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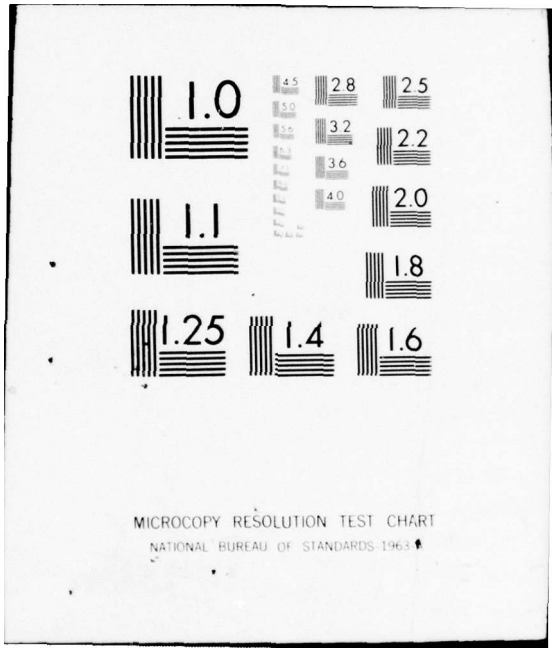
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DEFENSE SYSTEMS MANAGEMENT COLLEGE

PROGRAM MANAGEMENT COURSE
INDIVIDUAL STUDY PROGRAM

CONTRACTING STRATEGY FOR NAVY MISSILE ACQUISITIONS

STUDY PROJECT REPORT
PMC 77-2

CHARLES BERNARD DARLEY
GS-14 **DNC**

FORT BELVOIR, VIRGINIA 22060

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SECURITY CLASSIFICATION OF THIS PAGE *(When Data Entered)*

DEFENSE SYSTEMS MANAGEMENT COLLEGE

STUDY TITLE:

CONTRACTING STRATEGY FOR NAVY MISSILE ACQUISITIONS

STUDY PROJECT GOALS:

To identify the contracting strategy options and the associated major issues that influence the Navy Missile acquisition project manager

STUDY REPORT ABSTRACT:

This study report utilizes the past and present contracting strategy of the Sidewinder missile and the considerations for the contracting strategy for the development of a Sidewinder successor air-to-air missile as a basis for investigating the various contracting strategy options available to a program manager and some of the major issues associated with each strategy.

The investigative portion of the study addresses the available literature on contracting strategy guidance and gleans comments from individuals with experience in the contracting strategy process.

The study provides no recommendations for future idealistic contracting strategies but presents the experience of others from which future Navy Missile program managers may benefit.

TAXONOMY NUMERICAL CODES

KEY WORDS: Contracting strategy 10.07.03
Contracting techniques 10.07.03
Acquisition strategy 10.07.02.01

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CONTRACTING STRATEGY FOR NAVY MISSILE ACQUISITIONS

Individual Study Program

Study Project Report

Prepared as a Formal Report

Defense Systems Management College

Program Management Course

Class 77-2

by

CHARLES BERNARD DARLEY
GS-14 DNC

NOVEMBER 1977

Study Project Advisor
CDR Joseph F. Russell, USN

EXECUTIVE SUMMARY

Increasing weapon system acquisition costs and decreasing federal government personnel in the weapon system acquisition process are conditions which place a greater responsibility on a weapon system acquisition program manager to fully maximize the financial and human resources available to him to develop, procure and deploy to our defense forces systems which will meet the assessed threat at a reasonable cost.

This study focuses on that aspect of a weapon system acquisition wherein the contracting strategy for the weapon development and procurement is formulated by the program manager. Past and present Program Managers, Assistant Program Managers and Procurement Contracting Officers were solicited for comments based on their experience and their comments on the contracting strategy formulation process form the heart of this study.

This study makes no recommendations on future contracting strategies for Navy missile acquisitions but it is hoped that future Navy missile acquisition Program Managers may benefit from those experiences on contracting strategies noted herein.

ACKNOWLEDGEMENTS

The author wishes to express his sincere appreciation to those few individuals who took the time from their busy schedules to personally respond to the author's lenghty questionnaire in a face-to-face interview and to the others who responded in writing. Without the assistance of these individuals, based on their past and present experience in Navy missile acquisitions, this study would have little meaning.

To the many others, who for varied reasons did not respond to the author's questionnaire, the author recognizes the time scheduling burden of Navy missile program personnel due to reduced manpower resources, Congressional and DoD micro-management and an ever increasing demand on a Program Manager's time.

Love and appreciation are expressed for the author's wife, Marlene, for her physical and emotional sustenance for the past twenty-three years and more especially now for assisting the author in typing this paper.

TABLE OF CONTENTS

I. INTRODUCTION

For the past two years the author has been employed as a Weapon System Engineer for the Sidewinder Weapon System project in the office of the Sidewinder Assistant Project Manager(AIR-5105B), Air-to-Air Guided Missile Branch(AIR-5105) of the Aircraft Weapon Systems Division(AIR-510) under the Assistant Commander for Material Acquisition(AIR-05) within the Naval Air Systems Command.

The Sidewinder Weapon System project is managed from the Infrared Missile Systems Project Office(PMA-259) which is under the Deputy Commander for Plans and Programs(AIR-01) within the Naval Air Systems Command(NAVAIR).

Recent project support personnel losses within NAVAIR and more losses anticipated in the future as a result of government personnel cut-backs as well as impending austere defense budgets dictate that future missile acquisitions must be made which are not only cost effective but are likewise government manpower effective. Currently the Sidewinder project personnel are investigating the various aspects of weapon system acquisition in order to develop strategy planning for future procurements of Sidewinder missiles which will best utilize the talents of the remaining project support personnel while maintaining cost effective missile procurements.

PURPOSE - The purpose of this study project is to investigate and understand the contracting strategies which may be considered during the project management decision process as related to the procurement of Navy missiles. Although the study project is somewhat parochial in scope, it is hopeful that the subjective information herein will be of benefit to some Navy missile projects that are in being and will be an aid to future Navy missile project managers as they search for the optimum acquisition strategies for their particular projects.

GOALS - The specific goals of this study project were to identify the contracting strategy options and the associated major issues that influence the Navy missile acquisition project manager and then report them in such a manner that someone contemplating utilizing a certain contracting strategy on their missile project may have the benefit of anothers experience and lessons learned to aid in making a decision.

DEFINITIONS - In order to better understand the nature of the intent of this study project it is well that the reader understand the author's definition of the subject matter. "Contracting Strategy" as envisioned by the author is that aspect of the overall weapon system acquisition process wherein the philosophy of how the missile weapon system should be developed and procured and what roles the contractor and government agencies will play in the development and procurement of the missile weapon system.

The titles "program manager" and "project manager" are synonymous to the author and will be used interchangeably throughout this report.

The word "procurement" is intended to denote contracting for production hardware.

SCOPE - As mentioned earlier, this study project is somewhat parochial in scope but the intent was that the scope encompass all Navy missiles that are being developed and/or procured within the Naval Material Command. The author's immediated knowledge and experience on the Sidewinder project enables him to use it as an example of the past, present and future contracting strategy concerns of Navy missile project managers.

LIMITATIONS - The recognized limitations of this study project are that the information contained herein is primarily subjective and represents the judgements of past and present Navy missile project management personnel and, with changing weapon system acquisition policies such as OMB A-109,

may or may not be applicable or useful to any degree for future Navy missile procurements or developments. A further limitation is the narrowness of the questionnaire from which this study project report evolved and the completeness of the questionnaire returned by the respondees. (The author is quick to add that he claims no expertize at formulating questionnaires).

Another limitation may be the degree of candor of the responses to the questionnaire, even though the questionnaire was solicited on a non-attribution basis.

