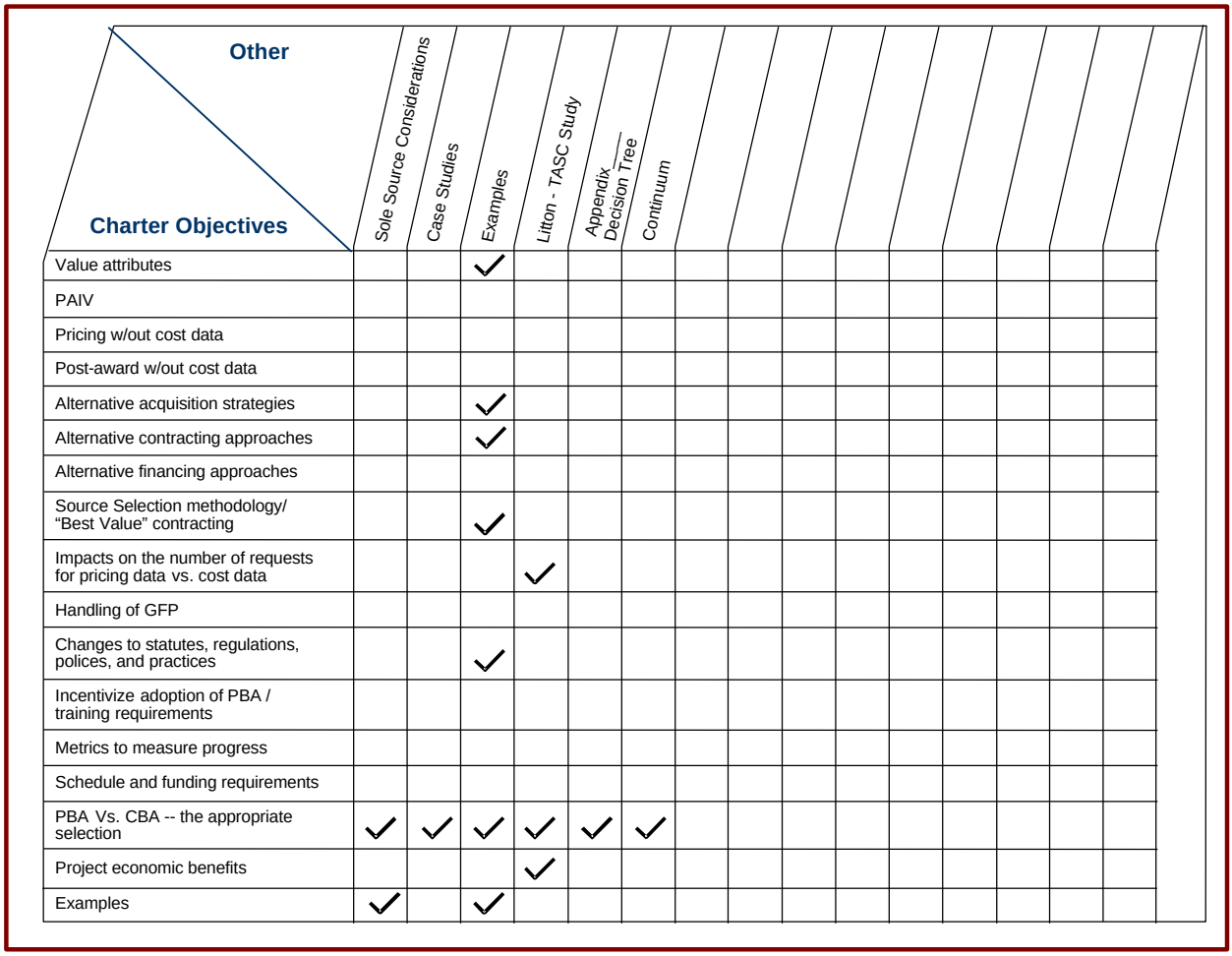
✓ = Supports + = Instrumental — = Impedes ☐ = Neutral

Appendix E
Checklist Showing How Recommendations Support Charter Objectives


Recommendations
Charter Objectives
Evolutionary / Incremental Acquisition Strategies
Price in ORD
Market Research
Dissimilar Competition
PPCC
Incentive-term
Source Selection Strategies
Past Performance
Instant Contract Price
TINA
Cost Data in FFP Competitive Contracts
Pricing Methods
Fixed Price, Variable Outcome
Share-in-Savings
Value attributes
PAIV
Pricing w/out cost data
Post-award w/out cost data
Alternative acquisition strategies
Alternative contracting approaches
Alternative financing approaches
Source Selection methodology/ "Best Value" contracting
Impacts on the number of requests for pricing data vs. cost data
Handling of GFP
Changes to statutes, regulations, polices, and practices
See Appendices
Incentivize adoption of PBA / training requirements
Metrics to measure progress
Schedule and funding requirements
PBA Vs. CBA -- the appropriate selection
Project economic benefits
Examples



Charter Objectives \ Recommendations	Time & Material CLIN	UCAs	Financing	Modifications	Value Engineering	Program Progress	GFP	Waivers & Deviations	Wage Determinations	T for C	Claims	Training	DFARS Preference	DFARS R&D Waiver	Metrics
Value attributes															
PAIV															
Pricing w/out cost data		✓	✓	✓			✓	✓		✓					
Post-award w/out cost data				✓	✓	✓			✓	✓	✓				
Alternative acquisition strategies															
Alternative contracting approaches	✓														
Alternative financing approaches			✓												
Source Selection methodology/ "Best Value" contracting															
Impacts on the number of requests for pricing data vs. cost data															
Handling of GFP							✓								
Changes to statutes, regulations, polices, and practices	**See Appendices**														
Incentivize adoption of PBA / training requirements												✓	✓	✓	
Metrics to measure progress															✓
Schedule and funding requirements												✓			
PBA Vs. CBA -- the appropriate selection															
Project economic benefits															
Examples															


Other
Charter Objectives
Sole Source Considerations
Case Studies
Examples
Litton - TASC Study
Appendix Decision Tree
Continuum
Value attributes
PAIV
Pricing w/out cost data
Post-award w/out cost data
Alternative acquisition strategies
Alternative contracting approaches
Alternative financing approaches
Source Selection methodology/ "Best Value" contracting
Impacts on the number of requests for pricing data vs. cost data
Handling of GFP
Changes to statutes, regulations, polices, and practices
Incentivize adoption of PBA / training requirements
Metrics to measure progress
Schedule and funding requirements
PBA Vs. CBA -- the appropriate selection
Project economic benefits
Examples

Appendix F
Recommended Statutory Language

The material from this Appendix has been included in a separate PBA document (Book 2 of 2). The material, recommended statutory language, is for official DoD use only.

Appendix G
Recommended Regulatory Language

The material from this Appendix has been included in a separate PBA document (Book 2 of 2). The material, recommended regulatory language, is for official DoD use only.

Appendix H

Checklist Showing Implementation Requirements – Policy, Regulatory, and/or Statutory Changes

Much Can Be Done Now ...

+ = Majority of effort | ✓= Requires change

Recommendations	Internal Procedure	Regulatory	Statutory
ORD Price Goal	✓+		
Market Research	✓+		
Dissimilar	✓+		
PPCC	✓+		
Cost Data (FFP Competitive)	✓+		
Fixed-price, Variable Outcome	✓+		
Letter Contracts/ UCAs	✓+		
Program Progress	✓+		
Waivers and Deviations	✓+		
Claims	✓+		
Forum for Success Stories	✓+		
Training	✓+		
Metrics	✓+		

Much Can Be Done Now…

Continued

+ = Majority of effort | ✓= Requires change

Recommendations	Internal Procedure	Regulatory	Statutory
Evolutionary	✓+	✓ 5000 Series	
Incremental Development	✓+	✓ 5000 Series	
Incentive-term	✓	✓+ DFARS	
Past Performance	✓+	✓ DFARS	
FFP R&D Waiver	✓	✓+ DFARS	
Preference for PBA	✓+	✓ DFARS	
PBA in Acquisition Plan	✓	✓+ DFARS	
Contract Types	✓+	✓ FAR / DFARS	✓
T for C	✓	✓+ FAR	
Value Engineering	✓+	✓ FAR	
GFP	✓+	✓ FAR	
Instant Contract Price	✓	✓ FAR	
Pricing Methods	✓+	✓ FAR / DFARS	✓
Contract Modification	✓	✓+ FAR / DFARS	✓

Much Can Be Done Now

Continued

+ = Majority of effort | ✓= Requires change

Recommendations	Internal Procedure	Regulatory	Statutory
Source Selection Strategies	✓	✓ FAR	✓+
TINA	✓	✓ FAR	✓+
Financing	✓+	✓ FAR	✓ +
Wage Determinations	✓	✓ FAR	✓ +
Cancellation Charges	✓	✓ FAR	✓ +

Appendix I
Acquisition Strategies

Evolutionary

Incremental Development

Evolutionary
Example 1
The Joint Air-to-Surface Missile (JASSM) Development
(Modified from Actual Events)

JASSM is designed to provide the Air Force and Navy a precision-guided, air-launched standoff weapon to destroy high value fixed targets. It is a stealthy, next generation cruise missile.

The program is nearing the end of a 24-month Preliminary Design and Risk Reduction Phase with two competing contractors. One of the contractors is a consortium of commercial companies that refuse to do business in a cost-based environment. (The PDRR contracts were value-based, firm-fixed-price contracts for $200 million.) At this time it becomes apparent that the two highest risk areas are the missile's seeker and its engine. This is true for both contractors.

The program manager and JASSM's two competing contractors are, however, unwilling to describe these as "high-risk".

The seeker itself is mature, but the software algorithms to automatically recognize a wide variety of targets are not. Despite considerable work during PDRR, they still need a substantial amount of development. These algorithms are essential if the missile is to achieve the precision capability the user wants. The missile does have an inertial mid-course guidance that, with satellite updates, will be somewhat accurate. In fact, the mid-course guidance without the seeker will allow the user to destroy about three-quarters of the targets. This mid-course guidance is already being produced on another program.

Additionally, there is not an existing engine that will allow the user to achieve the full range required; existing engines lack the fuel efficiency (i.e., gas mileage) to meet the user's range requirement and stay within the missile's weight limits. Work is underway on an engine that would yield enough range to meet the requirement. Unfortunately it is unclear when the new engine will be ready and how much it will cost to produce.

The program manager must plan to do price-based acquisition for development and production so as not to eliminate the commercial competitor. He wants to take maximum advantage of the competitive environment. He cannot get enough money to carry both contractors into development. Working with the two competing contractors and the users, the team develops an evolutionary acquisition approach to reduce the risk of development and to provide the user with an early capability. The baseline system will have the stealthy airframe and new warhead, but will use an existing engine. This engine yields only half the range the user wants. The baseline system will not have a seeker, but will use the off-the-shelf inertial system. There will be provisions (space and power) for later retrofit of the seeker and the new engine must be a form and fit replacement for the current engine. The baseline development program will include monies to continue developing and maturing both the seeker and the engine. Also included will be

provisions for detailed planning of follow-on phases. The second Block change will incorporate the seeker and the third Block change will incorporate the new engine. The first two production lots will be the baseline system. The third production lot will include the seeker. Depending on funding availability and risk, the engine will be available in about the fifth or sixth lot. Both companies are confident that at the down select they can offer firm-fixed-prices (with economic escalation) for the first two blocks of JASSM production. Their plan for PDRR contemplated this requirement. There is too much risk to bid for Block 3 given the uncertainty with the engine.

The JASSM Government team has extensive dialog with the two industry teams about the development program and the risks that exist. There appear to be a number of risk areas common to both contractors. These include the schedule to produce the test units, the schedule to develop the guidance software, and the likelihood of test failures. Additionally, each contractor has risks that are unique to its concept and/or plan. The program office and each competitor develop plans and schedules that each believe is realistic. From these discussions and historical information the program office also develops independent Engineering and Manufacturing **price estimates** for each contractor. The price estimates include substantial monies to cover the risk areas and a 15% profit. The program office shows the estimate to each contractor together with the supporting rationale. Each contractor has the opportunity to talk with the estimators to persuade them to alter the estimates in those areas where they disagree. After these discussions the estimators alter the estimates as they deem appropriate. The estimators again show the estimates to the competing contractors giving each an additional chance for reclama. Again, the estimators adjust the estimates as appropriate. The estimators then provide the final estimate to each contractor as a bottom line.

The program office requests and is granted a waiver to the Truth-in-Negotiations Act for the EMD bid. The waiver is based upon the fact that a reasonable price can be determined based on discussion with the contractor. The Request for Proposal for each contractor informs it that the Government may eliminate it from the competition if its bid for EMD is more than 10% below the Government estimate (unrealistic) or if the bid exceeds the Government estimate by 10% (unreasonable). The RFP informs the contractors that their bids should allow $50 million for technology development on the engine (value-based, fixed-price). The criteria for the source selection include the projected missile performance relative to the users' requirements, the remaining risk of the approach, the fixed prices for the first five production lots, each competitor's performance during PDRR (as compared to its original proposal) as well as instant contract price. The Air Force gets an abbreviated technical proposal, an integrated management plan for EMD, and bottom line cost for EMD and the first five lots. The Air Force makes a best value source selection and proceeds into EMD.

Evolutionary
Example 2
(Hypothetical)

The Army has a requirement for a new tank (M-2) to replace the current M-1 series. The key requirements are that the tank be substantially lighter, have a higher rate, accuracy and lethality of fire, be more survivable, faster, more economical to operate and have a longer range before refueling is required, than the current M-1 series tanks. There is existing technology to support all of the key requirements except there is a new, high-risk development required for the tank's engine. Other than the engine, the development is low risk. The Army decides to use an evolutionary approach where the first M-2's will use the existing M-1 engine while the technology development for the new engine proceeds in parallel. Once the technology is proven, the Army will begin incorporating the new engine into M-2 tank production. At that time, the Army will decide whether to retrofit the existing M-2 tanks or to offer them for foreign military sales. There is only one contractor capable of developing and producing the M-2. The Army has good data to develop an independent price estimate for development and production. They will use price data from the M-1 as well as price data for recent European-developed advanced tanks. They plan to ask for a TINA waiver in and approval to do a fixed-price development contract with the sole source contractor.

Evolutionary Program
Example 3
(Hypothetical)

The Navy has a requirement to develop software to integrate the data from several existing, developmental and conceptual sensor platforms to form an integrated command, control, and communications network. There is good definition to the existing platforms' interfaces, but the developmental platforms are still in flux and there is substantial risk in their schedules. The Navy decides to pursue an evolutionary approach. The first evolution will be a software development to integrate data from existing platforms. Because of the maturity of these platforms and because there has already been some work integrating them, this is a low-risk effort. Integrating the data from the developmental platforms is not low-risk now, but will become low-risk within four years as these platforms mature and the interfaces stabilize. Integrating the data from the conceptual systems is very high-risk because there are no interfaces and what data these systems actually provide may be substantially different from what the concept studies state. In light of all this, the Navy decides to pursue an evolutionary, fixed-price development. The first evolution will be integrating the existing platforms and providing for future integration of the developmental platforms. This will be a competitive procurement. The second evolution will be the integration of the developmental platforms as they mature and provide for future integration of the conceptual systems. The price for the first evolution will include a fixed option price for the second evolution based upon some specific technical and schedule assumptions for the developmental systems. To the extent that reality turns out to be different than those assumptions, the Navy intends to provide for a price adjustment to the fixed-price contract. Once the conceptual systems mature, the Navy intends to add them to the network using fixed-price development contracts and price-based acquisition using the prices for the first two evolutions (adjusted) as the basis for determining a fair and reasonable price.

