AFIT/GLM/LSY/92S-42

AWARD FEE IN SOFTWARE ACQUISITION

THESIS

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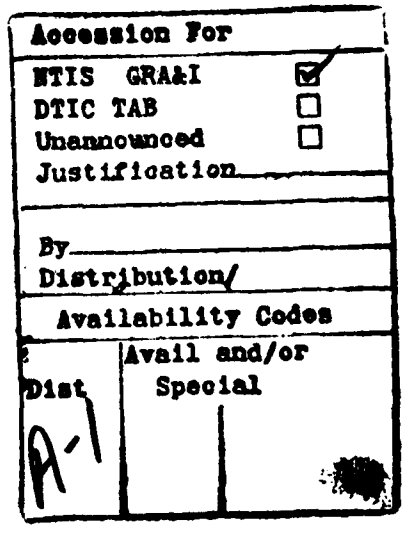

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AWARD FEE IN SOFTWARE ACQUISITION

THESIS

Presented to the Faculty of the School of Systems
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Master of Science in Logistics Management

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Preface

The structure of this document will support two categories of readers: a) senior management personnel interested in key issues, findings, and recommendations, and b) acquisition personnel. Senior managers should read Chapter I, Introduction, and Chapter V, Recommendations. The remainder of the acquisition work force should read all five chapters.

Chapter I introduces the topic and identifies the problem. Chapter II reviews the available literature on award fee contracts and software acquisition. Chapter III covers the research methodology used for this study. Chapter IV summarizes the data obtained during the interviews. Chapter V summarizes the findings of this research and proposes recommendations for further research to improve the system program offices ability to effectively use award fee contracts based on the data obtained during the literature review and interviews.

A number of individuals provided guidance and support to the researcher. These include: my thesis advisors, Mr. Daniel V. Ferens and Maj Dennis L. Hull; my thesis sponsor, HQ AFIC/LEC, Mr. David Hood.

This thesis is dedicated to my wife, Charlotte Ellen Hunter, without whose help and support this document would never have been completed.

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Abstract

The focus of this research effort was to determine, in general terms, what contractual tools are available to influence contractor performance during the software development process and, specifically, whether or not award fee contracts are appropriate tools. First, a qualitative, in depth literature review was done. Next, personal interviews were conducted with Program Directors and Deputy Program Directors at Aeronautical Systems Center, Electronic Systems Center, and Space and Missiles Systems Center. Then, after the results were summarized, the data was analyzed and findings were made.

Findings include: (1) award fee was found to be the most flexible provision in the FAR and its supplements to influence contractor performance during the software development process; (2) the literature search found a strong consensus on major events or milestones in the software development process; and, (3) program requirements are the key factor that drives the linkage between award fee and the software development events. For software development, award fee contracts give the government a flexible and effective means to effect the software development process.

AWARD FEE IN SOFTWARE ACQUISITION

I. Introduction

When the 1980 Five Year Defense Plan is compared with the 1992 Six Year Defense Plan, it appears that the defense budget is shrinking. This means there will be less money available for development and maintenance of current and future weapon systems. Many of today's weapon systems contain large amounts of software. Software development is fast becoming the critical part of all weapon systems development and maintenance.

> Software often incurs greater costs and more intractable problems. Its development and maintenance account for as much as 10% of the entire defense budget, ... with 80% of that figure going towards labor-intensive rework and updating. (Goldberg, 1990:60)

If the current state of the hardware development is compared with that of software, hardware is keeping pace with the technological advances while "software systems lag far behind" (Goldberg, 1990:60).

Government and contractors alike are aware of the problems associated with development and maintenance of software. To eliminate the lack of visibility in the software development process, the Department of Defense (DoD) developed DoD-STD-2167A, Defense Systems Software Development. This document describes a structured approach to software development. It outlines the development

process and describes the required documentation. However, this standard and others have still been inadequate to facilitate the development of software within cost and schedule (Goldberg, 1990:60).

General Issue

According to Goldberg, there is a need to develop an environment where both the Government and contractor develop supportable and maintainable weapon systems software on time and within budget. If this is done, there will be fewer programs with

> Intractable software problems... [leading to] ...canceled programs (e.g., DIVAD), or rather dubious circumventions of specifications, as in the B-1B bomber, Aegis shipboard air defense system, and M-X missile guidance system. (Goldberg, 1990:60)

There needs to be a way to focus both Government and contractor attention on the software development process that is both flexible and contractually binding. This would allow the Government to better assess the contractor's performance during the development process.

Background

"A major problem area quickly becoming evident ...[is]... software management. Software is the least understood and highest risk of a typical program" (DSMC, 1989:23). Costs associated with hardware and software development are a small part of the total life cycle cost.

Weapon systems maintenance costs comprise the largest part of life cycle cost. Figure 1, Normal Cost Distribution of a Typical DoD Program, shows the relative distribution of costs per development phase. This figure divides the phases into system research and development, production, and operation and support. The chart in Figure 1 indicates that the operations and support phase accounts for 60 percent of the total life cycle cost. Weapon systems life cycle cost is a complex issue and is outside the scope of this

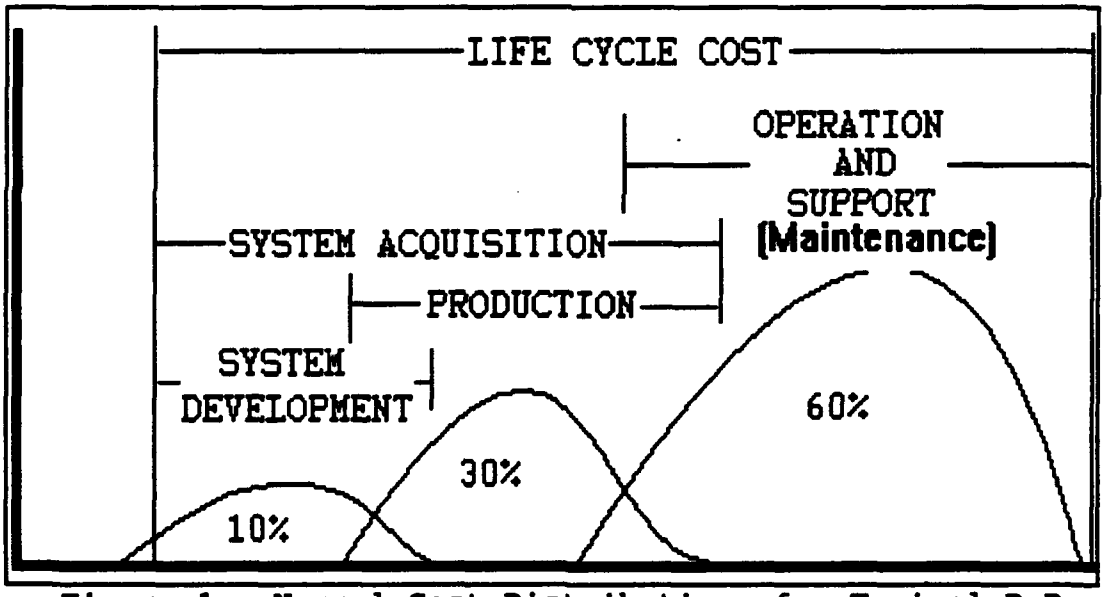


Figure 1. Normal Cost Distribution of a Typical DoD Program (DSMC, 1986:17)

research.

By the start of production, 85 percent of the life cycle costs are fixed. This is what makes software maintenance costs so high. Figure 2, Effect of Early Decisions on Life Cycle Cost, shows the effects early development decisions make on life cycle costs. There are

three key products which are essential for software maintenance that come from the software development process: documentation, modifiable code, and source code. The decisions on the quality and completeness of these tools are decided during development, where the pressures of development cost and schedule may sometimes override concerns for maintenance.

Figure 3, Fault Removal Cost, shows the relationship between correcting software and documentation early in development and later in operation. The costs to fix faults during the operation and support phase are over 80 times more expensive than during development (Integrated Computer

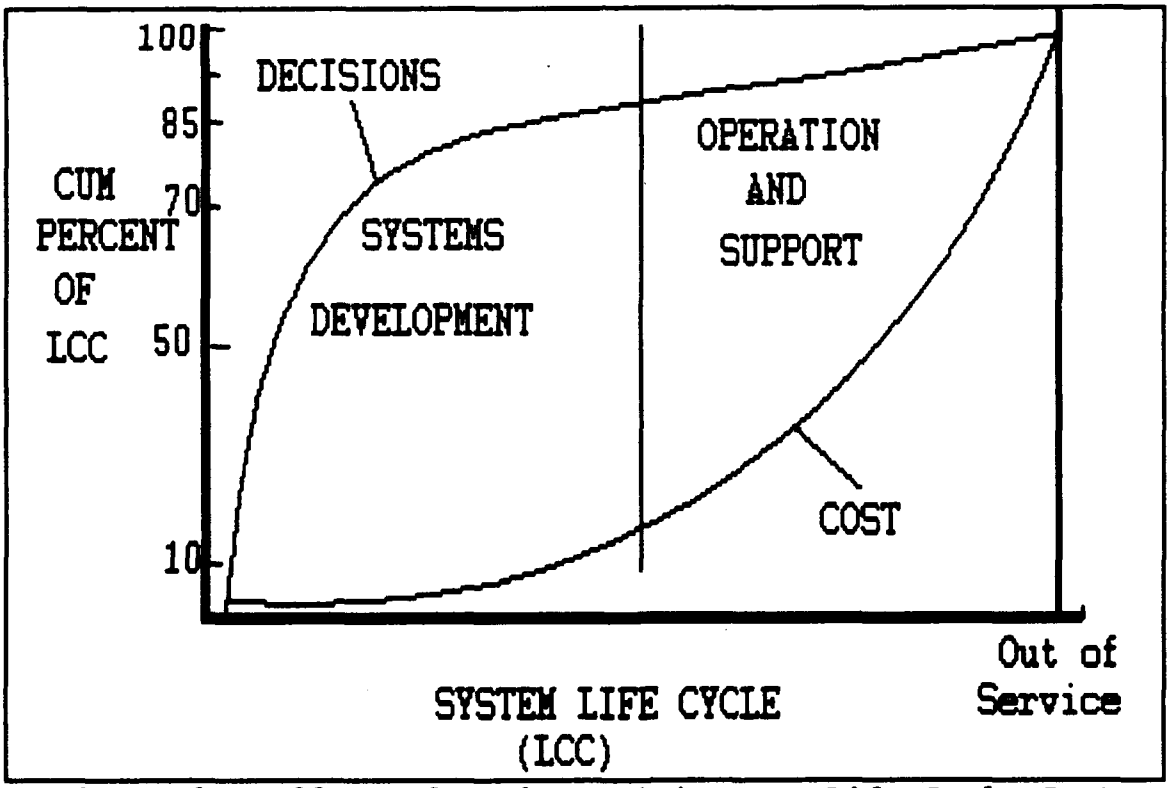


Figure 2. Effect of Early Decisions on Life Cycle Cost (DSMC, 1986:17-3)

Systems, 1988:340-1-27). The upper limit is unknown, for there are too many factors to calculate a true bound.

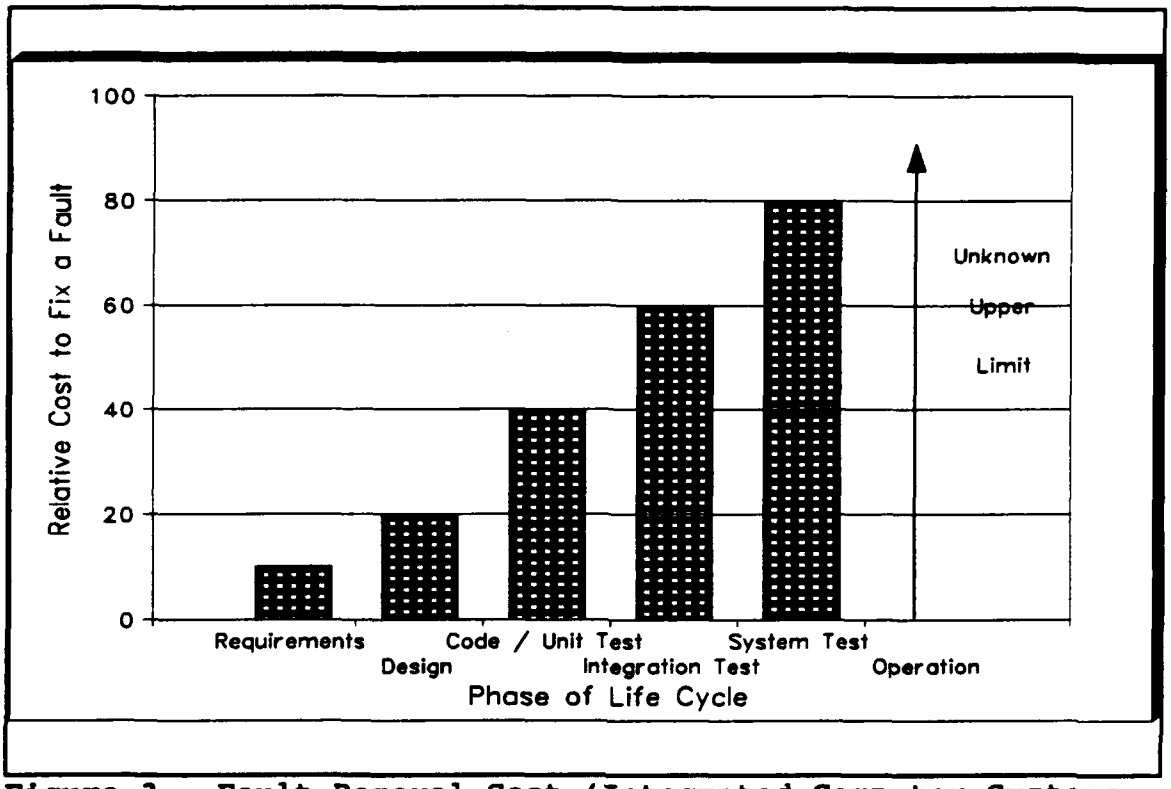


Figure 3. Fault Removal Cost (Integrated Computer Systems, 1988:340-1-27)

The cost of software development projects has increased since the 1960's with an increase in the contribution from software. In the past, hardware was the major cost driver for weapon system development. Today, software is the major cost driver. Figure 4 graphically displays this relationship.

With these facts, a means of influencing the software development process needs to be found. The development process must be monitored regularly, contractor performance must be evaluated, and the Government must have a feedback mechanism to show the contractor what constitutes acceptable

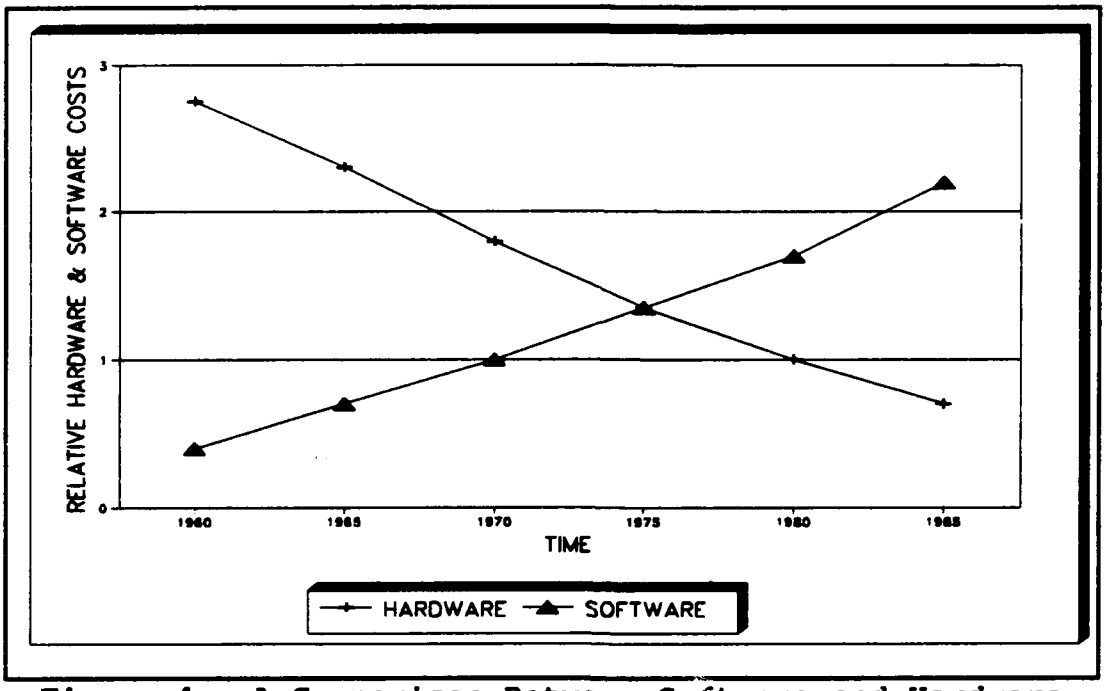


Figure 4. A Comparison Between Software and Hardware Cost for 1960 to 1985 (Simpson, 1987:3).

performance.

Problem Statement

The Government has limited contractual tools available during the software development process to provide the contractor with feedback and to insure the contractor delivers software that is on schedule, within cost, and maintainable. The research question is: What contractual tools are available to influence contractor performance during the software development process?

Investigative Questions

To determine what contractual tools are available to influence contractor performance during the development process, the following questions will be researched:

1. What provisions are available in the Federal Acquisition Regulation (FAR) and its supplemental regulations to influence contractor performance during the development process?

2. What events or milestones in the development process should be used to evaluate contractor performance during the software development process?

3. How should award fee, as described in the FAR and its supplements, and software development events be linked to influence contractor performance?

4. Can the award fee process be used to influence contractor performance during software development?

5. What award fee criteria should be used to evaluate contractor performance?

6. Does the award fee process include an appropriate type and form of feedback to give to the contractor for improving his ability to develop maintainable software on time, and within cost?

Scope and Limitations

This thesis will examine only a few of the numerous approaches available to influence the software development process. Approaches not covered include tracking software metrics, growth in lines of code, and code and unit test deficiencies. The research starts with the premise of using the FAR and its supplements as the primary tool to insure quality software is delivered to the Government.

Summary

This chapter presented a brief summary of the future financial picture of the defense budget and problems associated with software development. It discussed the need for developing tools to improve the software development process because, as more modern weapons systems are developed, the amount and complexity of weapon systems software will continue to grow.

Chapter II reviews current literature on software development. The chapter discusses the contractual requirements and software development process, reviews the tools available in the FAR and its supplements, and evaluates suitability of existing methods to influence contractor performance. The software development process is described and the various events and milestones suitable for linkage to the contractual requirements are reviewed. Contractor evaluation criteria and processes are evaluated. Finally, types and forms of contractor feedback are analyzed to determine their relative merits.

II. Literature Review

Introduction

This chapter summarizes the qualitative information available for possible answers to the questions proposed in Chapter I. The qualitative information available on each question is reviewed followed by a research summary.

Question 1. What provisions are available in the Federal Acquisition Regulation (FAR) and its supplemental regulations to influence contractor performance during the development process?

The FAR describes several types of contracts. The basic types are Fixed Price (FP) and Cost Reimbursement (CP). In a Fixed Price type of contract, the contractor has agreed to a fixed-price for the work to be performed. If the contractor exceeds the fixed price, any additional cost is his responsibility. In a Cost Reimbursement contract, the government will pay all allowable and allocable costs associated with the contract up to an agreed to ceiling (TASC, undated: Book 2, E-1 to E-6; FAR, 1990:Part 2).

Both FP and CP contracts can be varied by the type of fee arrangement in the contract. The amount of fee or profit the contractor receives may be structured to consider several factors; for example, performance, quality of work, schedule, and maintainable software.

The types of fee arrangements include fixed fee (FF), incentive fee (IF), and award fee (AF). A fixed fee arrangement is set at the start of the contract and is used primarily when the item being purchased is not defined well. Incentive fee arrangements vary significantly and may include schedule and technical performance incentives in addition to cost incentives. An award fee is used when the government wants a contractor to produce results, such as acceptable documentation or maintainable software, with standards which cannot be objectively quantified.

Possible combinations of contract types with different fee arrangements are depicted in Table 1. The type of contract used should be selected to fit the specific requirements of the weapon system being developed. For example, a FFP contract would be used by the government to contract of a lot of 500 AM-9 Sidewinder air-to-air missles. On the other hand, the development of the F-22 fighter aircraft would use a CP contract because the government share of risk in a new development is greater.

The FAR and its supplements have other tools, which are standard clauses required in all contracts, that can be used to influence contractor performance. One, show cause notice, is used "when the contractor has defaulted by failure to make delivery of the supplies or to perform the services within the specified time" (FAR, 1992:49.402-3(c)). The government uses a show cause notice to "call the contractor's attention to the contractual liabilities if the

contract is terminated for default, and request the contractor to show cause why the contract should not be terminated for default" (FAR, 1992:49.402-3(e)(1)).

TABLE 1

Combinations of Contract Types and Fee Arrangements

Contract Type	Fee Type	Contract/Fee
CP	IF	CPIF
CP	AF	CPAF
CP	IF/AF	CPIF/AF
CP	FF	CPFF
FP	IF	FPIF
FP	AF	FPAF
FP	IF/AF	FPIF/AF
FP	FF	FPFF

Another tool is to withhold payments. The Defense Federal Acquisition Regulation (DFAR) contains a provision covering remedies for noncomplying technical data (DFAR, 1992:227.403-74). This provision allows the government to withhold payment if technical data is not delivered in a timely manner. The amount of payment withheld is usually based on the "estimated value of the technical data to the government" (DFAR, 1992:227.403-74).

The most drastic is the termination for default clause which permits the government to terminate the contract reprocure the orginal supplies or services and charge the defaulted contractor with any excess reprocurement costs.

These are but three of the more drastic measures to modify contractor performance, and all such measures are subject to the disputes clause in the FAR and its supplements.

Question 1 Summary. The type of contract used is a key FAR management tool available to influence contractor performance during the software development process. In this review, award fee is the most flexible provision in the FAR and its supplements to influence contractor performance during the development process. Award fee also provides an appropriate vehicle for feedback.

Question 2. What events or milestones in the development process should be used to evaluate contractor performance during the software development process?

There are many articles and books on events and milestones in the software development process. This section reviews approaches of several authors and summarizes their findings.

Today, DoD-STD-2167A, Defense System Software Development, and Defense Systems Management College (DSMC)'s Mission Critical Computer Resources (MCCR) Management Guide are handy reference materials for any government project office performing the task of software development. However before the first of these documents was ever published, Lt Col Willard presented a management concept that can be used

to evaluate contractor software development performance that differed little from the first DSMC Systems Engineering Management (SEM) Guide. Lt Col Willard's concept is divided into four main areas: software development plan, development specification, personnel, and reviews and testing.

The software development plan is developed by the contractor and defines how the contractor will accomplish the software development activity. This plan should accomplish three major areas as a minimum. One, provide policies and procedures that have clear visibility into software development, integration, and test. Two, reduce the risk of schedule delays and cost overruns. Three, provide for better communication between the government and the contractor. (Willard, 1985:9)

After the plan is developed, a development specification is "produced and validated prior to writing any software" (Willard, 1985:9). The author says,

> Any additional time spent in project definition will be amply repaid later because good functional descriptions will allow better costing and scheduling, and the software development will stand a better chance of meeting desired performance standards. (Willard, 1985:9)

The author's concerns with personnel center around the contractor's ability to man the software development program with trained and qualified personnel. These concerns increase if the development effort is two or more years in length. For these longer efforts, Lt Col Willard believes

"personnel turnover and changes in program management direction must be anticipated and reflected in the planning documentation" (Willard, 1985:10).

The last area is review and testing. Lt Col Willard believes they must include evaluating the proposal, establishing a project environment based on appropriate reviews, providing the criteria for testing software against the performance standards described in the specifications, and setting appropriate milestones for review (Willard, 1985:10). The author states "The government's evaluation procedures must be in place both to review any contractor plan and insure that plans are implemented in a timely manner" (Willard, 1985:10).

Lt Col Willard's paper outlines a concept for controlling the software development process and supplies several areas that can be used to evaluate contractor performance.

Simpson's book, New Techniques in Software Project Management, describes a software development life cycle with four major stages. Each major stage contains one to seven minor activities building on each other. The four major stages in Simpson's life cycle are definition, design, implementation, and maintenance. Simpson places a feasibility study, requirements definition, and system functional specification within the definition stage of the life cycle (Simpson, 1987:14). The design stage normally includes system design, program or module design, and model

development (Simpson, 1987:14). Simpson's implementation stage contains the activities associated with software code development. These activities include module design/coding, test and debugging of modules, building a skeleton system, system testing, and system installation (Simpson, 1987:15). This life cycle includes the maintenance stage, because

> Historically, it is quite often the stage that is most often underestimated when resources and time are allocated in a software development project. In fact, this stage is quite often the single largest component of any software project. (Simpson, 1987:16)

This software development life cycle contains only four stages, but within each stage there are events or milestones that can be used to evaluate a contractor's performance.

DoD-STD-2167A, Defense System Software Development, divides the software development life-cycle into eight events each leading up to potentially nine milestones (DoD, 1988:10). Each milestone summarizes the contractor's analysis or design completed to this point. The contractor then presents his findings for government review and approval. The nine milestones are system requirements review (SRR), system design review (SDR), software specification review (SSR), preliminary design review (PDR), critical design review (CDR), test readiness review (TRR), functional configuration audit (FCA), physical configuration audit (PCA), and formal qualification review (FQR) (DoD, 1988:10).

In DoD-STD-2167A, SRR is the first step in the development process and is the step where all system level

requirements are documented. SRR is also the first attempt at a functional baseline that the government will approve (DoD, 1988:10). SDR occurs when the contractor documents the system level design and supplies to the government the final functional baseline. Once the functional baseline is approved, all other development requirements will be based on this baseline (DoD, 1988:12). SSR culminates the software requirements process and documents the software specifications. When the Software Requirements Specifications and associated Interface Requirements Specification are completed and approved by the government, they become the allocated baseline on which the software is designed (DoD, 1988:21). The PDR documents how software requirements are allocated to computer software components. This allows the government the ability to review and approve the contractor's preliminary software design (DoD, 1988:23). CDR documents the contractor's detailed design for all computer software configuration items (CSCIs). This allows the government to review and approve the design before the contractor builds software (DoD, 1988:25). TRR is the event at which the government reviews the contractor's integration test data for each CSCI to see if the contractor is ready for formal CSCI integration testing. Formal testing will not start until the government approves TRR (DoD, 1988:29). During FCA, the government evaluates the software to see that each CSCI functions according to development requirements (DoD, 1988:31). PCA occurs when the government

evaluates the CSCIs against the design documentation to insure each CSCI is documented correctly (DoD, 1988:31). The last review is FQR. This review evaluates the CSCI against the allocated requirement for that item (DoD, 1988:31).

These nine milestones allow the government to evaluate the contractor's performance based on the different stages in the development process (analysis, design, code, unit test, system integration test, and system test).

Yourdon's book, Managing the System Life Cycle, covers the total software development process from user's requirements to installation. The nine major events in Yourdon's life cycle are survey, analysis, design, implementation, acceptance test generation, quality assurance, procedure description, database conversion, and installation.

The survey is described as a "feasibility study or initial business study" (Yourdon, 1988:54). The survey's major purpose is to identify current deficiencies in user's environment, establish new goals, determine whether it is feasible to automate the business, and suggest some acceptable scenarios (Yourdon, 1988:54). The final step is to prepare a charter that will guide the project through the development process. The analysis activity transforms two major inputs, user policy and project charter, into a structured specification (Yourdon, 1988:54). The design activity allocates requirements in the specification to

hardware and software component that will make up the final system. The activity of implementation "includes both coding and integration of modules into a progressively more complete skeleton of the ultimate system" (Yourdon, 1988:54). The acceptance test generation activity takes the specification and uses it to define "an acceptable system, from a user's point of view" (Yourdon, 1988:54). From the specification, acceptance test cases are generated to verify the system being built. Yourdon's quality assurance activity takes the completed system and tests it against the acceptance test that was generated. The procedure description activity is the generating of a user's manual that both describes the system and instructs the user how to use it. The database conversion activity applies only when the new system is replacing an older one or when the new system requires a current user database. This activity covers the process of taking the current user's database and making it part of the new system. The last event or activity is installation. This activity can range from cutting over to the new system, to installing the system, training personnel, and supplying complete system documentation.

Yourdon's life cycle of activities appears to be complete. If applied correctly, it could supply the events needed to evaluate the contractor's performance.

In Implementing Software Engineering Practices Buckley describes a software life cycle using five milestones, three

reviews, and two test steps (Buckley, 1989:15). The milestones are software requirements review, preliminary design review (PDR), and critical design review (CDR), and two types of tests are code and unit test, and acceptance test (Buckley, 1989:15).

The author defines software requirements review as the formal documentation and review for the requirements definition phase of the development life cycle. Buckley believes this is a good point in the development process to give the customer a degree of assurance that work is proceeding properly (Buckley, 1989:80). Software requirements review is also the time period when the customer reviews and approves the software requirements specifications. PDR is defined by Buckley as where the top-level architecture for each computer software configuration item (CSCI) is reviewed and approved by the customer. This review deals with the software architecture, integration, draft test procedures, and draft user documentation (Buckley, 1989:88). CDR reviews the software's detailed design. This is done by reviewing the detailed design documentation (Buckley, 1989:121). Buckley defines code and unit testing as when code and units functions are verified. These informal tests are to verify the code or unit, as designed, will work and pass the formal tests (Buckley, 1989:128). Acceptance tests allow the customer to evaluate the software system. This evaluation determines if the customer will accept the system (Buckley, 1989:128-129).

Buckley's life cycle is a good starting point for developing events and milestones to evaluate the contractor's performance. The design reviews are very similar to the ones used by the government, but are not complete and his approach does not use formal audits.

First published in 1983 and revised in 1986 and 1990, DMSC's Systems Engineering Management Guide was written before the DSMC MCCR Management Guide and DoD-STD-2167A, which used many of its terms and definitions. The guide divides the software development cycle into seven reviews and two audits system requirements review. These are the same reviews and audits as DoD-STD-2167A.

The seven reviews and two audits are major events and milestones that can be used to evaluate contractor performance.

Whitten's approach differs from the majority of the authors reviewed. In his book, Managing Software Projects: Formula for Success, he presents a software development cycle that contains 15 separate, but interlinked, activities. These activities are objectives, specifications, high-level design, publications specifications, test plans, low-level design, code, unit and functional test, component test, publications draft one, system test, publications draft two, regression test, package, and final delivery (Whitten, 1990:12).

The objectives activity entails developing a document that "defines the requirements and operational need that

must be satisfied for a new or enhanced product" (Whitten, 1990:13). This document provides the underlying direction to follow as product functional and design tradeoffs are made throughout the development cycle (Whitten, 1990:13).

Whitten's specifications activity develops documents that describe in detail "the externals of the product" (Whitten, 1990:13). These documents describe what the product will look like to the user (Whitten, 1990:13).

The activity of high-level design identifies and documents the components that make up the product, the functional mission for each component, the interface across these components, and the external interface to the operating environment (Whitten, 1990:14).

Publications and specifications activity covers the content and layout of each publication to be delivered. This activity provides the user publications that accompany the product, and provides information on-line for the users of the product (Whitten, 1990:15).

The test plans activity develops the documents "that describe the who, what, when, where, and how for a designated test" (Whitten, 1990:15). Test plans are written for each activity. These include, for example, unit test, functional test, and system test (Whitten, 1990:15).

Low-level design covers two separate levels of design. The first level deals with how modules technically work with each other (external interfaces), while the second level designs how the module works itself (Whitten, 1990:15-16).

Whitten's coding activity covers the actual writing of software based on the low-level design documents.

For the unit and functional test activity, the author defines unit testing as the first time the code is run or executed (Whitten, 1990:16). This is different for functional testing, where two or more modules are tested together (Whitten, 1990:16).

The component test activity is different from unit and functional testing, because this is where some or all the product components are tested together (Whitten, 1990:17).

The publications draft one activity is the first time the product's publications are reviewed by groups within the project (Whitten, 1990:17). The author says these documents are the user documentation that, when finalized, will be delivered with the product.

The system test activity can be an independent or formal test and can be performed by programmers who did not develop the code. If desired, it can include test subjects that represent users of the product (Whitten, 1990:18).

Publication draft two activity starts when the comments from draft one are received and ends when the final document is printed (Whitten, 1990:19).

The regression test activity starts after the system test is complete and involves running a selected set of test cases against the software and supporting hardware (Whitten, 1990:19). Test cases are rerun if any problems are found and fixed during this activity.

The packaging activity "involves collecting the pieces of the product for delivery to the customer" (Whitten, 1990:19). This includes all software code, hardware, and user publications.

The last and final activity is delivery. This is the point where the product is delivered to the user (Whitten, 1990:15).

These 15 activities provide a good outline of the events or milestones needed to evaluate contractor performance, with most applying to government software acquisition.

In, Managing the Software Process, Humphrey uses a concept of the project plan (Humphrey, 1990:86). This plan contains five steps. These steps are: goals and objectives, work breakdown structure (WBS), product size estimates, resource estimates, and project schedule. The goals and objectives step "describes what is to be done, for whom, and by when, as well as the criteria for determining project success" (Humphrey, 1990:87). A WBS "subdivides the project into tasks that are each defined, estimated, and tracked" (Humphrey, 1990:87). The product size estimates are "quantitative assessments of the code required for each product element (subsystem, component, or module)" (Humphrey, 1990:87). Resource estimates are "based on prior experience, known productivity factors are applied to yield reasonable estimates of the resources required for each WBS element" (Humphrey, 1990:87). The basis for project

schedule is "the available project staffing and resource estimates, a schedule for the key tasks and deliverable items" (Humphrey, 1990:87).

This project plan becomes the guiding document for the software development process. The author believes "The project plan provides a definition of each major task, an estimate of the time and resources required, and a framework for management review and control (Humphrey, 1990:110). The major tasks, time and resources within the project plan are good candidates for evaluating contractor performance.