II. BACKGROUND

The Sidewinder missile was initially developed by the Naval Weapons Center (formerly the Naval Ordnance Test Station) at China Lake, California in the early 1950's and through successful successive product improvement iterations over the years has become a key missile weapon of the nations air defense arsenal. This was recently highlighted by an article in the Washington Post newspaper (See appendix A). Figure 1 shows an exploded view of the latest configuration of the Sidewinder missile which is designated AIM-9L (Air-Intercept-Missile-9L). This exploded view allows one to develop an appreciation for the similarity of all Navy missiles in that each must have as a minimum:

a. Guidance and Control Subsystem

b. Warhead Subsystem

c. Fuzing Subsystem

d. Propulsion Subsystem

In Figure 1 these subsystems are seen as:

a. Guidance and Control Subsystem

GCS (Guidance and Control Section) AN/DSQ-29 (with Umbilical 2603913)

FIN BSU-32/B

Wing MK I MOD 0

b. Warhead Subsystem

Warhead WDU-17/B

S-A (Safe-Arm) Device MK 13 MOD 2

c. Fuzing Subsystem

TD(Target Detector) DSU-15/B

d. Propulsion Subsystem

Rocket Motor Mk 36 Mods 5 or 6

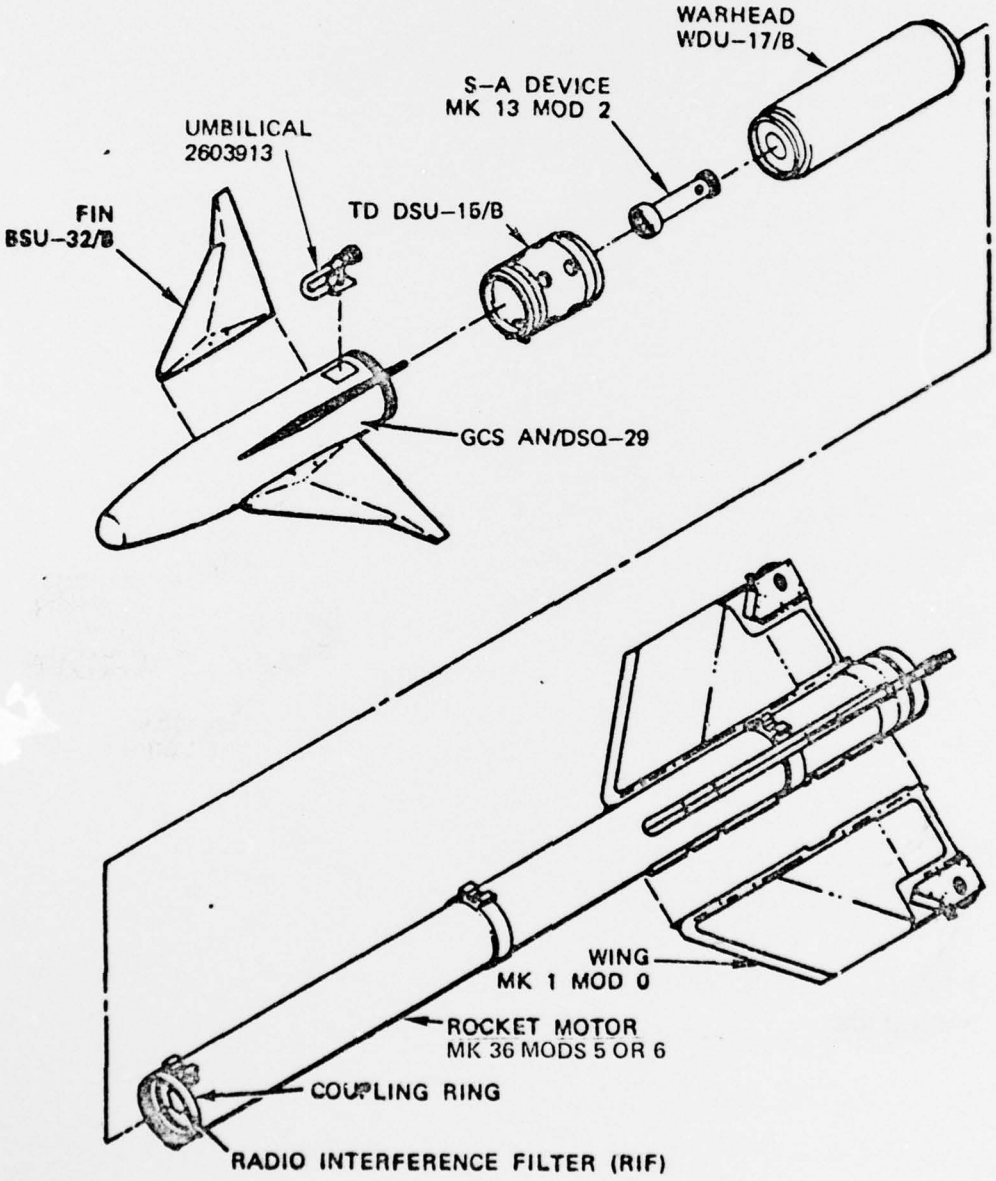

Figure 1 Sidewinder AIM-9L Guided Missile, Exploded View

TRADITION - Traditionally the Sidewinder contracting strategy has been to (1) develop each component in the government laboratory, (2) competively procure the components from contractors and (3) government assembly of the components into an all-up missile at a Naval Weapons Station prior to issuance. As is evident by this process, adequate government manpower resources with technical design and development management expertize at the laboratory level, with contractual and contractor surveillance management expertize at the procurement level, and with technical integration, test and maintenance management expertize at the assembly level are paramount requirements for this process to function successfully. Currently this traditional contracting strategy is being challenged in the Sidewinder program due to manpower losses. The missile being broken down into seven discrete components for which there are dual contractors providing competitive and mobilization base procurements for each component is heavily taxing the remaining manpower resources. To change the traditional contracting strategy to permit the procurement of two or more sub-system assemblies would alleviate some of the current management problems to a degree and changing the contracting strategy further to permit the procurement of an all-up missile(completely assembled by the contractor) from one or two contractors would further lessen the current manpower problems.

IMPACT - Any actions such as these involving changing the traditional contracting strategy may have a positive impact on the program manager's problems but may also produce strong countering negative impacts such as:

- The socio-economic impact on the previous small business suppliers of the minor components
- Commonality and interchangeability of components and spares when procured from two prime contractors

- Increased unit production cost due to the prime contractor's G&A being applied to the sub-contractor's cost
- Increased unit production cost due to shifting the component integration responsibility from the government to the contractor
- Increased unit production cost due to shifting the system design and data package risk from the government to the contractor
- Increased unit production cost due to shifting the system performance and reliability responsibility from the government to the contractor.

WHAT TO DO - What contracting strategy to utilize for future procurements of the Sidewinder AIM-9L must be fully investigated and decided upon to ensure a manpower and cost effective flow of Sidewinder missiles into the defense arsenal well into the 1980's. Additionally, the options available for the development and procurement of a successor to the Sidewinder must be investigated in light of the current changing regulations for weapon system acquisitions and the results of other studies underway which will be the basis for defining the future air-to-air "dog fight" missile. The honorable Malcolm R. Currie(DDR&E) in his statement to the 95th Congress[1] addressed the Sidewinder AIM-9L as an interim weapon and discussed the efforts underway for development of its successor(See Appendix B). In preparation for the advent of this new missile development, the Navy project coordinator for the Advanced Short Range Air-to-Air Missile(ASRAAM) has initiated an investigation of the acquisition strategies for new missile developments(See Appendix C).

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[1] The superscripts denote the Bibliography item number.

III. STUDY PROJECT METHODOLOGY

The study methods that were selected and the data sources to be used for this study project were:

a. An initial survey of literature which would be expected to address the subject of contracting strategies, such as Armed Services Procurement Regulations, Office of Manpower and Budget Circulars, Department of Defense Directives, Chief of Naval Operations Instructions, Naval Material Command Instructions, Naval Air Systems Command Instructions and Naval Sea Systems Command Instructions.

b. Preparation of a questionnaire for collecting data during a structured interview of past and present Project Managers, Assistant Project Managers, Procurement Contracting Officers, and representative contractors.

c. A secondary review of literature which may have been acknowledged by the respondees as containing guidance on contracting strategies.