Incremental Acquisition
Example 1
(Hypothetical)

The Air Force has decided to develop a new close air support aircraft that will replace the A-10. The Air Force issues a Request for Proposal (RFP) for Engineering and Manufacturing Development (EMD). The RFP contains some top level performance characteristics from the Operational Requirements Document as well as proposed terms and conditions for the contract. The proposed contractual arrangement for EMD is cost plus award fee. Two offerors respond. One is a traditional supplier of military aircraft, BOMART Corporation. The other is a commercial company (GULFAIR). GULFAIR has built military aircraft in the past, but quit doing defense business five years ago in order to concentrate on the commercial market. The proposal evaluation reveals that the BOMART offer is technically unacceptable, costs are unrealistically low, and its past performance record is poor. The Air Force eliminates BOMART from the competitive range. GULFAIR's technical offering is outstanding in every respect; they have incorporated state-of-the-art commercial electronics and manufacturing technologies, their past performance is exceptional, and the total ownership costs for their approach are very attractive. However, they have proposed alternate terms and conditions for EMD. They have proposed a firm-fixed-price contract at a price that is about 50% more than the allocated budget. During discussions, GULFAIR states that, as a matter of corporate policy, they do not accept cost reimbursable contracts. Their rationale is that their costs are their business and that they refuse to accept the hassle of cost reporting, accounting standards, audits, etc. Additionally, they resent having the Government determine how much profit they should get. GULFAIR notes that they have a thriving commercial business and really do not need this work in order to continue their solid growth. GULFAIR admits that their price for EMD is probably high. But they also note that many technical requirements in the RFP were ambiguous and incomplete, that some of the requirements may have inordinate cost consequences, that the Air Force's test program is ill-defined, and that even the number of test aircraft the Air Force wants is open-ended. They also point out that their experience in previous military developments was that there was enormous requirements creep. Thus, they contend, they have added significant monies to their bid in order to accommodate these uncertainties.

To resolve the problem, the Air Force program manager proposes an incremental development approach. Rather than asking GULFAIR to bid on the entire EMD, the program manager proposes segmenting EMD into five phases that are consecutive, but overlapping:

1. Requirements refinement and cost requirements trade phase,
2. Detailed design phase,
3. Test aircraft build phase,
4. Development test phase, and
5. Operational test phase.

The Air Force asks GULFAIR to offer a firm price for only the first EMD phase and to revise their initial bid to allocate the remaining amount among the following four phases as not-to-exceeds.

The Air Force proposes to issue a call for improvements for the second phase once the first phase is sufficiently complete and it has been determined that a fixed-price bid is reasonable for both parties. The Air Force agrees to use the same process for the third, fourth and fifth phases. The Air Force also agrees that it will not ask GULFAIR to provide cost or pricing data based upon the adequate price competition exemption to TINA. Finally, the program manager institutes a disciplined requirements control process to assure that all changes are properly accompanied by the appropriate changes in the fixed-price contracts. When EMD is over the total cost is only 5% more than the initial Government estimate.

Incremental Acquisition
Example 2
(Hypothetical)

The Air Force has a requirement to do a major environmental cleaning at Love Canal Air Force Base. The base is closing and the land is very valuable because of its location on the coast near a large metropolitan area. The Air Force has agreed to sell the land to developers, but only after cleaning up a contaminated area that is in the most desirable location on the base. The contamination consists of heavy metals, fuels, and numerous organic compounds known to cause cancer.

The Air Force knows what area is contaminated, but does not know the concentration of the contaminants, how far down into the soil the contamination extends, or the precise organic compounds that are in the soil.

Instead of contracting for the entire cleaning effort using a cost reimbursable contract, the Air Force decides to use an incremental approach. This is to allow a fixed-price contract so as to attract commercial environmental firms and avoid the infrastructure costs associated with cost reimbursable contracts.

The Air Force divides the effort into an assay phase, a fuel clean-up phase, a heavy metals clean-up phase, and an organic compound clean-up phase. The assay phase will extend over nearly the entire period of performance. Its purpose is to identify the precise nature of the contaminants, the extent of the contamination, and exactly what will be required to remove the contaminants. The other phases will be overlapping, but will begin at different times.

Contractor proposals contain a firm-fixed-price bid for the assay phase plus contingent fixed prices for the removal of the fuel, heavy metals and organic contaminants. The contingent bids are based upon clear assumptions about the nature and extent of the contaminants that the Air Force provides each offeror. The Air Force selects the winning contractor based upon its past performance, technical approach, and contingent fixed prices. Price for the assay phase is not a source selection factor except that it must be fair and reasonable given the scope of work the contractor proposes.

As the cleaning proceeds, either the Government or the contractor may ask for a price adjustment based upon findings from the assay phase and the degree to which those findings differ from the bidding assumptions. The Air Force has developed a model that estimates price for a clean-up based upon the volume of soil cleaned, the specific contaminants present, and the concentration of those contaminants. They intend to use the model to develop price-based adjustments when the actual conditions turn out to be different than the assumptions.

Incremental Acquisition
Example 3
(Hypothetical)

A program office has a need for technical support contractor assistance for the next five years for a new start development program. The support contractor will help structure a request for proposal, derive the system performance specification from the operational requirements document, assist the program office/contractor in identifying and solving technical issues, construct and implement a risk management plan, and develop a technology transition and preplanned product improvement plan.

There is substantial uncertainty about the magnitude of the effort required to assist the program office in identifying and resolving issues and to develop the technology transition and preplanned product improvement plans. The program office decides to do an incremental acquisition using PBA. The first increment will be for assisting with the request for proposal and deriving the system performance specification. The competing contractors can offer a firm price for these tasks and unpriced options for the remainder.

Past performance will be the most important factor in the source selection. Later in the program, the program manager will determine how much money he has to pay for support contractor assistance by year as well as the specific objectives he wants to accomplish. He will use a Fixed-price, Variable Outcome contract to secure the support contractor assistance for the remainder of the tasks.

Appendix J
Maintaining Competitive Incentives

Dissimilar Competition

Production Price Commitment Curve

Dissimilar Competition Program
Example 1
The C-17 Program and the Non-developmental Airlift Aircraft (NDAA)

In a 25 March 1994 Acquisition Defense Memorandum, the Air Force was directed to cap the production of C-17 aircraft at 40, prepare a plan to competitively acquire a Non-development Airlift Aircraft (NDAA) as an alternative or supplement to the C-17.

The NDAA Program was designated as an ACAT 1D program for purposes of Defense Acquisition Board (DAB) oversight. A decision on the quantities and type of NDAA to be procured was to be made no later than the integrated C-17/NDAA DAB Milestone III review scheduled for November 1995. In addition, the Air Force was directed not to proceed beyond 40 C-17 aircraft until after this DAB review.

During the ensuing months, from March 94 to November 95, the NDAA Program Office defined requirements, conducted a Strategic and Tactical Roundtable, held an Acquisition Strategy Panel, released an RFP, and negotiated a commercial contract for the procurement of commercially tailored Boeing 747-400Fs to satisfy, as a supplement to the C-17, the airlift requirements of the Air Force.

The DAB Milestone III review of November 1995 resulted in the decision to acquire 80 additional C-17s and no NDAA. The overall effect of the NDAA Program on the C-17 Program was the evidence of a viable alternative. This viable alternative provided strong motivation for the C-17 program to effect a revised schedule and cost reductions.

Dissimilar Competition
Example 2
(Hypothetical)

The Joint Air-to-Surface Standoff Missile (JASSM) obtained fixed-price bids for its first five lots in a competitive environment where there was adequate price competition. The Air Force has no insight into what it actually costs to produce the missile. The program office is preparing a sole source solicitation for the prime contractor, Lockheed-Martin, to bid on the remaining five lots.

At least three countries are producing cruise missiles similar to JASSM. Additionally there are at least two U.S. companies currently producing cruise missiles. None of these fully meet the JASSM requirement, though some exceed the requirement in some areas. There have been recent overseas procurements where the producers of these missiles offered them in competition with one another. Lockheed-Martin also offered JASSM in these competitions, but in a version that was not as capable as what the U.S. is buying.

The program office decides to use price-based acquisition for the remaining JASSM lots. It asks Lockheed to submit a rough order of magnitude price for the remaining JASSM lots. The contracting officer compares this price to the price Lockheed offered in the foreign competitions (adjusted for quantities, contract terms and conditions, etc).

The contracting officer determines, based upon this price analysis, that there is adequate price competition and no need to obtain cost or pricing data from Lockheed for the remaining production lots. This analysis becomes the basis for a TINA exemption.

Lockheed submits its firm prices for the remaining five lots. While the prices are slightly more than the price Lockheed offered in the foreign competitions, the contracting officer, using a cost-benefit analysis, determines that the slight increase is more than overshadowed by the improved performance in the U.S. version.

Dissimilar Competition
Example 3
(Hypothetical)

It is 2005. The Joint Strike Fighter program is experiencing significant production cost growth with Contractor X who received the EMD contract. The production prices will reflect this cost growth. The Government's use of cost or pricing data to establish price provides little incentive for the sole source contractor to reduce its costs.

To control the growth, DoD begins preliminary design work on potential upgrades to the F-16, F-18 and Harrier to partially meet the JSF requirement. Additionally, the technology for low cost standoff weapons and unmanned attack vehicles has sufficiently matured that both, taken together, could be a viable alternative to JSF should the production price continue to escalate.

DoD decides to increase the monies for risk reduction on these two alternatives so as to mature them earlier. The Air Force, Navy, and Marines have indicated to the JSF contractor that they are willing to accept upgrades to current systems in the interim while waiting for low cost standoff weapons and unmanned vehicles to mature as an alternative to continuing with the JSF.

The JSF contractor tells DoD that it is willing to offer a firm-fixed-price for the first 500 aircraft that is 25% less than the current Government price projections. There are four conditions. The first is that JSF production will be a price-based acquisition with the Government having no insight into actual costs. Second, to lower its costs, the contractor will have the freedom to make configuration changes not affecting performance or safety-of-flight. Third, the Government will implement strict measures to control requirements creep and reduce the number of absolute requirements to no more than ten of the most important from an operational perspective. Fourth, the Government will cease work on upgrades to existing systems.

The DoD agrees and Contractor X signs up to firm-fixed-price contracts for the first 500 aircraft at the agreed price.

Production Price Commitment Curve
Example 1
Joint-Air-to-Surface Standoff Missile

The Joint Air-to-Surface Missile (JASSM) is nearing the end of its Preliminary Design and Risk Reduction Phase. Two competing contractors (Lockheed and Boeing) have worked in parallel during this 22-month phase. A central focus of the work has been to reduce the technical risk as well as the production cost risk. Reducing the cost risk has required both contractors to actually build missile bodies and selected subsystems, as well as to bring the key manufacturing processes under control.

As part of the down select decision, the program office asks both contractors to submit firm-fixed-price bids for the first two production lots (approximately 200 missiles) and a production price commitment for the next three lots (approximately an additional 1000 missiles).

Neither contractor submits cost or pricing data. Both provide prices for lot quantity variations of up to plus or minus 20%. The prices are in then year dollars and include a lifetime repair warranty covering individual missile failures or systemic defects relative to the performance specification. The contractor will have total freedom to change the configuration throughout the first five lots so long as any changes are transparent to the user and do not pose a safety problem. There are no provisions for Value Engineering Change Proposals; the contractor is responsible for the non-recurring funding for any change it makes to lower its cost.

At the time the winning contractor makes its firm-fixed-price proposal for Lot 3 (approximately 5 years in the future) it may propose at his previous commitment without having to supply cost or pricing data. However, if the contractor chooses, it may also propose above its price commitment, but must submit certified cost or pricing data to support the proposed price.

Production Price Commitment Curve
Example 2
(Hypothetical)

It is time for a contractor to provide a proposal for Production Lot 6 for a current generation missile. There will be a total of 10 production lots. The contractor has been sole source since the beginning of development.

The program office has been receiving certified cost or pricing data to support negotiations for each of the preceding production lots. The program manager decides to attempt a transition from cost-based acquisition to price-based acquisition. Based upon price history for past previous missiles and the prices for the first five production lots, the program office is able to derive a price improvement curve and estimated prices for Lots 6 through 10.

The program manager shows the estimates to the contractor. She tells the contractor that if it will offer commitments for Lots 6-10 significantly below the estimated prices, it will not have to submit cost or pricing data to support the prices. The contractor agrees and proposes a commitment that is 5 percent below the estimates.

After negotiations, the contractor agrees to 7 percent, provided the program office gives it the authority to make changes not affecting missile performance. As a result, the contractor's firm-price for Lot 6 is 7 percent below the Government estimate.

The contractor retains the freedom to propose prices for Lots 7 through 10 that are higher than its commitment, but must submit certified cost or pricing data if it should do so. The Government gains a lower-than-expected price for Lot 6 and the potential of lower-than-expected prices for the remaining lots. The contractor has an enormous incentive to drive down costs because every cent saved is added profit. Even if the future lots fall back to cost-based, the Government will gain from the contractor's cost reduction activities.

Production Price Commitment Curve
Generic Clause

The contractor and the Government agree to the use of a Production Price Commitment Curve (PPCC) for Lots _____. This clause contains a PPCC for Lots _____. This clause will be in effect and placed in every contract awarded for Lots _____. Nothing contained herein is to be construed as diminishing the rights and duties of the parties as specified in FAR 52.249-8, "Default (Fixed Price Supply and Service)".

a. The contractor and the Government agree to the following incentives if the contractor submits proposals for each production lot that meet or improve on the prices submitted in its PPCC, as adjusted for changes delineated in the Average Unit Procurement Price Requirement (AUPPR) clause.

1. The contractor will continue to be the Government's sole source for all [insert program name] requirements through Lot ___. Upon Government determination that the contractor has met its schedule, quality and price commitments, the contractor will continue to be the Government's sole source for all [insert program name] requirements through Lot ___. The Government determination that the contractor has met its commitments will be based on whether the contractor met its contract delivery schedule, its system specification performance, and upon Government determination that the PPCC for Lots _____ is fair and reasonable based upon price analysis and subsequent incorporation into the contract.

2. No requirement for certified cost and pricing data will exist. These lots will be awarded based on price analysis using the prices from the previous lots.

3. The contractor will maintain configuration control allowing it the opportunity to make changes that do not affect the requirements found in the system specification. The contractor retains the responsibility to have traceability records so as to be able to identify the defective service inventory in the event of a systemic problem, and the contractor will notify the Government in advance of any changes. The Government will not pay for any Engineering Change Proposals (ECPs) in production except as caused by the Government through a change in the requirement.

4. The Government will use the contractor for maintenance and repair [use if applicable].

5. Government in-plant oversight during production, once the contractor quality system is verified to work, will be removed. The cognizant administration office will still be delegated responsibility to perform some administrative functions and may be asked to perform other tasks not related to inspection.

6. The contractor will have the opportunity to earn a production incentive for Lots _____.

b. Should the contractor submit a proposal for a production lot that exceeds the prices reflected in the PPCC, as adjusted for changes delineated in the AUPPR clause, the Government will allow the contractor the opportunity to address the cause of the excessive pricing prior to the Government decision to invoke any penalties. In the event the Government is not satisfied with the prices submitted, the Government has the right to invoke any or all of the following:

1. The contractor will honor its agreement to deliver to the Government a complete, final [inset program name] technical data package, suitable for re-procurement by the Government, at no additional cost to the Government, within 12 months after submittal of a proposal exceeding the PPCC.

2. The contractor will develop and qualify a second source for the production of [insert program name] at no additional cost to the Government, within 18 months after submittal of a proposal exceeding the PPCC and receiving direction to do so by the Government pursuant to paragraph "b" above. Qualification is defined as the successful completion of the approved acceptance test procedure for the first [insert program name] unit produced by the second source contractor. The Government will provide the test aircraft and test range for second source qualification at no cost to the contractor, if applicable. The contractor will pay a penalty of $ _____ for each working day that it is delinquent in providing a qualified second source after the 18 month period. The maximum liability is $ _____. The 18-month qualification period will be extended on a day for day basis for any caused delays.