Youll's book, Making Software Development Visible: Effective Project Control, does not cover major events or milestones. Instead, his book outlines the tools needed to gain visibility of what is happening during the software development process. In Youll's chapter on process visibility, he says "Visibility of the effects of the process will provide evidence of the effectiveness of a particular process or of a change to the process" (Youll, 1990:109). The author feels that process visibility will be gained by understanding the process and monitoring resource utilization.

To understand the process, Youll looks at three areas: rework, cost of change, and why the change occurred. Rework occurs when software does not perform within required specification, and can be caused by mistakes or by the customer changing requirements. Youll states the process can be improved if three questions can be answered: One,

what types of defects are occurring? Two, where are the defects occurring? Three, can the defects be detected earlier? (Youll, 1990:114). Tracking the cost of change through the development process allows insight into the cost of defect removal as well as tracking cost growth in system development. Identifying the number and cause of change allows for proper attention to be applied so they can be decreased. Youll believes all root changes and repercussion changes need to be monitored (Youll, 1990:114). Root changes are defined as changes in design or user requirements that cause repercussion changes. In the area of resource monitor, Youll believes tracking resources allocation and development progress allows visibility of the current development status as well as allows for the prediction of future requirements and performance.

Youll's approach for software development visibility can be tailored to evaluate contractor performance.

The software development process described in DMSC's Mission Critical Computer Resources Management Guide "presents an overview of the activities of an integrated software and hardware system as reflected in DoD-STD-2167A" (DSMC, 1991:5-2). The development process described in this guide refers to the same nine milestones described in DoD-STD-2167A and DSMC's Systems Engineering Management Guide, but calls them events and defines when each event is accomplished slightly different from them. SRR "may be held after the initial determination of system functions and the

preliminary allocation of these functions to configuration items" (CIs) (DSMC, 1991:5-2). This review also provides a look at the "developer's direction, progress, and convergence on a system configuration" (DSMC, 1991:5-2). SDR covers "all system requirements in order to establish the functional baseline documented by the system specification" and allocates hardware CI and computer software CI (CSCI) requirements (DSMC, 1991:5-2). SSR occurs when the allocated baseline is established for software. The software preliminary design is reviewed at PDR. From SSR to PDR "the developer will conduct informal design reviews, inspections, and walkthroughs to evaluate the progress and correctness of the design for each software component" (DSMC, 1991:5-7). These inspections "serve as the basis for material presented at" PDR (DSMC, 1991:5-7). CDR is the culmination of design activity and "should assure that software design satisfies the requirements of both the system level specification and the software development specifications (DSMC, 1991:5-9). Next is TRR, which is a formal review of the contractor's readiness to begin formal software CI testing and done after both individual modules and components are integrated and tested, and software test procedures are reviewed (DSMC, 1991:5-6). PCA "is the formal technical examination of the as-built software product against its design" (DSMC, 1991:5-11). FCA is a verification by the government that the CSCI's the contractor developed will perform in accordance with

requirements and interface specifications (DSMC, 1991:5-11). This is done by examining the test results and reviewing both the operational and support documentation. (DSMC, 1991:5-11). PCA may either be followed by or concurrent with FCA (DSMC, 1991:5-11). The last event is FQR, which verifies system performance complies with system requirements (DSMC, 1991:5-12).

The nine events outlined above can become the basis for evaluating contractor performance. They are all major events or milestones that must be successfully completed if quality software is to be delivered at the scheduled time and at the agreed price.

Question 2 Summary. These articles and books presented several approaches for events or milestones in the software development process that could be used to evaluate contractor performance. This research found a strong consensus on major events or milestones in the software development process.

There are nine common events or milestones within each of the readings that can be used to evaluate contractor performance. Except for Humphrey, all the authors use a combination of reviews, audits, or tests as events or milestones in the software development process. His approach used goals and objectives, work breakdown structure, resource estimates, and project schedule to evaluate performance. However, Humphrey's project schedule did contain events or milestones similar to the other

authors. The consensus of milestones that should be used are systems requirements review (SRR), system design review (SDR), software specification review (SSR), preliminary design review (PDR), critical design review (CDR), test readiness review (TRR), functional configuration audit (FCA), physical configuration audit (PCA), and formal qualification review (FQR). These specific names were not used by all the authors to describe the events in their software development life cycle, nor do all the phases fit every government software development project. Yourdon states "certainly every project, whether structured or not, goes through some kind of system analysis, design, and implementation" (Yourdon, 1988:45). These nine events and milestones should be tailored for each software development project.

Question 3. How should award fee, as described in the FAR and its supplements, and software development events be linked to influence contractor performance?

The possible linkages between award fee and software development events appear to be many. Table 1 shows four possible contract options. The types of contract are the key FAR management tools available to influence contractor performance during the software development process, and award fees are the most useful in influencing contractor performance throughout the software development process. The benefit of award fee are summarized by the following:

> The award fee contract provides not only profit or fee motivation, but also the motivation resulting from periodic evaluations by one's professional peers. In addition, it offers evaluation flexibility, in two forms:
>
> (i) the flexibility to evaluate on a judgmental basis taking into consideration both contractor performance levels and the conditions under which such levels were achieved; and
>
> (ii) the flexibility to adjust evaluation plans quickly to reflect changes in government management emphasis or concern. (NASA, 1989:1)

Question 3 Summary. By combining the flexibility of award fee with the events outlined in Question 2, the government can possess a workable means to influence the software development process and provide the contractor with feedback. An example of this is Appendix A, Performance Evaluation Periods, where the award fee periods are tied to events using a fee percent allocation.

Question 4. Can the award fee process be used to influence contractor performance during software development?

The literature reviewed did not give a clear perspective on this question. To answer this question, research has be done using the perspectives of current program directors.

Question 5. What criteria should be used to evaluate contractor performance?

The criteria for evaluating contractor performance during the evaluation period could range from identification

of development problem causes and solutions to government evaluation of contractor developed documentation. The criteria should not, however, be fragmented over a large number of performance areas and factors because it dilutes the award fee's emphasis and effectiveness (NASA, 1989:4; AFSC, undated:22).

> Instead, broad performance areas should be selected, such as technical and business management, supplemented by a limited number of subfactors describing significant evaluation elements over which the contractor has effective management control. (NASA, 1989:4)

As the contractor progresses through the software development process, the award fee criteria should change. The award fee process allows the criteria to be changed before the start of the next evaluation period as long as the contractor receives the new criteria before the start of the next period (NASA, 1989:4).

Question 5 Summary. The exact criteria is dependent on the specific software development program. The research has used the perspectives of current and former program directors to find the current system program office philosophy on criteria.

Question 6. What type and form of feedback should be given to the contractor to improve his ability to develop maintainable software on time, and within cost?

The feedback to the contractor can come in the form of a

written or oral presentation by the government at the end of each award fee period. The written or oral presentation could review strong and weak points used in evaluation and major changes required by the contractor in the next period to improve his rating (NASA, 1989:32-36).

Question 6 Summary. The literature does not fully answer this question. So, the researcher has made an attempt to compile data that will augment the available literature.

Summary

The literature review provided many possible solutions to the questions in Chapter I. The solutions discussed above present one possible solution set. They may not be the optimal solution set, because each software development project is different. These differences may appear to be small on the surface, but most are like viewing a floating iceberg. You know there are large differences that are currently unseen. A contract with award fee periods and the award fee criteria in Appendix A, Performance Evaluation Periods, and Appendix B, Evaluation Criteria, are recommended starting points.

Chapter III covers the methodology used to augment the answers to research questions two through six. This was done by surveying Program Managers, Deputy Program Managers, Contracting Officers, and contractors. The potential population for this sample is very large and contains people

both with and without award fee experience. The sample frame chosen for this research included personnel with award fee experience.

III. Methodology

Introduction

A literature search and survey were the method used for the research. The literature search reviewed articles written in professional journals, text books, Government publications, plus specifications and standards addressing the software development process and award fees. The survey focused on Program Managers, Deputy Program Managers, Contracting officers, and contractors who have experience with award fee in general, and specifically with award fee in software acquisition. A judgment sample was used for two reasons: (1) the opinions of personnel experienced with award fee were used to gain insight into current policies, experience, and effectiveness of award fees and (2) this experience base was used to develop a draft list of award fee criteria. (Emory and Cooper, 1991:275-277)

Methodology

There are different ways of surveying a population, including mailed questionnaires, telephone interviews, and personal interviews. Research has shown that telephone and personal interviews provide more reliable data then mailed questionnaires and avoid potential misinterpretion of questions (Emory and Cooper, 1991:338-339; Williams, 1992). This research primarily used personal and telephone

interviews, and only resorted to mailed questionnaires when the interviewee was unavailable for a personal interview.

Justification

The survey development process focused on developing questions that helped develop insight into the current status of award fee experience and use in the program office as well as the effect award fee is having or would have on software development. Questions will be developed using the design of experiment approach (McClave and Benson, 1991:859-865). The research analysis combines statistical and judgmental analysis. The design of experiment approach focuses on developing questions that facilitate statistical analysis.

Method Choice

Personnel interviews were conducted at Aeronautical Systems Division with Program Managers and Deputy Program Managers and with contractors in the Dayton, Ohio area who belong to the National Security Industrial Association (NSIA). Telephone interviews were used for managers at Electronic Systems Division and Space Systems Division, and for contractors affiliated with NSIA who were not located in the Dayton, Ohio area. This is a representative sample of the Air Force personnel experienced with award fee contracts. To familiarize the interviewees with the pending interview, a copy of an introductory cover letter (Appendix

C and E) and interview guide (Appendix D and F) was sent to each interviewee before the actual interview took place.

Research Process

The research process was divided into five specific parts: reviewing existing literature, preparing the interview guide, sample selection, conducting interviews, and analyzing the data.

Literature Review. An extensive literature review was conducted using data primarily from the last five years that focuses on the technical aspects of software development and the award fee process. The literature review is contained in Chapter II.

Interview Guide. Interview questions were developed with two different populations in mind, Government and contractor. The interview questions address three specific areas: "Program Director Information," "Program Background," and "Award Fee Perspective."

The "Program Director Information" area gathered data on the interviewee's position, both current and past, and his general acquisition experience.

In the area of "Program Background", data was gathered on the interviewee's award fee experience.

The last area, "Award Fee Perspective," examined the interviewee's personal views on how award fees should be used in software acquisition.

The question development process included numerous iterations to insure clarity and validity. The review process started with a review of the proposed questions by instructors and past Air Force Institute of Technology students familiar with surveys. The interview guide was then forwarded to a program office and commercial contractor with existing software award fee contracts for validation. Their selection was based on the researcher's personal experience with both.

Sample Selection. Sample selection was done by contacting the Contracting Policy Offices at Aeronautical Systems Division, Electronic Systems Division, and Space Systems Division to determine which Program Directors had experience with award fee contracts. This process also allowed access to personnel who had transferred from an award fee program to a non award fee program. Next, the contracting directorate of each program with an award fee was contacted to obtain a copy of the award fee plan.

Interview Process. Each Government interviewee received a cover letter (Appendix C) from the Aeronautical Systems Division (ASD) Vice Commander and a copy of the Government Interview Guide (Appendix D). The cover letter

explained the purpose of the interview, defined key terms, and discussed the attached material. In addition, the letter requested that an interview date and time be established. The contractor interviewee received a cover letter similar to the ASD Vice Commander from the researcher (Appendix E) and a copy of the Contractor Interview Guide (Appendix F).

Analysis of the Data. The survey results were used to establish an experience base from which some of the research questions can be answered. Data from the "Program Director Information" interview section was used to identify the interviewee's experience in program offices and what specific areas within the program office. The "Program Background" area supplied data concerning award fee and software experience. The last interview guide section deals with interviewee options as to the effectiveness of award fee on the software development process. Each of these sections contain questions that can be analyzed by either statistical or judgmental means.

Statistical analysis of questions included histograms, bar charts and data plots to find trends or locus of consensus. The judgmental analysis looked at the range of responses for each question and then tried to find a consensus of answers. These results will be opinions of managers with experience with award fee contracts and are useful as lessons learned for future award fee contracts.

The sample size from Government personnel was twenty-three and from contractor personnel was only four. .The Government sample size is large enough to make inferences about the population of programs with award fee. The contractor sample size is small and does not allow the researcher to make any authoritative inference about contractor views of award fees (Emory and Cooper, 1991:259-264). The contractor interviews where used to see if any large differences in view point existed.

The researcher found it very difficult to coordinate telephone interviews with Program Directors at both Space Systems Division and Electronic Systems Division. During the development of the questionnaire, the researcher found it very difficult to identify contractors with award fee contracts. The original plan was to have the ASD Vice Commander's cover letter include a request for the program director to forward a copy of the contractors survey to their contractor. The ASD Deputy Chief of Staff for Contracting did not concur with this approach because of a concern that the contractor may charge the Government for the assistance (Appendix G). The four contractors surveyed agreed to respond to the survey at no cost to the Government.

Summary

This chapter discussed the methodology research approach used for this thesis. The research approach

included a literature search and survey. The literature search reviewed current text books and articles covering software development and award fees. Air Force military and civilian and contractor personnel familiar with award fee contracts were surveyed by personal or telephone interview to answer to research questions.

Chapter IV discusses the analysis process used on the interview data. The discussion includes findings with respect to each question and factual information from data interpretation, inference, and evaluation.

IV. Findings

Introduction

The researcher conducted 27 interviews with program directors, deputy program directors, program managers, contracting officers, and contractors, between 10 January and 16 April 1992. During three interviews, both the Deputy Program Director and Program Director for the System Program Office participated. Nineteen of the interviewees were military, four were members of the civil service, and four were contractors.

All of the comments from both government and contractor interviewees were very enlightening, and revealed several facts. First, the interviewees tended to have the same viewpoint, i.e., *award fee is not a hindrance* to the program. Second, nineteen of the government and all four of the contractor interviewees plan to use award fees on future contracts. Third, sixteen of the interviewees feel award fee is very useful in software development because it focuses both government and contractor attention and fosters communication.

The remainder of this chapter will synthesize the data from the literature search and interviews. First, the sample size will be discussed along with the quantity of responses from each product center. Second, the interviewee responses to each question will be combined to find a common position. Last, these combined responses and the data from

the literature search will be used to address the research questions.

Sample Data

The government interview sample was obtained from the Contracting Policy Offices at Aeronautical Systems Center (ASC), Wright Laboratories (WL), Electronic Systems Center (ESC), and Space and Missiles Systems Center (SSC). This allowed the researcher to determine which Program Directors had experience with award fee contracts. This process also allowed access to personnel who had transferred from an award fee program to a non award fee program. The number of responses from ESC and SSC were lower then the original research had planned. This was due to the inability of the researcher to coordinate interview times with Directors not located at Wright-Patterson AFB Ohio. This research also called for interviewing local members of National Security Industrial Association (NSIA). The data sample did not include NSIA member data because the researcher did not have direct access to members and was not able to follow-up with the NSIA point of contact. The data from the four contractors (CONTR) that was included, was a direct result of sponsorship of the applicable program offices involved. Figure 5 shows the responses received based on the interviewee's location. The number of possible responses (40) for the government interviewees was derived for the information provided by the respective contracting offices.

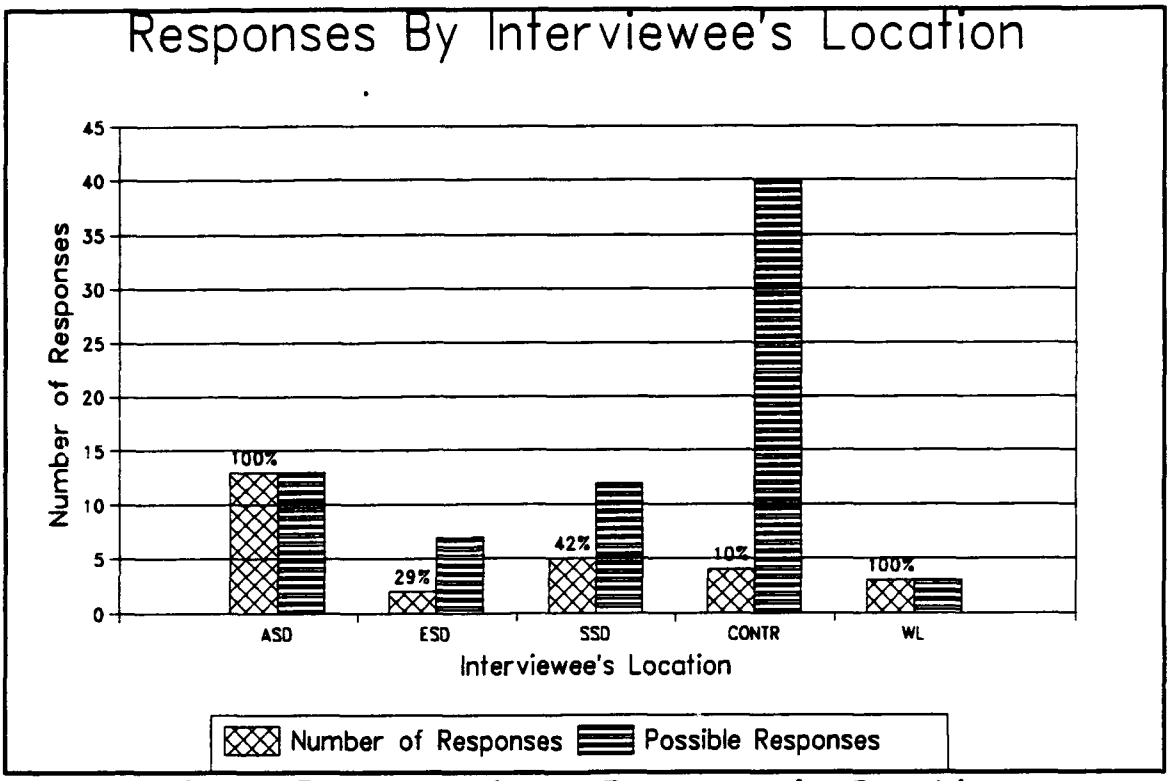


Figure 5. Interviewee Responses by Location

Interview Data

The following section will summarize the interviewee responses for each question, divided by government and contractor responses. In the following graphs, the interviewee numbers from one (1) to twenty three (23) represent the government interviewees, while numbers twenty four (24) to twenty seven (27) represent the contractor interviewees. The researcher used "N/C" when the interviewee did not comment on this question.

Program Director Information. The interview guide first asked for the date the interviewee was assigned to his/her current position. Figure 6 shows the time, in

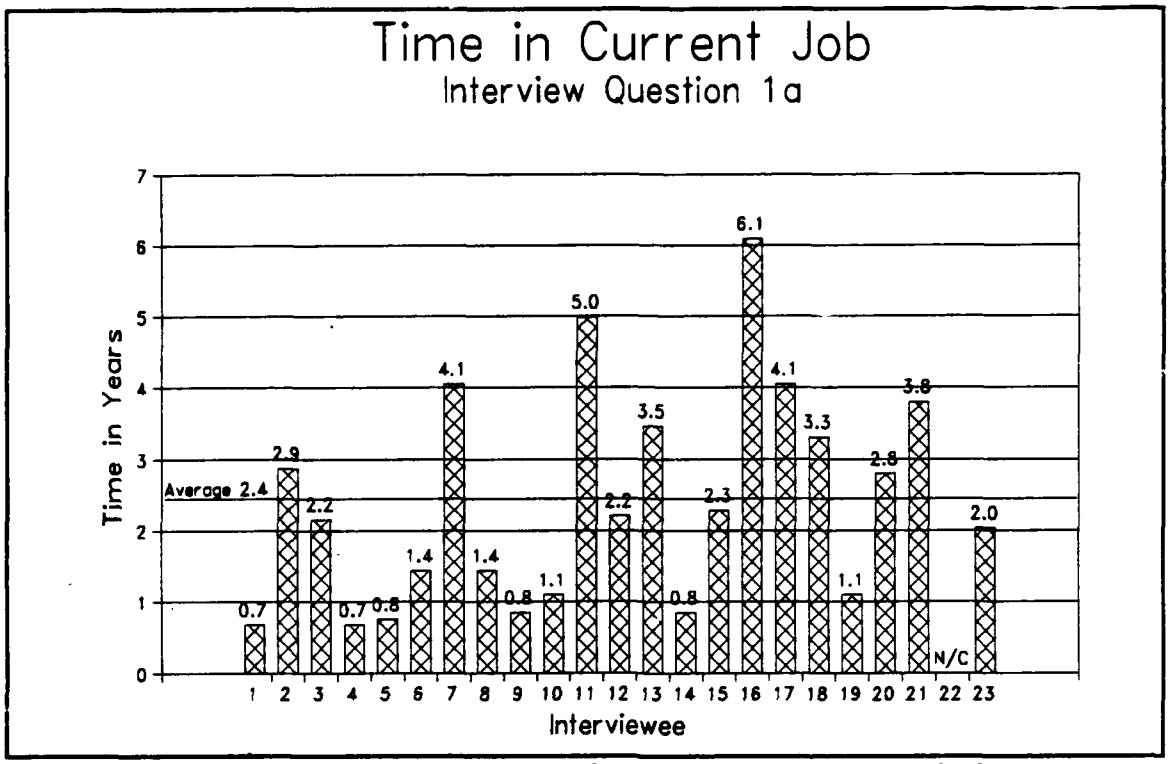


Figure 6. Government Time in Current Position

years, each government interviewee has spent in his or her current assignment. The years range from a high of 6.1 to a low of 0.7 years, with an average of 2.4 years. Contractor interviewees had a higher average time in current position- 3.5 years. Figure 7 shows the number of years for each contractor.

The second part of question 1 asked what level of certification the interviewee had in the Acquisition Professional Development Program (APDP), Program Management field. Figure 8 shows that most of the interviewees are certified. The figure uses an asterisk (*) to show an interviewee was certified in more than one field. The "R" is used to show a request for level three certification is

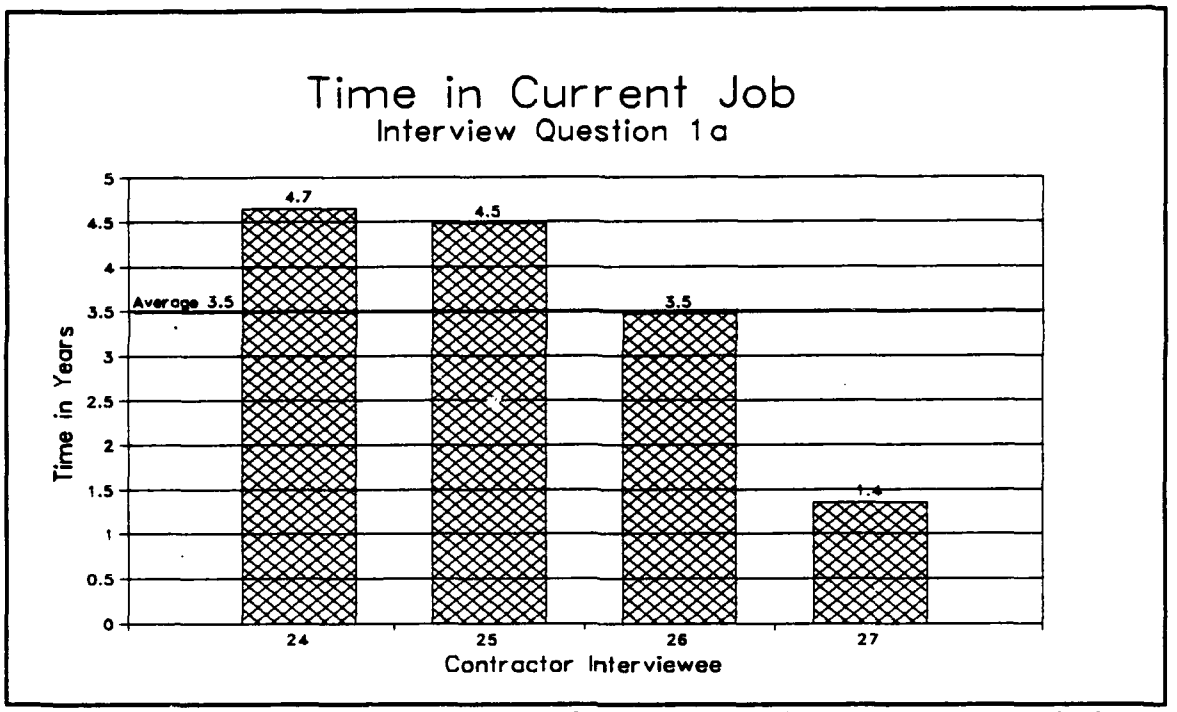


Figure 7. Contractor Interviewee Time in Current Position

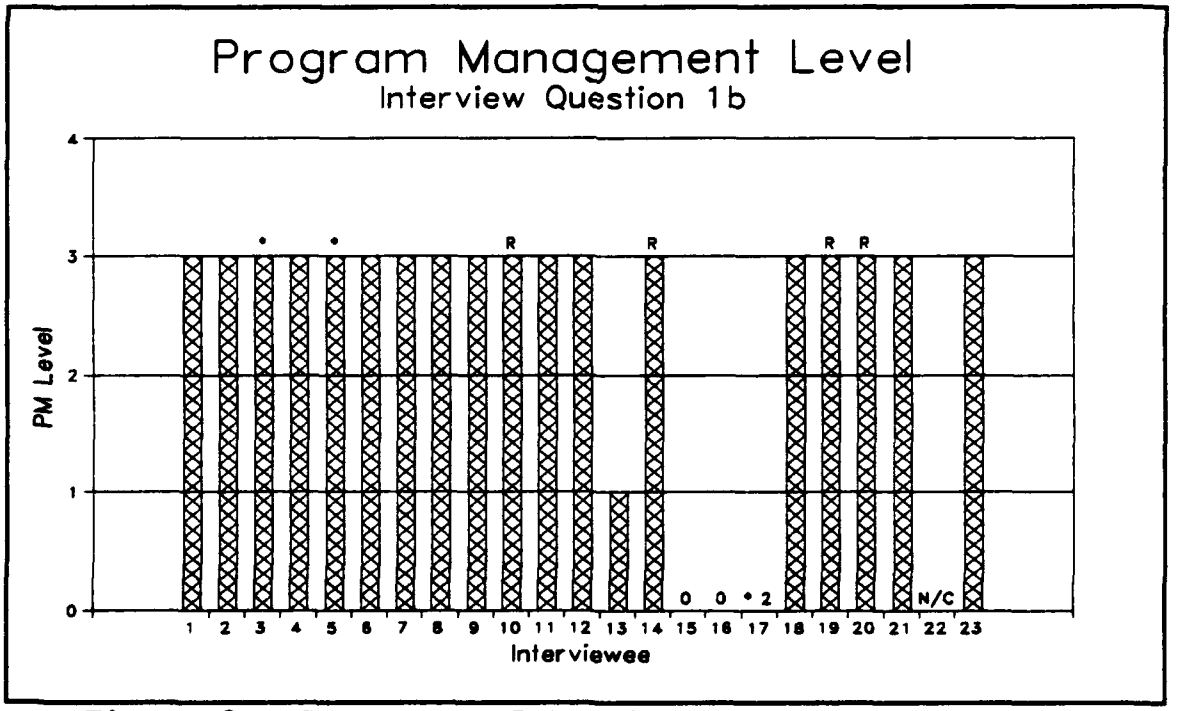


Figure 8. Government Interviewee Program Management Certification Level

pending. The "*2" is used to show the interviewee is certified level two (2) in the APDP Contracting field.

Question 2 deals with the government and contractor interviewees prior experience as a director or deputy program director and what specific programs. Of the individuals interviewed, 40 percent have prior experience (Figure 9). The second part of this question was designed to gain insight into the type of experience the interviewee had. The government and contractor interviewees with prior experience were mostly with large programs like the B-1 Bomber Program or a group of smaller basket programs under

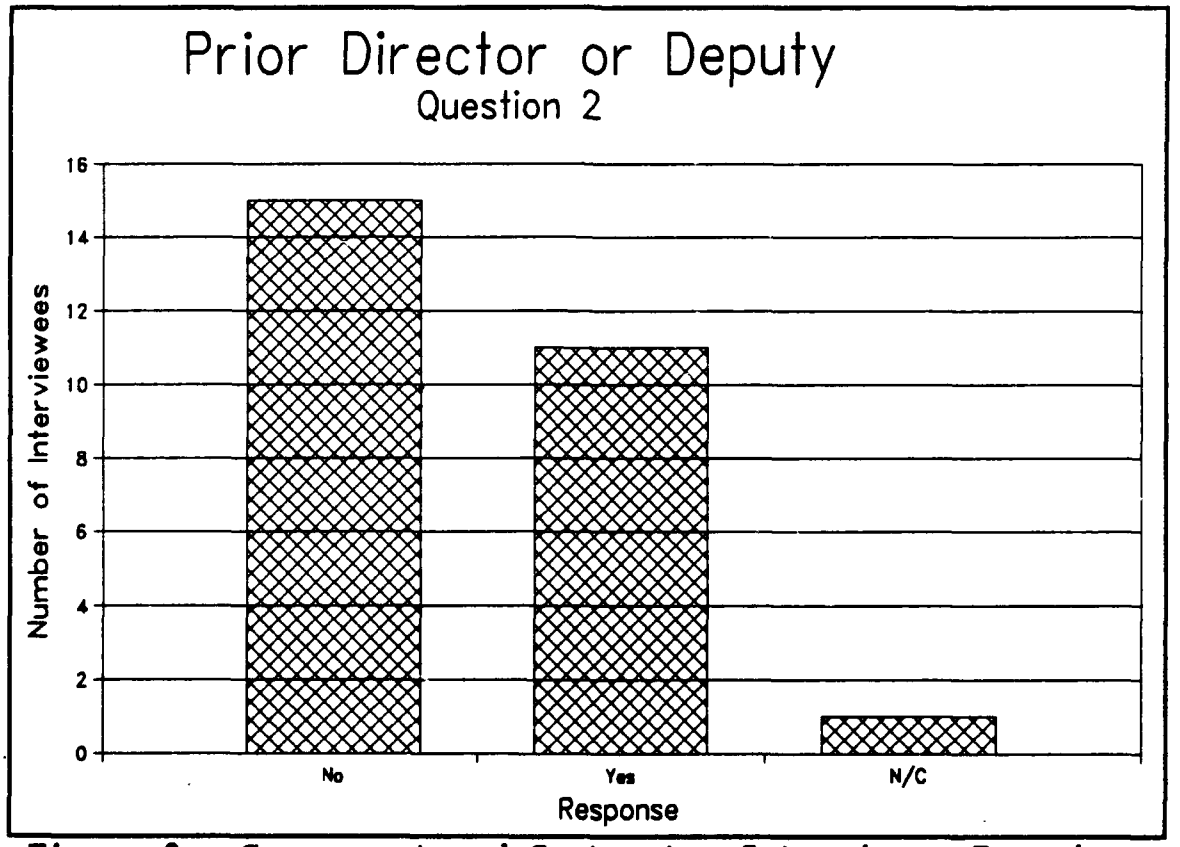


Figure 9. Government and Contractor Interviewee Experience as Director or Deputy Program Director

one director, for example, the Air-to-Surface Guided Missiles program office.

To understand the experience base of both government and contractor interviewees, question 3 asked for the length of time the interviewee had been in a System Program Office (SPO). The responses ranged for zero (0) to thirty (30) years with an average of 10.4 years (Figure 10).

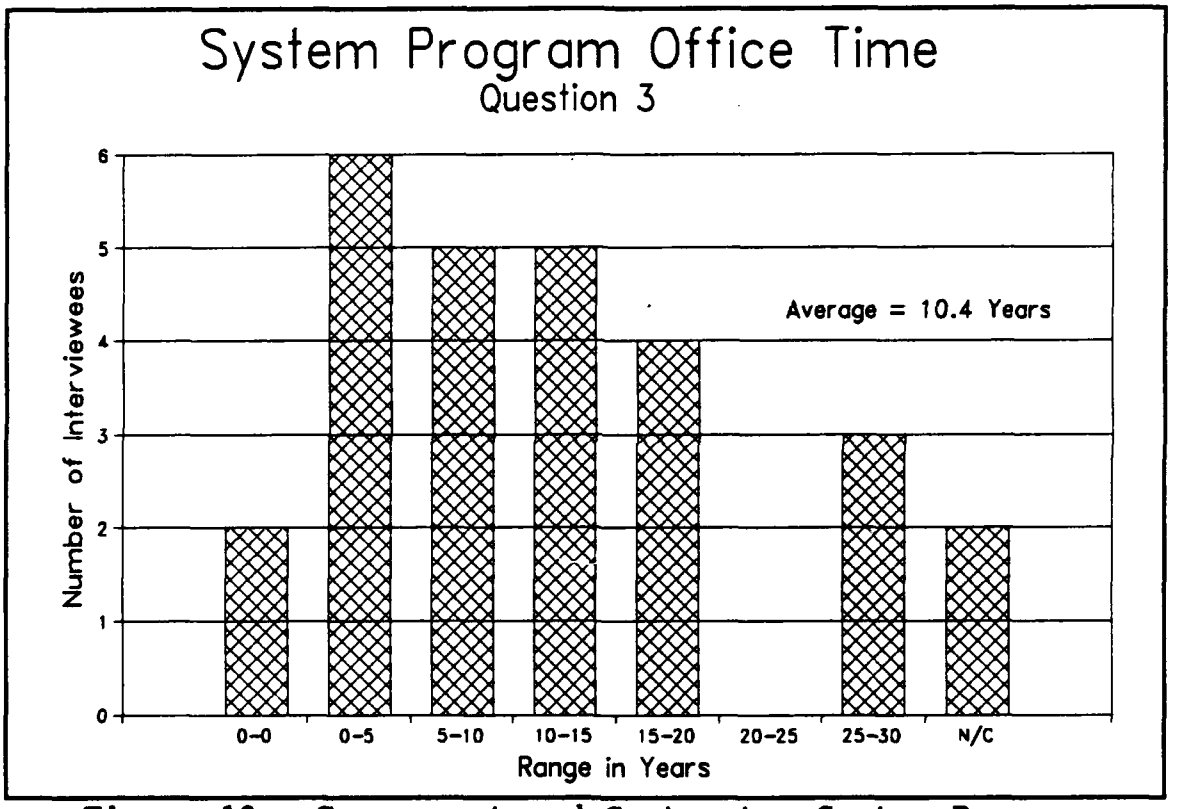


Figure 10. Government and Contractor System Program Office Time

The government interviewees were asked for their Air Force Specialty Code (AFSC). When the four government civilians where asked for their AFSC, the researcher asked that they be specified in terms of a military AFSC. Eleven of the twenty three government interviewees had more than one AFSC. The 0029 AFSC designates a Program Director while

an AFSC of 2916 designates a Program Manager, the 2716 is an Acquisition Specialist, and a 2816 AFSC is an Engineering Specialist. Figure 11 shows the distribution of interviewees in each AFSC.