DATA COLLECTION - The data collection would be a compilation of the verbal responses to each question of the questionnaire and a summation of any specific portion of a reference document addressing the subject matter.

DATA ANALYSIS - In as much as the data collected was primarily subjective, no attempt was intended toward analyzing the data, however those areas where a preference trend is indicated by the respondees should be recognized by the reader.

IV. RESULTS OF LITERATURE SURVEY

The results of the literature survey disclosed a lack of sufficient documents that specifically address the subject of "contracting strategy" as defined by the author. Previous investigators who have compiled a Taxonomy and Inventory of Official Acquisition Management Documents[2] also failed to identify any documents which addressed this subject. However, the documents listed in Appendix D appear to be those from which the majority of program managers obtain their basic guidance for weapon acquisitions.

Of those few documents that did discuss contracting strategy in some way to a limited sense, they each appeared to approach the subject in a different manner. The Defense Acquisition Study[3] by the National Security Industrial Association considered this subject from the viewpoint of contracting techniques. Appendix E contains an excerpt of the findings of that study.The Introduction to Military Management[4] considered this subject from the viewpoint of being an art. Appendix F provides an excerpt from that booklet.

V. RESULTS OF INTERVIEWS/QUESTIONNAIRES

Appendix G lists the organizations which were solicited for responses to the questionnaire. The significant questions and the responses thereto are summarized below in the same candid wording in which they were presented:

1. What intuitive and/or management skills do you feel are needed most importantly by the PM to make good contracting strategy decisions?

- o Understanding corporate philosophies/strategies
- o Knowledge of Armed Services Procurement Regulation (ASPR)
- o Knowledge of funding cycle
- o A feel for the contractor's financial position/motivation
- o Knowledge of government legal and contracting advice resources
- o Experience
- o Understanding of Dod weapon system acquisition process

2. Do you feel the contracting strategy(ies) for Navy missiles is (are) different from the other weapon systems?

- o Yes - more in-house depth to support procurement activities
- o No. The acquisition process and the alternative methods of contracting are for the most part common to all weapon systems. The unique differences may need special handling/attention
- o Yes - Second source and GFE make it so
- o Yes - Missiles are bought upon the assumption that Government data packages are perfect (government has performance risk) and they budget for ECP's to correct it
- o No - They are similar from the stand point of contracting
- o Yes - Different from aircraft in that they are procured

in greater quantities and consist of fewer component disciplines

- o Yes - That's bad because they have been treated like a round of ammunition without the benefit of an integrating contractor
- o Yes - Because of their utilization, O&S costs are a much smaller piece of the life cycle costs (6-8%) with missiles than with other systems. Procurement costs (WPN) constitute the greatest percentage of the pie
- o Yes - Contracts are for specific sections of the missile from different contractors, with missile assembled by the Navy at a Navy Weapons Station
- o Yes - For unmanned, automated guided vehicles the warrantee system is probably best - i.e., the contractor is responsible for all breakage or non-performance. Where the Gov't operator controls vehicle performance (Aircraft or non-automated missiles) the normal buy-off procedure is best

3. To what extent should the civilian Deputy PM be utilized in the contracting strategy process?

- o Significantly
- o Key role - alter ego of PM
- o Would depend on his individual qualifications
- o Should be a business manager vice an engineer and help plan the procurement strategy
- o Should be involved to the same degree as the PM
- o Should be the plans officer - responsible for ensuring that the long range program (> 90 days) satisfies the objectives of the

PM and higher authority

- o Should be in concert with PM and provide continuity
- o To the fullest extent possible commensurate with his abilities, expertise, and interest/motivation
- o Should provide the floor which supports the decision process
- o Should be centrally involved since the PM & his civilian cadre will be responsible for making the contracting strategy work
- o Large extent but PCO most important
- o Manage the achievement of program milestones
- o Establish liaison with contracting officer to maintain contracts schedule
- o Deputy should be fully cognizant of contracting strategy and ensure all steps of program are completed to support contracting schedule

4. In what phases of the acquisition cycle should field activities be utilized in the contracting strategy process?

- o From the beginning of the concept
- o During exploratory development
- o All phases -but development primarily
- o Technical requirements review, RFP/proposal review, source selection- in all phases
- o Throughout. The ultimate objective is to put weapons systems into the fleet. Contracting strategy is only a part of the overall strategy required to accomplish that objective, and must blend with the other parts of the whole. Field activities play a significant role in the procurement process (technical

evaluation, contractor monitoring, data packages, production support, testing, etc.). Since the role field activities must play in the process impact on contracting strategy, they should be utilized in the process

- o Field activities are required to establish ILS and test and evaluation requirements. For smaller supportive contracts, field stations can manage the contract
- o Field activities should be polled for their experience & recommendations during the RFP preparation process for validation phase

5. In what phases should the functional groups be utilized in the contracting strategy process?

- o All - must monitor field activities
- o All - set basic policies and get out of technical detail
- o All - if time/talent is available there
- o RFP review, proposal evaluation and source selection
- o All - from the beginning
- o In establishing requirements and how they could be contractually integrated into the specific contracts

6. What other sources are available to assist the PM in formulating his contracting strategy?

- o Previous successful programs
- o Industry, consultants, laboratories
- o Naval Weapons Center
- o OPNAV, DDR&E, Contractors
- o Body shops - Beltway bandits

- o Other services, NAVMAT HQ
- o Consulting firms - must be used with caution, 3 potential traps - (1) through lack of familiarity, they may develop incorrect recommendation (2) if reliance is too heavy, PM may find himself in the position of having the firm become his only corporate memory (3) the firm may develop dias as a result of dealings with other clients
- o Congressional staff

7. Should the PM develop a finite contracting strategy plan, and if so, at what point in the missile program?

- o Yes - Prior to commencement of process to select prime contractor for development
- o Contracting strategy should be mature enough to be put in first procurement plan and be iterated, as necessary, in revisions
- o Yes - Plan should be developed at DSARC I and be updated as program progresses
- o Yes - As early as possible but should also be a flexible plan
- o Yes - Establish at program initiation and then modify as requirements and opportunities dictate
- o Yes - From day one, with built-in flexibilities/alternatives
- o Yes - Before you ask for a RAN/D&F and before DSARC I
- o At Milestone 0, but, vary as project moves through other gates
- o Yes - To support the budget cycle in the development phase
- o Yes - Prior to validation phase RFP preparation

8. For future Navy missile developments, what impact do you think OMB Circular A-109 will have?

- None - Basically use the concepts now. Concern is how all lower eschelons implement it
- Extremely positive
- Requires DoD components to consider a greater variety of alternatives before proceeding with FSD. A program approved under A-109 will be fully phased, i.e., it will proceed from conceptual through demonstration and full-scale development (including pilot or low rate production) before preceeding to volume production for inventory. The Congress will also be committing to fully-phased programs, some of which may extend a decade or more into the future
- Should have a large impact, however DoDD 5000.1 and 2 do not follow A-109. In the end more "nay" sayers get in the act
- Stretch out development, increase costs and provide weapons to the fleet with fewer years of available non-obsolete life remaining
- Little, unless DoDD 5000.1 is changed to support it
- Add two years of time and money to development programs
- May result in earlier definitization of project, contractor source selection. Adds emphasis on life cycle costs. Emphasises cost as a major factor. Otherwise closely parallels prior DoD approach to system acquisition, therefore, impact is not as great as it may have been on other agencies. May get Gov't cut of warhead & rocket motor loading business
- Extend the R&D process
- Keep competition longer