3. The contractor will be required to submit certified cost and pricing data for any lot where its price exceeds its PPCC. The contractor will have to retroactively submit DD Form 1921, Contractor Cost Data Formats, for the lot in question and all preceding production lots.

4. The Government will have the option of reverting to Government configuration control.

5. The Government will have the option of reverting to Government logistics support. [use if applicable]

6. The Government will have the option of reinstating normal in-plant oversight.

7. The contractor will forfeit its opportunity to earn a production incentive for Lots _____.

Production Price Commitment Curve
Example of an Actual Contract Clause

ADJUSTMENT OF FEE BASED ON LOW RATE INITIAL PRODUCTION (LRIP) COST DETERMINATION

1.0 Introduction. The parties agree to individual LRIP Average Unit Procurement Cost (AUPC) Requirements for Lot options 1, 2 and 3 to this contract. The parties also agree to the use of a Procurement Price Commitment Curve (PPCC) for production Lots 4 through 7 as defined in Paragraph 2.4 below. The purpose of this clause is to:

- Define AUPC Requirements for LRIP Lots 1, 2 and 3;
- Identify the Contract Line Item Numbers (CLINs) which will be used for determining the actual AUPC performance;
- State the specific requirements associated with the PPCC for Lots 4 through 7
- Define LRIP Incentive fee payments under this contract for achievement of the below cited AUPC Requirements

The incentive fees for the LRIP options, which are tied to achievement of the respective AUPC Requirement, will be awarded after the actual cost for the respective LRIP lot option become available.

2.0 Average Unit Procurement Cost Requirements.

2.1 Definition. For the purposes of this clause, the AUPC Requirement is the total procurement cost of the weapon divided by the number of units per lot, where "units" is defined as the sum of the quantity of All-Up-Round (AUR) missiles and Captive Air Training Missiles (CATM) procured in a given Lot. Figure 1 delineates the specific CLINs included in the total procurement cost of the weapon by LRIP option number (1, 2 and 3).

Figure 1
LRIP INCENTIVE FEE CLIN STRUCTURE (LRIP LOTS 1, 2 & 3)

LOT 1	SUPPLIES OR SERVICES	LOT 2	LOT 3
0200	LRIP AUR MISSILES	0300	0400
0202	FIRST ARTICLE TESTING	N/A	N/A
0204	TRAINING MISSILES	0303	0403
0208	AUR CONTAINERS	0305	0405

2.2 Average Unit Procurement Cost Requirements. The contractor's AUPC for LRIP Lots 1, 2 and 3 are:

			Then Year $	**GFY96 $**
Lot 1	(Qty) missiles	AUPC: FY-01	$	$
Lot 2	(Qty) missiles	AUPC: FY-02	$	$
Lot 3	(Qty) missiles	AUPC: FY-03	$	$

The individual AUPC Requirements are subject to adjustment due to: quantity changes, Economic Price Adjustments, and Government-caused Engineering Change Proposals in accordance with the provisions of this clause.

2.3 LRIP Incentive Fee Payment Determination. The Contractor agrees to submit actual costs for LRIP Lot 1, LRIP Lot 2, and LRIP Lot 3 within 90 days after delivery of the last hardware unit in the respective Lot, should any or all LRIP options be exercised. Actual costs for the purposes of incentive determination shall consist of the composite of recurring and nonrecurring costs identified under paragraph 2.1 of this clause. The Government will audit, evaluate, and determine the actual cost of each Lot. The Government determined actual cost for the appropriate Lot will be compared to the AUPC Requirements identified under paragraph 2.2 to ascertain if an incentive payment is justified.

If the Government-determined actual costs for the LRIP Lots 1, 2 and 3 are greater than the respective AUPC Requirements (paragraph 2.2) plus any allowable adjustments, the Contractor will receive no payment. If the actual costs are equal to the respective AUPC Requirements, the incentive paid will be 5% of the respective AUPC Requirements. If the actual costs are less than the respective AUPC Requirements, the incentives paid to the Contractor will be 5% of the AUPC Requirements plus 100% of the difference between the AUPC requirements and the actual cost.

2.4 Procurement Price Commitment Curve (PPCC). The Contractor and the Government agree to the use of a Procurement Price Commitment Curve. This curve shall apply to Lots 4 through 7. The PPCC shall be based on the following calculation: Y=AXBQR. The definition of variables is as follows:

Y = Lot Average Unit Cost
A = Theoretical First Unit Cost
X = True Lot Midpoint
B = Coefficient of the Price Reduction Curve
Q = Lot Size
R = Coefficient of the Rate Curve

For purposes of this clause, the parties agree to use the indices in paragraph 3.4 to convert the AUPCs for LRIP Lots 1, 2, and 3 into GFY96$ in order to calculate the

Theoretical 1st Unit. The formula for True Lot Midpoint Equation is set forth in paragraph 2.5. The PPCC for Lots 4 through 7 is set forth in subparagraph C.

Adjustments to the PPCC are allowed for changes in quantity; Economic Price Adjustment; and Government-caused changes under the "Changes" Clause. This PPCC is a commitment by the Contractor to specific unit prices for production missiles to be procured in Lots 4 through 7. The specific PPCC derived unit prices for each of Lots 4 through 7 are set forth in paragraph C below and are defined to be identical in terms of performance and configuration to the AUPC CLINs used for LRIP Lot 3. This PPCC clause or a substantially similar clause will be in effect and placed in every contract awarded for lots 4 through 7.

The Government anticipates awarding follow-on, firm-fixed-price (FFP) contract(s) for Lots 4 through 7. The contract(s) may be on a multi-year basis, a base year with options, or some other basis.

To that end, the Government anticipates issuing a solicitation to the incumbent contractor for Lots 4 through 7 not later than ninety (90) days after the exercise of Option Item 0400 (Lot 3) of this contract.

A. If the United States Navy issues a solicitation for and purchases Lots 4 through 7 and provided the Contractor submits a proposal for Lots 4 through 7, in response to the solicitation, that meets or improves on the prices in the PPCC, the following actions will occur. (However, the decision not to issue a solicitation for or purchase Lots 4 through 7 is at the sole discretion of the Government, is final and shall not be subject to dispute by the Contractor under the "Disputes" Clause or any other clause of the contract, and shall not be appealed to any Board of Contract Appeals, Claims Court, or any other Court. Nor shall the decision create any cause of action under or related to the contract in any court.)

(1) Provided the Contractor's performance in the areas of cost, schedule and quality is acceptable through the decision date for contract award, the Government will issue sole source contract(s) to the Contractor for all missiles covered by the solicitation for Lots 4 through 7.

(2) The Government will consider waiving the requirement for certified cost or pricing data and making the above awards for Lots 4 through 7 on the basis of price analysis.

(3) The Contractor will retain configuration control allowing it the opportunity to make changes that do not affect the requirements found in the system specification or cause a need for re-qualification of the missile AUR or missile subsystems.

(4) The Government may continue to use the Contractor for missile depot maintenance and repair.

B. If the Contractor submits a proposal with price(s) for Lots 4 through 7, in response to the solicitation, that exceed the price(s) in the PPCC, the Contractor will be required to submit certified cost and pricing data with any proposal. In addition, the Government reserves the right to invoke any or all of the following:

(1) The Government may require the contractor to qualify a Government-approved second source within 18 months after date of the Government's written direction. Qualification is defined as (a) the successful completion of the Government approved acceptance test procedure for the first missile and, and (b) successful completion of Government-approved logistics depot procedures.

The contractor will be liable for the first $50,000,000 of the cost to qualify a second source. The contractor will be required to substantiate qualification costs incurred to the satisfaction of the Government. Qualification costs in excess of $50,000,000 will be shared 50/50 between the Government and contractor.

(2) The Government may require the contractor to pay the Government up to $25,000,000, or equitably adjust the contract up to $25,000,000, should the Government decide not to invoke (1) above.

The payment would be due no later than 180 days from the date of the Government's written decision.

(3) The Government will have the option of reverting to Government Configuration Control.

(4) The Government will have the option of reverting to Government Logistics Support (Government Organic Depot).

(5) The Government will have the option of increasing in-plant oversight.

(6) The Government may choose to release a competitive solicitation for Lots 4 through 7.

C. The following are the Contractor's PPCC derived unit prices for Lots 4 through 7

		Then Year $	**GFY96 $**
Lot 4	600 missiles AUPC* : FY04	$	$
Lot 5	600 missiles AUPC* : FY05	$	$
Lot 6	600 missiles AUPC* : FY06	$	$
Lot 7	600 missiles AUPC* : FY07	$	$

*Note: The same AUPC CLIN descriptions in paragraph 2.1 for Lots 2 and 3 apply to Lots 4 through 7.

2.5 Average Unit Procurement Cost Requirement Equation. The following equation should be used to (1) make adjustments to Lot 1, 2, and 3 AUPC requirements due to quantity variations in these lots and (2) project PPCC for Lots 4 through 7 (example applications of this equation are provided in the Technical Library):

$Y = AX^{B}Q^{R} * PCI$ where:

Y = Lot Average Unit Cost (Then Year Dollars)
A = Theoretical 1st Unit Cost (GFY96$)
X = True Lot Midpoint
B = Coefficient of the Price Reduction Curve
Q = Lot Size
R = Coefficient of the Rate Curve
PCI = Predicted Composite Index (Table 5)

The True Lot Midpoint Equation is as follows:

$$X = \left[\frac{(L+.5)^{B+1} - (F-.5)^{B+1}}{(B+1) * (L-F+1)} \right]^{1/B}$$ where:

X = True Lot Midpoint
L = Last Unit of Lot
F = First Unit of Lot
B = Coefficient of Price Reduction Curve

3.0 Economic Price Adjustment (EPA). The purpose of this clause is to provide the means for either upward or downward adjustments to the AUPC Requirements in paragraph 2.2 for LRIP Lot 1, LRIP Lot 2 and LRIP Lot 3 due to abnormal fluctuations in labor and material costs.

3.1 Any adjustments under this clause shall be made on a composite basis as indicated below. Adjustments to the AUPC Requirement for LRIP Lot 1, LRIP Lot 2 and LRIP Lot 3 will occur only if the actual labor and material composite index (ACI: Table 6) varies by more than +/- 5% from the Table 5 predicted composite index (PCI) at the time of LRIP Incentive Fee Payment determination (see paragraph 2.3). Adjustments will also be made to the PPCC for Lots 4 through 7 (see paragraph 2.4).

3.2 The following indices will be used as a standard measurement in this clause:

Category	**DRI/CIS Index**
Labor	1. AHE3761LNS - AVE HOURLY EARNINGS, MISSILES, INCL LUMP SUM WAGES

Material	2. A simple average of PPI367NS - ELECTRONIC COMPONENTS (MACHINERY AND EQUIPMENT) and WPI10 - METAL PRODUCTS

If any of the above indices are discontinued, or the method of calculating the indices changes, the parties hereto shall agree on an appropriate substitute.

3.3 For the purposes of this clause, it is agreed that the AUPC Requirements for LRIP Lots 1 through Lot 3 and the PPCC for FRP Lots 4 through 7 are subject to the following:

3.3.1 The labor category (Table 3) will be weighted at 30% to calculate a composite escalation index.

3.3.2 The material category (Table 4) contains the simple average of the two material indices listed in paragraph 3.2 and will be weighted at 70% to calculate the composite escalation index.

3.4 The following indices and Table values and formulas will be utilized as specified in paragraph 3.6.

First Quarter '96 DRI/CIS Indices

Table 1: AHE3761LNS

CY 1996:	19.268
CY 1997:	20.020
CY 1998:	20.853
CY 1999:	21.740
CY 2000:	22.642
CY 2001:	23.640
CY 2002:	24.651
CY 2003:	25.714
CY 2004:	26.867
CY 2005	28.073
CY 2006	29.272
CY 2007	30.531
CY 2008	31.844

Table 2: Simple Average of PPI367NS & WPI10

CY 1996:	1.170
CY 1997:	1.181
CY 1998:	1.199
CY 1999:	1.222
CY 2000:	1.244
CY 2001:	1.262
CY 2002:	1.279
CY 2003:	1.301
CY 2004:	1.325
CY 2005	1.349
CY 2006	1.376
CY 2007	1.403
CY 2008	1.431

Note: Table 3 and 4 indices are normalized to base year CY95

Table 3: AHE3761LNS

CY 1996:	100.000
CY 2002:	127.938
CY 2003:	133.454
CY 2004:	139.438
CY 2005	145.698
CY 2006	151.920
CY 2007	158.454
CY 2008	165.269

Table 4: Material Simple Average

CY 1996:	100.000
CY 2002:	109.316
CY 2003:	111.197
CY 2004:	113.248
CY 2005	115.299
CY 2006	117.607
CY 2007	119.915
CY 2008	122.308

Table 5: Predicted Composite Index

CY 1996: 100.00
CY 2002: (CY02 Table 3 Value x .30) + (CY02 Table 4 Value x .70) = 114.903
CY 2003: (CY03 Table 3 Value x .30) + (CY03 Table 4 Value x .70) = 117.874
CY 2004: (CY04 Table 3 Value x .30) + (CY04 Table 4 Value x .70) = 121.105
CY 2005: (CY05 Table 3 Value x .30) + (CY05 Table 4 Value x .70) = 124.419
CY 2006: (CY06 Table 3 Value x .30) + (CY06 Table 4 Value x .70) = 127.901
CY 2007: (CY07 Table 3 Value x .30) + (CY07 Table 4 Value x .70) = 131.477
CY 2008: (CY08 Table 3 Value x .30) + (CY08 Table 4 Value x .70) = 135.196

Table 6: Actual Composite Index (ACI)

CY96: 100.00

Step 1: $\frac{\text{CYxx = CYxx actual average AH3761LNS value x .30}}{\text{CY96 DRI/CIS AHE3761LNS value}}$

+

$\frac{\text{CYxx actual simple average PP1367NS/WPI 10 value x .70}}{\text{CY96 DRI/CIS simple average PP1367NS/WPI 10 value}}$

Step 2: Take the answer from above and multiply it by 100

Where the CYxx actual average value = (the sum of the actual values for months 1 – 12 for year xx)/12, calculated to three decimal places the CYxx actual simple average PP1367NS/WPI 10 = (CYxx actual average PP1367NS + CYxx actual average WPI 10)/2.

3.5 Economic Price Adjustments for the AUPC Requirements for LRIP Lots 1 through 3 will be made at the time of payment determination (see paragraph 2.3); and only after the final Calendar Year data for each of the paragraph 3.2 indices become available for

which an economic adjustment shall be accomplished; and only if the actual composite value for a give year, calculated in accordance with Table 6, exceeds or is less than the predicted Table 5 composite Index Value by more than five (5) percent.

3.5.1 For the purposes of this clause, the final Calendar Year data is defined as the first publication of the December value for the indices stated in paragraph 3.2 above for the year by the Bureau of Labor Statistics.

3.5.2 For the purposes of this clause, CY96 equates to GFY96. The midpoint of effort for TY$ conversion to GFY96$ is Calendar Year 2002 for LRIP Lot 1; Calendar Year 2003 for LRIP Lot 2; Calendar Year 2004 for LRIP Lot 3; Calendar Year 2005 for Lot 4; Calendar Year 2006 for Lot 5; Calendar Year 2007 for Lot 6; and Calendar Year 2008 for Lot 7.

If the Government determines that a program slippage is beyond the control of the contractor, the Government may adjust the ACI Midpoint of Effort year. (Subject to Government approval, the Contractor may propose a different midpoint of effort under this Clause with the proposal.)

3.5.3 Within sixty calendar days after the paragraph 3.2 indices become available for the midpoint year of LRIP Lot 1, LRIP Lot 2, and LRIP Lot 3 contracts, should a contract be awarded, the Contractor shall submit to the Contracting Officer, its economic price adjustment calculations, made in accordance with paragraph 3.6 below. Even if the calculations establish that no adjustment to the AUPC Requirement shall be made, the calculations shall still be submitted.