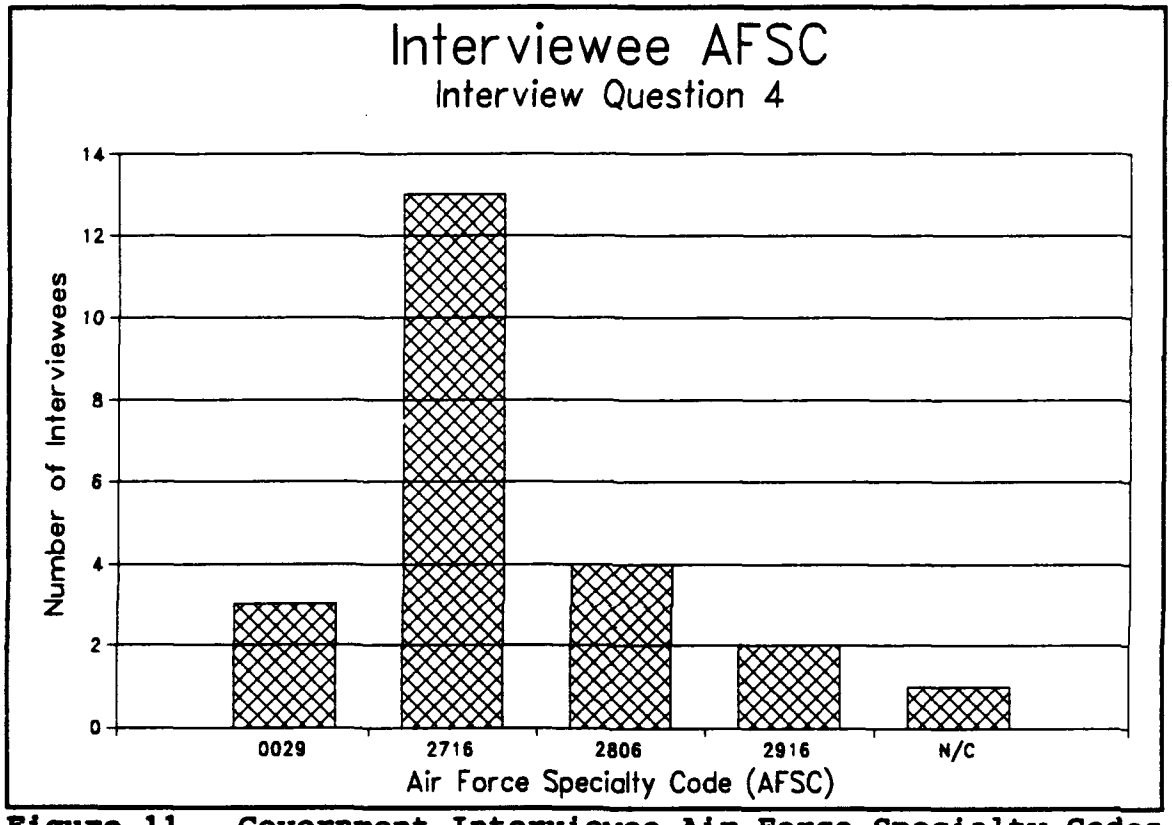


Figure 11. Government Interviewee Air Force Specialty Codes (AFSC)

Question 5 looked at what areas within the program office the interviewees have worked. Eleven of the twenty-three government interviewees had experience in more than one area. Most of the interviewees had either experience in engineering or program management/projects (20 out of 27), while the remaining seven have experience in either manufacturing, contracting, integration, or configuration management.

Program Background. This portion of the interview guide focused on uncovering the award fee experience the interviewees. Question 6 looked at the beginning of the award fee process. It asked if the interviewee had taken part in the precontract award fee process and, if they had, on what program or programs. Sixty-nine percent of the interviewees that answered the question, both government and contractor, had taken part in the precontract award fee process (Figure 12). The programs cited in part two of this question are large and again cover a wide range from Aircraft Engines to Vertical Launch Systems.

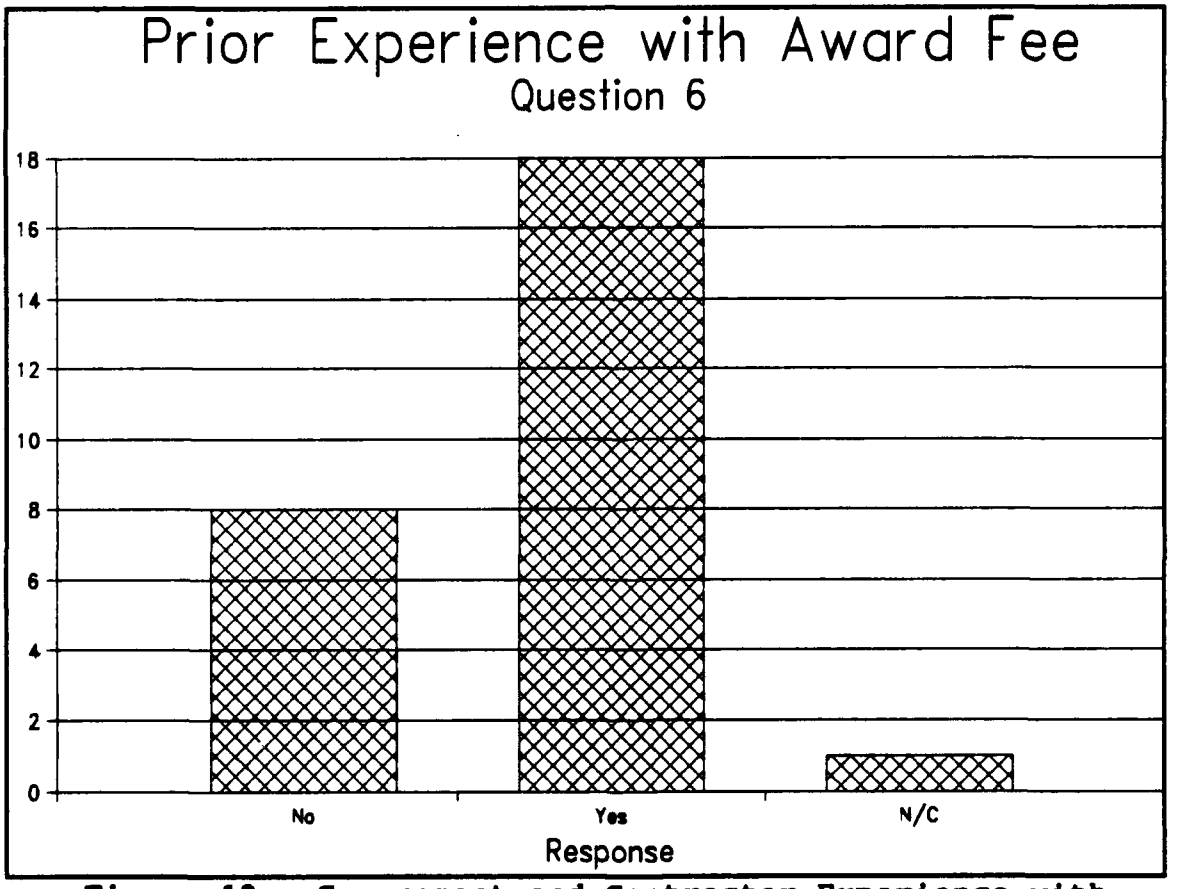


Figure 12. Government and Contractor Experience with Precontract Award Fee

The seventh question asked: Does your program office currently have an award fee contract? This question requested information on the number of award fee contracts in existence at the time on this research. The individuals interviewed were selected by their experience or their current position in a program with award fee contracts. Eighty-eight percent of those that answered the question currently had award fee contracts. The N/A in Figure 13 was the response from a Fee Determining Official (FDO) the researcher interviewed. All four of the contractors surveyed had award fee contracts.

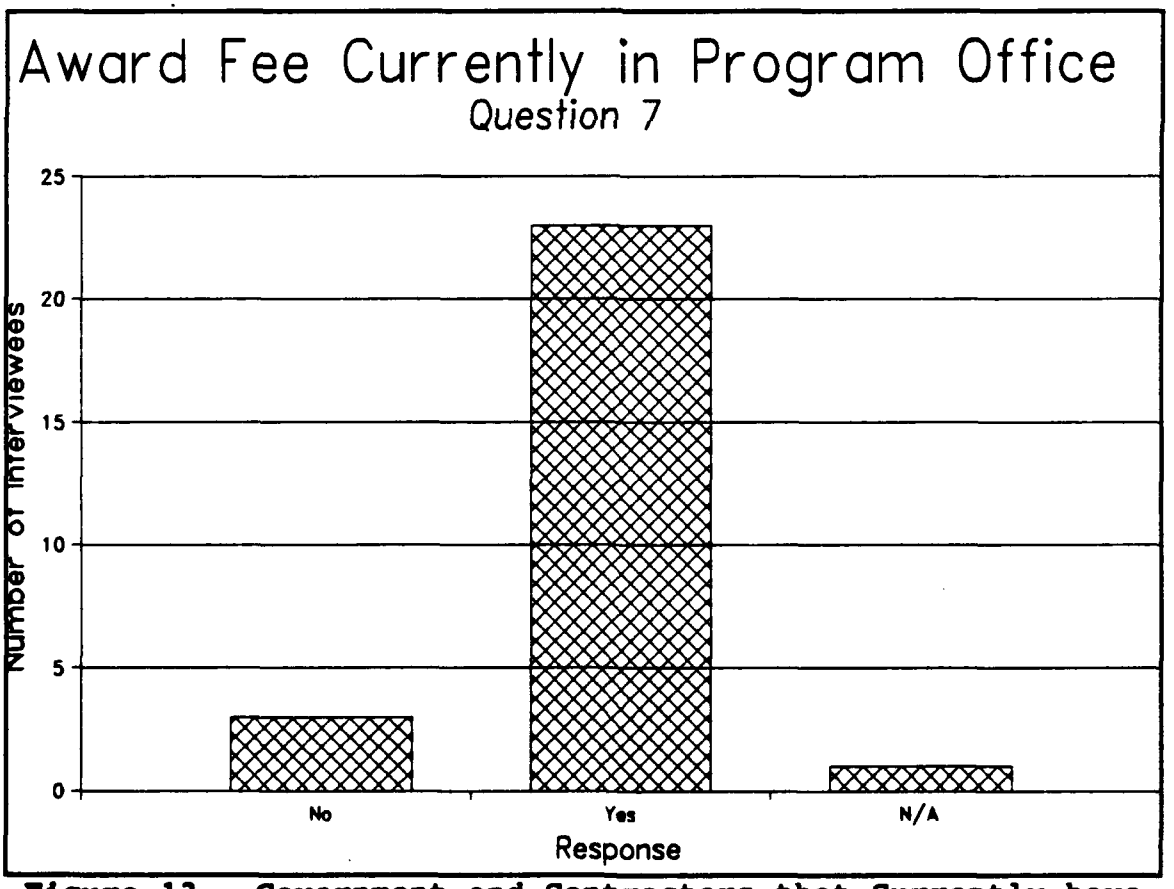


Figure 13. Government and Contractors that Currently have Award Fee Contracts

Questions 8 through 12 were focused on the interviewees current program. The eighth question in the interview guide focused on what portion of the program the award fee covered. This allowed the researcher to see where award fees are currently being applied. The responses ranged from the "Whole Program" to "Qualification of Second Source". There was no common application of award fee, and the application appeared to depend directly on the type of program/system under development. The researcher also found that the program's development phase, question nine, also influenced the application of award fee, question eight.

Question 9 asked the interviewee for the development phase of their respective programs. The phases ranged from concept exploration to production. Figure 14 shows the distribution of programs by phase and uses the following abbreviations: Concept Exploration (C/E), Demonstration /Validation (D/V), Engineering and Manufacturing Development (EMD), Production and Deployment (P/D), and Not Applicable (N/A). Three interviewees did not currently have award fee contracts. The award fee total in Figure 14 equals 29 because one interviewee had three award fee contracts; one each for C/E, D/V, and EMD.

The tenth question dealt with how the program's software was covered in the award fee plan. Most of the interviewees said that software development was covered either as a specific item or with "overall program management." Of the 27 interviewees, the FDO did not

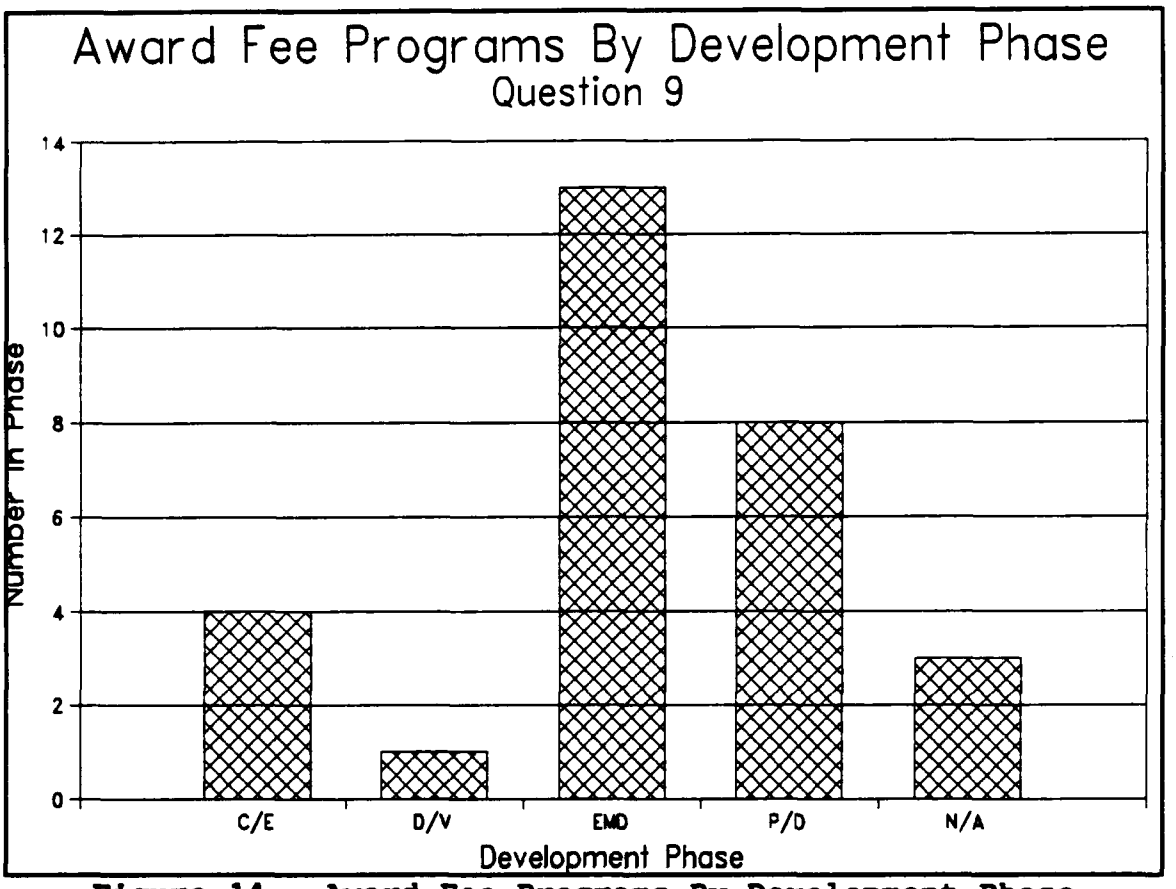


Figure 14. Award Fee Programs By Development Phase

comment because his position did not have individual program responsibility, and one interviewee did not responded to the question. The researcher found the reason that some interviewees answered this question "no" was that their specific programs were mostly hardware. For example, it was an aircraft engine program or a new 25mm fuse for the AC-130. Nineteen interviewees said that the award fee plan covered software development while five out of 27 said it did not.

The contract values, question 11, were of interest to see if there was any correlation between the contract value

and the award fee. Figure 15 is a modified frequency distribution of contract values. The contract values ranged from $1 million to $12 billion. The frequency bins are the value shown and lower until the next lower value (i.e., 1 = values between 0.0 and 1.0, 5 = values between 1.1 and 5.0).

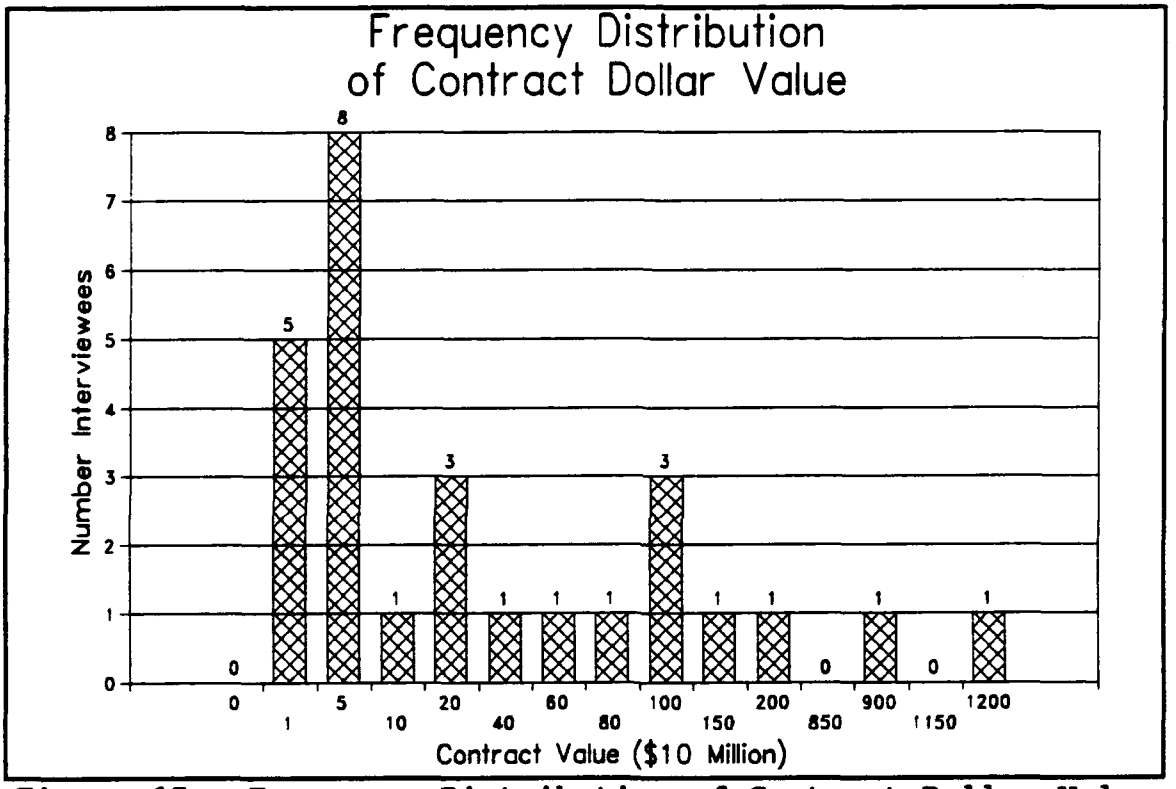


Figure 15. Frequency Distribution of Contract Dollar Value

Question 12 dealt with the percent award fee the contractor had received. This question was looking for a trend in award fee pool percentage that contractors received. The data shows no real trend, and percentages ranged from 30 to 100 percent. Two interviewees supplied award fee percentages by period. One showed a progressive increase (period 1=44%, period 2=54%, and period 3=100%).

The other interviewee's data varied between 90 percent and 82 percent(period 1=90%, period 2=82%, period 3=83%, and period 4=87%). It would be interesting to see if the contractor in example one could maintain this level of performance for award fee period four.

Questions 13 and 14 dealt with the interviewees' experience with award fee contracts and software development respectively. These two questions were used to gain some indication of the experience level of the interviewees and were used to evaluate the interviewee responses to the questions in the award fee perspective portion of the interview guide. All the interviewees had at least some experience with award fee contracts. Figure 16 shows the distribution of interviewee experience. The majority of interviewees had considerable experience with award fee contracts. Interviewee software development experience was less. The majority of interviewees had some software experience (Figure 17). Two interviewees had no experience with software development. This may have been due to the systems launch vehicle they were developing. These specific systems are hardware-intensive and have only a minimal amount of software.

Award Fee Perspective. The last section of the interview guide was Award Fee Perspective. The researcher used this section to collect data for the investigative questions associated with this research. The specific questions were: Question 4. Can the award fee process be

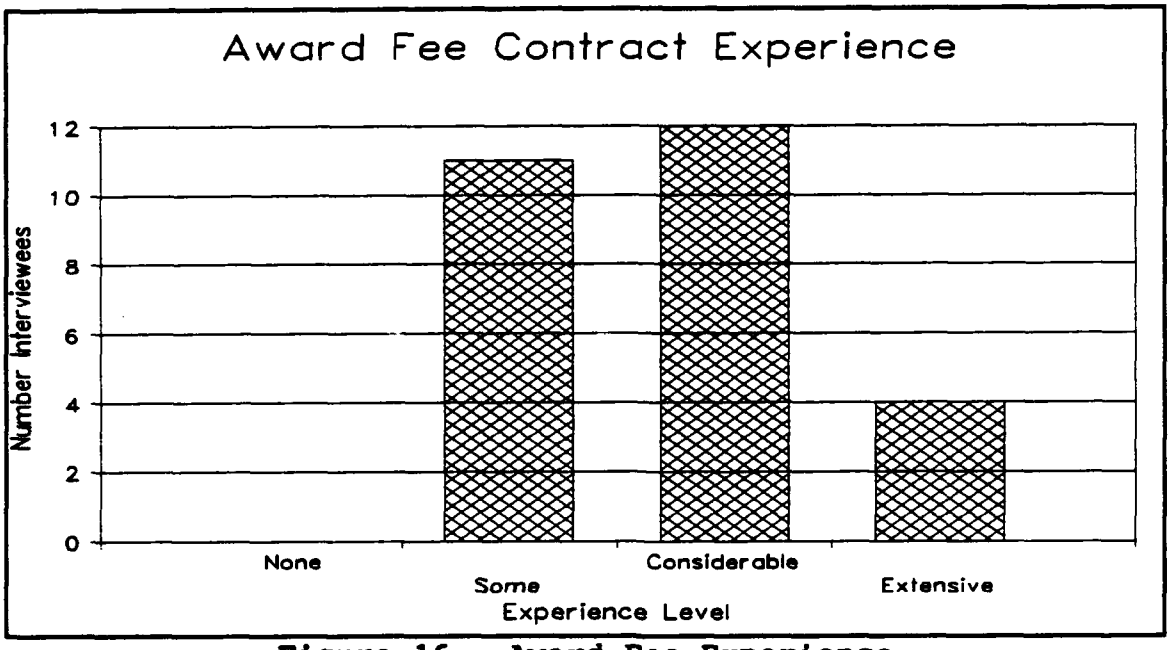


Figure 16. Award Fee Experience

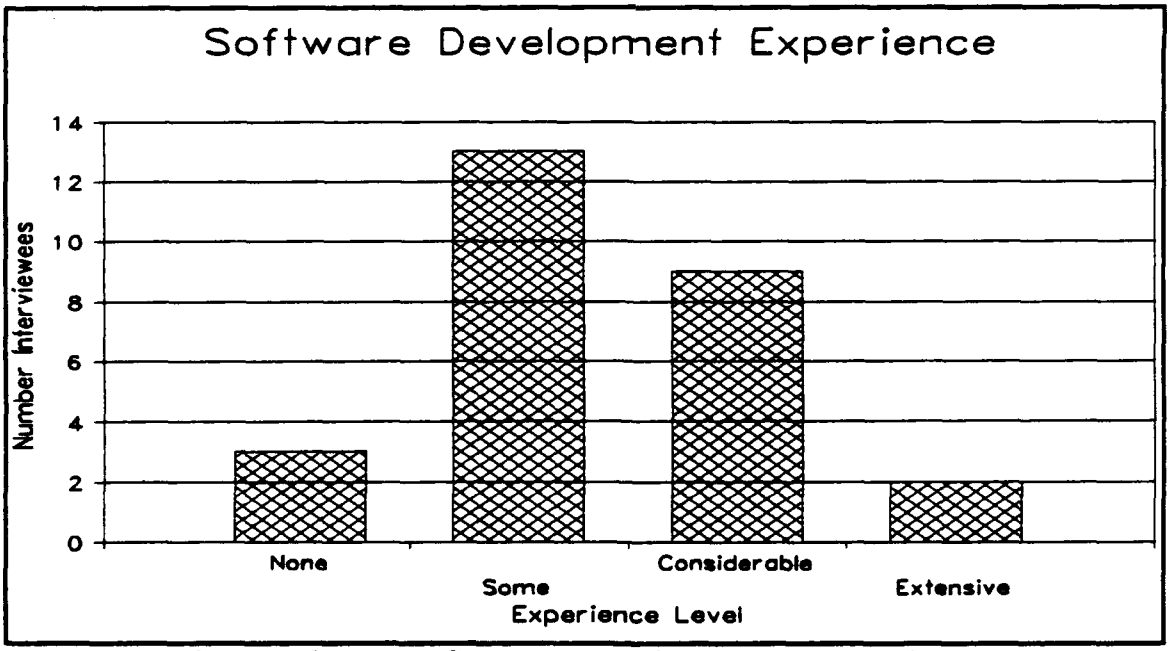


Figure 17. Software Development Experience

used to influence contractor performance during software development? Question 5. What criteria should be used to evaluate contractor performance? Question 6. What type and form of feedback should be given to the contractor to improve his ability to develop maintainable software on time, and within cost?

Question 15 asked: What written guidance would help in the development of award fee contracts? The interviewees from Electronic Systems Center (ESC) referenced ESC Commander's Policy letters on Award Fee Determination and HQ ESC/PK Policy letter on Award Fee Process Excellence. Nineteen of the twenty-four government interviewees said that examples would be of great benefit. These examples should include types of contracts that award fee has been used with, examples of both good and bad award fee plans, and criteria, and objectives most appropriate, to name a few. The interviewees also cited center policy letters, the Systems Command Award Fee Handbook, pros and cons of award fee, and education as additional areas that would assist the program director with award fee contracts. All four contractors interviewed looked for clear and definitive instructions on how the award fee is to be used. They looked for criteria that are "end items," commitment by both parties to implement the plan, and clear understanding of requirements to name a few.

Questions 16 through 23 asked the interviewees their options on the effects award fee has had on software

development. The questions address software development, cost control, delivery timeliness, maintenance costs, reliability, documentation, testability, and quality. These questions were developed to address research question 4: Can the award fee process be used to influence contractor performance during software development?

Seven of the twenty-three government interviewees, and one of the four contractor interviewees had similar comments for questions 16 through 23. One of the contractors interviewed was an aircraft engine manufacturer with little engine software in his product. In this case, award fee associated with software development would have little effect on contractor performance.

The sixteenth interview question asked if award fee would benefit software development. Comments include: benefit can not be quantified; there is no difference between hardware and software developments with award fee; some help in all areas; definitely, award fee is a motivator; award fee is a great benefit; and benefits can not be quantified. All except one government interviewee felt that award fee would be a positive influence on software development. The one government interviewee felt award fee would be a hindrance because:

> The contractor becomes focused on agreed upon software requirements. If award fee were in place, the contractor would <u>not</u> be willing to tweak mission requirements as needed in the development process. Requirements change. (Appendix H, page 141)

One of the contractor interviewees believed that the award fee process was of benefit to the whole program; for his approach was to deliver the highest quality product that can be produced. The award fee process supplied the feedback and interim evaluation necessary to insure the customer received a quality product (quality being defined as giving the customer what he wants). The question found software development would be helped by using award fees. This was arrived at by 88 percent of the interviewees responding positively to award fees affect on software development.

Question 17 addressed the affect award fee would have on software development cost control. The government and contractor responses were divided into seven categories not applicable (N/A), no comment (N/C), Depends, Not Sure, No, Yes, and Same as 16. The term "Depends" was used when respondents qualified their answer with, for example: if resource management is an award fee criteria or depends on contract type. The term "Same as 16" means the interviewee used the same answer as that in interview question 16. Figure 18 shows only five of twenty-three government and two of four contractor interviewees believed award fees would have a positive effect on software development cost. Example of "yes" responses were: helped focus management attention on specific areas, and contractor managers would become more involved in regulating hours. Some of the "no" responses by interviewees were: not an effective tool, and no, because of documentation.

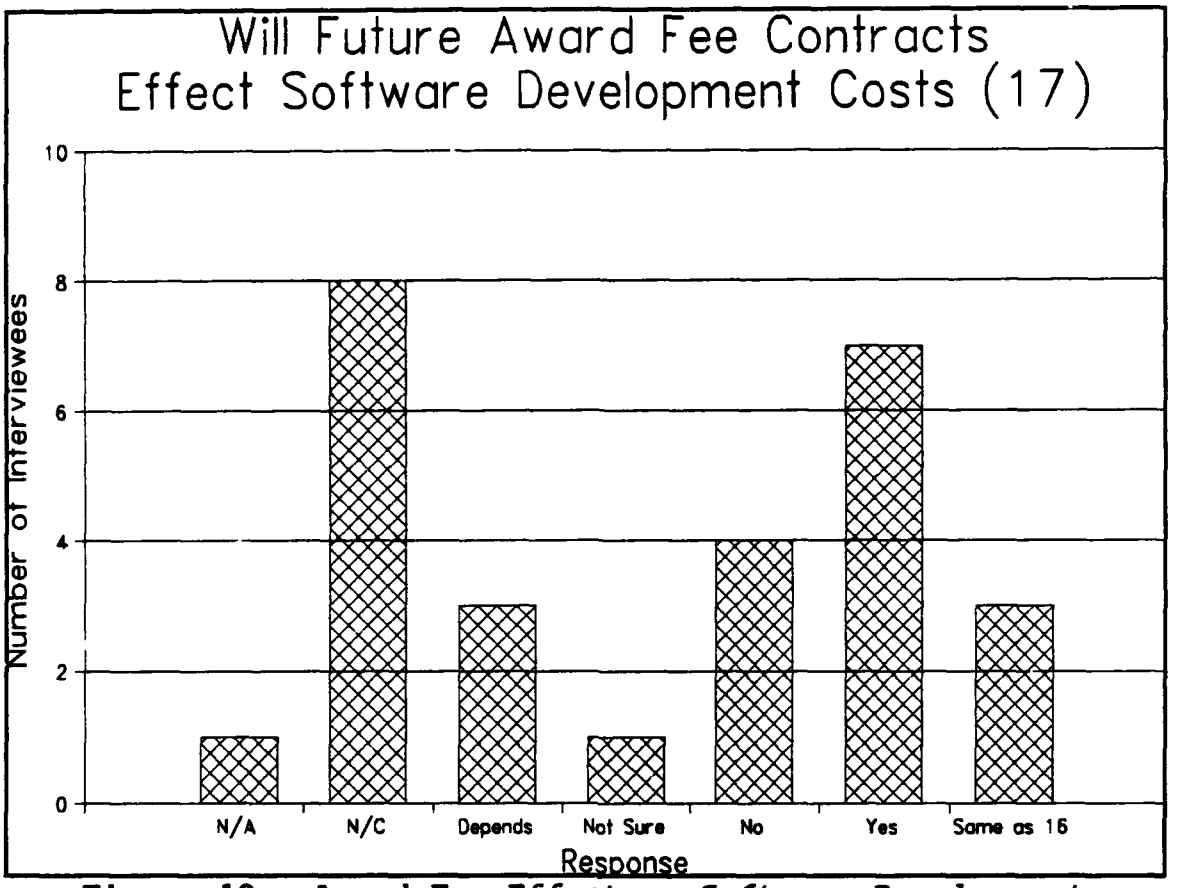


Figure 18. Award Fee Effect on Software Development Cost Control

Question 18 asked if award fee would improve software delivery timeliness. There was no clear consensus on this question. Only four of twenty-seven interviewees said "yes" (two government and two contractor). The interviewees that answered "no" felt that by incentivizing timeliness the government would be sacrificing system performance. Figure 19 shows the distribution of interviewee responses. The responses in the "might help" category said that award fee criteria focusing on timeliness may force better up front planning, it depends on the metric, and this is where award fee should be focused.