9. What are the advantagess of dual source competitive missile procurements?

- o Possible reduced unit costs. Analysis must be done & quantity must be large. Checks & balances on engineering/design competence. Politically advisable. More rapid capability to increase production rates in time of war
- o Wider industrial base maintained
- o Increased government involvement to keep a unified data package
- o Alternative producer if one fails to deliver
- o Mobilization base
- o Takes less time because contractor will imput greater effort for the same $
- o More than one technical approach
- o Better chance of success
- o Less likely for Gov't to be stuck with a bad idea
- o Verifies realistic performance versus state-of-art technology
- o Drives down procurement cost
- o An atmosphere of constructive conflict is created
- o Production baselines for reporcurement purposes become better defined (validated)
- o The industrial mobilization base is expanded
- o Unit product costs may be lowered
- o Competition advantages of costs and performance, if quantity can support maintaining two sources
- o By dividing the missile into parts & having associate contractor agreements between manufactures (while each manufacturer is

capable of doing the entire missile development & production).
A built in competition is available for the first production buy
(implied is procurement of level-3 MIL-D-1000 design data disclosure package)

10. What are the disadvantages of dual source competitive procurement?

- o Higher management front end costs
- o Overall cost to the Government is greater
- o Contractor monitoring and contract administration efforts are increased
- o Program manager's task is multiplied threefold
- o Cost in time and $ to get second source up to speed
- o More contractors to deal with means more people are needed to coordinate technical problems and administer contracts
- o Complexity of management increases
- o Probable higher costs due to smaller buys
- o Increased investment costs - second source tooling, qualification, test equipment
- o Increased workload on contracting personnel, contract administration personnel, test equipment certification personnel
- o Reduced ability to progress down the learning curve
- o More government involvement is required in the daily decision making of each contractor to minimize sandbagging attempts
- o Delays in obtaining contract
- o Extra expense when quantity of procurement will not support two contracts

11. What are the advantages of sole source procurements?

- o Significantly easier to administer both technically and administratively
- o Quicker with less chance of claims
- o May be the only way to buy specifically what you want
- o Clear cost advantage if valid data exists
- o Establishes a dedicated military/industrial team with one basic purpose
- o More timely response
- o Less expensive for small procurements
- o Small quantities of unique missiles or for rapid response

12. What are the disadvantages of sole source procurements?

- o Could get in rut if not managed properly
- o Takes time and effort to justify sole source
- o Generally higher costs, lower quality
- o High probability of contractor intransigence
- o Prime becomes complacent both technically and managerially. Tends to "get in bed" with government personnel
- o Uncontrolled engineering changes (marginal data package) would negate the negotiated price advantage gained during competition for the production contract
- o No alternative supplier if he fails to deliver
- o Cost per unit may increase due to no competition
- o No data package
- o No negotiations pressure

13. If your program was a "new start", what would you do differently regarding contracting strategy?

- o Less GFE - Greater numbers of components under the prime contractor
- o There are many specific changes I would make
- o Establish a strategy rather than reacting
- o Have the data package developed by the contractor and delivered to the government for subsequent competitive procurements (annual contracting assumed)
- o Initial front-end planning

14. What contracting strategy lessons have you learned that you feel should be passed on to future Navy missile PM's?

- o Emphasis on planning, reliability, maintainability and objectives
- o Motivate - technically, managerially and decisions properly
- o Review/control - data, processes and results
- o Develop a staff of competent, motivated advisors early in the program and do everything possible to insure their retention and application to the program
- o Avoid component procurements unless personnel resources are available to administer the contracts
- o Second source where possible- especially in R&D
- o Allow enough hardware lead time
- o Qualify every contractor for performance, business base and facilities
- o Do front end system engineering
- o After contract award - government/contractor unify to redo specifications realistically
- o Be careful about incentives - very hard to motivate the contractor

to do what you want him to do with incentives

- o Be flexible and develop strategy early
- o The contractor should be given a tight schedule as this will minimize costs & force problems to the surface quicker. Competition keeps the contractor incentive high

15. Figures (a) through (f) depict models of the more obvious contracting strategies. Sketch other contracting strategy models, as you see them, and note them as Figure (g), (h), etc. and describe the model.

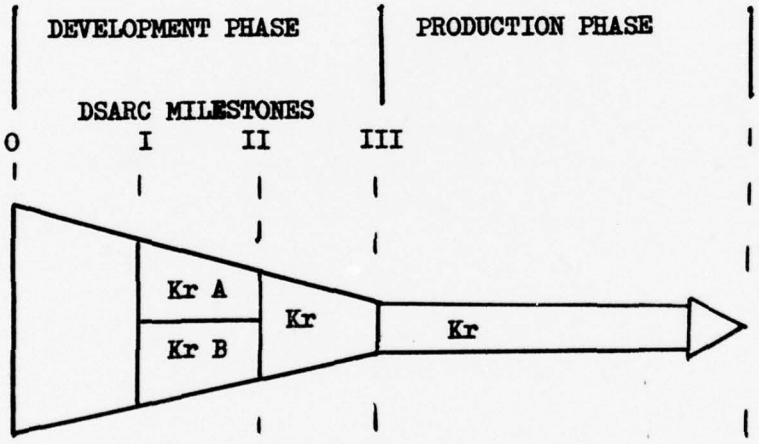

Figure (a) is a model of the Total System Prototype contracting strategy. Contractors (Kr) A and B compete in validation and the winner produces Full Scale Development hardware. Production is sole source.

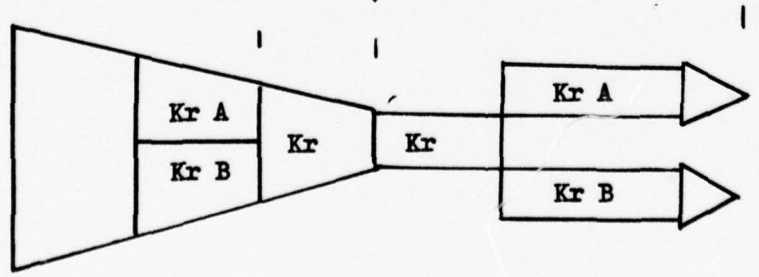

Figure (b) is a model of the Total System Prototype contracting strategy with dual source production after an initial low rate sole source procurement.

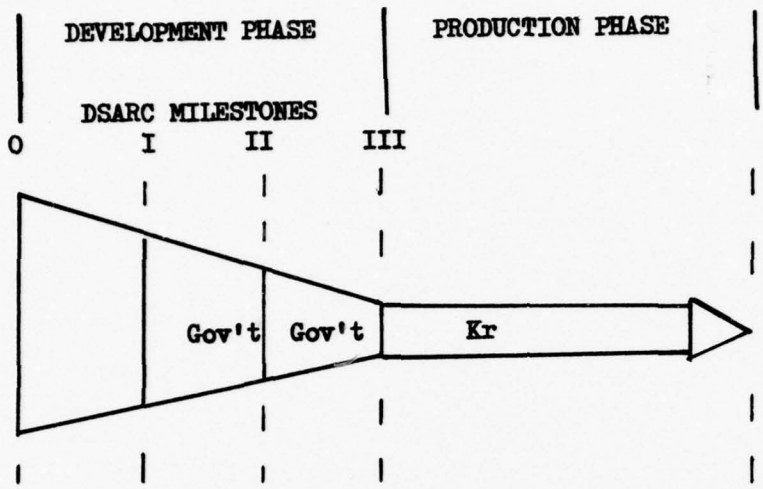

Figure (c) is a model of the government Total System development with sole source contractor production.

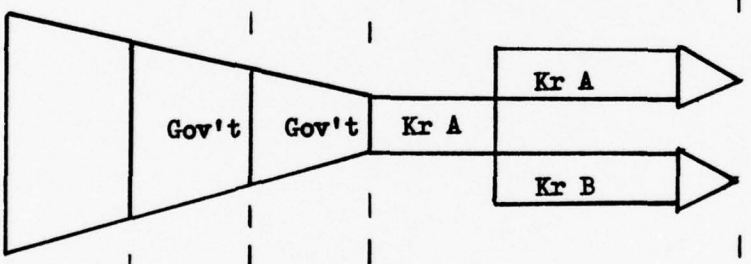

Figure (d) is a model of the government Total System development with dual source production after an initial low rate sole source procurement.