3.5.4 In any proposal for Lots 4, 5, 6 and/or 7 in response to a Government solicitation, the contractor shall include its economic price adjustment calculations in accordance with 3.7 below.

Even if the calculations establish that no adjustment to the PPCC shall be made, the calculations shall still be submitted.

3.5.5 In the event the Contractor does not submit the calculations required by paragraphs 3.5.3 and 3.5.4, the Contracting Officer shall make the EPA calculations in accordance with paragraphs 3.6 and 3.7 respectively.

3.6 Calculations. Economic adjustment amounts for LRIP Lots 1 through 3 will be calculated as follows:

Formula 1: CPA = (ACI – PCI)/PCI x AUPC

where CPA = Composite Price Adjustment
PCI = Predicted Composite Index (Table 5)
ACI = Actual Composite Index
AUPC = AUPC Requirement

3.6.1 AUPC adjustment calculations shall be made as follows:

The contractor shall calculate the ACI for the midpoint of effort year in accordance with Table 6. The Contractor shall then see if the ACI fall within the Range (plus or minus 5%) for that year, no adjustment to the AUPC will occur, but the Contractor shall submit this calculation in accordance with paragraph 3.5.3. If the ACI is outside the range for the midpoint year, then the Contractor shall calculate the CPA in accordance with Formula 1 under this paragraph.

If the ACI is greater than the PCI by more than 5%, the CPA represents an upward adjustment to the AUPC. If the ACI is less than the PCI by more than 5%, the CPA represents a downward adjustment to the AUPC. Depending upon whether an upward or downward adjustment is necessary, the CPA shall be added to or subtracted from the AUPC to derive the adjusted AUPC.

3.7 Updated versions of Tables 1 through 5 for the predicted values for Calendar Years 2005 through 2008 will be included in solicitation(s) for Lots 4 through 7. These tables will be based upon the most current DRI/CIS indices available as of the date of solicitation(s) release.

Calculations: Economic adjustment amounts for Lots 4 through 7 will be calculated as follows:

Formula 2: CPA = [(PCI, - PCI,)/PCI,] x PPCC Then-Year Lot Unit Value

Where: CPA = Composite Price Adjustment
PCI_1 = Predicted Composite Index included in contract xxx (Table 5)
PCI_2 = Predicted Composite Index included in solicitation(s) for Lots 4 through 7

PPCC = Procurement Price Commitment Curve

3.7.1 PPCC adjustment calculations shall be made as follows:

The Contractor shall compare PCI_2 with PCI_1 for the midpoint of effort year for each of Lots 4 through 7. If the difference between PCI_2 and PCI_1 falls within the range (plus or minus 5%) for that year, no adjustment to the PPCC will occur. If the difference between PCI_2 and PCI_1 is outside the range for the midpoint year, then the Contractor shall calculate the CPA in accordance with Formula 2 under this paragraph.

If PCI_2 is greater than PCI_1 by more than 5%, the CPA represents an upward adjustment to the PPCC. If PCI_2 is less than PCI_1 by more than 5%, the CPA represents a downward adjustment to the PPCC. Depending upon whether an upward or downward adjustment is necessary, the CPA shall be added to or subtracted from the PPCC to derive the adjusted PPCC.

Appendix K
Selecting the Source

Past Performance

De-emphasizing Instant Contract Price

Elevating Past Performance
Joint Air-to-Surface Standoff Missile (JASSM)

One recent example where offeror past performance played a substantial role in a major system acquisition is the Joint Air-to-Surface Standoff Missile (JASSM) program. Our purpose of including this example is to demonstrate how using past performance as the highest ranked (or no lower than the highest ranking) source selection criteria, as we envision it, will have a significant impact on the acquisition process, while bringing DoD practices closer to those used by the commercial sector.

The JASSM program was preparing to enter the Preliminary Design and Risk Reduction phase. The Government intended to award two contracts. There were five offerors. In the Source Selection Plan, offeror past performance was weighted equal to the technical and cost proposals combined. Rather than look at past performance in a broad way, which is the norm today for the majority of source selections that include past performance as a criteria, the program office chose to look at past performance specifically in those select areas that met the following two criteria:

1. There was likely to be some discrimination among the offerors, and
2. The successful contractor's performance in those areas would be key to the success of the program.

There were five of these areas with a tailored set of standards and color code definitions for each.

- **Product Support**: To what degree did the contractor stand behind its product once it was in the hands of the warfighter?

- **Software Development**: Was the contractor's software delivered on time, with functionality as promised and acceptable documentation?

- **Aircraft Integration**: How well was the contractor able to work through issues with aircraft contractors/program offices in making the aircraft and weapon perform as a system?

- **Cost and Schedule Control**: To what extent was the contractor able to deliver on its cost and schedule promises for both development and production?

- **Manufacturing**: To what degree did the contractor's performance in production demonstrate that it had its manufacturing processes under control? That it was able to manage its critical subcontractors? That it was able to control indirect costs?

For each offeror, the evaluation team looked at three contracts per area. The contracts were all less than five years old (i.e., recent) and covered work most similar to what the offeror would be doing on JASSM. The program office chose to secure agreement from each of the offerors as to what specific contracts most matched the criteria to be recent and relevant. Though not essential, this step helped secure offeror buy-in to the process. Color codes, with specific definitions, were developed by the program office specifically to conduct the past performance evaluation.

Some of the key findings for this pilot process include:

- Evaluating past performance was a very resource intensive, formidable undertaking. Approximately twice the resources went to past performance evaluation as to proposal evaluation. The more experienced evaluators were the ones evaluating past performance. However, the total effort took substantially less time and people than would have a more traditional source selection.
- Recent, relevant past performance was a good predictor of future performance for the two successful offerors. It also correctly identified areas where the two competitors were likely to be strong and areas where more problems were expected.
- All evaluators agreed that relying on past performance evaluation to predict future performance was better than relying on process/proposal evaluation or certification. (The technical proposal did not provide for any software development, manufacturing, management or similar process-type plans.)
- Written past performance data (e.g., Contractor Performance Assessment Reports (CPARs) and surveys) were at best a starting place for the evaluation. They did not provide the information really needed to do a complete and comprehensive evaluation. Follow-up with points of contacts and site visits were required to obtain the needed information. It is easy to understand why this is so when one realizes that a single CPAR represents a point-of-view or standard of performance that does not make for a valid comparison with any other CPAR except one written from the same point-of-view. For use in a source selection every CPAR must be normalized to a single point-of-view or standard in order to make valid contractor-to-contractor comparisons. This means that the standards and points of view are necessarily those established in the source selection plan and implemented by the team evaluating past performance. The results may be substantially different than those based on an individual CPAR which has not been “normalized.”

Past performance did make a difference in the award. An offeror who lost only because of its past performance unsuccessfully protested to the General Accounting Office (GAO). This result vindicated both the concept and the specific process.

De-emphasizing Instant Contract Price
Hypothetical Example

It is 2005. The Air Force is buying a new close air support aircraft to replace the A-10. The program has two competitors and is halfway through a four-year Preliminary Design and Risk Reduction (PDRR) Phase. The Air Force has given each contractor $1 billion for PDRR using a Fixed-price, Variable Outcome approach. Both contractors will fly prototype aircraft. Each has done and will continue to do substantial work on manufacturing development and deriving innovative approaches to reduce support costs. At this time, neither contractor has a substantial advantage over the other. Each competitor has begun the planning for the Engineering and Manufacturing Phase (EMD) proposal. The Milestone Decision Authority is adamant that she wants a realistic EMD program and wants a price-based approach to the remainder of the program.

The program manager decides to use an innovative approach for the source selection. He decides that EMD price will not be a factor in the source selection. He views this as reasonable because the EMD dollars are only 10% of the expected total ownership cost for the aircraft and because the differences between the contractors' prices are likely to be small. He also decides the EMD contract will be firm-fixed-price. He forms a small team from the program office to work with each contractor to prepare the EMD plan for the proposal. The team's charter is to assure the contractors' proposals for EMD are reasonable and realistic in terms of both price and schedules. He also forms a small team that will develop an independent cost estimate for the development program. He plans to use the estimate to secure a TINA waiver.

The program office team works with both contractors over the next 18 months. There is continuing dialog about specific tasks, technical risks and risk mitigating approaches, past experience with aircraft developments, requirements trades, prudent management reserves to cover unknown-unknowns, cost drivers, manpower loadings, profit, overhead, key assumptions, and similar factors. Each contractor and the program office team share a common goal: to develop an EMD proposal that is reasonable and realistic. Because neither the price nor the schedule will be a factor in the source selection, open dialog is the rule. In effect the team is able to work the EMD cost and schedule details with each contractor as if it were in a sole source situation.

Both contractors submit EMD price and schedule proposals as previously worked out with the program office team. They are fair, reasonable, and realistic on their face. The proposals are complete. The program manager has been able to adjust the EMD budget to reflect a most likely cost. The key factors in the source selection are each contractor's design, its performance during the PDRR phase, its firm prices for the first five production lots, and Government estimates for operations and support costs considering the warranties each contractor offers

Appendix L
Pricing Tools

Parametric Models

Parametric Case Study

COPADAT

Decision Trees

Software Models

Model	Description	Input Variables	Output Variables	User Community	Status	Pros/cons Complexity
Constructive Cost Model (COCOMO)	A regression based model that estimates software development/support costs, effort & schedules. (Applies to all software life cycle phases & types of software)	Software size is primary input. Other variables are: capability/experience of personnel & development practices of the organization (Tailored version include REVIC & ADACOCOMO)	Level of effort in man-months & program schedule information.	Industry & Government	Public domain model. (http://sunset.usc.edu/tools.html) Currently being updated to COCOMO II to more reflective of today's software development practices	Parametric models requires proper data collection, analysis, calibration and validation.
Price-S	Estimates software development and maintenance costs, effort & schedule. (Applies to all software life cycle phases & projects	Software size is primary input. Other variables are: productivity, complexity, application, and reuse. (Includes integrated risk analysis capability)	Tailorable to user's needs. (ex., cost by development/testing/maint-enance, project schedules, support costs by type and quality reports)	Industry & Government	Commercially available under Windows environment (Price Systems 800-437-7423)	Parametric model requires proper data collection, analysis, calibration and validation.
SEER-SEM	Very similar to COCOMO & PRICE-S	Very similar to COCOMO & PRICE-S	Very similar to COCOMO & PRICE-S	Industry & Government	Can be used on a Macintosh. Commercially available Galorath Inc. 310-414-3222)	Parametric models requires proper data collection, analysis calibration and validation.
Checkpoint	Similar to other software models	Similar to other software models.	Similar to other software models	Industry & Government	(Software Productivity Research, Inc 617-273-0140)	Parametric models require proper data collection, analysis, calibration and validation.
SLIM	Similar to other software models	Similar to other software models	Similar to other software models	Industry & Government	(Quantitative Software Management Inc. 703-749-3818)	Parametric models requires proper data collection, analysis, calibration and validation.
Software Architectural Sizing and Estimating Tool (SASET)	Similar to other software models	Similar to other software models	Similar to other software models	Industry & Government	(Air Force Cost Analysis Agency 703-746-5865	Parametric models requires proper data collection, analysis, calibration and validation.

Hardware Models

Model	Description	Input Variables	Output Variables	User Community	Status	Pros/cons Complexity
PRICE-H	Generates estimates for a diverse range of hardware equipment. Estimate's development & production costs and project schedules	Principal descriptors are weight & size that are coupled with various complexity factors.(Includes risk analysis capability)	Tailoable to user's needs. (ex., various cost spreads, labor hours, material costs, and program schedules)	Industry & Government	Commercially available under Windows environment. (Price Systems 800-437-7423)	Parametric models requires proper data collection, analysis, calibration and validation.
SEER-H	Knowledge based model that generates hardware estimates for development & production costs and project schedules. (For all hardware acquisition phases)	Size, volume, material & circuitry composition, and adjustment factors. (Includes integrated risk analysis capability)	Tailorable to user's needs. (ex., gross estimates, bread-out estimates by activity & labor categories.	Industry & Government	Commercially available. (Galorath Inc. 310-414-3222)	Parametric models requires proper data collection, analysis, calibration and validation.
NAFCOM	Specific to space hardware (e.g., launch vehicles, upper stages & spacecraft). Otherwise similar to above hardware models.	Similar to above hardware models. Also, considers specific ground rules, inflation tables & WBS format unique to NASA & AF.	Similar to above hardware models.	Primarily NASA	Free to Government agencies. Works under Windows.) (SAIC 205-971-6576)	Parametric models requires proper data collection, analysis, calibration and validation

Other Models

Model	Description	Input Variables	Output Variables	User Community	Status	Pros/cons Complexity
Automated Cost Estimating Integrated Tools (ACEIT)	Integrated cost estimating toolbox. Part spreadsheet & database that is flexible enough to perform any type of analysis life cycle costs to learning curves and beyond.	Flexible and open by the analysts through its spreadsheet use. Also, requests base year of calculated costs & inflation indices.	Output created by analyst. Has standard report formats for price analyst or financial manager.	Industry & Government	Commercial license. Ellen Coakley. ESC/FMC (781-377-5226) Tom Kiepinski Tecolote Research, Inc. (805-96406963)	Contains model-building tools, and therefore ground rules & assumptions determined by user. Saves significant hours over traditional processes.

Parametric Case Study

Consider a hypothetical situation where the Air Force has purchased an airplane suitable for carrying large numbers of troops into forward positions. This requires capable radar, armor protection, suitable communications, and chaff to confuse enemy weapons. These capabilities make the airplane unique when compared to a 737, which could be modified to carry large numbers of troops.

Assume the airplane is priced using price level information (e.g., price as a function of empty weight). Assume an r^2 of .99 or 99%, indicating a good relationship between the independent variable, empty weight and the independent variable, price. In this situation whether empty weight is a good predictor of price will depend on what was included in the database for the calculations and whether a causal relationship makes sense. If the database includes seven other similar type carriers, then confidence that the result is significant is increased. On the other hand if the high r^2 is the result of cherry picked data (i.e. using cases that will line up, then the relationship is flawed).

Relevant data is important. Transports should not be compared to fighters and bombers anymore than sledge hammers would be compared to claw hammers. Data points must be sensible and there should exist a good relationship between the predictor variable and price.

The sensibility test is less clear. To validate the weight observation, consider a complete range of observations. Do fighters weigh less and cost less than transports? What if a tank killer weighs an inordinate amount because it incorporates weighty titanium technology? Does it become an outlying point? Weight decreases often come at the expense of price increases. Therefore empty weight to price as a predictor may not be valid. What can be done to increase confidence that the price is fair and reasonable? Consider other indicators, for example, price per payload, price per pallet or price per maximum airdrop. If all of these measures supported the empty weight analysis, then confidence increases that the price predicted is fair and reasonable.

This approach supposes the parameters for supporting these observations contains a range of acceptability. For illustration purposes, assume the price per parameter of the transport in question when compared to an alternative transport resulted in a carrier that should cost between $30M and $60M and the empty weight analysis predicts $45M. If the contractor proposes $50M and will accept a settlement of $45M, is that a good deal? The amount of variability between $30M and $60Mm coupled with a questionable sensibility test and suspected cherry picking could lead someone to question whether this is a good deal. So what's a contracting officer or price analyst to do? Consider other analysis techniques.

Multi-variate parametric estimating is potentially better than a single regression at reducing the error in the predictive capability of the model. In the case above, adding other price correlation parameters to the empty weight analysis may increase the reliability of the estimate. For example, quality may relate to price. The quality of each

type of transport aircraft could be compared on a scaled basis with associated price. While this may seem somewhat subjective, there are indicators of reliability such as, mean time between failure for essential components and failure modes and effects criticality analysis (FMECA) data that support quality determinations. The expectation in this instance is that an increase in quality results in the increase in price up-front.