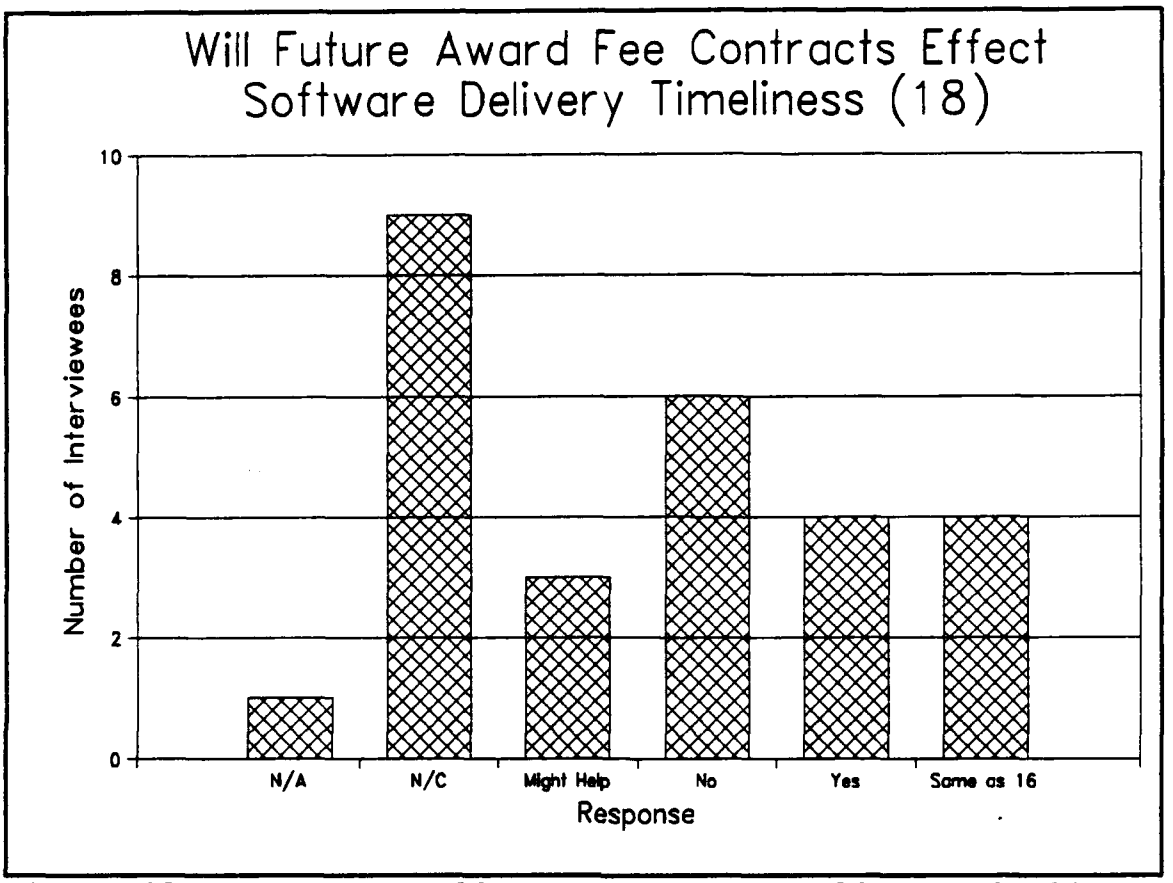


Figure 19. Award Fee Effect on Software Delivery Timeliness

Question 19 asked about software maintenance costs and the effect award fee would have on them. As with question eighteen, there was no clear consensus about its effect. The one "yes" felt that maintenance schedules could be conformed to award fee criteria. The "no," "might help," and "tough to measure" responses had a common theme. This theme was that most maintenance costs are incurred years after the system is delivered to the government and after the development contract is closed. It is very difficult to implement an award fee plan under these circumstances. Figure 20 shows the distribution of interviewee responses.

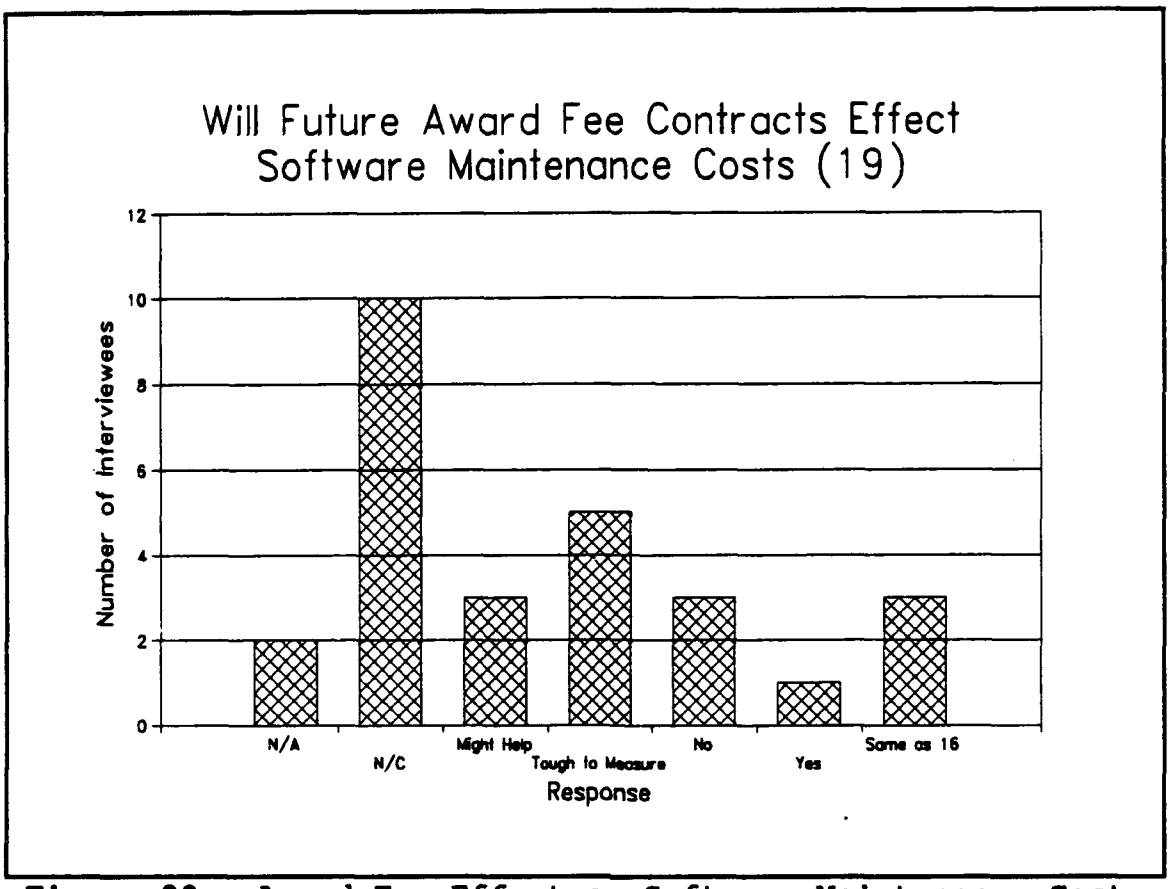


Figure 20. Award Fee Effect on Software Maintenance Costs

The interviewees were asked in question 20 if award fee would affect software reliability. There was an even split between interviewees who did and who did not believe award fee would effect software reliability (Figure 21). The interviewees who felt award fees would affect software reliability said that once the software is operational, reliability can easily be measured. The interviewees that answered "no" felt it would not reduce the number of failures and meaningful failure measurement will be completed too far in the future.

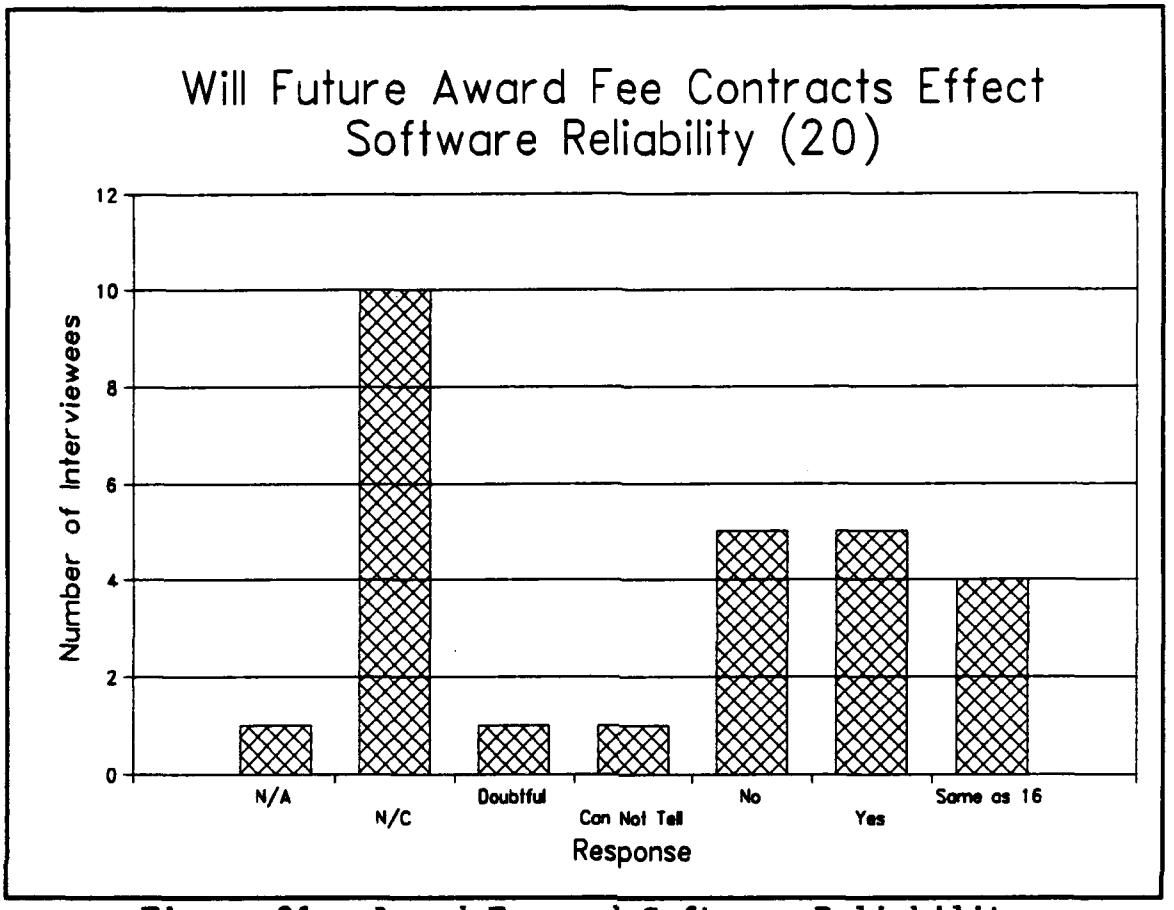


Figure 21. Award Fee and Software Reliability

Question 21 looked at award fee and its effect on software documentation. Eleven of the twenty-seven interviewees believed award fee would have a large positive effect on software documentation. Award fee can be used as leverage to insure timeliness and quality. Figure 22 shows a bar chart of the interviewee responses. The one interviewee that responded "can not tell" was unsure of the question.

Question 22 looked at the affect award fee would have on software testability (Figure 23). Six interviewees thought that award fee would affect testability. The

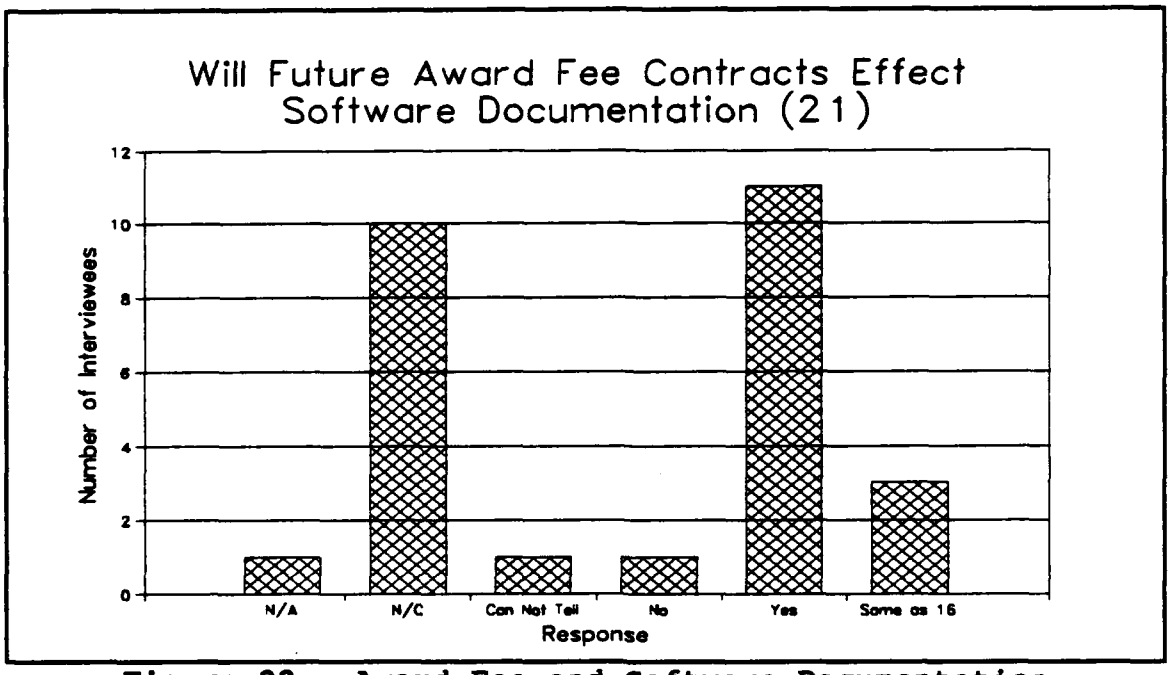


Figure 22. Award Fee and Software Documentation

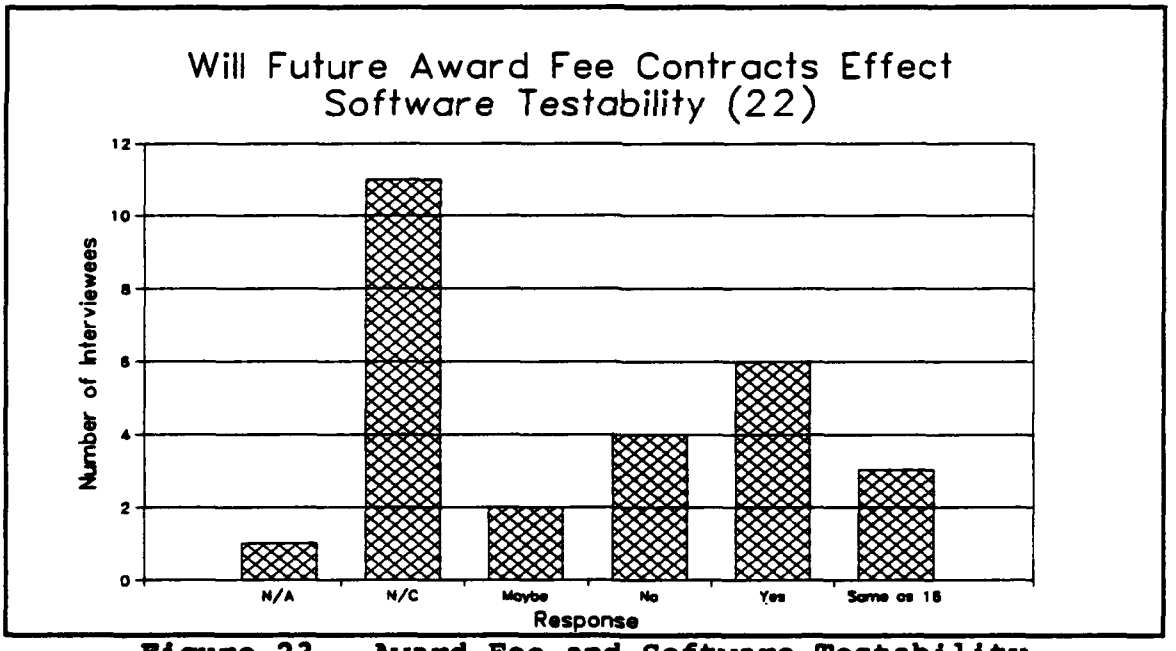


Figure 23. Award Fee and Software Testability

interviewees that said "yes," believed award fee would focus contractor attention of formal test and demonstration of

software requirements. Four thought award fee would have no affect at all. One interviewee believes the culture within the contractor is the driving force behind software testability. Two interviewees said "maybe." Their responses said the affect award fee would have is dependent on the criteria used to measure contractor performance.

The twenty-third question asked the interviewees if software quality would be affected by award fee. As in question twenty-two above, the difference between interviewee "yes" and "no" responses is only two (Figure 24). Interviewees said "yes," if specific criteria is measurable and meaningful. Interviewees responding "no"

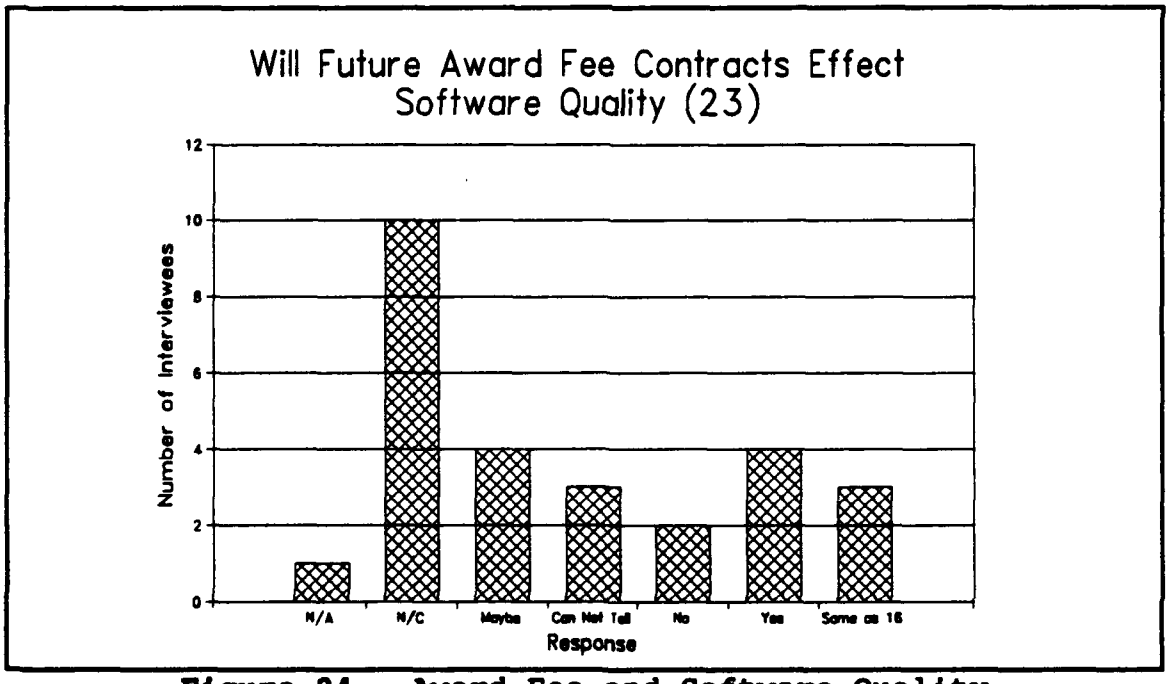


Figure 24. Award Fee and Software Quality

believe there is a problem in defining quality. Quality is

difficult to measure. If quality is defined as the software working and it does not, the software quality problem can be solved by using contractual procedures other than award fee. The interviewees that responded "maybe" either gave no more information for their response, or said it may be a by-product of good up front planning by both the government and contractor in implementing an award fee plan. The "can not tell" responses focused on the specific definition of software quality.

In questions 16 through 23 several main points were revealed. First, a Computer Software Improvement Program (CSIP) with its Software Capability Evaluation (SCE) can be used as award fee evaluation criteria in all these areas. Second, the award fee process forces up front planning and this planning can directly and indirectly affect all these areas. Third, the type of contract is a critical factor in the effectiveness of an award fee and its affect on these areas. Lastly, the award fee criteria may incentivize a specific area at the expense of system performance and/or capability.

Question 24 asked: What other tools does the program manager have besides award fee? Each interviewee cited tools that are described in the FAR and its supplements (withholding of payments, or cost report data), standard reviews and audits (design reviews, test results, or independent verification and validation), as well as specific metrics that each program develops during the

length of the program. The one item the researcher had not found in any literature associated with software development and award fee was the contractor performance appraisal reporting system (CPARS). Three government interviewees used the award fee performance data as the basis for their CPARS reports. This allowed the government program manager additional leverage with the contractor because the CPARS data is used by the government during the source selection evaluation process for future contracts. Government contractors usually are very interested in CPARS evaluations, because they have a direct effect on contractors' ability to win future systems contracts. Over fifty (50) percent of the interviewees that responded to the question referenced the systems development process, with its proper implementation and continual management as a key tool the program manager has to manage the software development process. The four contractors interviewed also cited the systems development process and its proper management as a key tool in the system development process.

Question 25 asked: How has having the award fee on your program benefitted the overall cost, schedule, and performance? The interviewees answers included: it has not, $4 million cost overrun, 6 month schedule slip, it has helped to control cost, improve government contractor relations and contractor responsiveness in resolving problems (Appendix H, pages 149-150). The specific interview comments to question twenty five are in Appendix H

and I. To present the data from this question, the researcher divided responses into five categories: to be determined (TBD), no comment (N/C), focus efforts, no, and help process. Figure 25 shows the distribution of interviewee responses. The TBD comment came from an interviewee whose contractor had just started work. The N/C was from a Program Executive Officer the researcher interviewed who had not directly managed an award fee contract. By combining the responses of "focus efforts" and

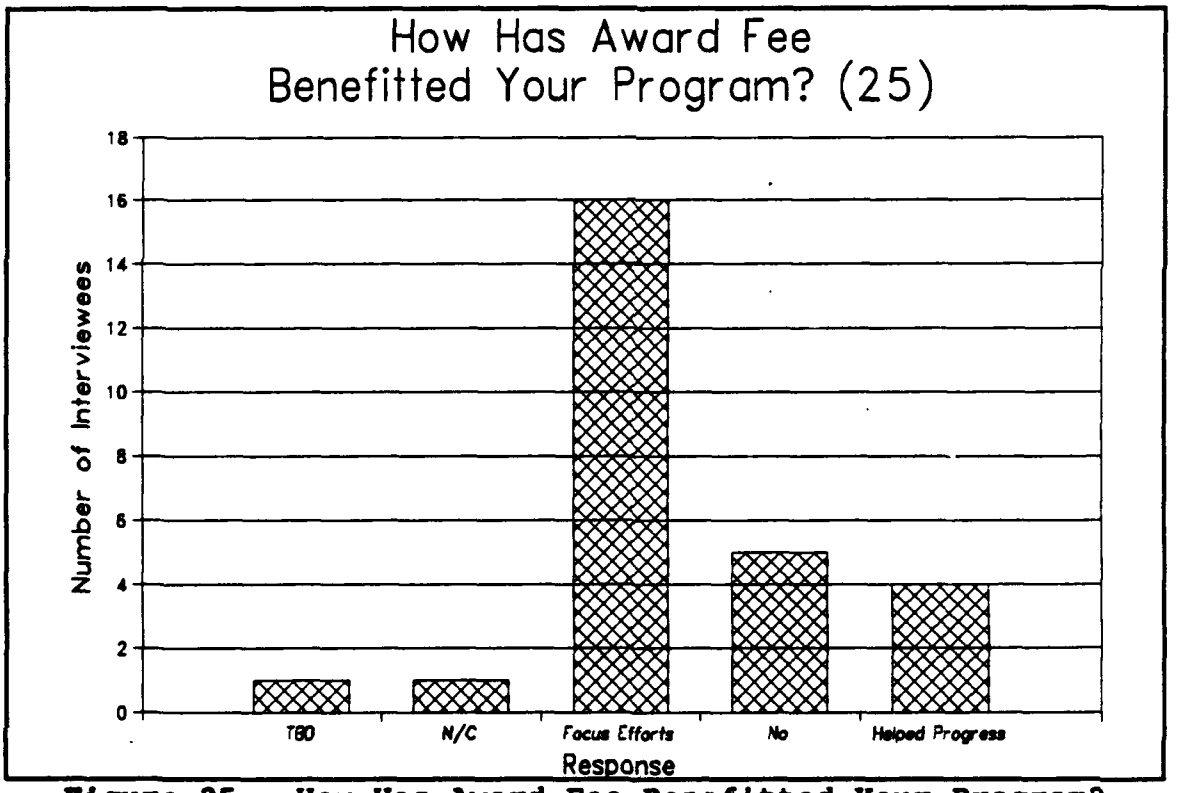


Figure 25. How Has Award Fee Benefitted Your Program?

"help process," the data supports a premise that award fee contracts have a positive effect on systems development, since 20 out of 27 interviewees responded positively.

In question 26a the researcher asked: Do you plan to have an award fee on future contracts? Three government interviewees said "no," and one government interviewee said "It depends and if applicable." All four contractors interviewed said yes. Figure 26 shows the responses to this question. This question shows 23 out of 27 interviewees would use award fee on future contracts.

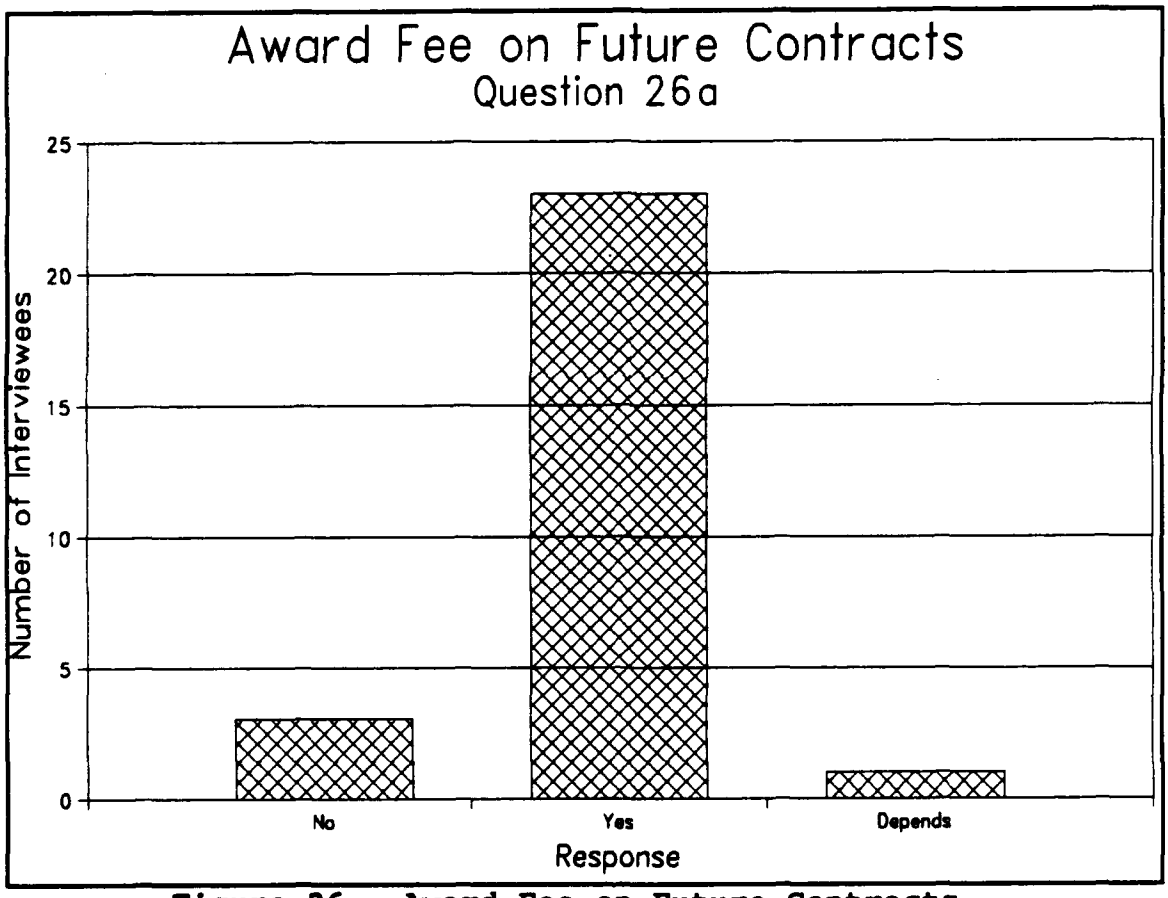


Figure 26. Award Fee on Future Contracts

Question 26b asked "Why" or "why not" to question 26a. The question 26a "No" answers seem to focus on the administrative burden of award fee contracts. These are their comments: "too much administration to be done," "the

process used to get to the FDO [Fee Determining Official] has too many layers," "the fee is determined by someone too far removed from the process," "the contracting process is flawed," and "given the effectiveness - the hassle is not worth the effort - too much government overhead" (Appendix H, page 151). The "it depends" comment in 26a generated a response that said the use of award fee depends on the system and its specific circumstances. The "yes" government responses to 26a generated key words for affecting contractor performance like motivate, incentives, effective tool, and leverage. The contractor interviewees cited motivation and the belief in the evaluation process as reasons for using award fee in the future. More specific information about interviewee reasons for using, or not using, award fee can be found in Appendix H and I.

In question 26c, the researcher wanted to see if software development would be included in future award fee contracts. Two government interviewees who plan to use award fee in the future said it would not include software as a category. Question 26d was used to allow interviewees to explain their decision. All contractor interviewees said "yes" to both questions. Figure 27 shows the interviewee responses.

Question 26d asked "why" or "why not" would software development be included in future award fee contracts. Two interviewees that said "yes" to question 26a and "no" to 26c. The interviewees gave the following reasons for this

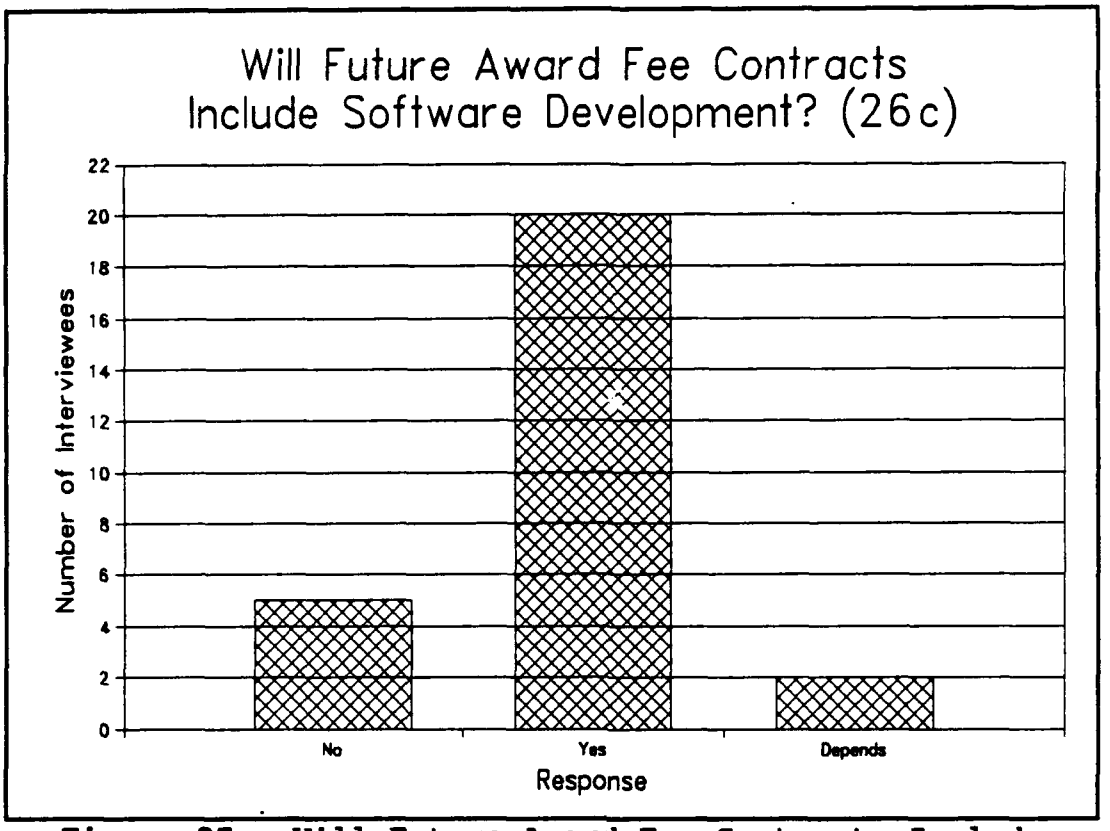


Figure 27. Will Future Award Fee Contracts Include *Software Development?*

change, "Generally don't manage our contracts at that level" and "No further software development is planned" (Appendix H, page 153). These answers are focused on the interviewee's specific program and therefore appear not to apply to all software development programs using award fee contracts. The interviewees that responded "yes" to questions 26a and 26c used similar reasons. Two reasons were "The award will make the software development managers responsive to procurement agency inputs and concerns" and "It is a better way to get a contractor's attention" (Appendix H, page 152-153). Appendix H and I can be

referred to gain a more complete understanding of the interviewee responses.

Questions 27a through 27c focus on award fee being a hindrance to government and contractors. Question 27a asked: Was having an award fee on you program a hindrance to overall cost, schedule, and performance?" Twenty-six interviewees (96 percent) said "No" (Figure 28). Only one interviewee said "yes."

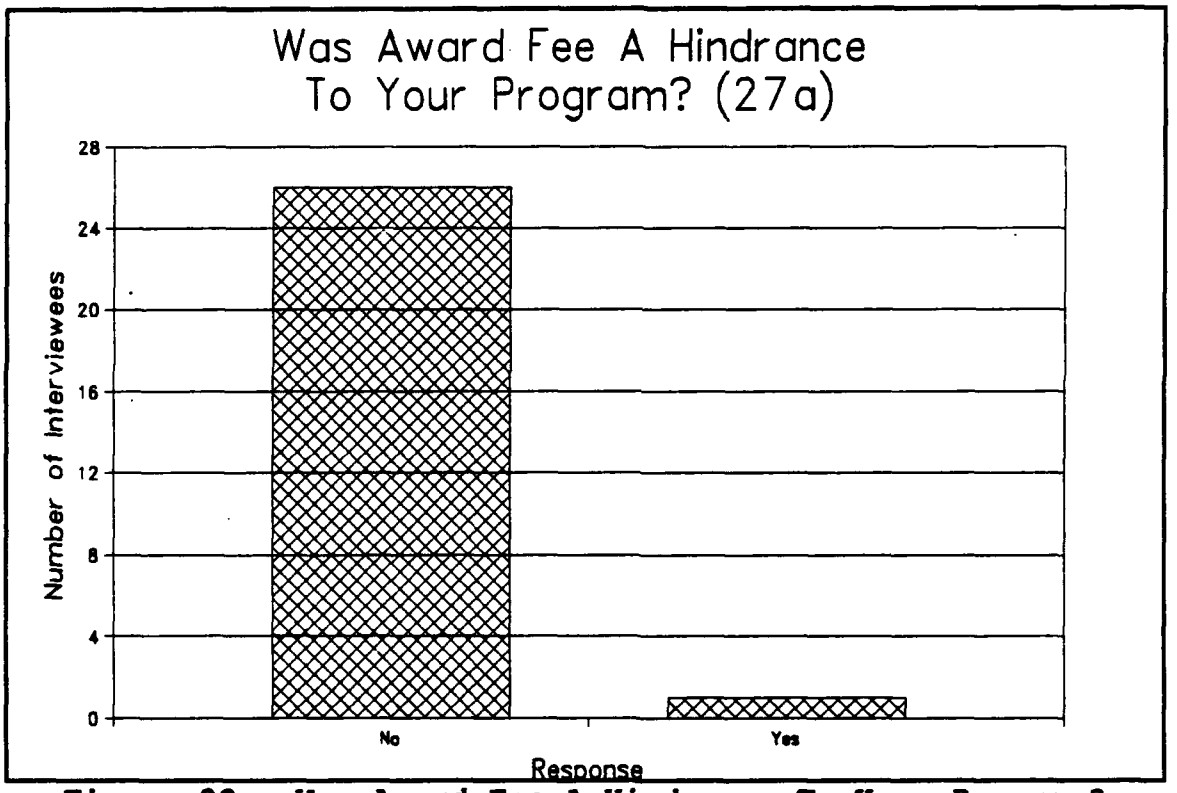


Figure 28. Was Award Fee A Hindrance To Your Program?