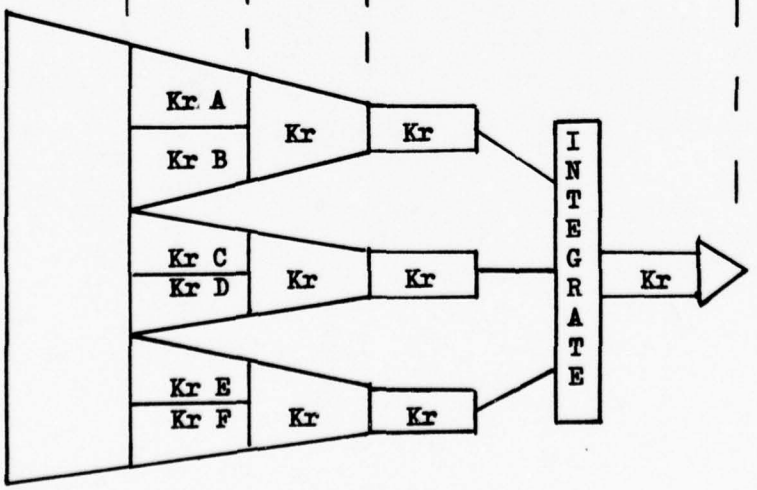

Figure (e) is a model of the contractor subsystem/component prototype contracting strategy wherein each subsystem/component is developed separately and integrated by another contractor.

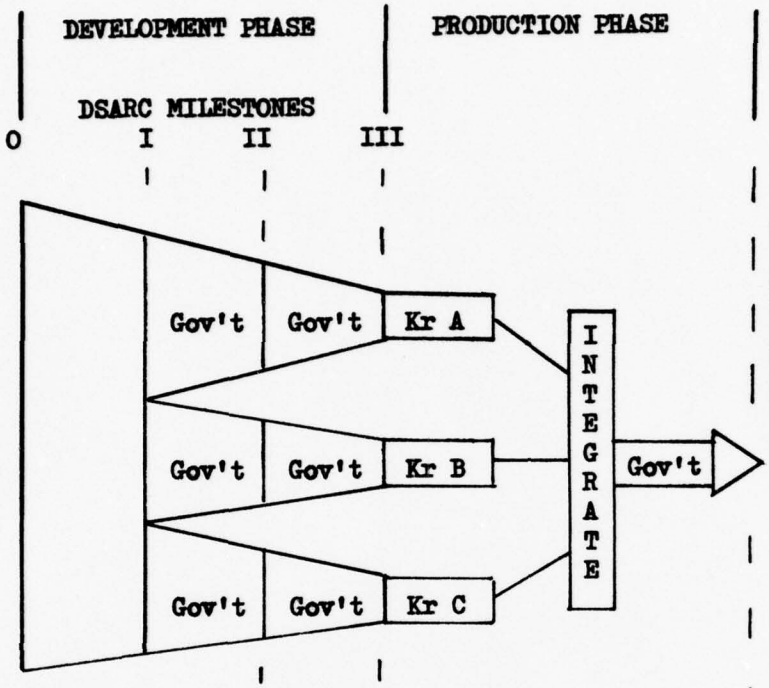

Figure (f) is a model of the government in-house sub-system/component development, competitive sub-system/component production by contractors and integration by a government weapons station.

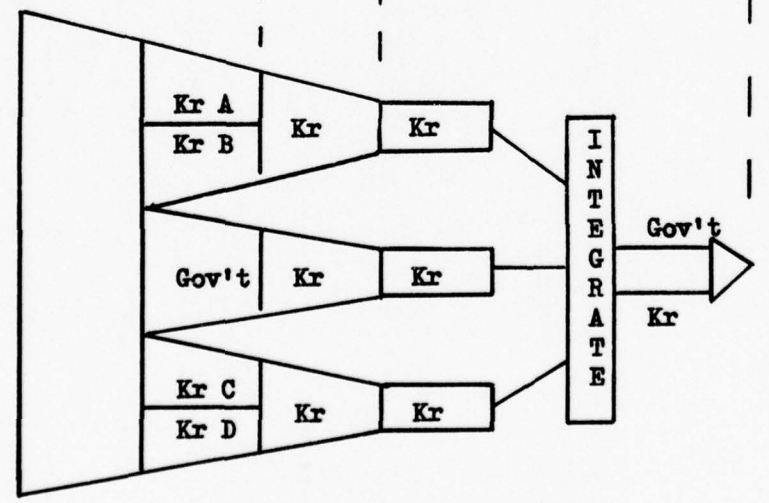

Figure (g) is a model of the sub-system/component prototype contracting strategy wherein the government and contractors develop the sub-system/component design and the prototypes and production hardware are procured competitively. The government or an integrating contractor makes the final assembly.

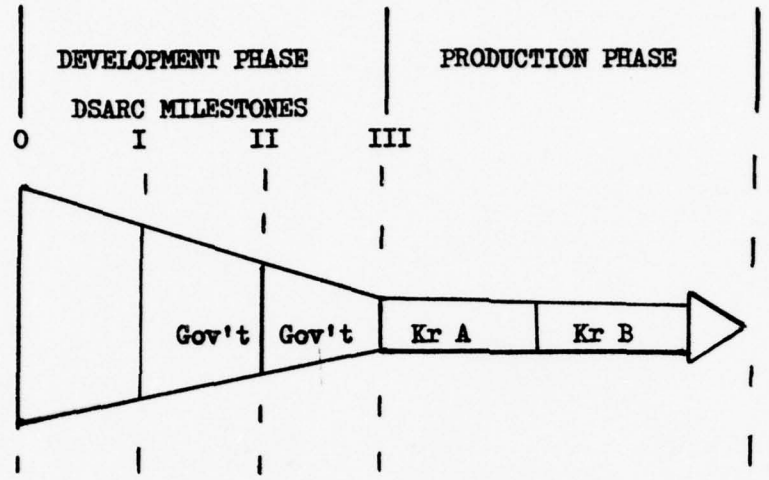

Figure (h) is a model of the Total System government development, the same as model (c) except the follow-on contract is awarded to the second contractor.

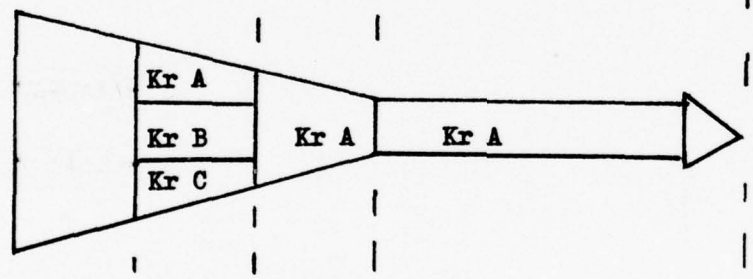

Figure (i) is a model of the Total System Prototype contracting strategy, the same as model (a) except three contractors competed in the validation phase.

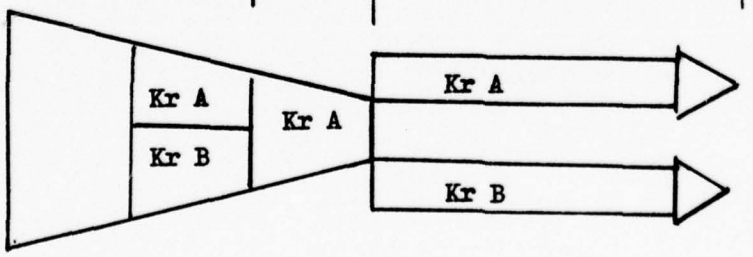

Figure (j) is a model of the Total System Prototype contracting strategy, the same as model (b) except there is no initial low rate production.