Another parameter could be the amount of change on each type of transport as it went through production. The level of change would be scored against the other types of transport aircraft. The expectation may be that a system with stable requirements and little need for change is less expensive than a system with changing requirements and a lot of change occurring. The model could incorporate scheduling aspects. This is more than just quantity because it considers the effects of rate and efficiency. The rate of efficiency would be scored against the other comparison carriers. The expectation may be that the transport that was more efficiently produced would be less expensive. This model could be run on COSTAT, which is a statistics application available through AFIT. The model would indicate if any of the predictor variables were related or had the same effects on price.

The equation could be:

Price = 150Empty Weight + 2300Quantity + 35000Quality + 71500Change + 100000Efficiency.

Assume variables are as follows:

Empty weight = 100,000 lbs.
Quantity = 1000 total over 30 years
Quality = 85.0 (on a scale of 1-100)
Change = 50 (on a scale of 1-100)
Efficiency = 95 (on a scale of 1-100)

Price = 150(100,000) + 2300(1,000) + 35000(85) +71500(50) + 100000(95)

Price = 15,000,000 + 2,300,000 + 2,975,000 + 3,575,000 + 9,500,000

Price = $33,350,000

The resulting equation and r^2 would likely be a better estimator than empty weight alone. Even if the r^2 was .74, which is less than the .99 for empty weight, it is likely to have a higher significance test and make more sense. A larger or different set of data points (i.e., transport models could also be chosen). The advantage to this approach is that a number of different variables can be added or subtracted to the model until a good predicting equation is found. What is needed from this contractor and other carrier contractors is some top-level data. If the data has been tracked historically and is readily available then the effort is minimized. If on the other hand suitable comparisons are

foreign products or data must be bought from alternative sources, then that will increase the effort.

Cost or Price Analysis Decision Assistance Tool (COPADAT)

Input scores based upon your judgement. If multiple CLINs/efforts where one CLIN is clearly the driver (e.g. 95%) then weight them and sum them for a single score entry. Otherwise, use a separate evaluation for each major CLIN/effort.

Category	Score	1	2	3	4	5	6	7
Type of Item	1	Commercial	RountineSvcs	Production	Medium Svcs	LRIP	ProSvcs	R&D
Competition	1	Adequate			Some			None
Contract Type	1	C/CS			IDIQ			FFP
Performance Risk	1	Low			Medium			High
Cost/Price History	1	Relevant			Some			None
	1.1							
Price Level 1 : P1								
Catalog or unit price information without supporting basis on any kind								
0								
0								

Score	**Level**	**General info needed**
1 - 2	Price Level 1 : P1	Catalog or unit price information without supporting basis on any kind
2 - 3	Price Level 2 : P2	Catalog/unit price plus available relevant market data plus general sales data
3 - 4	Price Level 3 : P3	Catalog/unit price plus available relevant market data plus general sales
		data plus government and contractor technical advice on similar item
4 - 5	Price Level 4 : P4	Catalog/unit price plus available relevant market data plus general sales data
		plus tailored cost information (e.g. top level labor rates, material, and overhead): example uncertified multi-variate model
5 - 6	Cost Level 1 : C1	Substantial amount of cost information and profit; could be cost or pricing data but not certified
6 - 7	Cost Level 2 : C2	Tailored Cost and Pricing Data; parametric models
7 - 8	Cost Level 3 : C3	Cost and Pricing Data
		Specific info needed
1 - 2	Price Level 1 : P1	Market well defined; no labor, material, overhead, or profit details
2 - 3	Price Level 2 : P2	Market generally defined; need info to contrast similar items; need recent quantities sold
3 - 4	Price Level 3 : P3	Market poorly defined; WBS level 1 detail with technical similarity input
4 - 5	Price Level 4 : P4	Market poorly defined; WBS level 2 detail without profit
5 - 6	Cost Level 1 : C1	Limited market; WBS level 3 detail with profit
6 - 7	Cost Level 2 : C2	Very limited market; tailored WBS level 4 detail with profit
7 - 8	Cost Level 3 : C3	No market; WBS level 4 detail or greater with profit
		Relevant Questions
1 - 2	Price Level 1 : P1	Is there an independent and verifiable record of market price?
2 - 3	Price Level 2 : P2	How does price, order size, and annual volume compare with other customers under similar circumstances?
3 - 4	Price Level 3 : P3	What is the basis of technical comparability and expertise?
4 - 5	Price Level 4 : P4	Can DCAA or DCMC provide assistance?
5 - 6	Cost Level 1 : C1	How does the requested level of detail match up with how the contractor accummulates data for his purposes?
6 - 7	Cost Level 2 : C2	How is the tailored detail handled in the cert?
7 - 8	Cost Level 3 : C3	Is the certification qualified in any way? It shouldn't be.

	Market poorly defined; WBS level 1 detail with technical similarity input
	Market poorly defined; WBS level 2 detail without profit
	Limited market; WBS level 3 detail with profit
	Very limited market; tailored WBS level 4 detail with profit
	No market; WBS level 4 detail or greater with profit

		Routine		Medium		Pro	
	Comm	Services	Production	Services	LRIP	Services	R&D
	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6	Type 7
Category	**Weight1**	**Weight2**	**Weight3**	**Weight 4**	**Weight 5**	**Weight 6**	**Weight 7**
Type of Item	35.0%	32.5%	30.0%	27.5%	25.0%	22.5%	20.0%
Competition	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%
Contract Type	14.3%	14.3%	14.3%	14.3%	14.3%	14.3%	14.3%
Performance Risk	15.0%	17.5%	20.0%	22.5%	25.0%	27.5%	30.0%
Cost/Price History	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%
	114.3%	114.3%	114.3%	114.3%	114.3%	114.3%	114.3%

Cost or Price Analysis Decision Tool (COPADAT)

Cost or Price Analysis Decision Assistance Tool (COPADAT) Instructions

The model incorporates instructions as comments to each cell. The model is currently set up in a table format but could be transformed into a decision software format. This will take the tabular presentation and establish a series of questions to answer/score one screen at a time with a resulting total score complete with recommendation of whether to pursue cost or price analysis and how much data to get. The tabular model is sufficiently user friendly if the user follows the comments.

By way of example, we will explore the model. The scenario is an engine spare part. It is an igniter available only from GEAE Evendale. It is a stable production item built for the last 15 years. While it is commercial in that it is of a type, this particular part is unique in that it must withstand greater temperatures. The first choice a COPADAT model user is given is the selection of the type of item. The type of item drives a set of weightings for the remainder of the choices. This is done to reflect the increased importance of commercial driving whether cost information is needed at one end of the spectrum and the less important role in determining whether you need cost information for a R&D acquisition on the other end of the spectrum.

The user selects a whole number score from (1) to (7) where “commercial” is equal to a (1) and R&D equals a (7) at the other end of the spectrum. This scenario uses a (3) rating for a production item. The next choice involves the adequacy of competition. Where competition is adequate it drives the conclusion for little need of cost information since the marketplace is defining a correct price level. It our scenario, we have no competition and the marketplace is not defined, therefore, we enter a score of (7).

The contract type is likely FFP, although a Basic Ordering Agreement (BOA) or Indefinite Delivery, Indefinite Quantity (IDIQ) arrangement could be used, which would decrease the need for cost information. In our scenario the contract is FFP unit pricing under an IDIQ contract, resulting in a score of (5). If the effort is FFP for a fixed number over a specified period of time, it would increase our need for cost information, since we are greater risk for accepting a bad deal.

The user's next choice is about the risk of performing. The likelihood of failure is low. Complexity compared to market alternatives is moderate. Configuration is stable. There is no special financing arrangement that would absorb cost problems or afford an opportunity to benefit from superior cost management. On balance this represents a middle-low score of (2) – (3). We will use a score of (2).

The fifth and last choice the user makes, regards the relevancy of cost/price history. In this scenario we have fifteen years of information. The information at the cost and unit price level is relevant in terms of sufficient volume and duration and its general appropriateness. Therefore, on a scale from one to seven, this would be a score of (1).

If there were fewer data points which conveyed less of an exact cost/price comparison, then the score would increase depending on the relevancy, since there would be a need for more current cost information to determine the price fair and reasonable.

The resulting total score is a 3.7, which equates to Price Level 3 or P3. There are four levels of price analysis and three levels of cost analysis. The lowest level of analysis requires catalog data while the highest level of analysis requires certified cost data. Price Level 3 recommends that the user obtain catalog/unit price information, available relevant market data, general sales data, and Government and contractor technical advice on similarity input. Price Level 3 also suggests the market is poorly defined, the user will need information to contrast similar items, and the user will also need recent quantities sold.

The model also prompts the user with questions as follows, "How does price, order size, and annual volume compare with other customers under similar circumstances?" and "What is the basis of technical similarity?" If the dollar amount exceeds the TINA threshold (currently $500K), then the model is suggesting the user see if the acquisition meets an exception (e.g., commercial or law) and if not, suggests the user process a TINA waiver for cost data through the Head of the Contracting Activity. If the waiver is not approved, then the user would have to get cost or pricing data.

We will now look at another example. Scenario two is an Engineering Change Proposal (ECP) on the C-17. The effort is an in-line fix to correct actuators on aircraft 100-215. The contract type is fixed price incentive (FPI). The type of item would score a (3) since it is a production fix. The extent of competition is essentially none; therefore, a score of (7) is given. The contract type is a little less than FFP, so a score of (6) is given. Performance risk is relatively low, a score of (3). The relevancy of cost/price history is a score of (5).

The entry of these scores into the appropriate score boxes results in a total score of 5.1, which equates to Cost Level 1 or C1. If the performance risk is a little less or the amount of relevant cost/price history is a little greater, then the score would drop below 5.0 and be a Price Level 4 or P4. C1 recommends a substantial amount of uncertified Work Breakdown Structure (WBS) level 3 cost data, to include profit. The user is prompted to consider how requested information compares to information the contractor tracks for its own purposes.

Price Level 4 recommends the user obtain catalog/unit price information, plus available relevant market data, general sales data, Government and contractor technical advice on similar items, and tailored cost information (e.g. top level labor rates, material, and overhead), but not profit.

Cost Level 1represents a more limited market compared to P4. The user senses a greater risk for accepting a bad deal under a C1 assessment versus a P4 assessment, which prompts the user to ask for more cost information. If the acquisition is over $500K, which we will say this one is, then the user would consider processing a TINA waiver.

By way of comparison consider the following:

Type of Item	Commercial	Score: 1
Competition	Adequate	Score: 1
Type Contract	FFP	Score: 7
Performance Risk	Low	Score: 1
Cost/Price History	Relevant	Score: 1
Total Assessment	P2	Score: 2.0

Change the above contract type to IDIQ, score 4, then the total drops to 1.6 or P1. Change the above contract type back to FFP, score 7; the performance risk to high, score 7; and cost/price history to none relevant, score 7; then the total score is 3.8 or P3.

Type of Item	Professional Svcs	Score: 6
Competition	Somewhat Adequate	Score: 3
Type Contract	IDIQ/T&M	Score: 3
Performance Risk	Middle High	Score: 5
Cost/Price History	Little	Score: 5
Total Assessment	C1	Score: 5.1

Change the above competition assessment to adequate, score 1, then the total assessment is 4.3 or P4.

Type of Item	Commercial	Score: 1
Competition	None	Score: 7
Type Contract	FFP	Score: 7
Performance Risk	High	Score: 7
Cost/Price History	None	Score: 7
Total Assessment	C1	Score: 5.9

Change the above type of item to anything but commercial and the model suggests the user needs certified cost or price data. As soon as the user moves above a production item to a score of 4, the model suggests C3 data is needed (i.e., non-tailored). The model is then biased against getting full-up certified cost or pricing data except in very uncertain situations characterized by development or initial production activities with no competition, FFP, high risk, and no cost/price history.

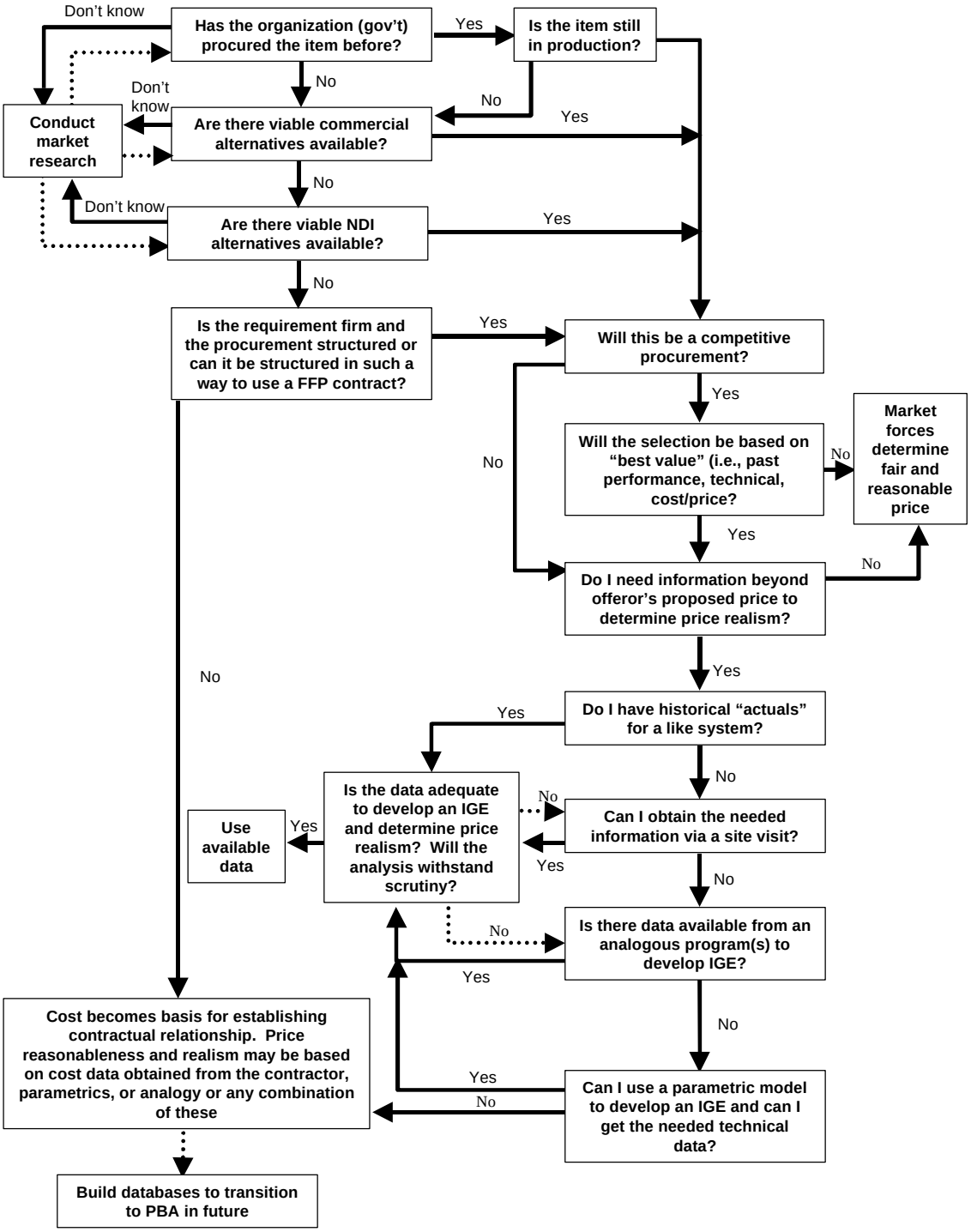
The following assessment would be for a C-130J.