Question 27b focused on why the interviewees responded to question 27a as they did. The interviewees that responded "No" (award fee was not a hindrance) cited similar reasons to the ones they gave to questions 25 and 26 in which they said "Yes." The following are some examples:

"Focused contractor on areas the government wanted, in this case reliability," "Been a positive influence," and "I believe their initial (first period) performance would have been worse without award fee" (Appendix H, page 154). The one interviewee that felt award fee was a hindrance responded, "Cost the government time, but has not effected contractor work" (Appendix H, page 154).

In question 27c, the interviewees were asked, "If award fee was a hindrance, what did you do to overcome it?" The only interviewee to comment stated the following, "It was/is a pain to administer (for government) but not a hindrance to contractor" (Appendix H, page 155). The interviewee that said award fee was a hindrance (question 27a) did not comment on this question. Figure 29 shows the distribution of responses.

The last series of questions, 28a through 28c, were optional and focused on examples of award fee performance periods and evaluation criteria, Appendixes A and B respectively. Interviewees' responses to these questions fell into three areas: 1) They answered the questions, 2) They just made statements about Appendixes A and B, and 3) They made a statement about award fees in general.

Question 28a asked: What effect on the process of software development would they have? Fourteen (14) of 27 interviewees responded to this question. Thirteen (13) of the interviewees thought the examples in Appendixes A and B would have a positive effect on the software development

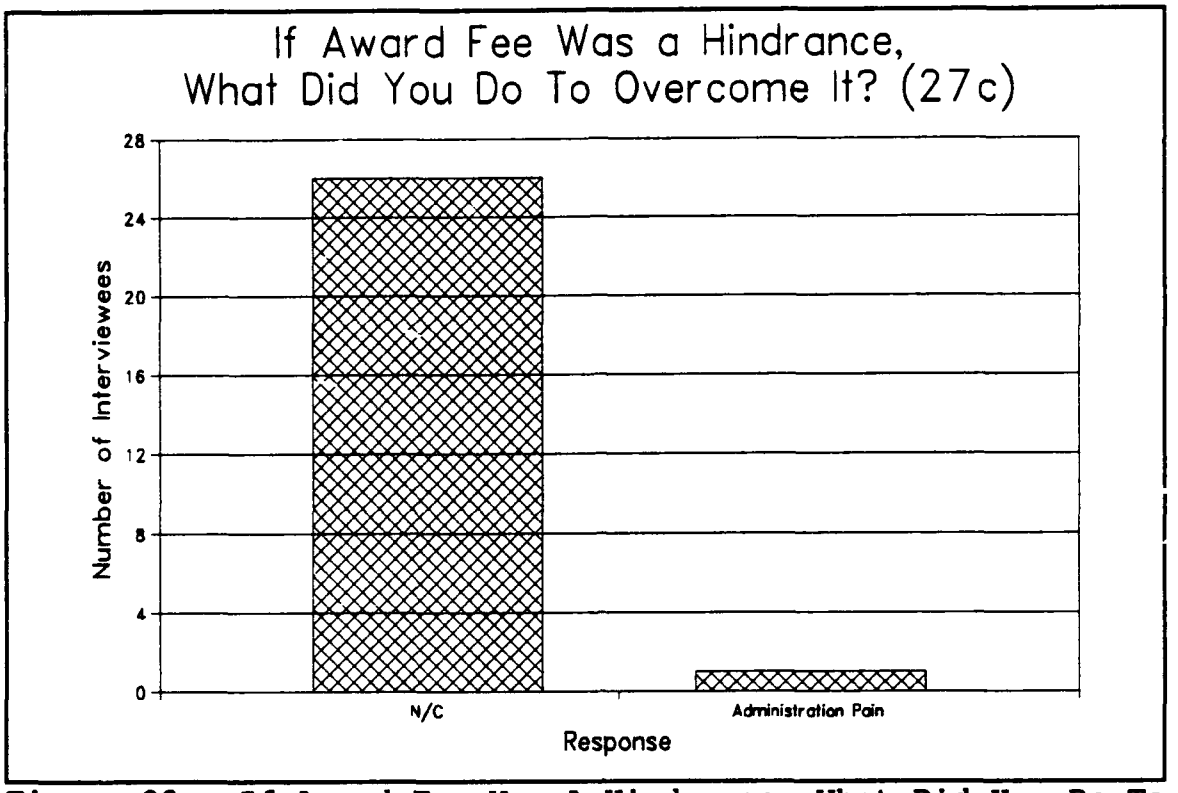


Figure 29. If Award Fee Was A Hindrance, What Did You Do To Overcome It?

process. Some of there comments were "Positive, better examples, the better yours will be done, would be a great help," "Yes - shows/communicates what is important and how to get the pot of gold - What he does not do will get him zero," and "Potential of insuring award fees are done right the first time" (Appendix H, page 156). One interviewee thought Appendixes A and B would have limited effect.

In question 28b the interviewees were asked "What benefit (or hindrance) would they be to the program office and the contractor if made part of the request for proposal and source selection?" Fourteen (14) of the 27 interviewees responded to this question. Thirteen (13) thought Appendix A and B would be beneficial if made part of the request for

proposal and source selection. One interviewee said the earlier the better, because it will help focus contractor and government on contractor strengths and weaknesses (Appendix H, page 157). Another interviewee said:

> A definite benefit to include them as part of the RFP package. The contractor will probably be receptive to almost any type of award fee plan, but he will want it to be something that is achievable. An award fee with criteria that are impossible to meet does nothing for either party. (Appendix H, page 157)

The one contractor that responded had thoughts along the same line: "It would be beneficial because it would give the proposal manager/program manager a heads up to understand what customer's major concerns are" (Appendix I, page 171). Government interviewee i thought Appendix B would confuse everyone. This interviewee did not further clarify his concerns and was unavailable to the researcher for additional clarification.

Question 28c asked the interviewee would Appendix A and B help the contractor understand what must be accomplished to receive an award fee? Fourteen (14) of 27 interviewees responded to this question, with interviewee i being the only negative response. The 13 interviewees that thought Appendixes A and B would help in contractor understanding cited several different reasons. One interviewee thought the contractor would focus his efforts on the award fee, which may be good or bad depending on the program Appendix H, page 158). This focus also depends on how the award fee, statement of work, and system specification are relating a

common requirement (Appendix H, page 158). Another interviewee took the approach that "award fee will force proper up front planning and tracking to the plan" (Appendix H, page 158). Interviewee l believes that "communications between the government and contractor is key to a successful program and award fee will incentivize this process" Appendix H, page 158) Interviewee r said that these Appendixes could possibly help. He used his past experience as justification;

> Our experience with our contractor revealed that when we change to award fee criteria similar to this it caused great confusion on their part. They saw the criteria as a checklist, that each one had to be met before moving on to the next section. Rather, our intent was to take observed behavior and see where it fell in the rating. (Appendix H, page 158)

The one contractor to respond said "they would summarize the major point only" and the contractor program managers task is to "interpret and break out lower level concerns" (Appendix I, page 171). As in question 28b, interviewee i said Appendix A and B would not help contractor understanding. His reason was:

> An award fee plan is by its nature tailored to the specific task/contract/program/phase. These may be useful as lists but they sure should <u>not</u> be dignified as 'policy' or regulation. (Appendix H, page 158)

The researcher asked the interviewees if they had any additional comments about award fee or the interview. To this question the researcher received 16 responses. The responses received fell into five broad categories: software, criteria, periods, award fee plans, and training.

In the software category, government interviewee b suggested a definition of software success was lacking. He believes tracking completed lines of code (LOC) can be misleading and completed modules are a better means of tracking software success.

Under the criteria category, six government interviewees had comments. Two said the criteria (Appendix B) was too broad and contained too many categories. The use of so many criteria makes the evaluation too fragmented. Government interviewee d believes the criteria needs to focus on the product and process (Appendix H, page 159). Interviewee m questioned the criteria (Appendix B) definition of successful completion. He said no design review is ever 100 percent complete. He recommends the award fee be used as an incentive for the contractor to exceed contract requirements (Appendix H, page 159). There were two contractor interviewees that commented about the criteria. These contractors were concerned that the criteria were focused only on software, not on the program as a whole. They (the criteria) need to be very program specific to attain the desired end item and not that he (the contractor) just checked the square (Appendix I, page 171).

The award fee periods in Appendix A brought comments from two government and two contractor interviewees. Government interviewees d and f had opposing views on what to tie award fee periods to. Interviewee d recommends award fee periods be tied to the calendar, not milestones,

while interviewee f recommends periods be tied to milestones (Appendix H, page 159). The contractor interviewees focused on number and length of the award fee period. Interviewee b believes four to five award fee periods are plenty to attain the desired end item. Interviewee c believes periods should be six months in length and be a "snap shot of the next two or more events" (Appendix I, page 171-172).

The award fee category comments come from six government and two contractor interviewees. Interviewees k and p focused on the FDO's role in the award fee process. Interviewee k believes the FDO should be the two letter Program Director. His reason was the Program Director has responsibility for program and should have FDO authority (Appendix H, page 159). Interviewee p felt the FDO changed too many times and there was no continuity in the evaluation process (Appendix H, page 160). Interviewee f believes no matter how good the award fee plan is, it cannot fix a bad statement of work or contract (Appendix H, page 159). Interviewee o feels the "working relationship between government and contractor is more important than award fee" (Appendix H, page 160). A very different approach was presented by interviewee s. He recommends the award fee pool be used to "help contractor with capitalization by giving him award fee up front" (Appendix H, page 160). If the contractor does not earn 100 percent of the period's fee the contractor must pay the government back. Interviewee s states the hinderance as "this approach 'drives PCO crazy'"

(Appendix H, page 160). Interviewee t believes "whatever guidance is provided, it must be able to be tailored to meet the needs of the program it is being applied to" (Appendix H, page 160). The two contractor interviewees b and d focused on different ares from each other and the government interviewees. Interviewee b believes that "award fee percentage versus ratings is important and should be shown," while interviewee d feels "praise or corrective action instituted by the award percentage ... determines how much management 'help' is supplied." (Appendix I, page 171-172).

The last category was training. Government interviewees g and p believe there is a lack of award fee trained personnel in the field today. Interviewee p believes a lessons learned data base is needed and may be a start in filling this void (Appendix H, page 160).

Summary

This chapter presented a summary of the interview data contained in Appendix H and I. Not all interviewee comments were covered in this summary, however, in the opinion of the researcher, not all were focused on the research questions presented in Chapter I. The data presented in this chapter should give the reader an idea of Program Director thoughts on award fee contract.

Chapter V will review the research questions presented in Chapter I using both literature and interview data, and provide the researcher's recommended answers. The chapter will close with a recommendation for future research.

V. Recommendations

Introduction

This chapter gathers the information in the Literature Review (Chapter 2) and Findings (Chapter 4), and presents the researcher's beliefs concerning the research problem statement and research question in Chapter 1. The data obtained in Chapter 4 was obtained from interviewing 23 government and 4 contractor program directors and deputies. The government interviews were conducted with personnel from Aeronautical Systems Center (old Aeronautical Systems Division), Electronic Systems Center (old Electronic Systems Division), and Space and Missile Systems Center (old Space Systems Division). The contractor interviews were conducted with personnel the researcher was able to contact through the program offices interviewed.

Research Findings

The focus of this research was on finding the contractual tools available to influence contractor performance during the software development process. Five research questions were developed to guide the literature and questionnaire data collection process. The following section states the research questions and discusses the research Findings.

Question 1: What provisions are available in the Federal Acquisition Regulation (FAR) and its supplemental

regulations to influence contractor performance during the development process?

Findings: The literature search found the type of contract used as a key FAR management tool available to influence contractor performance during the software development process. Award fee was found to be the most flexible provision in the FAR and its supplements to influence contractor performance during the development process. Award fee also provides an appropriate vehicle for feedback.

Question 2: What events or milestones in the development process should be used to evaluate contractor performance during the software development process?

Findings: Articles and books presented several approaches for events or milestones in the software development process that could be used to evaluate contractor performance. The literature search found a strong consensus on major events or milestones in the software development process.

There were nine common events or milestones within each of the readings that can be used to evaluate contractor performance. The consensus of milestones that should be used are systems requirements review (SRR), system design review (SDR), software specification review (SSR), preliminary design review (PDR), critical design review (CDR), test readiness review (TRR), functional configuration

audit (FCA), physical configuration audit (PCA), and formal qualification review (FQR). These specific names were not used by all the authors to describe the events in their software development life cycle, nor do all the phases fit every Government software development project. Yourdon states "certainly every project, whether structured or not, goes through some kind of system analysis, design, and implementation" (Yourdon, 1988:45). These nine events and milestones should be tailored for each software development project.

Question 3: How should award fee, as described in the FAR and its supplements, and software development events be linked to influence contractor performance?

Finding: The interviews conducted did not present a clear consensus on the linkage of software development events and award fee. The periods in Appendix A brought comments from two government and two contractor interviews. Government interviews d and f had opposing views on what to tie award fee periods to. Interviewee d recommends that award fee periods be tied to calendar dates not milestones; interviewee f recommends periods be tied to milestones (Appendix H, page 159). The contractor interviews focused on number and length of award fee period. Interviewee b believes four to five award fee periods are adequate to attain the desired end item (Appendix I, page 171). Interviewee c believes time periods should be six months in

length and be a "snap shot of the next two or more events" (Appendix I, page 171). It appears to the researcher that program requirements are the key factor that drives the linkage between award fee and the software development events outlined in Question 2 Findings above. The reason the researcher makes this statement is that in each interview referenced, the award fee process is, or has worked, with some measure of success. The example in Appendix A, Performance Evaluation Periods, is a good starting point for discussion.

Question 4: Can the award fee process be used to influence contractor performance during software development?

Findings: The literature reviewed did not give a clear perspective on this question. To answer this question, the researcher used interview questions 16 through 23. These questions focused on the affect award fee would have on software development, cost, delivery, reliability, documentation, testability, and quality. The interviews found 88 percent of the respondents believe award fee has a positive affect on contractor software development and 92 percent of the respondents felt award fee could affect contractor performance on software documentation; however, the interviews also found no clear consensus on the affect award fee would have on cost, delivery, reliability, testability, and quality.

Question 5: What award fee criteria should be used to evaluate contractor performance?

Findings: The exact criteria is dependent on the specific software development program. The researcher used the perspectives of current and former program directors to find the current system program office philosophy on criteria. The researcher used interview question 28 and Appendix B to gain some insight into current criteria used in system program offices. Ninety-two percent of the responding interviewees felt the criteria presented in Appendix B would be "Positive, better examples, the better yours will be done, would be a great help" (Appendix H, page 156). Two government interviewees said the criteria (Appendix B) was too broad and contained too many categories. They believe the use of so many criteria makes the evaluation too fragmented. The two contractors that responded were concerned the criteria were focused only on software, not on the program as a whole and believe the criteria should be very program specific to attain desired end item [not just checking squares] (Appendix I, page 171).

The researcher believes the criteria in Appendix B can be used as a starting point to focus the development of future award fee contract criteria. It is not intended to be blindly applied to all award fee contracts. The criteria in Appendix B is only intended to be the starting point and should be specifically tailored to the needs of each program.

Question 6: Does the award fee process include an appropriate type and form of feedback to give to the contractor for improving his ability to develop maintainable software on time, and within cost?

Findings: The literature did not fully answer this question. The researcher made an attempt to focus interview questions 28b and 28c to answer this question. The 13 respondents felt that award fee focuses the effort of both the government and contractor. They believe the award fee process fosters communications between the two and this communication "is key to a successful program and award fee will incentivize this process" (Appendix H, page 158). Based on the data from the interviews, the researcher believes the award fee process includes the appropriate type and form of feedback for a contractor to improve his ability to develop maintainable software on time, and within cost. The key is communication and award fee fosters it.

Research Summary

This research has focused on the contractual tools available to influence contractor performance during the development process. The research found award fee is the tool that can be tailored to a programs specific need and allows the program director to refocus the contractor efforts. Award fee is like any tool. It must be developed and executed correctly to have the desired effect. The award fee is only one part of the acquisition process and no

matter how good the award fee plan is, it cannot fix a bad statement of work or contract (Appendix H, page 159).

During the course of this research, the award fee plan for the F-22 System Program Office was found to be an excellent example. It is included in this thesis as Appendix J for future reference by the reader.

Recommendation for Future Research

As a result of this research, three areas, in the researcher's opinion, require further investigation. First, the area of experience of the acquisition force with award fees should be investigated. The researcher found that all program directors interviewed had at least some experience with award fee contracts. Their concern was that the personnel within their program did not have much, if any, award fee experience before the award fee process was started. By finding the program office experience base with award fee, an award fee training program may be justified and initiated. Second, the requirements for a standardized award fee training program should be investigated. This training program would increase the acquisition corps knowledge base on award fee and enable the development of an award fee data base that would assist in the development of future award fee contracts. The last area is the use of award fee as a tool to achieve an end. The concept of ends and means has been researched before (Quinn and Rohrbaugh, 1983:363-377). The purpose of this investigation would be

to examine the relationship of end and means in the context of award fees. The question is: are we, the government, giving the contractor the appropriate means to achieve the desired ends in the award fee process?

Appendix A: Performance Evaluation Periods
(ESC, 1990b: Annex 4)

The evaluation periods for this contract shall be tied to the program's contractual baseline. The contractual baseline shall be identified by contract award and shall be updated as required with government review and approval. Performance periods 1 through 5 will use Performance Evaluation Areas A, B, and D. Performance periods 6 through 9 will use Performance Evaluation Areas A, B, C, and D.

FEE ALLOCATION (Sample Plan)

PERIOD	%	START OF PERIOD	END OF PERIOD
1.	5	Start of Contract	Successful completion of System Requirements Review (SRR) to include disposition of Contractor's open action items and delivery of final SRR documentation to the Air Force.
2.	15	End of Period 1	Successful completion of Software Specification Review (SSR) to include disposition of contractor's open action items and delivery of final SSR documentation to the Air Force.
3.	10	End of Period 2	Successful completion of the last Preliminary Design Review (PDR) to include disposition of contractor's open action items and delivery of last PDR documentation to the Air Force.
4.	20	End of Period 3	Successful completion of the last Critical Design Review (CDR) to include disposition of contractor's open action items and delivery of last CDR documentation to the Air Force.

PERIOD	%	START OF PERIOD	END OF PERIOD
5.	10	End of Period 4	Successful completion of Program Status Review (PSR) and delivery of all PSR documentation to the Air Force.
6.	5	End of Period 5	Successful completion of Program Status Review (PSR) and delivery of all PSR documentation to the Air Force.
7.	15	End of Period 6	Successful completion of Test Readiness Review (TRR) to include disposition of contractor's open action items and delivery of final TRR documentation to the Air Force.
8.	10	End of Period 7	Successful completion of Functional Configuration Audit (FCA) and Physical Configuration Audit (PCA) to include disposition of contractor' open action items and delivery of final Functional Configuration Audit and Physical Configuration Audit documentation to the Air Force.
9.	10	End of Period 8	Successful completion of final Operational Test and Evaluation (OT&E) to include disposition of contractor's open action items and delivery of final OT&E documentation to the Air Force.
Total	%100		

Appendix B: Evaluation Criteria
(ESC, 1990b: Annex 3)

NOTE: THE FOLLOWING ARE ONLY EXAMPLES AND ARE NOT MEANT TO BE ALL INCLUSIVE.

Area A: General Management Practices

Unacceptable Rating (0 - 59 points). The contractor shall earn this rating and associated points for the following:

1. Causes of significant problems were identified late. Solutions were only stop-gap measures and little attempt was made to define more effective options and solutions.

2. In-depth risk analysis was lacking.

3. Poor corrective action was taken on identified problems.

4. Evaluation of problems was not presented to the program office in a timely fashion.

5. Program visibility was lacking.

6. Proposals were consistently late and incomplete, impacting audit/fact-finding efforts.

7. Poor communication of program issues in meetings and presentations.

8. Contract Deliverables (CDRLs) were frequently late, inadequate, and requiring corrections.

9. Poor visibility of program and equipment costs.

10. Program schedules were out-of-date, do not show critical path and do not show changes from Government approved baseline.

11. Lack of manning with appropriately trained/cleared personnel.

12. Disregard for cost effectiveness in management decisions.

13. C/SSR deviation were unacceptable.

14. Schedule milestones slippage was significant and without warning.

15. The scope and extent of documentation changes was unacceptable.

16. The Contractor was not timely and responsive in acting upon Government program office requirements.

Good Rating (60 - 79 points). The contractor shall earn this rating and associated points for the following:

1. Timely identification of problem causes and solutions.

2. Applies risk analysis to assess total impact and minimize subsequent impact.

3. Timely and aggressive corrective action on identified problems was lacking.

4. Meets critical milestones.

5. Provides timely evaluation of problems to program office.

6. Maintains visibility of program and equipment costs and schedules.

7. Proposals were submitted on time with consistent quality and no major audit/fact-finding and negotiation schedule problems.

8. Program issues were communicated in a timely manner, minimizing program impacts.

9. CDRLs were submitted on time with consistent quality.

10. Maintains visibility of program and equipment costs.

11. Program schedules were up-to-date, show critical path and show changes from Government approved baseline.

12. Consistent level of manning with appropriately trained personnel.

13. Cost effectiveness was part of management decisions.

14. C/SSR deviation were frequent.

15. Documentation changes were extensive but manageable.

16. The Contractor was somewhat timely and responsive in acting upon Government program office requirements.

Very Good Rating (80 - 89 points). The contractor shall earn this rating and associated points if the majority of the 'Good' criteria were satisfied, plus the following:

1. Anticipates problems and takes corrective actions to minimize impact.

2. Solutions demonstrate initiative and require little revision.

3. Required changes implemented with minor impact.

4. Request data for early problem anticipation.

5. Meets all significant schedule milestones.

6. Applies clear cost/effective trade-offs to meet performance requirements at minimum cost.

7. Proposals were submitted on time with superior documentation and no audit concerns.

8. CDRLs were submitted on time and demonstrated superior subject knowledge.

9. Skillfully adjusts program and equipments schedule priorities based on critical path analyses.

10. Supports subcontractor(s) in a timely and effective manner and contributes meaningful inputs.

11. Responsive and efficient communication of program issues with program office.

12. Appropriately trained personnel manning was not a problem.

13. Cost effectiveness was key part of management decisions.

14. C/SSR deviation were infrequent.

15. Schedule milestones showed only minor slippage from the Government approved baseline. Re-plans and presents recommendations to the Government to bring the schedule in line.

16. Documentation changes were normal and well managed.

17. The development never has problems with an adequate supply of trained personnel.

18. The Contractor was timely and responsive in acting upon Government program office requirements.

Excellent Rating (90 - 100 points). The contractor shall earn this rating and associated points, if the majority of the 'Very Good' criteria were satisfied, plus the following:

1. Solves difficult interface problems and implements low cost, high performance solutions which significantly enhance overall program success.

2. Enthusiastically implements cost savings ideas which result in system cost reductions.

3. Takes the initiative to work out difficult problems with subcontractor(s).

4. Demonstrates clear corporate commitment to program goals and objectives.

5. Communications with program office demonstrate initiative and teamwork in solving program issues.

6. Proposals submitted early and negotiations completed ahead of schedule.

7. C/SSR deviation were almost non-existent.

8. Schedule milestones were maintained at the Government approved baseline.

9. Documentation changes were minimized to the lowest.

10. The Contractor was very timely and responsive in acting upon Government program office requirements.

Area B: Systems Engineering

Unacceptable Rating (0 - 59). The contractor shall earn this rating and associated points for the following:

1. Documentation delivered for Government formal review was incomplete, inaccurate and contain untestable requirements.

2. Formal reviews were incomplete, and inaccurate.

3. Documentation, hardware and software don't demonstrate requirements traceability.

4. Contractor does not use modular and reusable design and programming practices.

5. Contractor does not follow or update the System Engineering Management Plan and Software Development Plan.

6. Develops and delivers software code other than ADA without formal Government waiver.

7. No Government approved software development tools were used.

8. Fails to provide accurate and complete list of proposed spares.

9. Growth, from approved Government baseline, in code, response time, and throughput capacity (memory, disk, CPU utility) were consistently greater than 10% or greater than 15% in a period.

10. Human Factors Engineering (HFE) and Reliability, Maintainability, and Availability (RMA) were not considered.

11. The Data Accessions List was meaningless and not updated.

12. Software units perform multiple tasks/functions with no clear inputs and outputs.

13. Software metrics were not maintained or accurate.

14. Quality Assurance (QA) was not used or demonstrated.

15. System Design was inadequate or does not meet requirements.

Good Rating (60 - 79 points). The contractor shall earn this rating and associated points for the following:

1. Documentation delivered for Government formal review was complete and accurate.

2. Formal reviews were complete and accurate.

3. Documentation, hardware, and software were developed and delivered to the Government with traceable requirements.

4. Contractor uses modular and reusable design and programming practices.

5. Contractor follows or updates the System Engineering Plan and Software Development Plan.

6. Contractor develops and delivers software code in ADA, unless waiver was formally approved by the Government.

7. Government approved software tools were used.

8. Final documentation reflects delivered hardware and software.

9. Follows configuration management procedures outlined in Software Development Plan.

10. Operational implementation of designs were presented to the Government.

11. Contractor adequately prepares for Design Reviews, Technical Interchange Meetings, and Tests/Installations.

12. Provides a complete list of proposed spares.

13. Growth, from approved Government baseline, in code, response time, and throughput capacity (memory, disk, CPU utility) were consistently greater than 10% but less than 15% in a period.

14. HFE and RMA were considered.

15. The Data Accessions List was meaningful and up to date.

16. Software units perform single task/function with clear inputs and outputs.

17. Software metrics were maintained.

18. QA was used.

19. System Design was barely adequate and meets most requirements.

Very Good Rating (80 - 89 points). The contractor shall earn this rating and associated points if the majority of the "Good" criteria were satisfied plus the following:

1. Documentation delivered for Government review contains no untestable requirements.

2. Formal reviews were comprehensive.

3. Requirements were easily traced in all documentation and Design Reviews.

4. Modular and reusable design and programming practices were used throughout this development unless a formal waiver was granted by the Government.

5. The System Engineering Plan and Software Development Plan reflect the day to day operations throughout this development.

6. ADA software code was developed with a software library in mind.

7. Government approved software tools were used to the maximum extent possible

8. Documentation reflects delivered hardware and software at delivery.

9. Operational implementation was considered throughout the development and delivery process.

10. Contractor effectively prepares for Design Reviews, Technical Interchange Meets (TIM's) and Tests/Installations.

11. Provides a list of proposed spares ahead of schedule.

12. List of proposed spares was complete and requires no more than minor alteration by Government auditors.

13. Growth, from approved Government baseline, in code, response time, and throughput capacity (memory, disk, CPU utility) were consistently greater than 5% but less than 10% in a period.

14. HFE and RMA were shown to be a driver.

15. Software units perform single well defined task/function with clear inputs and outputs.

16. Software metrics were maintained and accurate.

17. QA was used and demonstrated to the Government.

18. System Design was adequate and meets requirements.

Excellent Rating (90 - 100 points). The contractor shall earn this rating and associated points if the majority of the 'Very Good' criteria were satisfied plus the following:

1. No untraceable requirements were found.

2. Contractor uses effective/efficient modular and reusable design/programming practices.

3. Good System Engineering practices were used throughout the development process.

4. Good Configuration Management practices were used throughout the development process.

5. Government approved automated development tools were used to the maximum extent possible.

6. Provides a thorough list of proposed spares based on projected MTBF.

7. List of proposed spares was provided requiring no alteration by Government auditors.

8. Growth, from approved Government baseline, in code, response time, and throughput capacity (memory, disk, CPU utility) were consistently less than or equal to 5% in a period.

9. HFE and RMA were shown to be a driver and considered appropriately.

10. System Design optimizes resources and exceeds requirements.

Area C: Test, Evaluation and Installation

Unacceptable Rating (0 - 59 points). The contractor shall earn this rating and associated points for the following:

1. Contractor Configuration Management impacts Test, Evaluation and Installation.

2. System not ready for formal Acceptance Testing (e.g., Boxes not Buttoned up, Functional Configuration Audit failure, etc).

3. Inexperienced Contractor Test, Evaluation, and Installation personnel used.

4. Physical Configuration Audit failure.

5. Government approved Test, Evaluation, and Installation procedures not used.

6. Execution of unrealistic Test, Evaluation, and Installation schedules used.

7. Use of unrealistic plans and procedures.

8. Failure to supply appropriate packing lists.

9. No, or ineffective, operator and maintenance training was performed.

Good Rating (60 - 79 points). The contractor shall earn this rating and associated points for the following:

1. Contractor Configuration Management does not impact Test, Evaluation, and Installation.

2. System was ready for formal Acceptance Testing (e.g., Boxes were Buttoned up, Functional Configuration Audit passed, etc).

3. Well qualified Contractor Test, Evaluation, and Installation personnel were used.

4. Physical Configuration Audit passed with no major problems.

5. Government approved Test, Evaluation, and Installation procedures were used.

6. Execution of Test, Evaluation, and Installation schedules.

7. Use of Government approved plans and procedures.

8. Contractor supplied packing lists.

9. Operator and maintenance training was performed.

Very Good Rating (80 - 89 points). The contractor shall earn this rating and associated points if the majority of the "Good" criteria were satisfied plus the following:

1. Contractor Configuration Management was key to the success of Test, Evaluation, and Installation.

2. System was well prepared for formal Acceptance Testing.

3. Experienced Contractor Test, Evaluation, and Installation personnel used.

4. Physical Configuration Audit passed with only minor problems.

5. Government approved Test, Evaluation, and Installation procedures were correctly and effectively used.

6. Execution of realistic Test, Evaluation, and Installation schedules.

7. Use of realistic plans and procedures.

8. Contractor supplied appropriate packing lists.

9. Effective operator and maintenance training was performed.

Excellent Rating (90 - 100 points). The contractor shall earn this rating and associated points if the majority of the 'Very Good' criteria were satisfied plus the following:

1. Functional Configuration Audit passed with no problems.

2. Physical Configuration Audit passed with no problems.

3. No problems were found during installation.

4. Excellent operator and maintenance training was performed.

Area D: Security

Unacceptable Rating (0- 59 points). The contractor shall earn this rating and associated points for the following:

1. Contractor Security Program does not comply with the Industrial Security Program and/or the contract DD 254 and/or the applicable classification guides.

2. Contractor does not have a formal continuing Security Training program for contractor/subcontractor personnel.

3. Inexperienced Contractor Security personnel used.

4. Failure of an Security inspection and/or inspection.

5. Documentation was not controlled in accordance with Industrial Security requirements.

6. No clear lines of authority and responsibility were established within the security organization.

7. Staffing was not adequate to accomplish the tasks required by security directives and the needs of the program in a timely manner.

8. Communications were not adequate to facilitate timely, responsive replies to oral and written communications.

9. Security management staff does not plan ahead for all security and related program elements to provide staff, material and facility resources to accomplish projected requirements.

10. Billet structure will not meet current and projected future program requirements.

11. The Contractor does not furnish brief/debrief statements in a timely manner and does not avoid double billeting by assuring that existing personnel were debriefed in a timely manner.

12. The Contractor does not process access requests to appropriate Government agencies in a timely manor: does not track progress and report status to cognizant Government program and security management.

13. The Contractor was not timely in development and revising program unique Security Practices and Procedures (SPP's) and adherence to approved SPP's.

14. Contractor does not provide necessary support to acquire accreditation or approval of facilities for special program requirements.

15. Contractor does not adhere to the security guides and systems of control number assignment to produce a system of accountability that provides absolute traceability and minimizes possible compromise of program material.

16. The Contractor does not take all necessary steps to eliminate security infractions, conduct and document investigations when necessary, and does not prevent recurrences.

Good Rating (60 - 79 points). The contractor shall earn this rating and associated points for the following:

1. Contractor Security Program has many deviations from the Industrial Security Program and/or the contract DD 254 and/or the applicable classification guides.

2. Contractor has a below standard/formal continuing Security Training program for contractor/subcontractor personnel.

3. Few inexperienced Contractor Security personnel were used.

4. No major findings in all Security inspections.

5. Documentation was periodically controlled in accordance with Industrial Security requirements.

6. Lines of authority and responsibility were periodically established within the security organization.

7. Staffing was the minimum to accomplish the tasks required by security directives and the needs of the program in a timely manner.

8. Communications were minimal to facilitate timely, responsive replies to oral and written communications.

9. Security management staff does minimal planning ahead for all security and related program elements to provide staff, material and facility resources to accomplish projected requirements.

10. Billet structure was minimum to meet current and projected future program requirements.

11. The Contractor does the minimum in furnishing brief/debrief statements in a timely manner and does the

minimum to avoid double billeting by assuring that existing personnel were debriefed in a timely manner.

12. The Contractor does the minimum for timely process access requests to appropriate Government agencies: does the minimum to track progress and report status to cognizant Government program and security management.

13. The Contractor was somewhat timely in development and revising program unique security practices and procedures (SPP's); adherence to approved SPP's.

14. The Contractor was somewhat timely in development and revising cover stories for all program requirements.

15. Contractor does the minimum to provide necessary support to acquire accreditation or approval of facilities for special program requirements.

