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LEVEL II

Report N00014-78-C-0048

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7923 Jones Branch Drive
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31 December 1978

Final Report for Period 21 October 1977 – 31 October 1978

Prepared for

DEPARTMENT OF SYSTEMS MANAGEMENT
DEFENSE SYSTEMS MANAGEMENT COLLEGE
Fort Belvoir, Virginia 22060

LEVEL II

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This report covers the preliminary efforts by Advanced Technology, Inc. (ADTECH) to revise SYSTEM X (a series of case studies describing a hypothetical major weapons system acquisition) course material. It provides ADTECH's plans and approaches for preparation of new case study material, data assessment support requirements for selected case study exercises, and establishes the procedures for collecting, analyzing and cataloging data to

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support the new series of cases called SYSTEM X-II (SX-II).

ADTECH's planning activities described in this report include the development of case topics and master outlines which identify management issues and the types of computer models required for use within SX-II. In addition, a listing by case study exercise of the programmatic documentation applicable to a hypothetical air-launch cruise missile (ALCM) program has been compiled for eventual preparation during a subsequent portion of the SX-II development effort. This report also contains briefing material used by DSMC's Systems Management Division to report progress toward meeting contractual requirements to the DSMC Commandant.

SUMMARY

This report covers the preliminary efforts by Advanced Technology, Inc. (ADTECH) to revise SYSTEM X (a series of case studies describing a hypothetical major weapons system acquisition) course material. It provides ADTECH's plans and approaches for preparation of new case study material, data assessment support requirements for selected case study exercises, and establishes the procedures for collecting, analyzing and cataloging data to support the new series of cases called SYSTEM X-II (SX-II).

ADTECH's planning activities described in this report include the development of case topics and master outlines which identify management issues and the types of computer models required for use within SX-II. In addition, a listing by case study exercise of the programmatic documentation applicable to a hypothetical air-launch cruise missile (ALCM) program has been compiled for eventual preparation during a subsequent portion of the SX-II development effort. This report also contains briefing material used by DSMC's Systems Management Division to report progress toward meeting contractual requirements to the DSMC Commandant.

PREFACE

The Defense Systems Management College (DSMC) at Fort Belvoir, Va. is chartered by the Department of Defense Directive 5160.55 (March 4, 1975). DSMC conducts advanced courses of study that will prepare DoD personnel to serve in program/project management positions throughout the entire major weapon system acquisition community.

The principal course of instruction at DSMC is the Program Management Course (PMC) which provides students with the opportunity to experience the actions necessary to resolve program/project management issues through simulation exercises and case studies. SYSTEM X, the current simulation exercise/case study vehicle for PMC students contains 23 cases depicting the evolution of a hypothetical CONQUEROR missile program through the various phases in the acquisition process.

The Commandant, DSMC, has determined that a sufficient number of policy, procedural and technological changes have occurred in the DoD major weapon system acquisition management environment since installation of the original SYSTEM X in 1971 to justify its complete revision and modernization. As a result, Contract Number N00014-78-C-0008 was awarded to Advanced Technology, Inc. (ADTECH) to plan for a totally revised SX-II. This report covers the planning efforts and documentation developed during the first phase of this revision process.

TABLE OF CONTENTS

APPENDICES

1.0 INTRODUCTION

1.1 Background.

SYSTEM X (SX) is a hypothetical major weapons system around which has been developed a series of case study exercises simulating the real world of project management. These cases, which were originally developed in 1971, provide Program Management Course (PMC) students at the Defense Systems Management College with a laboratory environment for identifying and analyzing management problems which are likely to be encountered during the life cycle of a major weapons system acquisition. With the passage of time, these cases had been updated and revised to incorporate changes in technology, management concepts and DoD acquisition policy. However, the need for a completely new series is apparent because the amount of effort expended to continuously update and modernize the old series has become increasingly burdensome to the DSMC facility. A new series of cases, System X-II (SX-II) is intended to incorporate the latest technology and acquisition policy guidelines while retaining those time-honored management principles which are recognized by both government and industry systems managers.