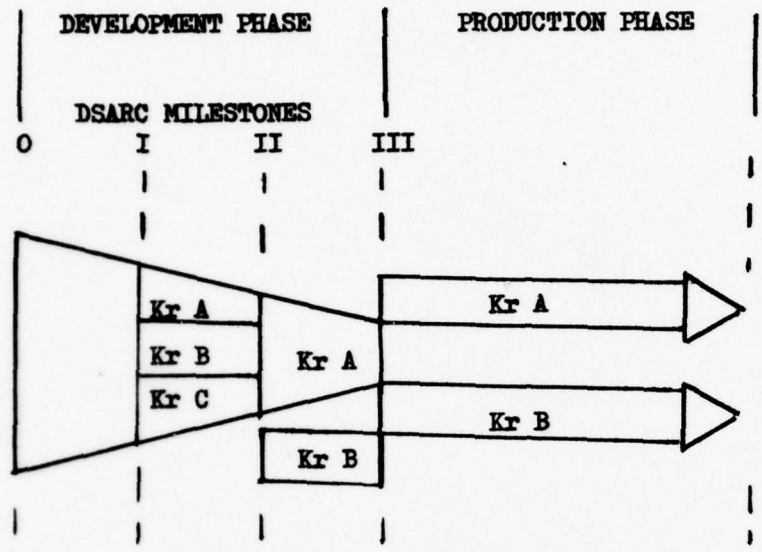

Figure (k) is a model of the Total System Prototype contracting strategy, the same as model (j) except the second source contractor assists in validating the data package and then moves into production.

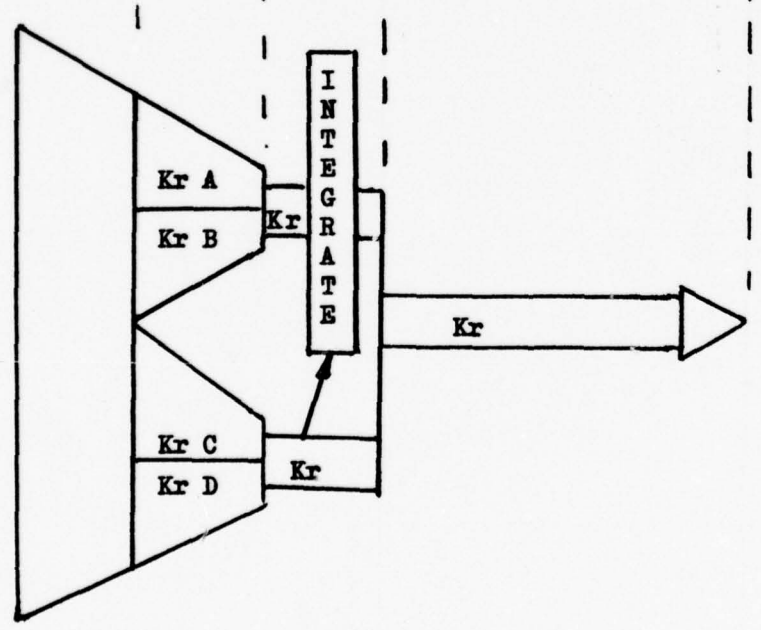

Figure (l) is a model of the sub-system/component contracting strategy wherein the FSED contractor for the major sub-system is also the integrator. Competition for first production is between contractor's capable of producing the entire system.

VI. CONCLUSIONS

It was quite evident from the literature survey that there are no "cook books" written about contracting strategies for weapon system acquisitions. However, to a limited degree, some aspects of contracting strategy can be found buried within the texts of some documents that deal with the subject of weapon system acquisition and generally the reader only stumbles over these during his pursuit of other subjects.

The respondees to the questionnaire did not offer any "cook book" approaches to contracting strategy in their comments. The contracting strategies for the past and present Navy missile acquisitions appear to be as numerous as there are missiles. This is in part due to the uniqueness of the personality and experience of each program manager, the uniqueness of the philosophy and experience of the various contractors and the uniqueness of the government-to-contractor relationships for each development/procurement. Although the program managers are unique they all appreciate the benefits of experience in a program management office and the understanding of the overall DoD weapon systems acquisition process.

In general, the Navy missile acquisition program managers realize the uniqueness of their program requires a contracting strategy for the development and procurement of a missile system involving large quantity productions at a reasonable low unit cost. However, the major exception to this is the development and procurement of strategic missiles, such as the Polaris, Poseidon and Trident, where the order reverses, i.e., smaller quantities at significantly greater unit cost. The program management offices for the strategic missiles and tactical missiles also reflect each of the organizational extremes. The strategic missiles

program management office is structured vertically and contains all of the functional expertise required by the program, whereas the tactical missile program management offices are structured to a functional matrix organization and rely heavily on Navy field activities for additional support.

There are mixed emotions and concerns among program management personnel about the effect of OMB Circular A-109. The one effect that seems to prevail in their minds is that it will tend to add time and cost to a program without any positive benefits. It will take several years before this will be proven or disproven.

The use of sole source or dual source developments and/or production procurements have advantages and disadvantages which must be weighed by a program manager when he is formulating his contracting strategy. There is no one contracting strategy model which can be universally applied to all situations. The program manager must formulate his model to reflect his best judgment of the most appropriate contracting strategy to meet the requirements of his program. There are many informational resources the program manager can call upon to assist him in his decision.

There have been many "lessons learned" by program managers over the years, now that they can look back and "monday morning quarterback" their programs. Many would make some significant changes in their programs. It seems apparent to the author that by being intimately familiar with the basic weapon systems acquisition guidance directives, communicating with fellow program managers throughout DoD, OSD, Congressional staffers and contractors, and by keeping abreast of the significant happenings in similar program offices would place the program manager in a condition

of "knowledgeable readiness" to be able to act and react as necessary to accomplish his mission with minimum perturbation.

A highlight to the author during this study was the opportunity to attend the ASRAAM acquisition strategy meeting reported in Appendix C. This was a working level meeting wherin the items basic to the nature of this study were being discussed and it provided valuable insight to the auther as to the mechanism for initiating the contracting strategy formulation process.

New 'Smart' Airplane Missile Could Revolutionize Dogfighting

By George C. Wilson
Washington Post Staff Writer

One of the "smart" weapons revolutionizing warfare is a new airplane missile that promises to change aerial dogfighting for all time.

The new missile is a major advance over the "smart" missile which supplanted the machine gun and cannon as the major weapon in aerial combat. That "smart" missile has a drawback —a blind spot.

The pilot armed with today's Sidewinder missile still has to maneuver to get on the enemy plane's tail before firing. The Sidewinder, if he does that, is supposed to home in on the heat from the other plane's engine and blow up inside it.

Today's Sidewinder cannot be fired at an enemy plane flying directly at the American pilot. Life or death still depends largely on which pilot can maneuver best within close range of the other.

The new advance that has American fighter pilots excited is a Sidewinder that can fire from head-on, from the side of the enemy plane or from the classic tail position. It promises quick kills without so much maneuvering.

Designated the AIM-9L Sidewinder, the missile is now in production and will soon be deployed on Air Froce and Navy planes. One source said yesterday that the new Sidewinder is so deadly that military officials are reluctant to let it be sold overseas where Communist countries could capture one.

The new Sidewinder's heat-seekers are much more sensitive than today's version, Pentagon officials said. The heat from the metal skin of the other aircraft is enough for the new Sidewinder to home in on.

Also, the new Sidewinder can outfly any plane in the sky today, according to military officers in charge of its development. There will be no way for today's fighter plane to escape if the Sidewinder locks on to it, they said.

During the Vietnam war, American pilots managed to foil the Soviet antiaircraft missiles partly by making steep dives and sharp turns to outmaneuver the pursuing missile.

Because the new Sidewinder is still aimed at any enemy airplane that's in the pilot's sights, the missile homes in only on the heat from it, not the launching aircraft.

Such "smart" weapons as the new Sidewinder and cruise missile promise to change not only fighting tactics but future designs of planes, tanks and artillery. Future planes, specialists predict, will not have to be as smart or as expensive as today's versions because the missile can do the maneuvering and killing.