16. Contractor does the minimum to adhere to the security guides and systems of control number assignment to produce a system of accountability that provides absolute traceability and minimizes possible compromise of program material.

17. The Contractor makes an effort to take all necessary steps to eliminate security infractions, conduct and document investigations when necessary, and does not prevent recurrences.

Very Good Rating (80 - 89 points). The contractor shall earn this rating and associated points if the majority of the 'Good" criteria were satisfied plus the following:

1. Contractor Security Program has few deviations from the Industrial Security Program and/or the contract DD 254 and/or the applicable classification guides.

2. Contractor has a standard/formal continuing Security Training program for contractor/subcontractor personnel.

3. Limited inexperienced Contractor Security personnel were used.

4. Few findings in an Security inspection and/or inspection.

5. Documentation was controlled in accordance with Industrial Security requirements.

6. Lines of authority and responsibility were established within the security organization.

7. Staffing was adequate to accomplish the tasks required by security directives and the needs of the program in a timely manner.

8. Communications were adequate to facilitate timely, responsive replies to oral and written communications.

9. Security management staff does adequate planning ahead for all security and related program elements to provide staff, material and facility resources to accomplish projected requirements.

10. Billet structure was adequate to meet current and projected future program requirements.

11. The Contractor does furnishing brief/debrief statements in a timely manner and does the avoid double billeting by assuring that existing personnel were debriefed in a timely manner.

12. The Contractor does timely process access requests to appropriate Government agencies: does the minimum to track progress and report status to cognizant Government program and security management.

13. The Contractor was timely in development and revising program unique security practices and procedures (SPP's); adherence to approved SPP's.

14. The Contractor was timely in development and revising cover stories for all program requirements.

15. Contractor does provide necessary support to acquire accreditation or approval of facilities for special program requirements.

16. Contractor does adhere to the security guides and systems of control number assignment to produce a system of accountability that provides absolute traceability and minimizes possible compromise of program material.

17. The Contractor takes all necessary steps to eliminate security infractions, conduct and document investigations when necessary, and does prevent recurrences.

Excellent Rating (90 - 100 points). The contractor shall earn this rating and associated points if the majority of the 'Very Good" criteria were satisfied plus the following:

1. Contractor Security Program has no deviations from the Industrial Security Program and/or the contract DD 254 and/or the applicable classification guides.

2. Contractor has a aggressive standard/formal continuing Security Training program for contractor/subcontractor personnel.

3. No inexperienced Contractor Security personnel were used.

4. No findings in an Security inspection and/or inspection.

5. Documentation was aggressively controlled in accordance with Industrial Security requirements.

6. Lines of authority and responsibility were clear, appropriate and established within the security organization.

7. Staffing was above required and appropriate to accomplish the tasks required by security directives and the needs of the program in a timely manner.

8. Communications were excellent to facilitate timely, responsive replies to oral and written communications.

9. Security management staff does exceptional planning ahead for all security and related program elements to provide staff, material and facility resources to accomplish projected requirements.

10. Billet structure was appropriate to meet current and projected future program requirements.

11. The Contractor aggressively furnishing brief/debrief statements in a timely mariner and aggressively avoids double billeting by assuring that existing personnel were debriefed in a timely manner.

12. The Contractor aggressively processes access requests to appropriate Government agencies: does exceptional tracking of the progress and report status to cognizant Government program and security management.

13. The Contractor was aggressive in development and revising program unique security practices and procedures (SPP); adherence to approved SPP's.

14. The Contractor was aggressive in development and revising cover stories for all program requirements.

15. Contractor aggressively provides all necessary support to acquire accreditation or approval of facilities for special pro[illegible]am requirements.

16. Contractor aggressively adheres to the security guides and systems of control number assignment to produce a system of accountability that provides absolute traceability and to the maximum extent minimizes possible compromise of program material.

17. The Contractor goes beyond all necessary steps to eliminate security infractions, conduct and document investigations when necessary, and does prevent recurrences.

Appendix C: Cover Letter to Government Interviewee

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS AERONAUTICAL SYSTEMS DIVISION (AFSC)
WRIGHT-PATTERSON AIR FORCE BASE, OHIO 45433-6503

REPLY TO ATTN OF: CV

15 JAN 1992

SUBJECT: Request for Interview

TO: See Distribution

1. Request either you or your deputy participate in an interview conducted by Major Mark T. Hunter, a graduate student from the Air Force Institute of Technology (AFIT). This interview will generate material for an AFIT research effort designed to determine if an award fee is a tool the program office can use to improve the software acquisition process.

2. Attachment 1 is the interview guide Major Hunter will use to conduct the interview. He will call your office the week of 20 January to schedule the interview. As part of his research, he will ask you to comment on his draft Performance Evaluation Periods (Atch 2) and draft Award Fee Criteria (Atch 3). Your comments to attachments 2 and 3 are optional, but are requested to complete the research effort. If your schedule precludes a formal interview, you also have the option of completing the interview guide and returning it to Major Hunter at FTC/DXDM by 16 March 1992.

3. Your cooperation and assistance with this effort is appreciated. The information obtained will provide data for Major Hunter's AFIT student thesis project. The data is not intended to assess organization, individual, or contractor performance. All responses will be held in the strictest confidence. No individual, program office, or contractor will be associated with any of the data, unless expressly desired by the System Program Office Director.

STEWART E. CRANSTON
Brigadier General, USAF
Vice Commander

4 Atch
1. Government Interview Guide
2. Draft Performance Evaluation Periods
3. Draft Award Fee Evaluation Criteria
4. Distribution List

Appendix D: Government Interview Guide

GOVERNMENT

INTERVIEW GUIDE

Interview Date: _____

Program Office: _____

Program Address: _____

_____

Phone No: _____

System Program Office Director: _____

Deputy Director: _____

Interviewee: _____

Request Anonymity: _____

INTERVIEW QUESTIONS

PROGRAM DIRECTOR INFORMATION

(This section is to determine your system program office background.)

01a. When were you assigned to your current position?

_____

01b. At what level are you certified under the Acquisition Professional Development Program?

_____

02. Have you been a System Program Office Director or Deputy Director on any other program(s)?

YES _____ NO _____

If yes, for which program(s), in which position(s), and for how long?

_____

_____

_____

03. Not counting your current assignment as Program Office Director or Deputy Director, what is the total time you were assigned to a system program offices?

_____

04. What specialty code(s) were you assigned?

_____

05. What system program office directorate(s) or divisions did you work for previously? (For example, engineering, logistics, procurement, program control, operations, test.)

_____

_____

PROGRAM BACKGROUND

(This section is to determine experience with award fee.)

06. Were you part of any precontract award process that used award fee?

YES _____ NO _____

If yes, for which program(s), in which position(s) of the process, and how long were you assigned to the program?

_____

_____

_____

07. Does your program office currently have an award fee contract?

YES _____ NO _____

IF NO, SKIP TO QUESTION 13.

08. What program or portion of the program has an award fee plan?

_____

_____

09. What phase is the program in?

_____

10. Is the program's software development covered in the award fee plan?

YES _____ NO _____

11. What is the approximate dollar value of the contract?

_____

12. What percent (%) of the contract's award fee has the contractor received in the past?

_____

13. What is your experience with award fee contracts?

a. None
b. Some
c. Considerable
d. Extensive

14. What is your experience with software development?

a. None
b. Some
c. Considerable
d. Extensive

AWARD FEE PERSPECTIVE

(This section is to determine your viewpoint on how an award fee should be used.)

15. What written guidance would help in the development of award fee contracts?

_____

_____

_____

_____

For Questions 16 through 23, how do you think having an award fee would benefit (or hinder) the program and software?

16. Software Development?

_____

_____

_____

17. Software Development Cost Control?

18. Software Delivery Timeliness?

19. Software Maintenance Costs?

20. Software Reliability?

21. Software Documentation?

22. Software Testability?

23. Software Quality?

_____

_____

_____

24. In addition to award fee, what other tool does a program manager have to control the software development process?

_____

_____

_____

25. How has having the award fee on your program benefitted the overall cost, schedule, and performance?

_____

_____

_____

26a. Do you plan to have an award fee on future contracts?
YES _____ NO _____

26b. Why or why not?

_____

_____

If 26a is NO, go to 27.

26c. Will the award fee on future contracts include software development?

YES _____ NO _____

26b. Why or why not?

_____

_____

_____

_____

27a. Was having an award fee on your program a hindrance to the overall cost, schedule, and performance?

YES _____ NO _____

27b. Why or why not?

_____

_____

_____

_____

27c. If the award fee was a hindrance, what did you do to overcome it?

_____

_____

_____

The remaining questions are optional but are requested to complete the research effort.

28. Currently, the only written guidance for Award Fee Plans is AFSC "Award Fee in Systems Acquisition - A Handbook for Program Directors and Contracting Officers". Please comment on attachments 2 and 3 and answer the following questions.

a. What effect on the process of software development would they have?

b. What benefit (or hindrance) would they be to the program office and the contractor if made part of the request for proposal and source selection?

c. Would they help the contractor understand what must be accomplished to receive an award fee?

Please comment below or directly on the attachments.

_____

_____

_____

_____

_____

_____

If not planning to have a formal interview, please return the guide and all attachments to:

FTC/DXDM

WRIGHT-PATTERSON AFB, OHIO 45433-6508

ATTN: MAJOR MARK T. HUNTER

Note: Attachments 2 and 3 referenced above are Appendix A and B of this Thesis.

Appendix E: Cover Letter to Contractor Interviewee

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS AIR FORCE FOREIGN TECHNOLOGY CENTER (AFIC)
WRIGHT-PATTERSON AFB, OHIO 45433-6508

17 JAN 1992

REPLY TO ATTN OF: FASTC/DXDM

SUBJECT: Request for Telephone Interview

TO:

1. Request either you or your deputy participate in an interview to generate material for an Air Force Institute of Technology (AFIT) research effort designed to determine if an award fee is a tool the program office can use to improve the software acquisition process. Your participation in this survey is optional.

2. Attachment 1 is the interview guide I will use to conduct the interview. As part of my research, I'd like your comments on the draft Performance Evaluation Periods (Atch 2) and draft Award Fee Criteria (Atch 3). Your comments to attachments 2 and 3 are optional, but are requested to complete the research effort. If your schedule precludes a formal interview, you also have the option of completing the interview guide and returning it to me at FASTC/DXDM by 16 March 1992. If you need to contact me, I can be reached at (513) 257-4166.

3. Your cooperation and assistance with this effort is appreciated. The information obtained will provide data for my AFIT masters thesis project. The data is not intended to assess organization, individual, or contractor performance. All responses will be held in the strictest confidence. No individual, program office, or contractor will be associated with any of the data, unless expressly desired by the System Program Office Director.

MARK T. HUNTER, Maj, USAF
Part Time AFIT Student

3 Atch
1. Contractor Interview Guide
2. Draft Performance Evaluation Periods
3. Draft Award Fee Evaluation Criteria

1st Ind,

TO:

Your participation in Major Hunter's survey on award fee is completely optional and there shall be no direct charge to any contract as a result of you completing the questionnaire or interview by the AFIT student.

Appendix F: Contractor Interview Guide

CONTRACTOR

INTERVIEW GUIDE

Interview Date: _____

Contractor: _____

Program: _____

Program Address: _____

_____

_____

Phone No: _____

Program Manager: _____

Deputy Program Manager: _____

Interviewer: _____

Request Anonymity: _____

INTERVIEW QUESTIONS

PROGRAM DIRECTOR INFORMATION

(This section is to determine your program office background.)

01a. When were you assigned to your current position?

_____

01b. Have you taken the Program Managers Course at the Defense Systems Management College?

_____

02. Have you been a Program Manager or Deputy Program Manager on any other program(s)?

YES _____ NO _____

If yes, for which program(s), in which position(s), and for how long?

_____

_____

_____

03. Not counting your current assignment as Program Manager or Deputy Program Manager, what is the total time you were assigned a program?

_____

04. What are your specialties, e.g. software, systems engineering, or mechanical engineer etc.?

_____

_____

05. What parts of programs did you work for previously? (For example, engineering, logistics, procurement, program control, operations, test.)

_____

_____

PROGRAM BACKGROUND

(This section is to determine experience with award fee.)

06. Where you part of the precontract award process that used award fee?

YES _____ NO _____

If yes, for which program(s), in which position(s), and for how long?

_____

_____

_____

07. Does your program currently have an award fee contract?

YES _____ NO _____

IF NO, SKIP TO QUESTION 13.

08. What program or portion of the program has an award fee plan?

_____

09. What phase is the program in?

_____

10. Is the program's software development covered in the award fee plan?

YES _____ NO _____

11. What is the approximate value of the contract?

_____

12. What percent (%) of the contract award fee has your program received in the past?

_____

13. What is your experience with award fee contracts?

a. None
b. Some
c. Considerable
d. Extensive

14. What is your experience with software development?

a. None
b. Some
c. Considerable
d. Extensive

AWARD FEE PERSPECTIVE

(This section is to determine your viewpoint on how an award fee should be used.)

15. What written guidance would help in the development of award fee contracts?

_____

_____

_____

_____

For Questions 16 through 23, how do you think having an award fee would benefit (or hinder) the program and software?

16. Software Development?

17. Software Development Cost Control?

18. Software Delivery Timeliness?

19. Software Maintenance Costs?

20. Software Reliability?

21. Software Documentation?

22. Software Testability?

_____

_____

_____

23. Software Quality?

_____

_____

_____

24. In addition to award fee, what other tool does a program manager have to control the software development process?

_____

_____

_____

25. How has having the award fee on your program benefitted the overall cost, schedule, and performance?

_____

_____

_____

26a. Do you plan to have an award fee on future contracts?
YES _____ NO _____

26b. Why or why not?

_____

_____

If 26a is NO, go to 27.

26c. Will the award fee on future contracts include software development?

YES _____ NO _____

26b. Why or why not?

_____

_____

_____

_____

27a. Was having an award fee on your program a hindrance to the overall cost, schedule, and performance?

YES _____ NO _____

27b. Why or why not?

_____

_____

_____

_____

27c. If the award fee was a hindrance, what did you do to overcome it?

_____

_____

_____

The remaining questions are optional but are requested to complete the research effort.

28. Currently, the only written guidance for Award Fee Plans is AFSC "Award Fee in Systems Acquisition - A Handbook for Program Directors and Contracting Officers". Please comment on attachments 2 and 3 and answer the following questions.

a. What effect on the process of software development would they have?

b. What benefit (or hindrance) would they be to the program office and the contractor if made part of the request for proposal and source selection?

c. Would they help the contractor understand what must be accomplished to receive an award fee?

Please comment below or directly on the attachments.

_____

_____

_____

_____

_____

_____

If not planning to have a formal interview, please return the guide and all attachments to:

FTC/DXDM

WRIGHT-PATTERSON AFB, OHIO 45433-6508

ATTN: MAJOR MARK T. HUNTER

Note: Attachments 2 and 3 referenced above are Appendix A and B of this Thesis.

Appendix G: Memo from ASC Contracting Office on Contractor Survey

10 JAN 1992

MEMO TO: ASD/CV

SUBJECT: AFIT Thesis on Award Fee (Your Memo, 3 Jan 92)

1. We reviewed the package and also discussed it with JAG. JAG's opinion is that the AFIT student should go to the contractors directly for their input and not go through the program offices. We agree that going through the program offices to the contractors could be interpreted by the contractors as being an official request under a contract and there could be more chance of the contractor charging his time directly to a contract. If the AFIT student went directly to the contractor he would not be associated with any particular program and any charge the contractor might have would be to a general overhead account which would be spread over all government contracts. However, even the total amount of any charge would probably be very minimal.

2. If the decision is made to request input from the contractor as the student has set up the package, there should be some minor changes to the first indorsement which the SPO personnel sign. The contractor should be told that their response is on a voluntary basis and that there should be no direct charge to any contract as a result of their completing the questionnaire or being interviewed by the AFIT student.

3. In another topic, one area of the package is somewhat confusing. The letter to the contractor says that the student will call the contractor to set up an interview. Paragraph 3 of the letter for your signature to the SPO Directors says that the contractor can mail his responses back indicating there would be no interview.

Bill

WILLIAM S. TODD, Colonel, USAF
DCS, Contracting
Aeronautical Systems Division

Appendix H: Government Interviewee Responses

INTERVIEW QUESTIONS

PROGRAM DIRECTOR INFORMATION

(This section is to determine your system program office background.)

01a. When were you assigned to your current position?

a. 9 months
b. Aug 89
c. 15 Apr 90
d. Oct 91
e. 3 Sep 91
f. 1 1/2 years
g. 1988
h. 18 mo
i. Aug 91
j. May 91
k. Jul 87
l. Apr 90
m. Jan 89
n. Aug 91
o. Mar 90
p. 6 years
q. 4 years
r. Mar 89
s. May 91
t. Sep 89
u. Sep 88
v. N/C
w. Jun 90

01b. At what level are you certified under the Acquisition Professional Development Program?

a. PM - Level III
b. PM - Level III
c. PM - Level III Requested, Test - Level III
d. PM - Level III
e. PM - Level III, Cont - Level III
f. PM - Level III
g. PM - Level III
h. PM - Level III
i. PM - Level III
j. PM - Level III Requested
k. PM - Level III
l. PM - Level III

m. PM - Level I
n. should be PM-Level III
o. 0
p. 0
q. Contracting - Level II Pre/Post Award
r. PM - Level III
s. PM - Level III Requested
t. PM - Level II, Application for Level III at SAF/AQS
u. PM - Level III
v. N/C
w. PM - Level III

02. Have you been a System Program Office Director or Deputy Director on any other program(s)?

a. no
b. no
c. no
d. yes
e. no
f. no
g. yes
h. no
i. yes
j. no
k. no
l. yes
m. no
n. yes
o. yes
p. no
q. no
r. no
s. yes
t. no
u. no
v. N/C
w. yes

If yes, for which program(s), in which position(s), and for how long?

a. N/A
b. N/A
c. N/A
d. TACIT RAINBOW - 4 1/2 years
e. N/A
f. N/A
g. Program Manager for B1 Production
h. N/A

i. Deputy Prog Dir, Electronic Combat & Reconnaissance (ASD/RW) Jan 89 - Nov 89, Dep PD, AMRAMM, Nov 89 - Aug 91
j. N/A
k. N/A
l. Deputy Program Director Air to Surface Guided Weapons
m. N/A
n. All engines
o. Strategic Air Command Deputy Program Manager for Acquisition Logistics B1
p. N/A
q. N/A
r. N/A
s. Classified - Director of two
t. N/A
u. N/A
v. N/C
w. Deputy Small ICBM - 11 month

03. Not counting your current assignment as Program Office Director or Deputy Director, what is the total time you were assigned to a system program offices?

a. 0
b. 15 years
c. 14 mo
d. 10 1/2 years
e. 3 years
f. 19 years
g. 29 years
h. 7 years
i. 10 Years
j. 13 years
k. 12 years
l. 7 years
m. 0
n. 30 years
o. 6 years
p. 30 years
q. 17 1/2 years
r. 19 years
s. 19 years
t. 4 Years
u. 10 years
v. N/C
w. 12 years

04. What specialty code(s) were you assigned?

a. 2716
b. 27XX
c. 2916
d. 27XX, 0029
e. 29XX, 64XX
f. 2716, 2724, 2835
g. 2825, 2716
h. 2716, 2724
i. N/A Gov Civil
j. 2716, 28XX
k. 0029, 6416
l. 0029, 2716, 28XX
m. 2716
n. 2716
o. 2806
p. 28XX
q. 1102 civilian
r. 2911, 2916, 2716, 0029
s. 2716, 2635, 3036
t. 2855
u. 2825,2816
v. N/C
w. 5135 (49XX), 2845, 2816, 2716

05. What system program office directorate(s) or divisions did you work for previously? (For example, engineering, logistics, procurement, program control, operations, test.)

a. Engineering
b. Projects, Test
c. Projects
d. Configuration Management, Projects
e. Configuration Management, Data Management
f. Program Control, Program Management
g. Flight Test, Program Control
h. Projects
i. Projects
j. Projects, Engineering, Test
k. Manufacturing, Quality Assurance
l. Program Management
m. None
n. Engineering
o. Program Management
p. Engineering
q. Contracting
r. Test and Deployment, Program Control, Engineering, Operations
s. Director Space Weapons, All
t. Integration and Operations
u. Engineering

v. N/C
w. Engineering, Program Management

PROGRAM BACKGROUND

(This section is to determine experience with award fee.)

06. Were you part of any precontract award process that used award fee?

a. no
b. yes
c. N/A
d. yes
e. yes
f. yes
g. no
h. no
i. no
j. yes
k. yes
l. no
m. no
n. yes
o. no
p. yes
q. yes
r. yes
s. yes
t. yes
u. no
v. N/C
w. yes

If yes, for which program(s), in which position(s) of the process, and how long were you assigned to the program?

a. N/A
b. AMRAAM Launcher - Front office oversight - 3 years
c. N/A
d. TACIT RAINBOW / Production non recurring contract
e. ASD Deputy Contracting and Manufacturing - 2 years
f. TR 1 Airframe 79-81
g. N/A
h. N/A
i. N/A
j. MK 15
k. C130 Program Director
l. N/A
m. N/A
n. Aircraft Engines

o. N/A
p. First award fee on VITA
q. ADI, F16
r. Classified Weapon System/Configuration Management/4 years Vandenberg AFB Space Shuttle Deployment Program/Chief, Business Management, Dir Program Office/4 years, Vertical Launch Systems/Program Manager/3 years
s. All levels
t. Space Test Program P91-1 mission Source Selection Evaluation Board Team Chief
u. N/A
v. N/C
w. Program Manager Small ICBM Basing Director ASAT Integration, ASAT IV&V

07. Does your program office currently have an award fee contract?

a. no (FPIF, CPIF, AND CPFF ONLY)
b. yes
c. N/A
d. yes
e. yes
f. yes
g. yes
h. yes
i. no
j. yes
k. yes
l. yes
m. yes
n. yes
o. yes
p. yes
q. yes
r. yes
s. no
t. yes
u. yes
v. yes
w. yes

IF NO, SKIP TO QUESTION 13.

08. What program or portion of the program has an award fee plan?

a. The 0053 (FPIF) contract has been modified by adding the Continuing Software Improvement Program (CSIP). CSIP is an award fee program focused on offering incentives to the contractor to improve their software development process. Hope to initiate award fee program by 1 June 92.

b. Launcher Contract
c. N/A
d. EMD - Weapon System and Engine
e. Qualification of 2nd Source
f. Lot 3 - 4 Production
g. Development
h. CPAF Contract
i. N/A
j. Program Management, ILS Management, Systems Engineering Management, Production Planning
k. Production
l. Basket SPO with 20 programs - CEDA, Design effort for new fuse for 25mm bullet for AC130
m. CPAF - Research and Development
n. The total component improvement program
o. All, Quality of technical work, Systems Engineering, Program Management, Special Interest
p. Hole program
q. Hole program
r. Integrated Apogee Boost Subsystem (IABS) Production. In the past, our satellite production has also had award fee.
s. N/A
t. All
u. Production and Launch Support Services
v. Delta
w. React, AVR

09. What phase is the program in?

a. DT&E / Formal Testing
b. Production
c. N/A
d. EMD
e. FSD
f. Production
g. Concept Exploration, EF111 Engineering Development
h. Final part of Concept Exploration
i. N/A
j. FSD
k. Production
l. EMD

m. Full Scale Development/Production
n. All phases
o. Concept Exploration
p. Test and Evaluation
q. Engineering and Development/Advanced Development
r. Production and Development
s. N/A
t. Development
u. Production
v. Production
w. FSD

10. Is the program's software development covered in the award fee plan?

a. yes
b. no
c. N/C
d. yes
e. no
f. yes
g. yes (EF111)
h. yes
i. N/A
j. yes
k. no
l. no (All Hardware)
m. yes
n. yes
o. yes
p. yes
q. yes
r. no (Not specifically, however overall program management does include contractor performance including software development)
s. yes
t. no (not as a specific item)
u. no
v. N/A
w. yes

11. What is the approximate dollar value of the contract?

a. $940 M
b. $72.8 M
c. N/A
d. $12 B total Weapon System and Engine
e. $10 M
f. $800 M
g. $230 M
h. $488 M

i. N/A
j. $162 M
k. $1.2 B
l. $1 M
m. $150 M
n. $49.5 M/$45 M
o. $36 M
p. $44 M
q. $44 M / $32 M
r. $118 M
s. $1.7 B
t. $50 M
u. $939.7 M
v. $850 M
w. $45 M / $33 M

12. What percent (%) of the contract's award fee has the contractor received in the past?

a. Between 60 and 75 %
b. Period 1-44 %, Period 2-54%, Period 3-100%
c. N/A
d. Less than 90% for period 1 (Need to cut this data by contract type)
e. N/A
f. 70 % 3 of 5 Periods Complete
g. Program Just Started
h. 81 - 71 %
i. N/A
j. 50 - 80 %
k. 80 - 90 %
l. No periods completed yet
m. 70 %
n. 74-86% / 75-80%
o. 45 - 52%
p. 30 - 60%
q. 30 - 60% / 50%
r. 1988 - 90%, 1989 - 82%, 1990 - 83%, 1991 - 87%
s. New contract
t. 60 - 95 %
u. New Contract
v. 30 - 80%
w. 82% / 76%

13. What is your experience with award fee contracts?

a. Some
b. Considerable
c. Considerable
d. Some
e. Extensive

f. Considerable
g. Considerable
h. Some
i. Some
j. Considerable
k. Considerable
l. Some
m. Some
n. Extensive
o. Some
p. Some
q. Considerable
r. Considerable
s. Extensive
t. Considerable
u. Considerable
v. Considerable
w. Extensive

14. What is your experience with software development?

a. Some
b. Considerable
c. Some
d. Extensive
e. Some
f. Some
g. Considerable
h. Some
i. Considerable (All Bad)
j. Some
k. Considerable
l. Considerable
m. Some
n. Some
o. Some
p. Considerable
q. None
r. Considerable
s. Considerable
t. Some
u. none
v. None
w. Extensive

AWARD FEE PERSPECTIVE

(This section is to determine your viewpoint on how an award fee should be used.)

15. What written guidance would help in the development of award fee contracts?

a. 1) ESD CC Policy on review of award fee Determination, dated 19 Aug 91
2) ESD PK Policy Letter award fee Process Excellence, dated 13 Nov 91
3) award fee in Systems Acquisition, A Handbook for Program Directors (HQ AFSC/DCS-PK)
4) AFR and Supplements, Part 16.4

b. Challenge is in tailoring criteria to small manageable (small) number of criteria tied to specific periods.

c. N/A

d. Who did it before, Examples

e. Guidance Booklet - examples. Lessons Learned. Criteria

f. Written down somewhere the Pros and Cons of award fee, where do you get, the benefits, and what are the costs. There is an administrative cost associated with award fee. There is some benefit too. This document should explain what is an award fee intended to do, what is an award fee, and how to structure the award fee Plan to do that job.

g. Think guidance is all there - Need training. No GOOD Education Program.

h. More extensive data base of good award fee Plans (Few examples from ASD/SSD). Level of experience - informal review - advice. Guidance Group - People to go to with questions

i. Little. We understand the concept. It is however rather manpower intensive and an administrative burden to properly execute. But effective.

j. Handbook - Templates - How to fund/implementation. How to brief contractor on results.

k. None

l. Examples of award fee plans that work - Successful programs ranging from simple to complex. Reluctance from people in trenches because of administration work load. CEDA award fee requires additional efforts.

m. Type of contract(s) to be used, objectives most appropriate to award fee, suggested areas covered, suggested criteria, administration, teaching of results (metrics) ie did it do what intended to do. Standardization of %' (award amounts), applicability of base fees.

n. Acquisition Handbook for award fees. More of real life examples other hand AFSC handbook. Plan and criteria are personalities involved. What other people grade and how the grade.

o. An easy awareness of the tools to do the job. Checklist for the process, examples {KEEP IT SIMPLE}

p. Lessons learned in the for of templates. Period breakout measures

q. FAR and FAR Sup, Samples of what has worked in the past

r. If I was in the beginning stages of developing an award fee contract, there is some basic guidance I would want to see: a) The different contract types that award fee can fit into (e.g., CPAF, FFP/AF, etc.)
b) Some examples of how award fee can be applied (e.g., to incentives certain parts of the contract such as schedule.)
c) Guidance on how the award fee pool should be (e.g., 3% of contract value.)

s. SSD/PK has guide Lessons Learned - How to get the contractor to be responsive with changing funding - came from ATF Award fee contract.

t. Strawman criteria, some examples with good and bad results (lessons learned) that can be tailored to each program.

u. award fee is a good contract management tool. The guidance we need should specify which type contract award fee can be used.

v. N/C

w. The award fee process should be the cornerstone of the entire contract management process. Tell the contractor what you expect, tell him how he is doing at mid term, grade him at end of period after listening to your story and his story concerning how he did against expectations set at first of period. Criteria should not be too objective. FDO should be able to measure contractors progress against the odds.

For Questions 16 through 23, how do you think having an award fee would benefit (or hinder) the program and software?

16. Software Development?

a. CSIP uses the SEI Software Capability Evaluation (SCE) as the evaluation tool. The SCE is designed to motivate the Contractor to improve their software development process. Changes in the Contractor's previous ad hoc development process have already been observed.

b. Significant help in EMD phase.

c. N/A

d. - The same comment for 16 through 23 -
Benefit can not be quantified

e. - The same comment for 16 through 23 -
All the questions on software would receive the same answers as hardware. There should not be any difference.

f. It would help. award fee in an appropriate tool but must have a good software program manager to use the tool.

g. Could help how well they do design/make assessment on design

h. - The same comment for 16 through 23 -
Should help in all areas
Chose one area and other may suffer

i. - The same comment for 16 through 23 -
These all could be elements in an award fee plan for the specific period - in and of themselves they are not of the level to justify a plan. - The impact would be, I feel, generally positive. - But the degree of oversight to administer would be considerable.

j. - The same comment for 16 through 23 -
Definitely - The weights for each area will change according to phase.

k. yes

l. Yes award fees can - difficult - maintaining balance between hardware and software

m. Benefit - Control and management of software management indications

n. - The same comment for 16 through 23 -
award fees is a motivator for all programs
Can be applied to software because software is easy to change

o. yes

p. yes

q. All depends on program size, $ of award fee pool, and administration burden

r. Hinder - The contractor becomes focused on agreed upon software requirements. If award fee were in place, the contractor would <u>not</u> be willing to tweak mission requirements as needed in the development process. Requirements change.

s. - The same comment for 16 through 23 -
Never been a hinderance. Is a great benefit

t. award fees are not in themselves either good or bad / benefit or hinder the program. The <u>criteria</u> must reflect what the Government is looking for. If the criteria are bad so are all the results.

u. It will benefit both the Government and contractor. The contractor will identify requirements. He

cannot meet or will have difficulty meeting early in the development cycle.

v. Yes

w. Ideal, provided the criteria permits FDO to grade contractor's handling of both known unknowns and unknown unknowns. FDO needs flexibility.

17. Software Development Cost Control?

a. It is expected that low level detailed software process information the CSIP program will capture and monitor will provide the Program Director the requisite insight into the Contractor's software process to keep control of the development costs.

b. Moderate. Other techniques may be as effective.

c. N/A

d. N/C

e. N/C

f. Indirect help

g. Not sure

h. N/C

i. N/C

j. N/C

k. No - Because of documentation
Not normally incentivized

l. Yes - Help in the since of focusing management attention on specific areas

m. Depends on type of contract, if cost type of contract award fee would have to have high pool to incentives cost control

n. N/C

o. yes - It should

p. Not effective tool

q. - The same comment for 17 through 23 -
Would benefit all

r. Benefit - The contractor managers would become more involved in regulating hours. More management intervention would ultimately decrease cost, by streamlining schedules.

s. N/C

t. N/C

u. If resource management is an award fee criteria, the contractor will control the number of people working the program and will clearly define tasks being worked.

v. Depends on contract type

w. Same as 16. Can needs to be taken to allow FDO to make a holistic assessment vs. a C/SCSC objective criteria. If you don't set up right criteria will be forced to double bang for technical problems (in technical achievement criteria) and cost problems (in cost criteria).

18. Software Delivery Timeliness?

a. Metrics have shown that software process improvement translates directly into productivity improvement and reductions in testing time.
b. Somewhat. What is your metric?
c. N/A
d. N/C
e. N/C
f. Might help. This is where the award fee should be focused.
g. All goes back to design / Measurable / Make assessment on design
h. N/C
i. N/C
j. N/C
k. Yes
l. Force up front planning - will not help in plan execution
m. Good potential for benefit
n. N/C
o. No help - did not make a difference
p. Not effective tool
q. N/C
r. Hinder/Benefit - A software delivery award fee may force the contractor to deliver a substandard product. It could also force him to work overtime to meet schedules. Software timeliness invariably change.
s. N/C
t. N/C
u. Deliverables at time phased milestones, let you know how well the contractor is performing and you will have a great deal of leverage
v. If issue is quality product delivered late vs poor product delivered on time, award fee could incentivized wrong goal if schedule was rewarded.
w. Same as above, being able to set new objectives for each period gives contractor a chance to start with clean slate each period.

19. Software Maintenance Costs?

a. Metrics have also shown that software process improvement will increase the early detection of errors and decrease the numbers of errors per KSLOC. The cost to correct a defect discovered early in the development phase is 10-90 times what it would be in field operation.
b. Not worth it to me. What do you mean? Suppose in EMD.

c. N/A
d. N/C
e. N/C
f. Would not be easy to measure. Collateral benefit
g. Could have impact
h. N/C
i. N/C
j. N/C
k. Doubtful
l. Would be tough - outside design and award fee period
m. This would be difficult to measure
n. N/C
o. No help - did not make a difference
p. Does not applied
q. N/C
r. Benefit - Maintenance schedules can easily conform to award fee criteria. Very appropriate
s. N/C
t. N/C
u. I don't believe it would have much of an impact
v. No - Too far in the future. award fee must be timely - instant gratification to work.
w. Same as above, FDO can put priority on specific items with contractors management that would otherwise would not get emphasize.