Type of Item	Commercial	Score: 1
Competition	None	Score: 7
Type Contract	FFP w/T&M	Score: 6

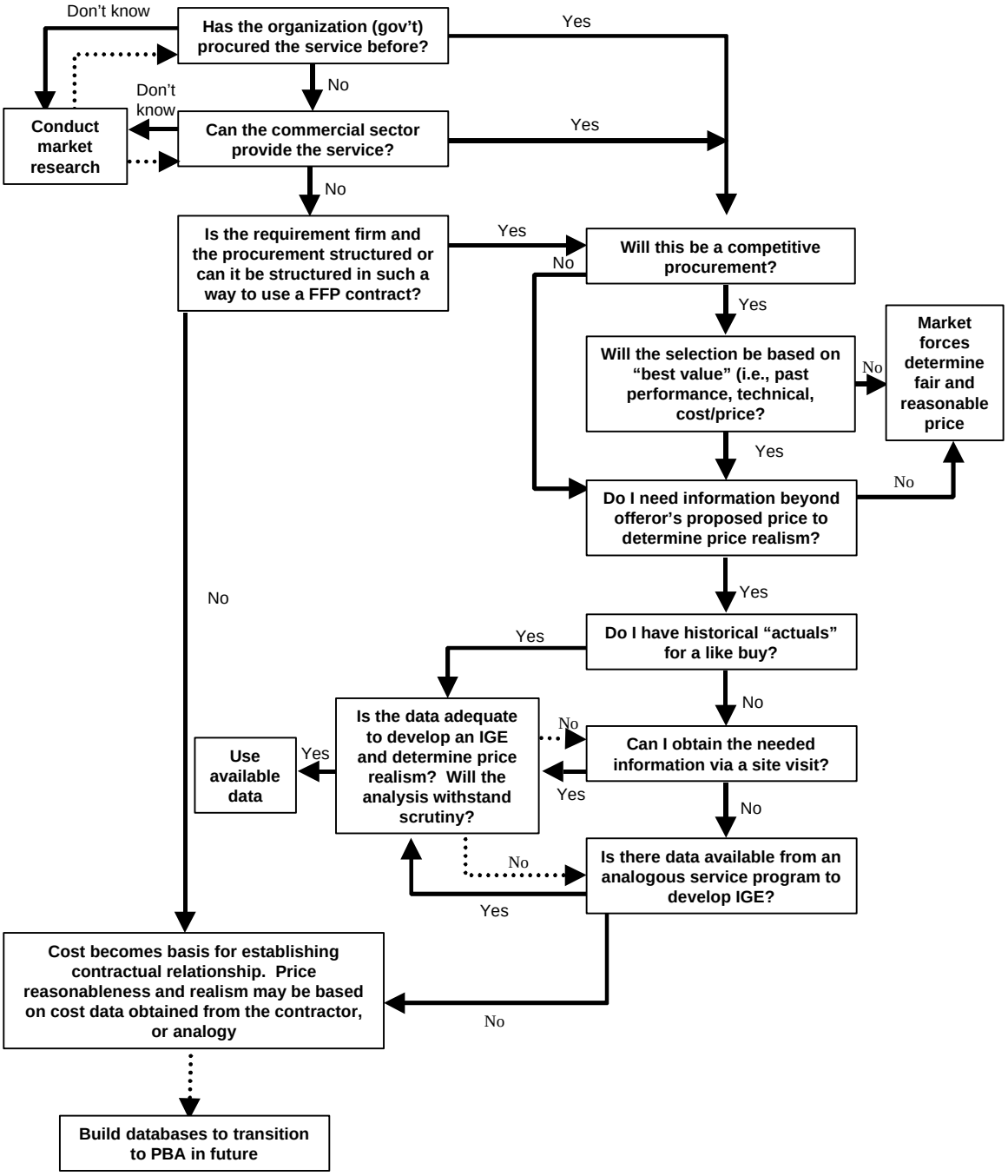
Performance Risk	Low	Score: 2
Cost/Price History	Little (45% unique)	Score: 6
Total Assessment	P4	Score: 4.7

Change the above assessment of type of item to production, score 3, and the total score is 5.4 or C1. Change the above assessment of type of item to production, score 3, and cost/price history to a lot, score 2, and the total score is 4.3 or P4.

Decision Tree for Weapons Systems/Hardware, RD&E to Procurement



Decision Tree for Services



Appendix M
Contract Types

Fixed-price, Variable Outcome

Share-in-Savings

Fixed-price, Variable Outcome
Example 1
Joint Direct Attack Munition (JDAM) Program

In 1991, the Air Force competitively awarded two contracts for the Preliminary Design and Risk Reduction (PDRR) phase of the Joint Direct Attack Munition (JDAM) Program – an ACAT 1D program to develop a guidance package to improve the accuracy of dumb bombs. The two winning contractors (Lockheed-Martin and McDonnell-Douglas) were to work in parallel over a period of approximately 18 months to do risk reduction and manufacturing development. There were two primary goals. The first was to reduce risk sufficiently to allow entry into a moderate-risk Engineering and Manufacturing Development (EMD) phase. The second, equally important goal was to mature the design and develop the manufacturing processes so that the two contractors could offer firm-fixed-price bids for the first two production lots, as well as non-binding production price commitment curves for the following three lots. Each contractor proposed its Statement of Work. The two contracts were cost plus fixed fee. Prior to the award all competitors understood informally that the Air Force planned to allocate no more than $40M per contract. After award both winners received the criteria the Air Force planned to use for the EMD down select.

The JDAM PDRR, as well as most similar risk reduction programs, was a perfect candidate for a Fixed-price, Variable Outcome contract. First, the objectives allowed substantial leeway in what the contractor had to do to satisfy them. The statements of work were essentially plans of what the contractor intended to accomplish. Second, the "carrot," potential for future work, was sufficient motivation to preclude either contractor from a half-hearted or wasteful effort. Third, the $40M was a firm ceiling. Practically speaking, the Air Force had no money to fund an overrun beyond $40M. One down select criteria for EMD was cost control during PDRR. This made the likelihood of any overrun essentially zero.

Fixed-price, Variable Outcome
Example 2
(Hypothetical)

The Army has a number of field radios awaiting repair at the original manufacturer, a commercial company. There is no prior repair history on these radios. The Army did not buy data that would allow a competitive repair contract. Based upon previous repair costs for similar radios, the Army estimates it has enough money to repair from 50-75% of the radios. Ordinarily, the Army would contract for the repairs using a time and materials (cost reimbursable) contract. In this case, the Army decides to use a Fixed-price, Variable Outcome contract. It proposes to give the contractor $2M plus an incentive of $500 for every radio the contractor returns to serviceable status. The contractor accepts. Both the Army and the contractor are pleased with the results.

Share-in-savings
Example 1
(Hypothetical)

An agency decides to conduct a source selection to institute enterprise resource planning (ERP). A share-in-savings contract is used whereby the contractor is paid a percentage of the savings that accrue from ERP implementation. A full and open competition is conducted to select the contractor. The solicitation requires the offerors to propose a payment method of which the percentage of savings to be shared is one element. The winning contractor makes significant investments up front to install the ERP system, reengineer agency processes to conform to the ERP system, conduct training, etc. The contractor begins to receive payments in about three years, after the agency begins to realize savings from ERP implementation. The contractor receives 50% of those savings over a ten-year period. These savings are derived by the agency that conducted a base-line study of its in-house costs before ERP implementation. The agency sets up a monitoring system as part of its ERP system that calculates savings attributable to ERP compared to the baseline costs.

Share-in-savings
Example 2
(Hypothetical)

An agency determines that it has a piece of DoD-unique support equipment common to many of its platforms that is a key TOC-driver. The sole source contractor provides data demonstrating this support equipment item is a high-failure item whose commercial equivalent is reliable on an order-of-magnitude better than the DoD-unique item. The contractor is willing to invest its own funds to upgrade the support equipment item so its reliability is comparable to that experienced on the commercial equivalent, provided the return on investment makes it worthwhile for the contractor to take this risk. Discussions with the contractor disclose that its corporate office typically authorizes investment of corporate funds on projects where the internal rate of return (IRR) is at least 25-30%. The contractor must invest significant funds in the early years to design an upgrade that will raise reliability of this item to comparable commercial standards. It is anticipated that savings will not accrue until 3-5 years after contract award. Also using an IRR analysis, the ’s analysis discloses that a ten-year contract will be needed so a 30% return accrues to the contractor over the term of the contract. The contract provides that the contractor will be paid 50% of the TOC savings resulting from operational use of a much more reliable support equipment item. Existing failure reporting systems can be used to track the TOC savings that result from introducing a support equipment item that is more reliable into operational use.

Appendix N

Memorandum from USD (AT&L) to the Acquisition Workforce and Defense Acquisition University

The material from this Appendix has been included in a separate PBA document (Book 2 of 2). The materials, recommended memorandums, are for official DoD use only.

Appendix O
PBA in a Sole Source Environment

Excerpts from the _____ Program Independent Cost Estimate[62]

Independent Cost Estimate. Fact -finding trips were made to _____ as well as to the program office, PMA-___, in Lexington Park, MD. These trips formulated the basis for the technical and programmatic baselines used to define the program for purposes of cost estimating; no formal Cost Analysis Requirements Document (CARD) was generated by the program office.

Development Phase. Development phase cost estimates reflect the _____ contract for prototype fabrication and a follow-on contract for support of government tests. Under the agreement, _____ will fabricate … NCCA's development phase cost estimate of $xxx is $xx (seven percent) lower than the PM's estimate of $xxx. NCCA considers the PM's development phase cost estimate to be reasonable. The PM estimated development phase costs based on the _____ offer, adjusted for program development duration. The _____ offer suggests a _____ year development program; the PM … has extended it to _____ in an effort to reduce risk.

Recurring Hardware. NCCA's cost estimate is based on recurring hardware production first unit cost (T_1) cost stepped-up to development T_1 based on a cost relationship underpinned by historical missile cost data. This estimate was favorably cross-checked by a cost estimating relationship (CER) which estimates development recurring hardware cost as a function of production hardware cumulative average cost of the first 1,000 units (CAC_{1000}).

Nonrecurring Hardware and Support. This cost category includes: missile design, systems engineering, program management, and data. NCCA used a parametric CER which derives cost as a function of the program duration in number of months, and production CAC_{1000}. This CER was validated by costs experienced under the baseline JSOW program, currently completing its development. Software costs were estimated as a function of lines of code and productivity experienced by _____ during the (program) development contract. Government in-house system test and evaluation (ST&E) costs for the AUR test flights were estimated discreetly based on the number of live fires; other government ST&E costs were accepted from the POE.

Procurement Phase.

Procurement cost estimates reflect production of ____ units over a ___ year period. NCCA's procurement phase cost estimate of $_____ is $___ (seven percent) higher than the PM's estimate of $____. NCCA considers the PM's procurement phase cost estimate to be reasonable.

[62] Excerpts taken from a Naval Center for Cost Analysis Memorandum for the Assistant Secretary of the Navy (Research, Development, and Acquisition) (Financial Management and Comptroller), Serial Number Ser NCCA-33/173-97, dated 15 December 1997.

Recurring Hardware. NCCA used engineering build-up and historical analogies to the existing (program) to estimate recurring hardware. The historical analogy method used cost and technical information from other programs with comparable performance and schedule requirements as a basis for deriving estimates.

Support. This category includes systems engineering/program management (SE/PM) and data costs. NCCA estimated contractor SE/PM using lot by lot factors, based on historical missile cost data, applied to recurring hardware costs.

Excerpts from the ___ Program Request to Waive Requirements for Submission of Certified Cost or Pricing Data (Development Program)[63]

To provide the Government insight into and validation of _____ proposed _____ program plan, the Contracting Officer requested the joint DCMC/DCAA team evaluate the processes involved in formulating the _____program proposal. DCMC and DCAA were requested to:

a. observe _____ proposal preparation;
b. review _____ pricing and estimating methodologies;
c. ascertain if _____ employed sound estimating practices and reasonable approaches;
d. verify that _____'s proposed performance schedule was realistic and achievable; and,
e. identify potential risk areas.

References (b) and (c) represent DCMC and DCAA's completed cost estimates and reviews. These audits revealed the following information:

a. DCMC and DCAA reviewed _____'s proposed commercial initiatives and found them to be based on sound practices and approaches.
b. DCMC and DCAA analyzed, in great detail, the risks associated with _____'s proposal. While their overall assessment of the proposal was "____-risk", the reports indicated that the proposal was complete and accurate. … They took no exception to _____'s integrated business tool, the engineering and manufacturing commercial practices employed, or the technical initiatives proposed. Further, DCMC and DCAA agreed that there should be cost savings for both the Government and Contractor as a result of _____ employing commercial engineering and manufacturing practices.

In addition to the full IPT review, PMA-___ formulated an internal PMA-___ cost estimate. The following is a summary of PMA-___'s findings:

a. The program manager found the methodologies used for the _____ proposal to be a departure from _____ normal estimating practices. The primary method used for the _____ estimate was the integrated business tool. This tool utilizes parametric cost analysis vice their task-based estimating system. This tool uses process-based estimates and relies on historical product development / process costs data. Basically, the tool allows the estimator to review common engineering processes for analogous programs based on technical and

[63] Excerpts taken from a Naval Air Systems Command, Assistant Commander for Contracts Memorandum for the Commander, Naval Air Systems Command, Serial Number Ser AIR-2.4.1.1.6/A032, dated May 7, 1998.

programmatic comparability. From the tool's database, commonalties were established between the (program) processes and other programs (e.g., …).

b. Enclosure (1) provides a breakdown of the (program) processes developed using the integrated business tool, their analogous programs, and their costs. The airframe hardware design estimate provides an excellent example of how _____ used the integrated business tool to develop their cost data.
c. PMA-___ reviewed each of the integrated business tool estimates shown in enclosure (1) and found _____'s estimating system to be sound. PMA-___ conducted its review by comparing each estimate to traditional engineering estimates of itemized development tasks. While PMA-___ took no exception to the Contractor's estimating methods or processes employed, their review did find _____'s proposed schedule too aggressive. The program manager's analysis of the proposed performance specification and statement of work resulted in an estimating EMD scheduled of __ months. PMA-___'s estimated schedule was approximately __ months longer than that proposed.

As the IPT and PMA reviews indicated that _____'s proposed performance schedule was overly success-oriented and constituted ____-risk, PMA-___ requested the development of an independent cost estimate (ICE) from the Naval Center for Cost Analysis (NCCA). NCCA, in coordination with ..., utilized parametric cost analysis based on models and equations which statistically correlated historical cost experience with system programmatic, physical, and performance characteristics.

In summary, the risk associated with _____'s success-oriented schedule has been mitigated by PMA-___ budgeting for a __ month program. The resulting program manager's estimate of $___ has been validated by the NCCA ICE of $___, a difference of less than 5%. … Finally, numerous contractual provisions are in place to incentivize _____ to control costs. Therefore, it is my belief that requiring the contractor to provide certified "cost or pricing data" as defined under FAR Part 15 would not provide the Contracting Officer a greater ability to determine "price reasonableness" nor would it provide the Government a more accurate cost estimate.

This request for waiver is not based upon a refusal of the contractor to provide certified cost or pricing data. The Contracting Officer believes that these successive reviews have generated extensive and accurate data to arrive at a "fair and reasonable price" for the (program) engineering and manufacturing development procurement. In recommending the waiver for submission of certified cost or pricing data for the subject contract, I note that this will significantly reduce costs for both the Government and contractor coincident with proposal preparation and negotiation, with no detriment to the quality of the contracting function.

Excerpts from the _____ Program Business Clearance Memorandum Documenting the Cost Estimate Completed in Lieu of Requesting Certified Cost or Pricing Data[64]

The (program) is in the twenty-first year of production. Prior to FY96 all (program) buys were based on certified cost or pricing data and cost analysis. In FY96 FAR Section 15.802 was revised in part to state that the Contracting Officer should use every means available to ascertain a fair and reasonable price prior to requesting cost or pricing data. FAR 15.804 was also revised to allow for approval of such a waiver when prices could be determined without submission of certified cost or pricing data. Thus, the FY96 buy was based on price analysis of prior (program) procurements. The FY 96 _____/NAVAIR pricing strategy incorporated escalation and future affordability adjustments.