"The age of the smart weapon is here," said William J. Perry, Pentagon research director, in an interview with The Washingtin Post. He said smart weapins will "revilutionize warfare."

AN AIM-9L SIDEWINDER
. . . installed on F-14 Tomcat

APPENDIX B

EXCERPT from PROGRAM OF RESEARCH, DEVELOPMENT, TEST AND EVALUATION, FY1978 (Bibliography Item 1)

Within Visual Range (WVR) Missiles

This family of missiles is intended to be the primary air-to-air weapons for "dogfighting" when the target is beyond effective gun range. Our interim weapon, the AIM-9L SIDEWINDER is in production and we are in the process of improving critical components such as the rocket motor and the optical fuze to make them more effective and producible. Our major emphasis for the future is to tie together a number of technology related programs and requirements studies into a Joint Navy/USAF development effort for a new missile. The AIMVAL program is a joint Navy/USAF effort which was directed by Congress with the purpose of determining the value of seeker sensitivity and off-boresight target acquisition for WVR missiles. To date, AIMVAL has completed development of the Air Combat Maneuvering Installation (ACMI), the ACMI pods, and modification of the aircraft. Flight and ground crews have completed training and first data collection flights will be flown in January 1977. Data collection will continue through September 1977 with initial reports becoming available at the start of FY 1978. We are requesting $1.6 million for the Navy and another matching $1.6 million for the USAF in FY 1978 to conduct a thorough analysis of the data produced by AIMVAL. We expect this effort to provide answers to questions on seeker sensitivity and off-boresight target acquisition and thus make a major contribution to the joint requirements for the new generation

of WVR missiles of the 1980's. AIMVAL, however, provides only a portion of the answers. We are initiating "homework" related efforts which can resolve some of the other important issues involved in the development of a new WVR missile. We need to know, for example, the relative value of cryogenic versus thermoelectric cooling, the potential benefits offered by dual mode seekers, and the potential of futuristic warheads and fuzes. The "homework" effort will be initiated at a modest level by the USAF in FY 1978 with the Navy joining this coordinated program in FY 1979. When I feel we have sufficient data to merge the efforts of the two services into a joint program, I intend to designate a lead service, develop a viable program plan, and initiate a prototype development effort similar to the BVR effort now underway. For FY 1978 I am requesting $5.9 million to investigate promising technologies involved with seeker components and other related hardware. There is no other way to gain a confident understanding of the value of these technologies and associated problems. I feel this effort must continue at this austere level and that this program meets with the guidance provided by Congress in PL 94-361.

OPNAV 5216/144 (REV. 6-70)
S/N 0107-LF-778-8099

APPENDIX C

DEPARTMENT OF THE NAVY

Memorandum

DATE 12 October 1977
APC7/JHQ

41 OCT 1977

FROM: APC-7

TO: Distribution

SUBJ: Memorandum for the Record

Encl: (1) Proceedings
(2) Attendees

1. Enclosures (1) and (2) are furnished as a brief record of the discussions and participation in the ASRAAM organization staffing meeting at NSWC White Oak, October 5 and 6, 1977 acquisition strategy.

J. H. [illegible]
PROJECT ENGINEER, ASRAAM
BY DIRECTION

Distribution:
AIR-5105
AIR-5015A
AIR-5105B
AIR-5105B1 (Darley)
AIR-503X
NAVWPNCEN (Codes 39, 39051, 3685)

PROCEEDINGS

ASRAAM ACQUISITION STRATEGY MEETING

NSWC Headquarters
5-6 October, 1977

5 October

Introductory Remarks by J. Quinn and G. Miller

Program Overview by J. Quinn

Allen Gates Presentations (Lab Roles and the Acquisition Process) plus remarks from participants on some of their experiences.

Mr. Earl Langenback presentation on his tour with OMB (Mr. Dietrich's office) particularly in regard to a proposed amendment to A-109 and A-76.

Agenda Items

OSD/Congressional Reactions to A-109 - To be acceptable, ASRAAM will be structured so as to reflect A-109 in so far as possible.

Program Initiation - Technology transfer will be accomplished through technical briefings by Government laboratories, program managers, and DOD component HQ personnel. Also GFM items may be provided as design options (WH, S&A and RM/S&A). Utilization of such technology by bidders may be encouraged through source selection. Also GFM items may be furnished where standardization is a consideration criteria and as alternatives where cost effectiveness is concerned.

Program Initiation - Exploration of alternative design concepts can be encouraged through the RFQ/RFP, e.g., requiring contractor to fully justify preformance and cost effectiveness of his particular system. Such a justification may be based upon existing/proposed/growth vis-a-vis associated risks (technical, schedules, and cost); or upon consideration of alternative subsystems.

Government-Furnished Material and Facilities - Test facilities that can be made available to bidders will be developed. Utilization rates (i.e., dollars/hour, etc.) will be provided in the RFQ/RFP. GFM items that may be considered are discussed under Program Initiation above. Particular attention may be directed toward the allocation of design requirements into physical, functional and form dimensions.

Contractor and Government Roles

Revised roles of the Navy Laboratories - Under the concept of A-109 no laboratory would be responsible for creating the weapon system design but a laboratory would be responsible for technical support to NAVAIR in assessing/monitoring development of a particular design to assure that Government requirements are included in any new weapon system and further that such requirements are meaningfully demonstrated to the satisfaction of the Government. Although the Naval Weapons Center and the Pacific Missile Test Center would be responsible for "Lead Laboratory" and "Testing/In-Service Engineering", respectively, the specifics of these roles remain to be identified. During the System Definition and Validation/Demonstration phases the degree of participation by the Government may be minimal depending upon the contracting approach (e.g., selection of FFP type contracts could limit the Government's role to test plan approval while on the other hand, selection of CP type contracts could permit Government intervention/participation on a carefully-managed basis). Further study of this problem is required.

Contracting-Out for PMA Support - Manpower and space constraints make contracting-out for PMA support a necessity and "a fact of life". The tasks for the support contracts should be minimized, low profile, and never include policy matters. Contractors should not be placed in the role of reviewing Government activity generated documents or positions but should be confined to day-to-day administrative support only.

System/Subsystem Design and Integration - Bidders/Contractors should be made aware of the total system integration problems early in the acquisition process. Physical and functional constraints (mission profiles) should be defined at the onset and the intended multiple use of the weapon on different aircraft should be described in detail through the provision of technical data packages for each launch platform application. To minimize the impact of systems integration changes/problems, bidders should be advised that all such costs must be included in the projected life cycle cost for his proposed system. And further, to keep missile and aircraft builder problems, relationships, and costs manageable the Government should be placed (contractually) between the two builders.

Planning and Source Selection - In addition to the normal Navy involvement of headquarters, field activities, and laboratory personnel in the source selection process, Air Force and Army activities will be invited to participate as well. In addition, activities outside the DOD (e.g., FAA, NASA, etc.) will be considered for involvement if their interest and resources so permit.

Contractor Monitoring and Testing - The degree of contractor monitoring and contractor/Government testing will be in direct relationship to the type of contract (e.g., FFP, or CP) selected for the System Definition and Validation/Demonstration phases. See Revised Roles of the Navy Laboratories above.

Alternative Development Plans

Following 5000.1/A-109 Prime Guidance/Deviations - As stated at the beginning of this meeting OSD and Congressional reactions to A-109 dictate that this project will be structured to reflect A-109 philosophy.

Reducing the Length of the Development

Schedule compression can be achieved by tailoring and pre-positioning decision points in such a manner that achievement of a particular milestone automatically triggers the initiations of the next event. Some DSARC and In-House reviews may be reduced to progress information presentations rather than being a solicitation of approval as they normally are. Additionally, some further schedule compression can be achieved by managing concurrency (i.e., by permitting overlap of some test programs or overlap testing and manufacturing programs).

Program Methodology

Enlisting Industry Interest, Contractual Strategy, Number of Contractors, Completion, Production Plans - Elements of each of these discussion points appear throughout these remarks and some were covered during the Program Overview at the beginning of this meeting. The impact of the above discussions on each of these areas will be reflected in the next iteration of program planning.