20. Software Reliability?

a. CSIP promotes early error identification, error prevention and error reduction. It is expected that this will translate directly into highly reliable system.
b. Very effective
c. N/A
d. N/C
e. N/C
f. Will not help. Will not reduce first numbers of failures. indirectly
g. Goes back to design
h. N/C
i. N/C
j. N/C
k. Doubtful
l. Force upfront planning - Dependent on contractor culture - May focus contractor effort
m. Yes, if you get specific criteria
n. N/C
o. No help
p. Can not tell
q. N/C

r. Benefit - Once the software is operational, reliability can easily be measured and awarded appropriately.
s. N/C
t. N/C
u. I don't believe it would have much of an impact
v. No - See 19
w. Warranties may be better unless award fee period is concurrent with fielding.

21. Software Documentation?

a. CSIP requires process improvements in all areas of the development process. Because documentation is an integral part of the development process, it is expected that improvement in the process will result in quality documentation.
b. How do you define?
c. N/A
d. N/C
e. N/C
f. Can be used for leverage. If part of award fee process.
g. Would help quality / timeliness
h. N/C
i. N/C
j. N/C
k. Yes
l. Yes - can be effective - can see into process
m. Very effective with tremendous payoff down stream
n. N/C
o. Yes - small enough
p. Not effective tool
q. N/C
r. Benefit - Quality and timeliness of documentation can be easily determined by cross checking DIDs and program milestones. Appropriate.
s. N/C
t. N/C
u. Some what of an impact. This relates to deliverables. You must specify what documentation you want delivered and specify the schedule.
v. Possibly - but how do you rate good vs better. Ask for what you want and insist on it contractually without reward
w. - The same comment for 21 through 23 - See 16 through 20

22. Software Testability?

a. CSIP promotes the evolution of software engineering from an ad hoc labor intensive activity to a managed, quality controlled process. It is expected that this disciplined approach will result in a quality test baseline.
b. Probably less effective
c. N/A
d. N/C
e. N/C
f. Could If part of award fee process
g. No Comment / Not enough information on these
h. N/C
i. N/C
j. N/C
k. Maybe
l. No - Culture within contractor is the driving force. May help with upfront planning
m. Yes, again if you get specific criteria that is measurable and meaningful
n. N/C
o. Yes - The hold contract price
p. Not effective tool
q. N/C
r. Benefit - award fee in this area will force the contractor to use innovative and creative techniques to formally test and demonstrate software requirements. Warranted.
s. N/C
t. N/C
u. No impact
v. N/C
w. - The same comment for 21 through 23 - See 16 through 20

23. Software Quality?

a. CSIP incentivizes the Contractor to pay close attention to his software development process. It is expected that this close scrutiny will result in process improvement which in turn will result in product improvement. Continued process improvement will being the Contractor to a level enabling him to measure adherence to that process identify root causes of poor quality, and correct those causes.
b. How do you define?
c. N/A
d. N/C
e. N/C
f. Indirectly

g. Should be part of source selection to weed out contractors with poor software quality
h. N/C
i. N/C
j. N/C
k. Maybe
l. Quality/Reliability - Upfront planning may be effected - May disinstentivizes contractor - Contractor may not test - Difficult - field experience - Focus on upfront planning and Quality/Reliability mat be a by-product.
m. Yes, again if you get specific criteria that is measurable and meaningful
n. N/C
o. Can not tell - Contractor has an approved software development process
p. Not effective tool
q. N/C
r. Benefit - Delivered software must conform to quality standards spelled out in MIL-STD-. Inadequate software should be penalized.
s. N/C
t. N/C
u. Not much of an impact. How would you measure software quality? What would be your criteria? If you mean performance then it would have a specific impact
v. How do you evaluate - This seems binary to me for imbedded software. It work or it don't. If it don't its a contract problem.
w. - The same comment for 21 through 23 - See 16 through 20

24. In addition to award fee, what other tool does a program manager have to control the software development process?

a. The Joint STARS Program Office employs design notebook "Code Reviews" focused on the software development process. A close systematic study of the audit trail provides insight into the internal workings of the process.
b. CPARS can be very powerful. Milestone billing.
c. N/A
d. DoD-STD-2167A, Computer Resources Working Group, Software Development Design Reviews, Software Integrate Program
e. Progress Payments withholds
f. Program Reviews, Design Review, Contract Type are all tools. award fee is a hammer in the tool box.
g. C/SCSC, WBS, Design Reviews

h. Depends on contract type, Reviews, IV&V, Good Approach, Good Specifications, Draft RFP's

i. Metrics are imperative - there not many good ones - no universal ones - very contractors depend - We have to understand their process.

j. CPARs that us award fee evaluation as input. - TPM DSMC Sys Book page 146. - C/SCSC - System Engineering Master Schedule - Entrance and Exit Criteria

k. Oversight (Reviews), Progress payment, Set schedule, Use All

l. Metrics - caution - only if contractor uses them to manage. e.g. Contractor develops a manning plan but never refers back to it

m. Periodic statusing of management indicators, Source selection criteria and SDC/CRs. 2167A compliance, program manager training, solid engineering support, IV&V (in some cases)

n. Long standing relationships with engineering contractors

o. Having enough educated manpower

p. Regulations, Specifications, Don't have anything else.

q. Data Delivery, Reviews and Approval - With holing fee if data not acceptable - Inspections and provisions to determine work acceptability

r. - Software Development Plan (approval authority)
- CFSR/CSSR (Cost Report Data)
- STP/STD approval (Test Documentation)
- Software Development Specifications.

s. - Accreditation of Software Capability, Do not view contractor as advisory, - Goal is to work with Government. - Process team work.

t. The requirements process

u. N/C

v. The contract - specifications - schedule - testing - IV&V

w. The software engineering design, development and test process must be aggressively managed. This is most critical. CPAR with interim CPAR might also help.

25. How has having the award fee on your program benefitted the overall cost, schedule, and performance?

a. TBD

b. Yes, but SPO manpower investment is significant.

c. N/A

d. It has helped to get the program this far

e. No

f. Contractor focus work on award fee items. The Government needs to look at where it wants the

contractor to focus and make sure these are the areas convened in the award fee plan.

g. B1A, concept good, people changed in the (EF111/not yet) middle so the report card on contractor was lacking all most a year between award fee Periods. Next award fee period lack documentation - process was lacking. Need score card on smaller periods. Develop tracking process. Get together with evaluators to compare notes. -- TRAINING --

h. When you incentives one thing it gets done - Overall Management - award fee was Best Tool

i. I've seen it on limited applications - finite tasks - On a macro basis - I am very skeptical -

j. Made the program more aware of what is going on - Need a structure to support Government data collection for award fee. Need more manning. - There is a return on the investment for award fee.

k. Cost - No, Schedule - No, Contractor Performance - YES

l. TBD, On CEDA focus management attention e.g Government wanted to reduce CEDA contractor overhead and the award fee process made the contractor focus management attention on it.

m. Only one award fee period, most areas haven't significantly changed since 1st period, but I do feel 1st period would have been worse if not for award fee. If nothing else, it forces the Government to give feedback. If administered right and fairly.

n. All important things get highlighted - it is working today - Contractor is not surprised, Contractor looks at themselves during period

o. It has not $4 M cost overrun and 6 month schedule slip.

p. It has not been effective. May be more effective than Fixed fee

q. It has not made a difference

r. Our contractor responds to award fee inputs constructively. IABS production is 50% complete and projecting an underrun. The effort is on schedule or exceeding it and performance in the field has been demonstrated and satisfactorily proven. The award fee has made the contractor more responsive to the SPO in some of the more intangible areas. They seem to listen to us better when we "discuss" technical solutions to problems that have arisen. Also, award fee seems to motivate them to move out independently on problem ares, without our prodding. This is a subjective evaluation of award fee, we have not done any type of cost/benefit analysis.

s. Requires effort in administration and upfront. Can slow down RFP process - With award fee, never had a project come in late or over cost. Forces you to do

it better. Good managers will manage well. - Helps managers with hammer. Forces you to justify your position either good or bad. Questions get asked: Did it complete on time and schedule. Past experience, Fix Price overrun. If incentive fee used on cost but less product.

t. Provides contractor incentive to meet our program goals

u. It has helped to control cost, improve Government / Contractor relations and contractor responsiveness in resolving problems

v. We incentives performance with a separate incentive. award fee looks at management, subcontracts management, responsiveness to government and innovation. It gets the contractors attention - especially on small issues.

w. Award fee is absolutely the most powerful tool available to program managers on FSD contracts.

26a. Do you plan to have an award fee on future contracts?

a. yes
b. yes
c. yes
d. yes
e. yes
f. yes
g. yes
h. yes
i. It depends if applicable
j. yes
k. no
l. yes
m. yes
n. yes
o. no
p. no
q. yes
r. yes
s. yes
t. yes
u. yes
v. yes
w. yes

26b. Why or why not?

a. Incentivizes Contractor
b. N/C
c. N/C
d. With cost contracts - It is a tool for high visibility
e. Leverage on Managers
f. 1) Will allow better control of cost and schedule.
2) Work trades on the margin of the contract.
g. In Cost Plus contracts need to find a way to control contractor costs. Need for evaluation of integration of subcontractors - not easy to quantify. The ability to interface with platform contractor
KEY AREAS Management, Engineering, Schedule, Strong Subcontract Management
h. Maybe because the program will drive requirements
i. Depends totally on the circumstances
j. Big tool to motivate contractor - no other tool to replace it.
k. To much administration to be done
l. Because it is an effective tool to focus contractor and emphasize ares where the Government want attention - Flexible, can change areas of emphases based on Development/Production process - Incentives are fixed and susceptible to gaming by contractor
m. Appears to be a good return on investment. However, do not underestimate time and effort to administer correctly.
n. Gives the individual program manager the authority to make things happen - A lot of leverage
o. The process used to get to the FDO has too many layers. The fee is determined by someone to far removed from the process. The contracting process is flawed.
p. Given the effectiveness
- The hassle is not worth the effort.
- To much Government overhead.
q. Under proper circumstances
r. award fee is the most responsive and flexible tool we've used to incentives positive contractor performance.
s. It works and Division Commander says so.
t. N/C
u. It's a good management tool.
v. It works to motivate contractor and formalize an evaluation process. It is a "report card" for the contractor's program manager.
w. I try never to award an FSD contract without it.

If 26a is NO, go to 27.

26c. Will the award fee on future contracts include software development?

a. yes
b. yes
c. yes
d. yes
e. yes
f. yes
g. yes
h. yes
i. It depends
j. yes
k. no
l. yes
m. Can only speak to current contract
n. yes
o. no
p. no award fee contracts
q. yes
r. yes
s. yes
t. no
u. no
v. probably
w. yes

26d. Why or why not?

a. N/C
b. If phase of program is appropriate. Wouldn't make as much sense in full rate production.
c. N/A
d. Depends on specific program requirements
e. Important element of program
f. It depends on program. If software was a major item it would be used.
g. award fee has more leverage than award fee Amount Incentive fee's seem to get less attention Incentivizes Contractor deliver on time a quality baseline.
h. Importance of Program Requirements
i. Not likely beyond being one of the elements of the larger picture
j. Don't know how else to control without this useful tool
k. To much administration to be done
l. Because it is an activity who's track record is dismal - Area that is accentual, software has to be there is the system is to work - It is a better way to get a contractor's attention.
m. N/C

n. Gives the individual program manager the authority to make things happen - A lot of leverage
o. To much work with little or no payoff
p. It has not been effective in motivating contractor performance.
q. Under proper circumstances
r. The next major software development will be a Cost Plus award fee (CPAF). Cost Plus puts the risk on the Government. The award will make the software development managers responsive to procurement agency inputs and concerns.
s. It works and Division Commander says so.
t. Generally don't manage our contracts at that level
u. No further software development is planned
v. If we have any. Need to consider the entire contract incentive package and evaluate those things that are important to the Government
w. N/C

27a. Was having an award fee on your program a hindrance to the overall cost, schedule, and performance?

a. no
b. no
c. no
d. no
e. no
f. no
g. no
h. no
i. no
j. no
k. no
l. no
m. no
n. no
o. no
p. yes
q. no
r. no
s. no
t. no
u. no
v. no
w. no

27b. Why or why not?

a. N/C
b. Only problem was spo manpower loading.
c. N/A
d. Make sure the contractor does not "fill squares." Look at total program/product. Need to look at quality.
e. Not significant enough dollars
f. Focused contractor on areas the Government wanted in this case reliability.
g. Worked with TR 1 program in bring out manufacturing process from black to white world.
h. Been an effective tool and been able to limit the administration of award fee. Been a positive influence
i. Got the contractor's attention
j. Gave ability to monitor contractor and structure Government Program Office.
k. Did not help
l. May be more upfront effort but small.
m. As I said previously, their performance was not demonstrably influenced by award fee (although too short to really tell). But, I believe their initial (first period) performance would have been worse without award fee.
n. N/C
o. Didn't make a difference
p. Cost the Government time but has not effected contractor work
q. More Pain Than Gain
r. award fee was not a hindrance because it was based upon criteria which required the contractor to exceed cost, schedule, and performance requirements before fee would be awarded. Average performance would result in no award fee.
s. It gets time in administration but same as Defense Acquisition Board.
t. Overall cost, schedule, performance is included in the criteria.
u. An award fee has the contractor motivated to balance the various aspects.
v. it works
w. N/C

27c. If the award fee was a hindrance, what did you do to overcome it?

a. N/C
b. N/C
c. N/C
d. N/C

e. N/C
f. N/C
g. N/C
h. N/C
i. N/C
j. N/C
k. N/C
l. N/C
m. It was/is a pain to administer (for Government) but not a hindrance to contractor
n. N/C
o. N/C
p. N/C
q. N/C
r. N/C
s. N/C
t. N/C
u. N/C
v. N/C
w. N/C

The remaining questions are optional but are requested to complete the research effort.

28. Currently, the only written guidance for award fee Plans is AFSC "award fee in Systems Acquisition - A Handbook for Program Directors and Contracting Officers". Please comment on attachments 2 and 3 and answer the following questions.

28a. What effect on the process of software development would they have?

a. N/C
b. N/C
c. N/C
d. N/C
e. Depends on emphases placed in award fee Plan.
f. Help put rigger in what should have been there in the first place.
g. N/C
h. Positive, better examples, the better yours will be done, would be a great help.
i. Limited - very general.
j. Positive effect on process.
k. Could not hurt.
l. Yes - Shows/communicates what is important and how to get the pot of gold - What he does not do will get him zero.
m. N/C

n. Yes / CIP did have a PCO 100 and award fee.
o. Should help process - give more tools.
p. Would help - Liked criteria.
q. Potential of insuring award fees are done right the first time.
r. Award fee criteria should be less constricting up until CDR completion. After CDR, award fee will become more beneficial and can be more specific.
s. Help as more guidance in the field, it is event driven.
t. N/C
u. N/C
v. N/C
w. N/C

28b. What benefit (or hindrance) would they be to the program office and the contractor if made part of the request for proposal and source selection?

a. N/C
b. N/C
c. N/C
d. N/C
e. Benefit if acknowledged upfront and agreed to as part of contractor selection.
f. Earlier is better help focus Contractor/Government on Contractor strength/weakness.
g. N/C
h. Make more clear to contractor what is required.
i. None - confusion.
j. Excellent - 1) Allows Contractor to tell the Government what is stupid. - 2) Tells Contractor what is expected and allows for up front work by the Contractor. - 3) Up front communication is always is good.
k. Very beneficial.
l. Yes - He (the contractor) would understand what was important - better proposal - The ATF approach have contractor write Statement of Work. Integrated management schedule Force contractor to think through process and think through entrance and exit criteria for each performance period.
m. N/C
n. Helpful.
o. Great benefit to contract to help him BID the work. More honest BID.
p. Great help.
q. Many make plan negotiable - More information in RFP the better the proposal.
r. A definite benefit to include them as part of the RFP package. The contractor will probably be receptive to almost ant type of award fee plan, but

he will want it to be something that is achievable. An award fee with criteria that are impossible to meet does nothing for either party.

s. Yes, benefit to have upfront communications.
t. N/C
u. N/C
v. N/C
w. N/C

28c. Would they help the contractor understand what must be accomplished to receive an award fee?

a. N/C
b. N/C
c. N/C
d. N/C
e. Absolutely!!
f. Yes, but the Contractor will focus his effort on the award fee.
g. N/C
h. Yes, would help contractor see what is expected.
i. No - An award fee plan is by its nature is tailored to the specific task / contract / program / phase. These may be useful as lists but they sure should not be dignified as 'policy' or regulation.
j. Yes.
k. Yes - Be careful - Must be tailored - Need for agreement on what is incentivized between Government and Contractor. Move item 13 page 5 to management.
l. Yes - Award fee will force proper upfront planning and tracking to the plan. In the past, programs have had poor upfront planning and the contractor "pencil wipes the plan by the seat of the pants. Communications between the Government and Contractor is key to a successful program and award fee will incentive this process.
m. N/C
n. It would clarify what would be required. Anything in writing will help clarify requirement - 6 month period with 3 month status reports.
o. Yes
p. Yes
q. Yes.
r. Possibly. Our experience with our contractor revealed that when we change to award fee criteria similar to this it caused great confusion on their part. They saw the criteria as a checklist, that each one had to be met before moving on to the next section. Rather, our intent was to take observed behavior and see where it fell in the rating.
s. Yes
t. N/C

u. N/C
v. N/C
w. N/C

Final Comments made by interviewees

a. N/C
b. What defines successful? How are you tracking software? If LOC, can be misleading. Need to track completed modules, etc. Criteria is way too broad, cannot watch everything -- need to select few critical elements and focus award fee on that. (Not an Acquisition checklist)
c. N/C
d. Need to tie award fee periods to calendar not milestones. This will keep the contractor for focusing on near term goals at the expense for long term program requirements.
The award fee plan needs to focus on the product and process. It also must look at the attitudes the process will foster.
The F22 award fee Plan is the preferred approach to award fee contracts.
e. N/C
f. Award fee will not solve a bad SOW or Contract.
Award fee Contracts should be managed by experienced personnel. Criteria need to hook back to SOW.
Look at growth reference to make sure it is sending the right message. Include other category that cover areas important to program office.
Option - Need to have a period to tie to milestones.
Concerns - FOT&E is not available in all acquisitions.
g. Final Comment - There is a need for training on award fees for O-6 and Above as well as below.
h. N/C
i. N/C
j. N/C
k. - Lower FDO to 2 Ltr Program Director. Program Director has responsibility for program and should have FDO authority.
l. N/C
m. "Successful completion" is subjective because no PDR or CDR is 100%, how does contractor know what to shoot for until afterwards. How about the actions/efforts required prior to PDR/CDR to assure successful completion? - It takes much more than milestone completion (subjective at lest) to keep program on track. This only looks at an important but not total part of the picture. What about quality, responsiveness, attitude, etc. - Just

delivering what the contract requires is limited thinking, because the contract cannot cover all aspects, requirements, user needs, and quality of a product/service. What about user inputs?

n. N/C

o. - Working relationship between Government and contractor is more important than award fee.

p. - Need to have a lessons learned data base - Streamline award fee process - FDO changed to many times - no continuity - For this contract contractor was not interested in build system but reluctantly agreed. Because this was a large contractor, the award fee hammer was not big enough. This was a one-of-a-kind system and the contractor didn't think it was important.

q. N/C

r. N/C

s. - Suggest using ATF approach. Government define SDR/Milestone II/Demonstration Validation. Contractor will supply schedule and plan which will be put on contract. - Can help contractor with capitalization by giving him award fee upfront. If 100% fee not earned must pay Government back. Hinderance - Drives PCO Crazy. Award fee is not easy for Government but can have great reward for Government.

t. What ever guidance is provided, it must be able to be tailored to meet the needs of the program it is being applied to.

u. N/C

v. I have a basic problem with their approach. In my opinion the focus is wrong. It should be on what the contractor can do to <u>earn</u> the award fee, not what are the detractors that keep the contractor from getting the award fee. It should be geared towards a positive approach, not a negative one. In other words, don't subtract for bad performance, reward good performance. I strongly believe that meeting the contract requirements should earn the contractor zero award fee. Exceeding them is a reason for rewarding him with fee. (Depending on the type of contract. If award fee is the only profit opportunity, then he should get 50% for success and earn the rest.) The evaluation criteria refers to Unacceptable and still provides up to 59 points. I can't believe that we would give anything for unacceptable performance. Good on their scale is 60 - 79 points. I read this as met standard. This is where you should go from 0-50 for how much he exceeded standard. Very good on their scale is 80-90 points and excellent is 90-100 points. On this scale you would give over half your points for unacceptable and only 10 points for very

good or excellent. The contract should specify firm requirements. If those are not met, contractual remedies are in order. Use award fee as a carrot to encourage exceeding requirements.

w. Too many categories and too specific. Traps FDO. Makes evaluation too fragmented. Criteria should permit subjective holistic judgmental by FDO. See our examples - administration of process must have importance and credibility with contractor.

Appendix I: Contractor Interviewee Responses

INTERVIEW QUESTIONS

PROGRAM DIRECTOR INFORMATION

(This section is to determine your program office background.)

01a. When were you assigned to your current position?

a. Nov 87
b. 1988
c. 1989
d. Feb 91

01b. Have you taken the Program Managers Course at the Defense Systems Management College?

a. no
b. no
c. (Program Manager Pratt & Whitney course)
d. no

02. Have you been a Program Manager or Deputy Program Manager on any other program(s)?

a. yes
b. no
c. yes
d. yes

If yes, for which program(s), in which position(s), and for how long?

a. Advanced Tactical Transports - 2 years - Program Director
b. none
c. ATF Dem Val
d. Six other programs as program manager

03. Not counting your current assignment as Program Manager or Deputy Program Manager, what is the total time you were assigned a program?

a. 2 years
b. N/C
c. 1988
d. 6 years

04. What are your specialties, e.g. software, systems engineering, or mechanical engineer etc.?

a. Systems Engineering, Operations Research
b. Control Systems Engineering
c. Engineering/Aero
d. Systems Engineering

05. What parts of programs did you work for previously? (For example, engineering, logistics, procurement, program control, operations, test.)

a. Engineering
b. Engineering
c. Engineering
d. Hardware - manufacturing including procurement Production/assembly/test

PROGRAM BACKGROUND

(This section is to determine experience with award fee.)

06. Where you part of the precontract award process that used award fee?

a. yes
b. yes
c. yes
d. yes

If yes, for which program(s), in which position(s), and for how long?

a. F22
b. AFIT/F16 DFCS/AMAS, Element Manager/ Chief Engineer, 8 years
c. F22 engine
d. Two programs as program manager for two years each program

07. Does your program currently have an award fee contract?

a. yes
b. yes
c. yes
d. yes

IF NO, SKIP TO QUESTION 13.

08. What program or portion of the program has an award fee plan?

a. Total EMD Program
b. Total AFTI/F16 CAS
c. Total EMD Program
d. Total program

09. What phase is the program in?

a. EMD
b. Flight Test
c. EMD
d. detail design of software

10. Is the program's software development covered in the award fee plan?

a. yes
b. yes
c. yes
d. yes

11. What is the approximate value of the contract?

a. $ 65 + B (EMD and Production)
b. $35 M
c. $1 1/2 B
d. $30 M

12. What percent (%) of the contract award fee has your program received in the past?

a. 93%
b. 50%
c. 97% expect over 90%
d. 90% of each award fee period

13. What is your experience with award fee contracts?

a. Some
b. Some
c. Some
d. Considerable

14. What is your experience with software development?

a. Some
b. Considerable
c. Some
d. Some

AWARD FEE PERSPECTIVE

(This section is to determine your viewpoint on how an award fee should be used.)

15. What written guidance would help in the development of award fee contracts?

a. Definitive instructions on how the award fee is to be used, areas of evaluation, rating definitions, award fee process.
b. Explanation of each criteria and weighing factor. Make criteria "end item" not "process" oriented. Any criteria item must be specifically identified in contract.
c. 1) Clear understanding of requirements.
   2) Comprehensive plan to be judged by.
   3) Commitment by both parties to implement that plan.
   4) Current plan well laid out / good objective/subjective requirements.
   5) Award fee short course may be a good idea.
d. Clearer definition of positive and negative points of customer that imp[act award fee assessment

For Questions 16 through 23, how do you think having an award fee would benefit (or hinder) the program and software?

16. Software Development?

a. yes
b. Favorable impact - Put award fee criteria on end product and overall schedule.
c. For engines no effect
d. - Same comment for 16 - 23 -

In all the programs that I have managed, maximizing our fee has never served as the primary motivator. I expect myself and program personnel to put (?) the highest quality product that can be produced. By "highest quality product" I am including everything from management, software, cost control, reliability, hardware, test, etc. By stressing this approach we have always equaled or exceeded the project goal or award fee goal that was established. The amount of dollars associated with the award or profit had minor influence on performance. However, the review process by which we asses ourselves and, of course, the customer's assessment were the primary cudos that motivated us and felt the praise of our efforts. Changes required due to short comings were immediately addressed and perused vigorously to conclusion thereby again improving the quality of our product.

So to say that award fee benefit or hinder my program, the answer is no. However, the evaluation process associated with the award milestones is very beneficial.

17. Software Development Cost Control?

a. yes
b. Favorable - Use cost variance on end item as criteria
c. No effect - did not distinguish between engine and control software.
d. - See 16 -

18. Software Delivery Timeliness?

a. yes
b. May be unfavorable - Focused schedule attainment usually degrades software quality
c. Yes - award fee effect on software same as engine hardware.
d. - See 16 -

19. Software Maintenance Costs?

a. unknown
b. unknown
c. N/C
d. - See 16 -

20. Software Reliability?

a. yes
b. Award fee should reward robust software that handles all input conditions without degrading operating capability.
c. N/C
d. - See 16 -

21. Software Documentation?

a. yes
b. Put CDRL's in criteria
c. N/C
d. - See 16 -

22. Software Testability?

a. yes
b. To much emphasis on test results can hurt the overall program - i.e. no body tests till they absolutely have to. User testing of delivered software is a good indicator of job done.
c. N/C
d. - See 16 -

23. Software Quality?

a. yes
b. Use final product user evaluation for criteria
c. N/C
d. - See 16 -

24. In addition to award fee, what other tool does a program manager have to control the software development process?

a. SDCCR's
b. Personnel; proper dedicated equipment; detailed status of machine code, and test; tailored MIL-STD-2167A, get involved positively - be a part of the

solution/can't add to the problem.

c. 1) Integrated master plan/schedule on monthly bases.
2) Costs monthly.
3) Performance measures on monthly bases.
4) Reviews.

d. Regularly scheduled technical reviews similar to PDR and CDR. This is several levels above a TIM's.

25. How has having the award fee on your program benefitted the overall cost, schedule, and performance?

a. Incentivizes and focused the contractor and the Government

b. Focused attention to specific areas of achievement.

c. 1) Good motivator.
2) Not the thing that make you do a good job.
3) Award fee is the result not the means.
4) If the contractor does what he plans to do he receives 100% fee for period. My success as a good contractor is to do what you said you are going to do. CPAR is another motivator.

d. The evaluation process has been beneficial in managing, cost, schedule and performance by pointing out strong and weak points.

26a. Do you plan to have an award fee on future contracts?

a. yes
b. yes
c. yes
d. yes

26b. Why or why not?

a. You get paid for good performance
b. With good percentage schedule and criteria it is a motivator.
c. Fair contracting approach
d. Because I believe in the evaluation process

If 26a is NO, go to 27.

26c. Will the award fee on future contracts include software development?

a. yes
b. yes
c. yes
d. yes

26b. Why or why not?

a. Essential element of program
b. Focus attention to important areas
c. N/C
d. This contractor is directing its goals towards software efforts and away from hardware efforts

27a. Was having an award fee on your program a hindrance to the overall cost, schedule, and performance?

a. no
b. no
c. no
d. no

27b. Why or why not?

a. Management tool
b. N/C
c. If measure was milestone the milestone maybe dumb. This was not held against them.
d. Because all our efforts were <u>not</u> based on $ amounts but on program satisfaction in quality of the end item.

27c. If the award fee was a hindrance, what did you do to overcome it?

a. It is beneficial - not a hinderance
b. N/C
c. N/C
d. N/A

The remaining questions are optional but are requested to complete the research effort.

28. Currently, the only written guidance for Award Fee Plans is AFSC "Award Fee in Systems Acquisition - A Handbook for Program Directors and Contracting Officers". Please comment on attachments 2 and 3 and answer the following questions.

Please comment below or directly on the attachments.

28a. What effect on the process of software development would they have?

a. N/C
b. N/C
c. N/C
d. The award fee evaluation criteria establishes primary ares of concern.

28b. What benefit (or hindrance) would they be to the program office and the contractor if made part of the request for proposal and source selection?

a. N/C
b. N/C
c. N/C
d. It would be beneficial because it would give the proposal manager/program manager a heads up to understand what customer's major concerns are.

28c. Would they help the contractor understand what must be accomplished to receive an award fee?

a. N/C
b. N/C
c. N/C
d. They would "summarize" the major points only. Program manager should interpret and break out lower levels of concern.

Final Comments made by interviewees

a. As examples, the attached listing is O.K.; however it must be focused on the total program not just software (unless it is a software program) or disciplines (e.g. systems engineering and test). The focus must be on products, e.g. Air Vehicle, Training System, Total Communications System, etc.. The specific criteria in the attached ares are very insightful and could be adapted to a total program focus as suggested above.

b. 1) Too many award fee periods, 4 to 5 is plenty
2) Criteria should be very program specific aimed at attaining desired end item - not how well he checked the squares.
3) Contractor receive requirements from the PCO not Government program office.
4) The award fee percentage versus ratings is important and should be shown.
5) Tell a contractor exactly what you want done and grade him on how well he did what you asked for.
6) Research and Development programs must have more flexibility to change and adjust to unexpected program demands than production systems.

c. 6 month period - snapshot of next 2 or more events. Don't over monitor. Need to focus on long term goals as well as short term goals. To make criteria better, go from excellent to unacceptable and make good spread larger 40-79 points.

d. I want to repeat that the evaluation process is critical at the program level. The award fee based on the outcome of the evaluation process will be used to judge the program manager by management. Praise or corrective action instituted by the award percentage than determines how much management "help" is supplied.

PERIOD 3 PERIOD 3 PERIOD 3 PERIOD 3 PERIOD 3 PERIOD 3

F-22 WEAPON SYSTEM AND F119 ENGINE AWARD FEE PLAN

1 APRIL 1992
(Supersedes plan dated 24 September 1991)

EVALUATION PERIOD 3
1 APRIL 1992 - 30 SEPTEMBER 1992

APPROVED: _____

JAMES A. FAIN, Jr.
Major General, USAF
Director of F-22 SPO
F-22 Award Fee Determining Official

PERIOD 3 PERIOD 3 PERIOD 3 PERIOD 3 PERIOD 3 PERIOD 3

F-22 WEAPON SYSTEM AND F119 ENGINE AWARD FEE PLAN

I. INTRODUCTION

The specific criteria and procedures used to monitor and assess contractor performance and, thereby, recommend award fee payments to the Fee Determining Official (FDO) are described in this plan. An award fee is used to motivate excellent performance by the contractors to execute the F-22 and F119 Engineering and Manufacturing Development (EMD) program. The awarded amount is determined by the Government's review of management and performance areas under the control of the contractors. The F-22 and F119 award fee determinations will be made separately for the weapon system and engine contractors. Award fee determinations made by the Government are not subject to the "Disputes," "Allowable Cost and Payment," or "Termination" clauses of the contract.

II. AWARD FEE INTEGRITY

Determination of contractor performance and award fee eligibility is subjective. However, the process is explicit enough to allow the contractors every opportunity to understand how the award amount is based on performance. Every effort will be made by the Government to assure fairness of evaluation, as well as prompt and consistent feedback. Contractor performance, as assessed by the Integrated Product Teams (IPTs) and functionals, will form the basis for award fee disbursements, with the final determination made by the FDO for both the F-22 weapon system and the F119 engine contractors.

III. DEFINITION OF TERMS AND RESPONSIBILITIES

A. The *FDO* for the F-22/F119 program is the Program Director, ASD/YF, whose responsibilities are:

1. To approve the award fee plan and authorize any changes to the plan throughout the life of the contract.

2. To approve the members of the Award Fee Review Board (ARB) and appoint a Chairman.

3. To determine the amount of award fee earned and payable to the F-22 weapon system and F119 engine contractors for each evaluation period.

4. To notify the contractors of the amount of fee awarded them at the final evaluation each period, with a description of their strengths and improvement items which impacted the award fee decision for that evaluation period.

B. The *ARB* consists of a chairman, a secretariat, a recorder, the technical director, representatives from the IPTs and functional staffs in the System Program Office (SPO), Director of Logistics Support at the Sacramento Air Logistics Center, and the commanders of the Defense Plant Representative Offices (DPROs) at the prime contractors. The ARB and its members are listed in Attachment (Atch) 1. The responsibilities of the ARB are:

1. To review the monthly reports, as submitted by the IPTs/functionals.

2. To evaluate the contractors' performance using the IPTs'/functionals' recommendations and any other pertinent information.

3. To develop the ARB recommendation on the rating and amount of the award fee.

4. To recommend changes to the Award Fee Plan.

5. To independently provide regular performance feedback to their individual contractor counterparts, specifically highlighting strengths and improvement items, per the criteria in the plan, and as identified in the monthly reports. At the midterm and final, this feedback should occur prior to the IPTs/functionals presenting their assessment to the ARB.

C. The *ARB chairman*, the Deputy Program Director, ASD/YF, whose responsibilities are:

1. To appoint an ARB secretariat.

2. To approve the selection of Performance Monitor Focal Points (PMFPs).

3. To provide performance feedback, in accordance with the areas of emphasis and criteria in the award fee plan, at a top level, to the contractors on a regular basis.

4. To conduct ARB meetings and break any ties in ARB voting.

5. To review recommended changes to the Award Fee Plan and provide the FDO with a recommendation on which changes should be made.

6. To present the ARB's recommended rating and award fee range, with supporting data, to the FDO.

D. The *ARB secretariat*, ASD/YFMP's Award Fee Branch, whose responsibilities are:

1. To consolidate the ARB's assessment and recommendation for presentation to the FDO, at both the midterm and the final of each period of performance.