1.2 Perspective of the contractual effort.

As part of DSMC's efforts to update and modernize the PMC, ADTECH has been tasked by contract to plan for and develop SX-II course material. The type of support provided includes assistance in:

(a) Developing plans and approaches for preparation of course material;

(b) Developing plans for computer support; and

(c) Developing data bases, computer models and control programs.

Under a contract modification, ADTECH's effort was extended and the following specific tasks were added to the original contract:

(a) Development of detailed case topics and issues. This effort shall include case issue definition, development of alternative approaches and preparation of case scenarios. Data assessment requirements will also be determined.

(b) Collect, analyze and catalog weapon system data for use in the new series of cases.

2.0 SX-II DEVELOPMENT PLANNING

2.1 Methodology for SX-II development planning.

The basic objective around which the new SX-II cases are being developed has been revised to the extent that the PMC student will now be trained specifically for the position of project manager as opposed to the SX-I objective which emphasized student training for assignment to mid-level positions within a program office. In furtherance of the objective to develop entirely new cases, development planning was not constrained by the mandatory employment of training techniques which are currently utilized in SX-I. Another aspect of the planning effort specified that development of a "college solution" to the issues was not required but that a means of normalizing case material to a common baseline would be included following the completion of each case. The emphasis of each case exercise would be placed on identification and thorough discussion of possible courses of action for resolving management issues rather than gaining student understanding of a college approved "correct" answer.

2.1.1 Planning guidance. The Systems Management Division's initial guidance provided ADTECH with a baseline for the conduct of all SX-II planning. This guidance consisted of the following:

(a) The general subject areas for each acquisition phase were specified.

(b) Functional courses were to develop management concepts, DoD policy and doctrine while the SX-II cases were to provide the "laboratory" for application of these concepts and policy.

(c) A decision-oriented computer module was to be incorporated into the SX-II process to support acquisition phases I, II and III.

(d) The Cruise Missile (TOMAHAWK) Program was to form the basis for case exercise development. (Subsequently, this was changed to the Air Launched Cruise Missile (ALCM) program); and

(e) Case material to support small and medium-sixed programs was to be included in the development planning.

2.1.2 Overall conduct of SX-II cases. Planning for SX-II case development was to consider a revised case study presentation rationale. Whereas SX-I contains a highly structured approach which requires students to complete designated reading assignments and to focus on selected management issues, SX-II was to be designed to require students to "dig out" issues and possible courses of action for their resolution. Furthermore, if specific programmatic information or data was required by a student, an SX-II staff member was to take the necessary steps to ensure that the requested information is made available from the SX-II documentation library. Students were not to be required to operate data terminals. The SX-II classroom discussion should encourage students to develop several case issues and alternative solutions rather than limit their analysis to a few college-selected issues.

2.2 Preliminary planning efforts.

2.2.1 Definition of the project management process. The first step in developing plans for case studies depicting the program management environment consisted of defining the general procedures contained in each of the acquisition management phases. ADTECH analysts were able to obtain the latest DoD thinking on the management of acquisition programs through the attendance at two seminars at DSMC. These seminars entitled "Major Systems Acquisitions in the Department of Defense" were held at DSMC on 13-14 December 1977 and 6-7 February 1978. The subject matter presented provided a unique insight into the role of the program manager and his need to deal successfully with technical risk, competition and the contract as a management tool. From these initial efforts, a preliminary determination of the issues to be covered in SX-II was established to confirm the relevance of the processes defined. Appendix A contains the results of this preliminary effort.

2.2.2 Case study development considerations. It became apparent that a suitable mechanism was required to adapt the acquisition management processes and associated issues to the academic environment. A considerable degree of success had been

achieved in this endeavor for SX-I. However, considering the DSMC planning guidance provided for SX-II (paragraph 2.1.1), an entirely new conceptual approach was required. Since there appeared to be a minimum of precedence upon which to base this new type of case study development, ADTECH compiled a series of questions/considerations which were intended to expand upon and clarify DSMC's general guidance and provide the basis for the development of the additional documentation provided in this report. The reply to these questions/considerations serve as the baseline upon which the follow-on case exercise, data assessment and documentation preparation efforts will be accomplished. Appendix B contains a partial listing of these questions/considerations plus general case subject areas derived from them.