ASRAAM MEETING ATTENDEES

5 October 1977

Name	Activiey Code	Telephone
Charles Darley	AIR-5105/DSMC	692-8620
Allen B. Gates	NWC/Code 332	(AV) 245-3010
William B. Porter	NWC/Code 39	(AV) 245-2504
LCDR Robert L. Champoux	AIR-5105	692-8620, (AV) 228-8620
George Cooper		
Michael J. Lindemann	PMS-404-43	692-7296
Vance C. Dailey	NADC/Code 80A	(AV) 441-2500
James R. Swanson	NWC/Code 3685	(AV) 245-3784
G. O. Miller	NSWC/CA	(AV) 290-1274
Harold R. Bradshaw	AIR-503X	692-3490

APPENDIX D

OMB LEVEL

A-109 Major System Acquisitions
A-76 Policies for Acquiring Commercial or Industrial Products and Services for Government Use

DoD LEVEL

DoDD 4105.62 Selection of Contractual Sources for Major Defense Systems
DoDD 5000.1 Major System Acquisition
DoDI 5000.16D The Planning, Programming, and Budgeting System
DoDD 5000.2 Major System Acquisition Process
DoDI 5000.2 The Decision Coordinating Paper(DCP) and the Defense Systems Acquisition Review Council(DSARC)
DoDD 5000.26 Defense Systems Acquisition Review Council(DSARC)
DoDD 5000.28 Design to Cost
DoDD 5000.3 Test and Evaluation
DoDD 5000.30 Defense Acquisition Executive
DoDI 5010.12 Procurement of Technical Data and Information
DoDI 7000.2 Performance Measurement for Selected Acquisition
DoDI 7000.3 Selected Acquisition Reports
DoDI 7000.7 The Selection and Application of Management Control Systems in the Acquisition Process
DoDI 7000.10 Contract Cost Performance, Funds,Status, and Cost/Schedule Status Report
DoDI 7000.11 Contracto Cost Data Reporting

CNO LEVEL

OPNAVINST 3960.10 Test and Evaluation
OPNAVINST 5000.42 Weapon Systems Selection and Planning
OPNAVINST 5000.46 Decision Coordinating Papers(DCPs), Program Memoranda(PMs) and Navy Decision Coordinating Papers(NDCPs), preparation and processing of

CNM LEVEL

NAVMATINST 4200.49 Selection of Contractual Sources for Major Defense Systems

NAVAIR LEVEL

NAVAIRINST 4200.22C Procurement Plans
NAVAIRINST 4200.24 Selection of Contractual Sources for Major Aircraft and Missile System Acquisitions

ASPR - All Armed Services Procuement Regulations

NPD -- All Navy Procurement Directives

Other - Annual Appropriations

APPENDIX E

EXCERPT from DEFENSE ACQUISITION STUDY (Bibliography Item 3)

Contracting Techniques

Situation

Contractual arrangements between the Government and the contractor may take various forms which should be, but are not always, made dependent upon the state of uncertainty of accomplishment of the work and the degree of realism involved in cost estimates. The technical spectrum from the "impossible to define" to the "precisely defined" end product is matched by various contract types ranging from cost-plus-fixed-fee (CPFF) to firm-fixed-price (FFP) contracts. The matching of contract form and financial risk is of greatest importance; however, there is frequent failure to recognize this, which creates severe problems in reconciling contractual commitments with realities.

Recommendations

- The contract type should be selected that fits the degree to which, realistically, (a) technical requirements can be defined precisely in terms of state-of-the-art, (b) financial risk can be assumed by the contractor and (c) costs can be estimated accurately. Until all significant technical unknowns have been identified and resolved, cost-reimbursement contracts, with exact form tailored to the individual project, should be the only type used and fixed-price type contracts should be specifically prohibited.

- Firm cost or price commitments for any contract should be limited to that period of time which can be assessed with accuracy.

- Total Package Procurement should be discontinued. It should be recognized that it is impossible to estimate with precision the development and production costs for the number of years in advance that are required.

- Detailed risk analyses should be routinely required in competitive responses to requests for proposals covering new weapon systems, for evaluation with price, schedule and performance estimates.

- The Department of Defense should initiate source selection for production of new weapon systems and high risk subsystems, wherever practicable, by contracting for prototype development and testing (documented or undocumented, competitive or noncompetitive, as appropriate).

- Life-cycle time schedules established during program formulation should not be permitted to dictate movement of the weapon system into engineering and production prior to resolution of technical development difficulties which could significantly modify cost estimates or degrade performance.

- The Department of Defense should provide for postaward adjustment of fixed-price contracts to cover technical uncertainties which are encountered beyond those reasonably foreseeable at the time the contract was definitized.

APPENDIX F

EXCERPT from INTRODUCTION TO MILITARY PROGRAM MANAGEMENT (Bibliography Item 4)

Contracting

Contracting is a functional expertise, like many other functional activities which contribute to successful program execution. Yet, it is something special for the program manager. Most of the program output will be obtained through industry sources, and contracting is the means of achieving arrangements with these sources. If mistakes are made, they are longer-lasting and less amenable to simple correction than mistakes in other functional areas. Moreover, the art of contracting is particularly dependent—if it is to be done right—on an understanding of the program's requirements. Only someone intimately familiar with present and future program plans can communicate this understanding. That someone should be the program manager. It must be the program manager if he wants the right results.

The objective of the contracting process is to get the best source working for the program under the best arrangement. Every program manager and every contracting officer ought to agree on this motherhood statement. More important, they ought to agree on what logically follows from it—that competition is a tool for identifying the best source and that the contract is a vehicle for defining the best arrangements.

It would be unrealistic, however, not to acknowledge that there is a predisposition to conflict between the technical people in the program and the contracting people. To technical people, the contracting officer is often viewed as a policeman waving his book of unintelligible rules, insisting on competition for its own sake, unwilling to accept technical judgments on the sources which should be used, emphasizing price to the exclusion of any other consideration, and generally making more work and slowing things down. To contracting people, the technical man is often viewed as emphasizing technical quality to the exclusion of everything else, unwilling to consider contractor past performance, always behind schedule and trying to make it up with a quick contract award, disdainful of lead time realities, wedded to his contractor, unmindful of laws and regulations, and generally going too fast and taking too many shortcuts. Both have experienced one or many occasions of frustration with the other, when their expressed views were only a pale reflection of their innermost thoughts.

APPENDIX G

LIST OF ORGANIZATIONS WHO WERE SOLICITED FOR RESPONSES TO THE QUESTIONNAIRE

ORGANIZATION CODE	MISSILE PROJECT
NAVAIR-5105	Air-Launched Guided Missile Branch
-5105B	Sidewinder
-5105C	Sparrow
-5105D	Phoenix
-5105E	Harm,Shrike, Std ARM
-5105F	Condor,Walleye, Lazer Maverick
-5105G	Harpoon
-5105H	Tomahawk
APC-7	Advanced Short Range Air to Air Missile
PMA-242	Anti-Radiation Missiles
-245	Condor/Walleye/Mod Weapons
-258	Harpoon
-259	Infrared Missile Systems
-262	Sparrow III
-263	Cruise Missile
NAVAIR-2161	Air-to-Air Branch
-21611	Sidewinder
-21613	Sparrow
-21621	Condor/Shrike
-21622	Harm/Std ARM
-2163	Harpoon
-2164	Cruise Missile
NAVMAT-08	DCNM for Acquisitions
NSP-10	PM-1 Strategic Missiles
NAVSEA-654	Surface Missile Systems
-6541	Long Range Missile Systems
-6542	Medium Range Missile Systems
NAVWPNCEN-36202	Sidewinder
PACMISTESTCEN-2136	Sidewinder
Ford Aerospace & Communications Corp.	Sidewinder
Raytheon Company	Sidewinder, Sparrow

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