2. To select a recorder who will maintain the minutes of the ARB meetings, notify ARB board members and PMFPs when the monthly reports and the midterm and final briefings are due, distribute forms, receive and distribute completed monthly reports to all directors, and perform other duties as assigned by the ARB chairman.

3. To maintain the Award Fee Plan, including any updates as approved by the ARB and the FDO.

4. To maintain the award fee files, including current copies of the Award Fee Plan, any internal procedures, the PMFPs' monthly reports, and any other documentation having a bearing on the FDO's decision.

E. The *PMFPs*, who are listed in Atch 2, act as facilitators for the SPO IPTs and functionals in the award fee area. Their responsibilities are:

1. To continually collect award fee information related to the contractor's performance from other members of the SPO, DPRO members, and other Government team members in assigned areas, in accordance with Atch 3.

2. To prepare monthly Performance Reports for each evaluation period in the format shown in Atch 4 and submit these reports to the secretariat not later than 8 working days after the end of each month. These monthly reports will be coordinated through the appropriate IPT or functional director, and will reflect the overall evaluation position of that IPT or functional staff.

3. To prepare midterm and final IPT/functional briefings for presentation to the ARB. These briefings will be coordinated through the appropriate IPT or functional director, and will reflect the overall evaluation position of that IPT or functional staff.

4. To provide assistance to the ARB secretariat in preparation of the midterm and final ARB recommendation to the FDO.

5. To understand the contractor performance requirements necessary to achieve each level of performance as defined in Atch 8.

6. To recommend changes to the plan.

F. The *F-22/F119 DPRO members* at all four primary contractors, whose responsibilities are:

1. To participate on the IPTs or functionals, observe contractor performance, and provide current, accurate information and assessments on contractor performance to the SPO and contractor on a regular basis.

2. To submit monthly award fee reports in the format shown in Atch 4, not later than 5 working days after the end of the month, to the secretariat, who will distribute them throughout the SPO as appropriate.

3. To recommend changes to the plan.

G. The *Performance Monitors*, who are all F-22 SPO members and other Government personnel associated with the F-22 weapon system or F119 engine program, whose responsibilities are:

1. To participate in the program, and provide current, accurate information and assessments on contractor performance on a regular basis to the appropriate PMFP.

2. To recommend changes to the plan.

3. To maintain open, honest, and frequent communications with the contractors.

IV. AWARD FEE EVALUATION REQUIREMENTS

A. The standard award fee period of performance is 6 months in duration; however, the first period was shortened, running from contract award to the end of the Government's fiscal year. Subsequent periods are aligned with the start and midpoints of the Government's fiscal year and align the award fee evaluations with the contractors' bonus plans. The schedule of evaluation periods is in Atch 6. There are 17 evaluation periods over the life of the EMD program.

B. The award fee evaluation will cover four areas of emphasis which reflect the balanced approach desired in order to deliver the final product within specification, on cost and on schedule. The first three areas are integrally related; a strength or improvement item in one of those three areas will potentially impact the other two. The fourth area emphasizes the other items of concern to the SPO for a specific period.

1. Overall Progress Toward Integrated Weapon System/Engine System Development

2. Overall Schedule Performance

3. Overall Cost Control

4. Other Program Considerations

C. Criteria, which more specifically define the Government's expectations, and which are subsets of the areas of emphasis, will be chosen each period as necessary. These criteria will further expand on the four areas of emphasis. The criteria for the current period are in Atch 7 for the weapon system and Atch 8 for the engine. The criteria for the fourth area of emphasis are listed in priority order, from highest to lowest.

D. Each IPT and functional office will develop an overall adjective rating based on their observations at both the midterm and the final, in accordance with the definition of the ratings described in Atch 9.

E. The individual criteria ratings are reviewed and integrated by the ARB, which develops the overall individual contractor ratings for both F-22 weapon system and the F119 engine. These ratings will then be used as recommendations to the FDO, to assist his determination of the percentage of fee each contractor may earn at the end of the period.

F. The total available award fee is calculated at approximately 9 percent of the total estimated cost at contract award. Rollover (a process whereby award fee not earned in a prior period may be added to a later award fee pool) will generally not be practiced unless the Government chooses to emphasize a performance period by rolling the unearned award fee forward. Award fee amounts which are not rolled forward are unearnable. The Government reserves the right to change available award fee prior to the beginning of any particular period.

V. AWARD FEE ADMINISTRATIVE PROCEDURES

A. Contractor Procedures:

1. The contractors have the option of submitting a self-assessment paper, not to exceed 10 pages in length, to the ARB secretariat, not later than 5 working days after the midterm or final date. The contractors also have the option of presenting a self-assessment briefing to the ARB not later than 10 working days after the midterm and final date.

2. The self-assessment paper will be submitted to the FDO in unedited form by the ARB, along with the ARB's Government-based assessments and recommendations.

3. The contractors will submit proposed criteria, within each area of emphasis, as well as other plan changes, for the next period of performance, as requested by the secretariat to support scheduled ARB meetings.

B. Government Procedures:

1. The recorder will notify each board member and PMFP 15 working days before the end of the evaluation period and suspense the IPTs/functionals' final briefing. (See schedule of activities at Atch 10.)

2. The PMFPs, in concert with their director, will consolidate their IPTs'/functionals' final briefing, using information as documented in the monthly reports, for presentation to the ARB not later than 10 working days after the end of the period. An electronic copy of the briefing will be provided to the secretariat by the close of the ARB briefing.

3. The ARB will evaluate the IPT/functional briefings and determine the recommended amount of fee.

4. The secretariat will consolidate the ARB's assessment and recommendation for presentation to the FDO not more than 15 working days after the close of the evaluation period.

5. The FDO will determine the amount of award fee to be paid to both the F-22 weapon system and the F119 engine contractors not more than 25 working days after the close of the evaluation period.

6. A contract modification will be issued to implement the FDO determination for each contractor not more than 5 working days after the FDO decision.

7. The Government will provide the contractors a debrief in a timely manner at the end of each award fee determination.

VI. MIDTERM EVALUATION

A. The IPTs/functionals will perform midterm contractor evaluations for each evaluation period. The purpose of the midterm evaluation is to advise the contractors of strengths *in* performance which should be continued, as well as improvement items which could result in a lower rating at the end of the evaluation period. This midterm evaluation will not result in any fee being awarded, but will be an input into the final determination for the evaluation period.

1. The recorder will notify each PMFP 15 working days before the midpoint of the evaluation period and suspense the IPT/functional midterm briefings.

2. Midterm briefings will be presented to the ARB not more than 10 working days after the midterm of the evaluation period.

3. The ARB will review the IPT/functional briefings and determine their overall recommendation for presentation to the FDO. The FDO will approve a midterm evaluation debrief to the contractors.

VII. MODIFICATION OF THE AWARD FEE PLAN

A. Changes to the Plan: Prior to the beginning of any evaluation period, the Government reserves the right to change the award fee evaluation criteria, period duration, distribution of remaining award fee dollars, and other matters covered in this plan, by written notice from the Procuring Contracting Officer (PCO) to the contractors. Every reasonable attempt will be made to coordinate changes to future periods with the contractors prior to the changes taking place. Changes to the plan for the current period will be agreed upon mutually by the Government and the contractors.

B. Method for Making Changes: Any member of the ARB may propose a change to the plan. Changes may also be proposed by performance monitors, DPRO members, PMFPs, and the contractors. Proposed changes will be evaluated by the ARB after the midterm point, but sufficiently before the final point to allow coordination with the contractors. The coordinated plan will then be submitted to the FDO for approval. Approved changes to the plan will be formally provided to the contractors by the PCO at least 5 working days prior to the beginning of the first period for which they are applicable. If changes in the current period evaluation criteria are agreed to, the contractors will be formally notified by the PCO not later than 1 working day before the date they take effect.

10 Attachments
1. Award Fee Review Board Members
2. Performance Monitor Focal Points
3. Instructions for IPTs and Functional Offices
4. Performance Report
5. Sample Briefing Format
6. Award Fee Evaluation Periods
7. Weapon System Award Fee Areas of Emphasis and Criteria for Period 3
8. Engine Award Fee Areas of Emphasis and Criteria for Period 3
9. Rating Definitions
10. Award Fee Evaluation Schedule

AWARD FEE REVIEW BOARD MEMBERS

Chairman	F-22 Deputy Program Director
Alternate Chairman	F-22 Director of Projects
Members	F-22 Technical Director F-22 System Program Office Functional Directors SPO Integrated Product Team Directors DPRO Commanders at Lockheed and Pratt & Whitney Director of Logistics Support at Sacramento Air Logistics Center
*Secretariat	ASD/YFMP (Award Fee Branch)
*Recorder	Assistant Award Fee Program Manager

* Nonvoting members

Atch 1

PERFORMANCE MONITOR FOCAL POINTS

Air Vehicle Integrated Product Team (IPT)	Capt Jim Corbin
Engine IPT	Ms Sandi Simmons
Training IPT	Capt Jesse James
Support IPT	Ms Connie Rankin
Engineering	Lt Col Steven Glass
Program Control	Ms Carol Geisert (Weapon System) Ms Sandy Dibley (Engine)
Contracts	Lt Col Gary Boylan
Program Management	Mr Ron Detmer
Test	Lt Col Mark Stubben

Atch 2

INSTRUCTIONS FOR INTEGRATED PRODUCT TEAMS (IPTs) AND FUNCTIONAL OFFICES

A. Monitoring and Assessing Performance.

1. IPTs/functionals will maintain a continuous written record of the contractors' performance, including inputs from other Government personnel, in their evaluation area(s) of responsibility. The contractors' performance will be assessed based on correspondence, reports, data items, meetings, and conversations which demonstrate the contractors' day-to-day performance. A summary of the contractors' performance will be prepared monthly and documented in the Performance Report. These monthly reports will be coordinated through the appropriate IPT or functional director and will reflect the overall evaluation position of that team or functional.

2. Informal records, not maintained by the secretariat in the award fee files, used in preparing the evaluation report are to be retained by the Performance Monitor Focal Points (PMFPs) for 6 months after the period is completed, in order to support any inquiries made by the Fee Determining Official (FDO).

3. IPTs/functionals will conduct all assessments in an open, objective, and cooperative spirit, so that a fair and accurate evaluation is obtained. The IPTs/functionals will continue to provide their counterparts feedback on the program issues as a part of the day-to-day management of the program, as well as formal feedback on a regular basis. The IPTs/functionals will make every effort to be consistent from period to period in their approach to determining their recommended ratings. This will enhance contractor receipt of information from which to plan improvements in performance. Positive performance accomplishments should be emphasized just as readily as negative ones.

B. Performance Report.

1. The IPTs/functionals will prepare monthly Performance Reports as shown in Atch 4. These reports should include input from applicable members of the System Program Office (SPO), Defense Plant Representative Office (DPRO), or any other Government agency which may have relevant information on the contractors' performance.

2. Monthly reports will be submitted through the IPT or functional director, to the Award Fee Review Board (ARB) secretariat on the eighth working day of the month, and will be considered as input to the midterm and final IPT/functional briefing to the ARB. Monthly reports should contain the following information:

a. The evaluator's name and that of the IPT/functional, the award fee period, the month covered by the report, the contractor being evaluated, and any special conditions which may have influenced that month's performance. Special conditions should consider the technical, economic, and schedule environment under which the contractors were required to perform. What effect did the environment have on the contractors' performance?

b. The contractors' major strengths and improvement items relative to planned activities during that month, listed in priority order, including the impact of that strength or improvement item on the execution of the overall program. If applicable, include in the impact any recommended or ongoing corrective actions. Give examples of contractors' performance for each strength and improvement item listed. Ratings should generally be based on more than one occurrence, not single incidents. However, several minor examples may be used to support a generalized strength or improvement item. Reporting items requiring improvement is especially important when repeated communication with the contractor fails to resolve the issue.

Atch 3

c. A recommended adjective rating for each criteria for that month. The strengths and improvement items should provide concrete examples of the contractors' performance which support the recommended rating.

d. The strengths and improvement items, annotated by an asterisk or specifically listed in a cover letter, which are recommended for discussion during the feedback sessions between the Deputy Program Director and his contractor counterparts.

C. Briefings.

1. The midterm and final briefings will be presented to the ARB not more than 10 working days after the midterm or close of the evaluation period, and will contain the same type of information as found in the monthly report.

a. The briefing should assess the overall IPT/functional assessment of the contractor's progress toward delivering the end product within the specification, cost, and schedule requirements, as related to the areas of emphasis and criteria.

b. The recommended adjective rating should be based on the entire evaluation period.

2. IPTs/functionals will be prepared to present briefings to the ARB and FDO at the midterm and final as required. IPTs/functionals will also provide assistance in preparing the ARB recommendation for presentation to the FDO for both the midterm and final reviews as required by the secretariat.

D. Feedback.

1. On a monthly basis, the IPTs/functionals will present the FDO and ARB chairman their team's top strengths and improvement items as related to the award fee criteria. Based on the discussion, the ARB will reach agreement on the consolidated integrated feedback to be given to the contractors. The ARB chairman and IPTs/functionals (and sub-IPTs for the Air Vehicle) will provide that formal feedback to their counterparts relative to observed performance during that interval. After the feedback is completed, a memorandum for record will be sent to the secretariat documenting completion of the feedback and any open actions as a result of the assessment.

2. The IPTs/functionals should also conduct feedback prior to and after the midterm and final briefings to ensure the contractors clearly understand the assessment.

3. Feedback should also be conducted by the IPTs/functionals after the FDO's decision to provide continuing dialogue with the contractors on the results of the assessment and the SPO's expectations for the next evaluation period.

E. Changes to the Plan.

1. IPTs/functionals shall recommend any changes to the Award Fee Plan for the next period (particularly evaluation criteria), as suspensed by the secretariat. The teams will also provide any rationale for recommended changes to the secretariat and ARB.

2. Coordination and approval of the changes in the SPO and with the DPRO will take place after the midterm and before the final evaluation. Every reasonable attempt will be made to coordinate changes with the contractors prior to the changes taking place.

PERFORMANCE REPORT

Name: **'Award fee period:**

Organization:

Contractor: **Report Month:**

Special conditions which influenced this month's performance (if any):

Criteria: (Must be listed in Atch 7 or 8)

Strengths of the contractor's performance for this criteria (with specific examples):

Impact of this strength on execution of the program:

Improvement items in the contractor's performance for this criteria (with specific examples):

Impact of this improvement item on execution of the program:

Recommended adjective grade for this criteria:

(Page Break After Each Criteria)

Next Criteria: (Must be listed in Atch 7 or 8)

Strengths of the contractor's performance for this criteria (with specific examples):

Impact of this strength on execution of the program:

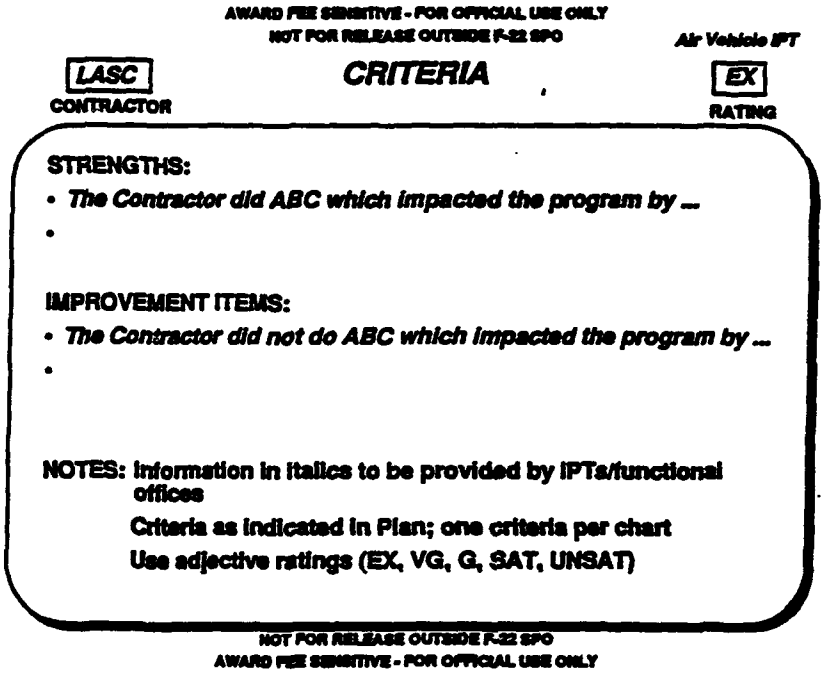
Improvement items in the contractor's performance for this criteria (with specific examples):

Impact of this improvement item on execution of the program:

Recommended adjective grade for this criteria:

(Continue for each criterion. Do not repeat the information at the top of the first page (contractor, name, period, etc.) on each page.)

SAMPLE BRIEFING FORMAT



For assistance using this format, see the Award Fee Secretariat.

Atch 5

AWARD FEE EVALUATION PERIODS

The award fee period of performance is typically 6 months in duration; however, the first period will be shortened in order to align evaluations with appropriate times in the Government's fiscal year and to align award fee evaluations with the contractors' end of year activities such as bonus plans.

PERIOD	START	MIDTERM	FINAL
1	Contract Award	none	30 Sep 91
2	1 Oct 91	31 Dec 91	31 Mar 92
3	1 Apr 92	31 Jun 92	30 Sep 92
4	1 Oct 92	31 Dec 92	31 Mar 93
5	1 Apr 93	31 Jun 93	30 Sep 93
6	1 Oct 93	31 Dec 93	31 Mar 94
7	1 Apr 94	31 Jun 94	30 Sep 94
8	1 Oct 94	31 Dec 94	31 Mar 95
9	1 Apr 95	30 Jun 95	30 Sep 95
10	1 Oct 95	31 Dec 95	31 Mar 96
11	1 Apr 96	30 Jun 96	30 Sep 96
12	1 Oct 96	31 Dec 96	31 Mar 97
13	1 Apr 97	30 Jun 97	30 Sep 97
14	1 Oct 97	31 Dec 97	31 Mar 98
15	1 Apr 98	30 Jun 98	30 Sep 98
16	1 Oct 98	31 Dec 98	31 Mar 99
17	1 Apr 99	15 Aug 99	31 Dec 99

This schedule of evaluations allows for a shortened first period, which will give the contractors an award fee evaluation prior to deciding on bonuses for personnel and prior to closing out financial accounts in December. After the short first period, the year will be divided into two periods, each year having the same cycle: October through March and April through September.

Atch 6

WEAPON SYSTEM AWARD FEE AREAS OF EMPHASIS AND CRITERIA FOR PERIOD 3
(To be updated each period)

AREA OF EMPHASIS: Overall Progress toward Integrated Weapon System Development

• CRITERION D1: **Development of Weapon System.** This criterion assesses the quality of the efforts associated with developing a specification compliant weapon system, including the identification and successful resolution of requirements issues. The progress toward achievement of the Design-to-Cost (DTC) goals and the contractor's efforts to achieve those goals through the implementation of reasonable cost reduction activities and studies will also be considered. Additionally, an evaluation will be made to assess the responsiveness of the contractor to incorporate changes, coordinate those changes, if appropriate, with the engine contractor, and perform the additional work generated from the Engineering Change Proposal (ECP) process. Innovative management and technical processes and solutions to achieve weapon system performance are also evaluated in this criterion.

• CRITERION D2: **System Interfaces.** This criterion assesses the identification of all system interfaces, development and adherence to all Interface Control Documents, and identification and integration of any Government Furnished Equipment necessary to achieve the integrated weapon system requirements.

• CRITERION D3: **Management of Subcontractor Efforts.** This criterion assesses the integration of all subcontractor efforts to support the overall integrated weapon system development, including efforts to define, control and flow down the performance requirements necessary for achievement of contract specification requirements.

AREA OF EMPHASIS: Overall Schedule Performance:

• CRITERION S1: **Schedule Management.** This criterion evaluates the contractor's performance against planned schedules. The assessment will encompass the integration of the Integrated Master Schedule with the Cost/Schedule Control System (C/SCS), including an assessment of the validity of the causes for schedule adjustments necessary to meet Integrated Master Plan criteria and the effectiveness of schedule recovery plans. The evaluation will also measure the contractor's ability to identify potential schedule problems early and project the impact of near-term schedule changes on long-term events.

AREA OF EMPHASIS: Overall Cost Control:

• CRITERION C1: **Cost Management.** This criterion evaluates the contractor's actual cost performance compared to the established Performance Measurement Baseline as expressed in the C/SCS and the effective use of the cost control system in the day-to-day management of the program, including evaluating the impact of variances and implementing corrective action planning and an evaluation of the contractor's progress toward C/SCS reviews. This criterion also evaluates the cost management of subcontractor efforts and timely development of revised estimates of program costs. The assessment also includes the quality and timeliness of performance measurement reports. This criterion will also evaluate the contractor's efforts to monitor, track and pursue the active management of overhead costs.

• CRITERION C2: **Affordability Analysis Process.** This criterion assesses the process of allocating DTC goals and the feedback to the Integrated Product Teams (IPTs) to allow timely cost reduction efforts. This criterion also assesses the management of the Affordability Analysis process.

Atch 7

AREA OF EMPHASIS: Other Program Considerations:

• CRITERION O1: **IPT Philosophy.** This criterion evaluates the contractor's effective and efficient use of the IPT philosophy to manage the program on a daily basis. This management approach includes the use of an integrated approach to make decisions and tradeoffs, and the use of timely, clear communication within, among, and at all levels above and below the IPTs.

• CRITERION O2: **Integrity Programs.** This criterion evaluates the effective integration and implementation of integrity programs.

• CRITERION O3: **Software Programs.** This criterion evaluates the progress toward demonstrating and implementing the common, team-wide System/Software Engineering Environment, as well as progress on the Software Development Plans. The evaluation will include an assessment of the contractor's efforts to develop an integrated set of tools supporting all phases of systems, hardware, and software engineering. This criterion will also evaluate the development, continuous improvement, and adherence to consistent, team-wide software development plans.

• CRITERION O4: **Contract Change Process.** This criterion evaluates the contractor's compliance with the requirements of the contract change process, including responses to Advanced Change Study Notices, Contract Change Proposals, and Engineering Change Proposals. The evaluation will look at the logical organization of the proposals, supportability of cost data, conduct of "good faith" negotiations, and coordination of issues with the System Program Office, Defense Plant Representative Offices, and Defense Contract Audit Agency.

• CRITERION O5: **Management/Technical Information System (M/TIS).** This criterion evaluates the progress toward continued definition and implementation of the M/TIS requirements, including the Video Teleconferencing Center capability.

• CRITERION O6: **Training System Approach.** This criterion evaluates the steps being taken to formalize the training system strategy, especially plans for identifying training systems subcontractors.

• CRITERION O7: **Small Business/Small Disadvantaged Business Programs.** This criterion evaluates the contractor on his management of and innovative approaches toward meeting small and small disadvantaged business goals as outlined in the contract.

ENGINE AWARD FEE AREAS OF EMPHASIS AND CRITERIA FOR
PERIOD 3
(To be updated each period)

AREA OF EMPHASIS: Overall Progress toward Integrated Engine System Development

• CRITERION D1: **Development of the Engine System.** This criterion assesses the quality of the efforts associated with developing a specification compliant engine system, including the identification and successful resolution of requirements issues. The progress toward achievement of the Design-to-Cost (DTC) goals and the contractor's efforts to achieve those goals through the implementation of reasonable cost reduction activities and studies will also be considered. Additionally, an evaluation will be made to assess the responsiveness of the contractor to incorporate changes, coordinate those changes, if appropriate, with the weapon system contractor, and perform the additional work generated from the Engineering Change Proposal (ECP) process. This criterion will also evaluate the effective integration and implementation of integrity programs. Innovative management and technical processes and solutions to achieve engine system performance are also evaluated in this criterion.

• CRITERION D2: **System Interfaces.** This criterion assesses the identification of all system interfaces, use of the Associate Contractor Working Group, development and adherence to all Interface Control Documents, and identification and integration of any Government Furnished Equipment necessary to achieve the integrated weapon system requirements.

• CRITERION D3: **Management of Subcontractor Efforts.** This criterion assesses the integration of all subcontractor efforts to support the overall integrated engine development, including efforts to define, control and flow down the performance requirements necessary for achievement of contract specification requirements.

AREA OF EMPHASIS: Overall Schedule Performance:

• CRITERION S1: **Schedule Management.** This criterion evaluates the contractor's performance against planned schedules. The assessment will encompass the integration of the Integrated Master Schedule with the Cost/Schedule Control System (C/SCS), including an assessment of the validity of the causes for schedule adjustments necessary to meet Integrated Master Plan criteria and the effectiveness of schedule recovery plans. The evaluation will also measure the contractor's ability to identify potential schedule problems early and project the impact of near-term schedule changes on long-term events.

AREA OF EMPHASIS: Overall Cost Control:

• CRITERION C1: **Cost Management.** This criterion evaluates the contractor's actual cost performance compared to the established Performance Measurement Baseline as expressed in the C/SCS and the effective use of the cost control system in the day-to-day management of the program, including evaluating the impact of variances and implementing corrective action planning. The contractor's progress toward C/SCS validation will also be evaluated. This criterion also evaluates the cost management of subcontractor efforts and timely development of revised estimates of program costs. The assessment also includes the quality and timeliness of performance measurement reports. This criterion will also evaluate the contractor's efforts to monitor, track and pursue the active management of overhead costs.

Atch 8

• CRITERION C2: **Affordability Analysis Process.** This criterion assesses the process of allocating DTC goals and feedback to the Integrated Product Teams (IPTs) to allow timely cost reduction efforts. This criterion also assesses the management of the Affordability Analysis process.

AREA OF EMPHASIS: Other Program Considerations:

• CRITERION O1: **IPT Philosophy.** This criterion evaluates the contractor's effective and efficient use of the IPT philosophy to manage the program on a daily basis. This management approach includes the use of an integrated approach to make decisions and tradeoffs, and the use of timely, clear communication within, among, and at all levels above and below the IPTs.

• CRITERION O2: **Contract Change Process.** This criterion evaluates the contractor's compliance with the requirements of the contract change process, including responses to Advanced Change Study Notices, Contract Change Proposals, and Engineering Change Proposals. The evaluation will look at the logical organization of the proposals, supportability of cost data, conduct of "good faith" negotiations, and coordination of issues with the System Program Office, Defense Plant Representative Offices, and Defense Contract Audit Agency.

• CRITERION O3: **Management/Technical Information System (M/TIS).** This criterion evaluates the progress toward continued definition and implementation of the M/TIS requirements, including the Video Teleconferencing Center capability.

• CRITERION O4: **Small Business/Small Disadvantaged Business Programs.** This criterion evaluates the contractor on his management of and innovative approaches toward meeting small and small disadvantaged business goals as outlined in the contract.

RATING DEFINITIONS

The Fee Determining Official (FDO) will determine an overall rating of each contractors' performance, which will be related to the percent of award fee paid. The relationship between rating and award payment is shown below.

Rating	Percent of Award Fee
Excellent	91-100%
Very Good	71-90%
Good	51-70%
Satisfactory	1-50%
Unsatisfactory	0%

The following definitions describe, in general, the types of performance which will lead to the various grades assessed by the Integrated Product Teams/functionals and recommended by the Award Fee Review Board to the FDO. These standard rating definitions will be applied against the areas of evaluation and criteria in order to provide an assessment of each prime contractor's performance and resultant award fee rating. The ability to deliver a quality product is defined from a product perspective, while the management and communications areas are defined from the process perspective. The intent of the F-22/F119 program is to use the award fee to manage the overall program and to motivate the contractors to execute the program as planned. Successful execution of the program will maximize the award fee amount given to the contractors.

Excellent:

- A high probability exists that a quality product will be delivered on time and on budget
  - Schedule is met as planned (deviations are minor and have no impact on overall program)
  - Potential cost problems are aggressively identified and resolved early
- Management initiatives are extremely effective
- Communications are exceptionally open, timely, and meaningful

Very Good:

- A moderate to high probability exists that a quality product will be delivered on time and on budget
  - Schedule is met as planned, with minor rescheduling required (deviations are minor and have little impact on overall program)
  - Potential cost problems are proactively identified and resolved
- Management initiatives are highly effective
- Communications are consistently open, timely, and meaningful

Good:

- A moderate probability exists that a quality product will be delivered on time and on budget
  - Schedule is usually met as planned, with some rescheduling required
  - Contractor demonstrates ability to identify and resolve cost problems
- Management initiatives are usually effective
- Communications are usually open, timely, and meaningful

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Satisfactory:

- A low to moderate probability exists that a quality product will be delivered on time and on budget
  - Schedule deviations require replanning and program impacts are increasing
  - More aggressive actions by the contractor are needed to identify and resolve cost problems
- Management initiatives require strengthening
- Communications are sometimes not open, timely, and meaningful

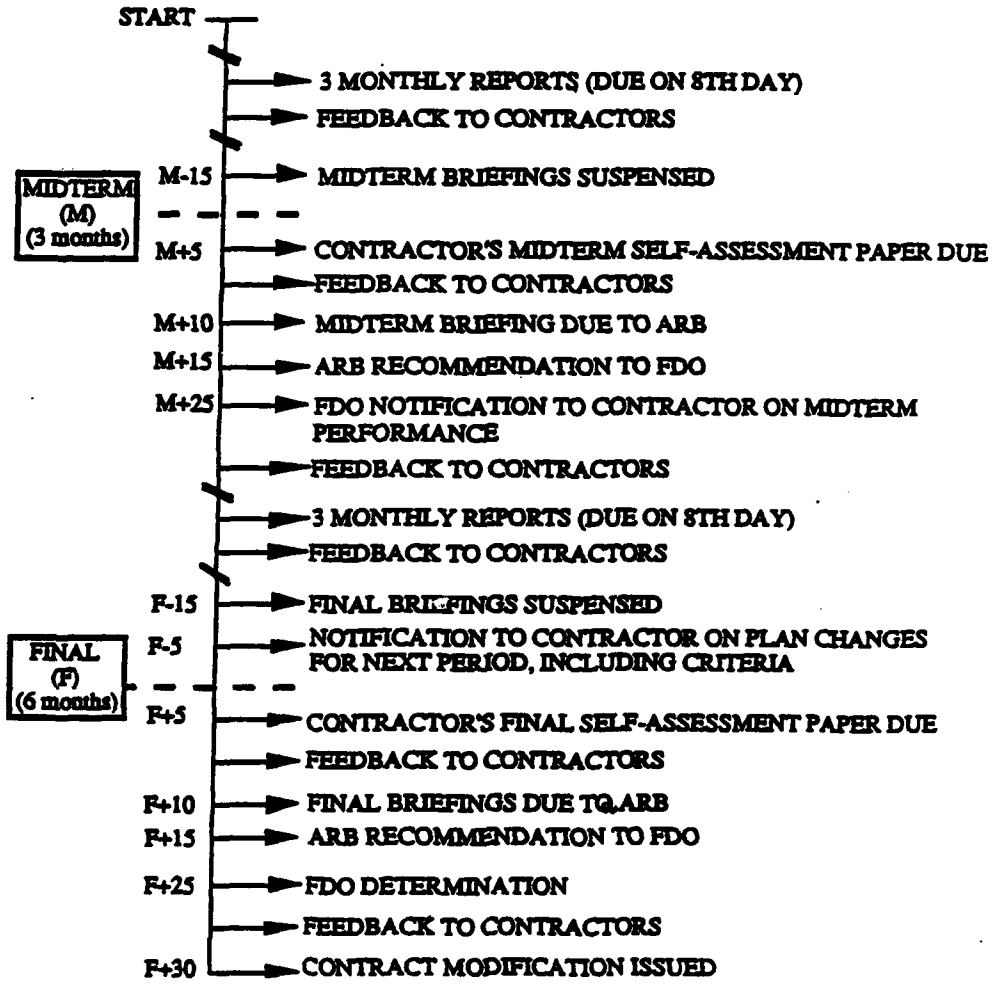
Unsatisfactory:

- A low probability exists that a quality product will be delivered on time and on budget
  - Schedule control is nonexistent
  - Inability to identify and resolve cost problems requires Government intervention
- Management initiatives are ineffective or nonexistent
- Communications are consistently lacking in openness, timeliness and meaningfulness

No award fee is paid for unsatisfactory performance.

AWARD FEE EVALUATION SCHEDULE

DAYS SHOWN ARE WORKDAYS



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Vita

Major Mark T. Hunter was born on 16 June 1954 in Detroit, Michigan. He was graduated from George Mason High School in June 1974 and from the Virginia Military Institute in May 1978 with a Bachelor of Science in Electrical Engineering. Major Hunter entered the Air Force on active duty in September 1978. He began his career as a navigator student at Mather AFB, California; then he went to Combat Crew Training School at Castle AFB, California. Medically disqualified from flying status in June 1980, he transferred to Headquarters Space Systems Division (AFSC) where he was assigned to the Space Defense System Program office until July 1984. He completed Squadron Officer's School in residence in May 1984. Next, he went to Headquarters Electronic Security Command in the Special Activities Directorate until August 1990, where his last position was Deputy Chief, Engineering and Development Division. He completed Air Command and Staff College by correspondence in April 1987 and graduated from the Defense Systems Management College's Program Management Course in September 1989. Assigned to the Foreign Aerospace Science and Technology Center (AFIC) in the Measurement and Signals Intelligence Division since August 1990, he started the master's program part time at the AFIT School of Systems and Logistics in September 1990.

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13. ABSTRACT *(Maximum 200 words)*

The focus of this research effort was to determine, in general terms, what contractual tools are available to influence contractor performance during the software development process and, specifically, whether or not award fee contracts are appropriate tools. First, a qualitative, in depth literature review was done. Next, personal interviews were conducted with Program Directors and Deputy Program Directors at Aeronautical Systems Center, Electronic Systems Center, and Space and Missiles Systems Center. Then, after the results were summarized, the data was analyzed and findings were made.

Findings include: (1) award fee was found to be the most flexible provision in the FAR and its supplements to influence contractor performance during the software development process; (2) the literature search found a strong consensus on major events or milestones in the software development process; and, (3) program requirements are the key factor that drives the linkage between award fee and the software development events. For software development, award fee contracts give the government a flexible and effective means to effect the software development process.

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5. Comments

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