The reference (a) authority to waive certified cost or pricing data was granted for the FY97 (program) requirements based on extensive actual cost history with a stable configuration, approved purchasing, estimating and accounting systems, and low Defective Pricing Action (DPA) risk.

The FY97 (program) buy will be contracted for on a FFP basis. Sufficient pricing history exists and the requirements are well defined.

NAVAIR and _____ mutually agreed to use regression analysis to determine costs for the FY97 procurement. The FY96 pricing strategy provided the basis for analysis. However, the FY97 data set consisted of actual costs from _____'s CCDRs, versus negotiated prices, for the relevant range. Additionally, the parties agreed to adjust the cost data to account for affordability initiatives and savings resulting from NAVAIR granting a waiver of certified cost or pricing data. The methodology for analyzing costs was "considered to be a reasonable and acceptable approach" by DCMC. _____ and NAVAIR independently established the exhibit pricing positions based on the above agreements. The _____ and NAVAIR curves produced slightly different results and, since settlement was at the bottom line, should not be considered as precedents under future negotiations.

The NAVAIR FY97 unit prices were based on the exhibit cost analysis using a parametric estimating method as follow. Historical factory costs, less general and administrative expense, from the FY91 through FY94 (program) CCDRs were used to develop parametric estimating models for each missile section. The actual cost data were then normalized for inflation and plotted using three regression models: linear, polynomial and learning curve. The most logical model with the best correlation was selected to develop a total program factory cost. The factory cost amounts for each section were then summed to equal a total program for each variant. Level of Effort (LOE) tasks were also

[64] Excerpts taken from a Memorandum for the File, Subj: FY97 (Program) Pre/Post Business Clearance Memorandum Review Panel Disposition, Serial Number Ser AIR-2.4.1.3/MB980, dated October 17, 1997.

analyzed based on FY91 through FY94 actual factory costs. After consultation with the PMA, it was determined that the scope and complexity of the FY94 tasks were most similar to that of the FY97 tasks. Therefore, FY94 actuals were employed exclusively in the LOE analysis. A ___% downward adjustment was then made to all costs to account for affordability initiatives implemented subsequent to the timeframe of the historical costs data which will make the subject effort more cost effective. The decrement was based on the FY96 (program) affordability initiative settlement position which was revalidated by DCMC.

A price analysis was conducted using a weighted average comparing the FY97 unit prices to those for similar configurations under the last five production contracts. Except for FY96, those prices were based on certified cost or pricing data and derived from extensive cost analysis and negotiations supported by Defense Contracts Audit Administration, Defense Plant Representative Office teams and, in some instances, Navy Price Fighters. The historical prices were then adjusted for inflation. The result was the NAVAIR's FY97 basic and option prices were 6.36% and 7.58%, lower overall.

- **EMD**
  - **Maximum Thrust**
  - **Turbine/Rotor Inlet Temperature**
  - **Complexity**
    - **Degree of New Component Design**
- **Production**
  - **Maximum Thrust**
  - **Maximum Thrust to Engine Dry Weight Ratio**
  - **Turbine/Rotor Inlet Temperature**
    - **Use of Exotic Materials**

EMD & Production Engines - Cost Drivers

	F_nMax	F_n@IRP	T/RIT	SFC	W_a	OPR	BPR	Dry Wt	F_nMax /Wt	New Components	Hardware NR	Hardware Rec	Hardware Total	Program Total
F_nMax	1.000													
F_n@IRP	0.8603	1.000												
T/RIT	0.4383	0.3016	1.000											
SFC	0.0224	-0.2965	0.6189	1.000										
W_a	0.4696	0.7397	-0.2624	-0.8567	1.000									
OPR	0.5353	0.1442	0.7103	0.7893	-0.4361	1.000								
BPR	0.0664	0.3224	-0.4994	-0.9634	0.8238	-0.7023	1.000							
Dry Wt	0.9610	0.9277	0.3185	-0.1870	0.6508	0.3636	0.2269	1.000						
F_nMax/Wt	0.2848	-0.1047	0.4809	0.7292	-0.5579	0.6753	-0.6338	0.0086	1.000					
New Components	0.7965	0.7200	0.5031	0.0196	0.3868	0.3995	0.1121	0.7473	0.2899	1.000				
Hardware NR	0.6876	0.4812	0.5204	0.1830	0.1558	0.5104	-0.0172	0.5688	0.5145	**0.9296**	1.000			
Hardware Rec	**0.9425**	0.7066	0.2863	-0.4390	0.6004	0.1669	0.9415	0.8014	0.2193	0.9244	0.9060	1.000		
Hardware Total	0.6901	0.5574	**0.5883**	0.2046	0.1701	**0.4874**	-0.0302	0.5816	0.4794	**0.9540**	0.9755	0.9355	1.000	
Program Total	**0.7738**	0.6359	0.5611	0.1521	0.2524	0.5003	0.0164	0.6736	0.4632	**0.9693**	0.9742	0.9654	0.9905	1.000

EMD Engine Correlation Analysis

Equation: $Y = (42{,}797.7)(X^{1.79})$ (12.686)

where: Y = Total Development Program Cost (FY95$K)
X = Number of New Design Components

CER Statistics	Variable Range
R^2 = 0.9526	34,967 ≤ Y ≤ 2,817,590
Adjusted R^2 = 0.9467	1 ≤ X ≤ 8
F = 160.95	
SEE = 29.95%; -42.95%	

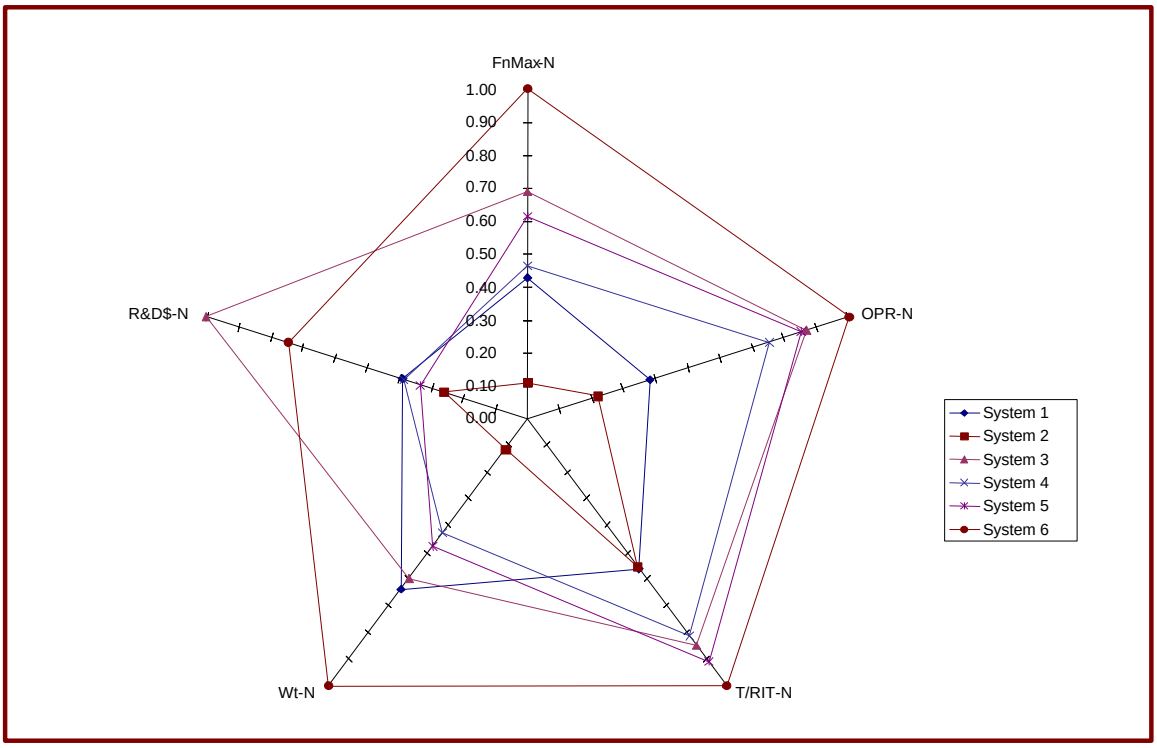
EMD Total Program CER #1

Equation: $Y = (5.938)\ (10^{-5})\ (X^{2.225})$ (4.5548)

where: Y = Total Development Program Cost (FY95$K)
X = Maximum Thrust (lbs)

CER Statistics	Variable Range
R^2 = 0.7477	34,967 ≤ Y ≤ 1,705,985
Adjusted R^2 = 0.7117	7,990 ≤ X ≤ 40,805
F = 20.75	
SEE = 56.70%; -143.98%	

EMD Total Program CER #2



Historical Relationship between R&D Price and Physical / Performance Characteristics

	F_nMax	F_n@IRP	T/RIT	SFC	W_a	OPR	Dry Wt	F_nMax /Wt	Afterburner Dummy	Maurer Factor	Unit 100 Cost
F_nMax	1.000										
F_n@IRP	0.8061	1.000									
T/RIT	0.7427	0.4984	1.000								
SFC	-0.7699	-0.9442	-0.3596	1.000							
W_a	0.8005	0.9580	0.3696	-0.9935	1.000						
OPR	0.7490	0.3764	0.9101	-0.2711	0.2875	1.000					
Dry Wt	0.8314	0.7771	0.3206	-0.8865	0.9019	0.3073	1.000				
F_nMax /Wt	0.5391	0.7025	0.8705	0.2773	-0.1024	0.9091	-0.6449	1.000			
Afterburner Dummy	0.3169	-0.0888	0.5536	0.1895	-0.1684	0.6797	-0.0744	0.5590	1.000		
Maurer Factor	0.7313	0.6241	**0.3795**	-0.6457	**0.6810**	0.4173	0.7315	-0.1064	0.1524	1.000	
Unit 100 Cost	**0.9164**	0.8146	**0.8252**	-0.7548	0.7578	0.7873	0.6748	**0.8970**	**0.2685**	**0.6653**	1.000

Production Engine Correlation Analysis

Equation: $Y = (0.0747)\ (X^{1.065})$ (9.2403)

where: Y = Production Unit 100 Cost (FY95$K)
X = Maximum Thrust (lbs)

CER Statistics	Variable Range
R^2 = 0.9143	1,283 ≤ Y ≤ 6,760
Adjusted R^2 = 0.9036	9,300 ≤ X ≤ 40,805
F = 85.38	
SEE = 14.34%; -16.75%	

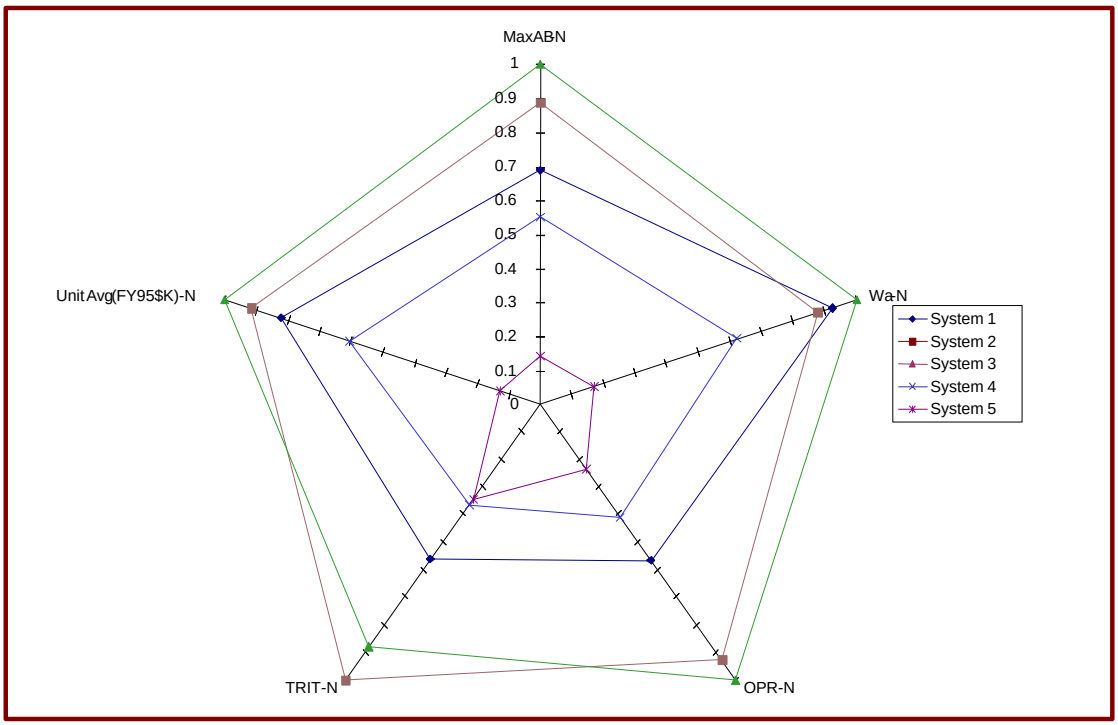
Production CER #1

Equation: $Y = (1.487)\ (10^{-3})\ (X^{0.862})\ (Z^{0.768})$ (5.439) (1.697)

where: Y = Production Unit 100 Cost (FY95 $K)
X = Maximum Thrust (lbs)
Z = Turbine/Rotor Inlet Temperature (^{o}F)

CER Statistics	Variable Range
R^2 = 0.9393	1,283 ≤ Y ≤ 6,760
Adjusted R^2 = 0.9220	9,300 ≤ X ≤ 40,805
F = 54.17	1,700 ≤ Z ≤ 2,730
SEE = 13.0%; -14.94%	

Production CER #2



Historical Relationship between Production Price and Physical / Performance Characteristics

- CERs Do Not Incorporate
  - Low Observability Devices
  - Type of Nozzle
  - Vertical Lift
  - Supercruise

- Predictive Capability (Accuracy)
  - E&MD Total Program CER (Number of New Design Components)

	Estimated	Actual	Residual %
Real Engine 1	513,882	528,300	2.73%
Real Engine 2	1,785,216	1,705,985	4.64%

  - Production CER (Maximum Thrust and T/RIT)

	Estimated	Actual	Residual %
Real Engine 1	2,250	3,027	25.69%

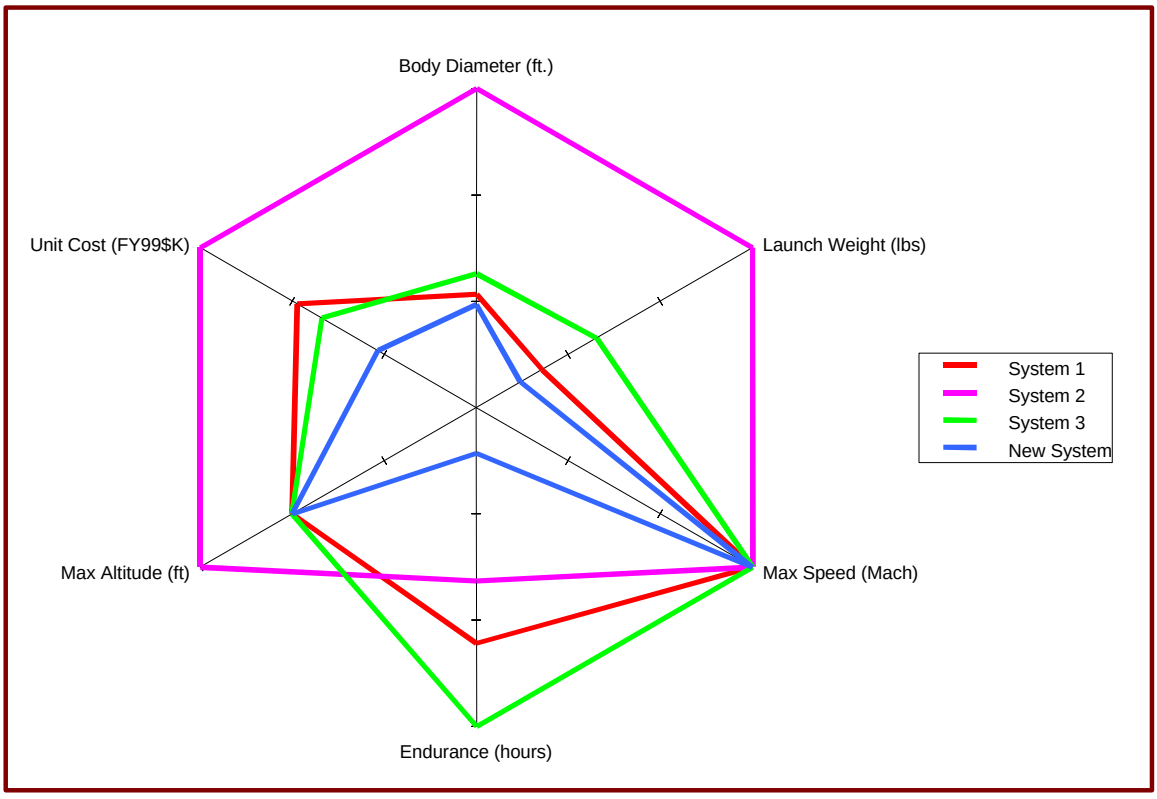
  - Production CER (Maximum Thrust and Afterburner Dummy)

	Estimated	Actual	Residual %
Real Engine 1	3,284	3,027	8.48%

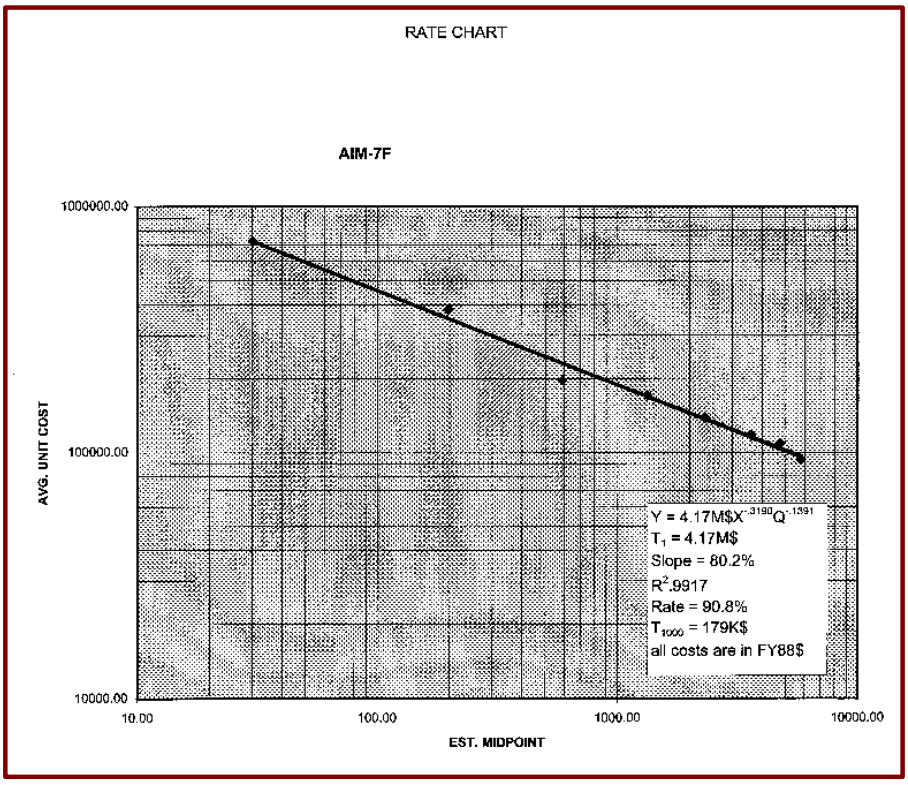
Validating CER Accuracy

	Body Diameter (ft.)	Launch Weight (lbs)	Maximum Speed (Mach)	Endurance (hours)	Maximum Altitude (ft.)	Unit Cost (FY99$K)	Quantity Procured (to date)
System 1	1.1	w	0.8	h	40K	x	1,000
System 2	3.1	4.2w	0.8	.7h	60K	x+135	2,400
System 3	1.3	1.8w	0.8	1.4h	40K	x-35	1,600
New System	1.0	.7w	0.8	.2h	40K	x-113	200

Data Used for Developing Parametric CER



Corresponding Amoeba / Spider Chart

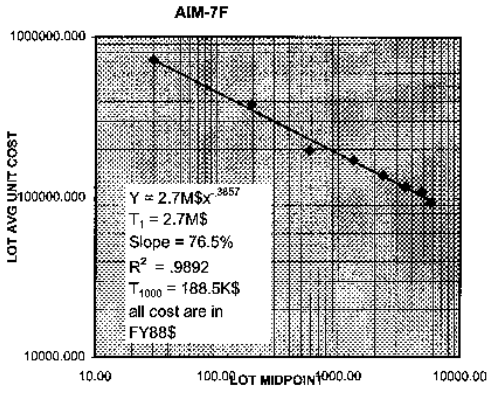


Data Used for Developing Parametric CER

FY88$

Input from: AIM-7F

First	*Last*	*Est. Midpoint*	*Actual Y-value*
1.000	100.000	30.250	722234.000
101.000	325.000	197.088	383039.000
326.000	925.000	587.318	196862.000
926.000	1805.000	1329.169	171471.000
1806.000	2915.000	2327.474	138060.000
2916.000	4313.000	3580.433	117362.000
4314.000	5213.000	4752.872	108710.000
5214.000	6357.000	5771.352	93254.000

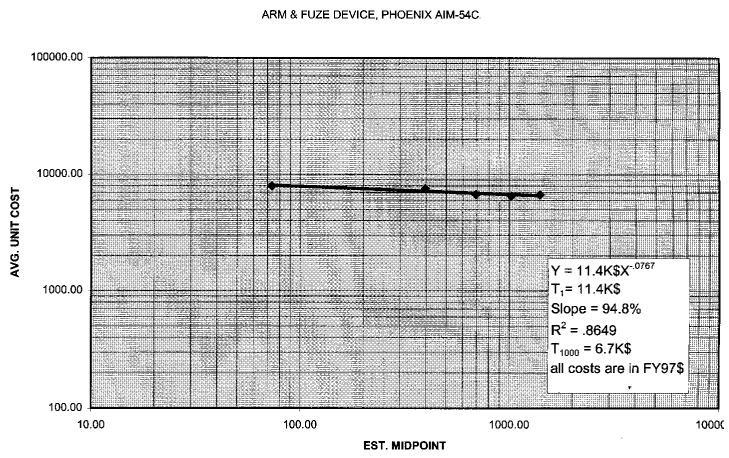


Total System Learning Curve
Total System Learning / Rate Curve

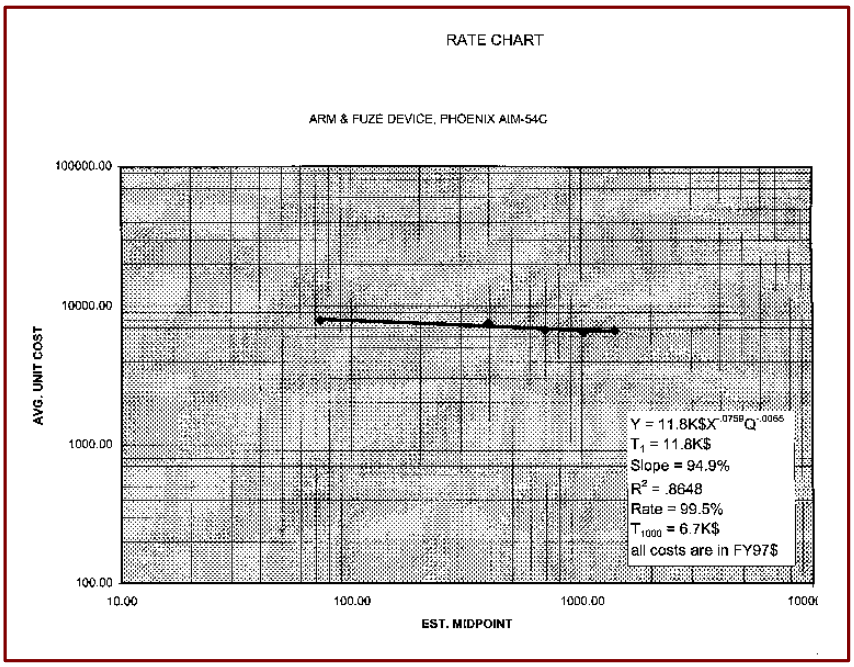
Learn_chart

ARM & FUZE DEVICE, PHOENIX AIM-54C

First	Last	Est. Midpoint	Actual Y-value
1.000	260.000	73.312	7972.000
261.000	560.000	396.404	7535.000
561.000	838.000	692.576	6729.000
839.000	1223.000	1021.982	6508.000
1224.000	1578.000	1395.387	6692.000



Sub-component Learning Curve



Sub-component Learning / Rate Curve

Example
Unique Program Solution

The (program) is an on/off road designed primarily to transport up to 33,000 pounds of ammunition and other classes of supply for the U.S. Army over the severest of terrain conditions. Its capability is unique in that only one operator is required to load, transport and unload a wide verity of payloads without leaving the truck cab. This is accomplished by having the cargo loaded onto NATO standard platforms (flat tracks), which the truck can self-load and unload through the hydraulically powered load handling system.

The (program) began establishing the foundation of its Life Cycle Cost Management Plan in mid-1997, which included Hardware Upgrades, Focused Maintenance, Enhanced Soldier Safety, and a Continuous Customer Focus (CCF) program. Hardware upgrades formed the basis of a "Spiral Modernization" program in which both supply demands and maintenance activities were analyzed in conjunction with the CCF program. These reviews focused the Life Cycle Management initiatives, to those areas where the greatest results could be obtained for the lowest developmental and implementation cost.

The nature of the products (i.e., heavy trucks) leverages commercially developed and produced components. Like the rest of the automotive industry, heavy truck component suppliers are very competitive and anything but stagnate. Some segments make performance advancements, while others may reduce component cost with the same performance. The program business strategy has been to foster and benefit from this environment, implementing improved or lower cost components into production as running changes, bringing the spare and repair parts network along in consort.

By utilizing best practices developed within commercial industry, the program was able to greatly reduce the component development costs while leveraging the high volume cost savings of commercial parts sources.

The CCF Program was one of the program's lead efforts in the reduction of Life Cycle Cost. Through face-to-face interviews with soldiers at a variety of locations throughout CONUS, the program team identified parts that were the most resource intensive for either diagnostic or replacement actions. Concurrently, with the CCF action, other members of the (program) IPT were reviewing the top 100 parts by demand history and top 100 parts by maintenance time for the (program). By cross-referencing the two top 100 lists with the results of the CCF survey, the program team was able to readily identify the specific parts that would have the highest return on our investment for Life Cycle Cost Reduction. A series of component failure analyses followed the demand study, which in turn resulted in:

a. Incorporating component improvements already available or under development.

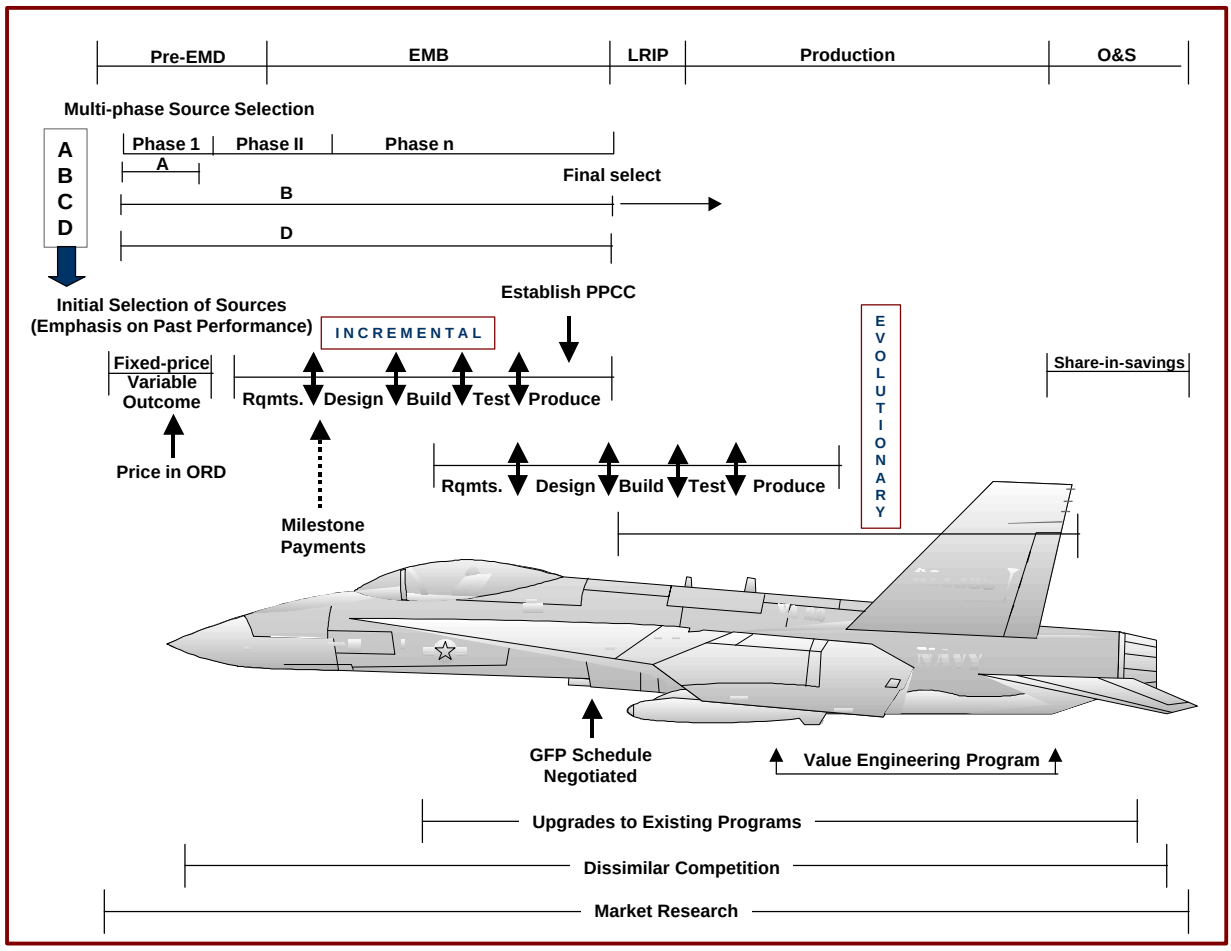
b. Revised troubleshooting or diagnostic procedures to reduce the probability of good components being needlessly replaced with no evidence of failure (NEOF).

By analogy, commercial data for similar components was used to estimate potential cost savings. But as analogy assumes a singularity of physical size and operating tempo and environment that rarely truly exist between military and commercial items, the commercial estimates are tempered by "engineering factors" during the synthesis and analysis cycle. Once the program team developed a confidence level of potential hardware savings, the implementation costs were added to arrive at potential savings.

Through this process, the (program) IPT identified 26 vehicle enhancements that reduced the maintenance burden on soldiers, increased their safety, or reduced component failure rates. These “Spiral Modernization” enhancements are being incorporated to the fleet via the Modernization through Spares (MTS) Program for vehicles already in the field, and through a production line change program.

These enhancements are already producing measurable results in the reduction of (program) LCC. The (program) IPT will continue to monitor these cost drivers as they mature in order to integrate the latest technological changes and continue to reduce LCC.

Appendix P
Relationships between Recommendations



Relationships between Recommendations