2.3 Selection of the hypothetical weapon system development program.

Identification of a suitable "real world" major weapon system acquisition program to use as a model for case study development was a critical aspect of SX-II planning. Several factors were weighed before a final determination was made. Among those factors considered were the following:

(a) The availability of data to support the development and resolution of issues;

(b) The applicability of program management issues to all three services' students;

(c) The current status of the program; i.e., whether the program had successfully passed through two or more acquisition management milestones at the OSD level;

(d) The willingness of the program management personnel at all levels to provide assistance to the SX-II development efofrt; and

(e) The ability of the program to reflect the current intent of OSD/service acquisition policy.

2.3.1 The TOMAHAWK program. The major weapons system program initially selected was the U.S. Navy's Surface Launched Cruise Missile (SLCM) also known as the TOMAHAWK. However, because

this program is keyed exclusively to filling Navy sea control mission needs, DSMC eventually decided to develop SX-II around the air-launched cruise missile (ALCM) program. Insofar as practicable, all program documentation was to reflect issues associated with that program.

2.3.2 The ALCM program. It was DSMC's position that the ALCM program addressed management issues that would provide a greater challenge to students from all three services because it had proceeded in such a way that it contained greater potential for application to tri-service mission requirements. This basic change required a major adjustment in ADTECH's planning efforts in that much of the data collected and catalogued in the SX-II data base (particularly early program documentation) were no longer applicable because the sea control mission area was no longer the primary interest. Following the decision to utilize the ALCM program as the basis for SX-II development, ADTECH intensified efforts to establish points of contact within the Air Staff as a means of obtaining necessary documentation and an understanding of the issues pertinent to ALCM development. These efforts have been fruitful. A significant amount of expertise and documentation for the ALCM has been collected and incorporated into the SX-II data base (paragraph 2.5 below).

2.4 Development of the program management scenario for SX-II.

2.4.1 The TOMAHAWK scenario. In compliance with early guidance, ADTECH developed a TOMAHAWK program scenario which described the hypothetical weapons system development through the DSARC I milestone. The scenario contained ADTECH's preliminary determination of the first six case study topics plus a description of the alternative system concepts which would be evaluated during the conceptual phase of the acquisition process. Appendix C contains copies of these scenarios plus descriptions of five alternative concepts.

2.4.2 The ALCM Scenario. The increased importance of the MENS in fulfilling OMB Circular A-109 requirements indicated the need to shift ADTECH's development priority from the ALCM scenario to the Mission Element Need Statement (MENS) in this phase of

of SX-II planning. It was agreed, therefore, that a prerequisite to the preparaton of the ALCM scenario would be the development of a MENS which would form the basis for case study exercises for all phases of the process (see paragraph 2.9.1 below). As a result, completion of the ALCM scenario will be accomplished during a subsequent phase of SX-II development.

2.5 Formulation of the SX-II data collection plan.

A methodology for identifying, collecting and cataloging various types of documents, briefings, printouts, and newspaper and magazine articles was developed and published in the SX-II data collection plan (Appendix D). This plan was implemented within ADTECH. To date, 25 newspaper/magazine articles, 51 briefings and 55 documents from the Joint Cruise Missile Program Office, the Air Staff, the Army Operational Test and Evaluation Agency, and the Naval Materiel Command, have been incorporated into this data bank. In addition, a complete catalog of DoD life cycle cost models has been prepared and selected users manuals for operational systems have been incorporated into the data base. As additional data are collected, they will be incorporated into the system in accordance with the collection plan.

2.6 Identification of specific program management issues.

As a means of emphasizing the issues which ADTECH considers critical to the major weapons system acquisition process, areas for investigation or examination and thrust areas (Appendix E) were formulated to provide DSMC with a preliminary indication of the direction ADTECH recommends for further case study development. These issues were initially conceptualized out of the TOMAHAWK project documentation (sea control mission area), but they are readily adaptable to the appropriate mission areas and issues to be resolved within the ALCM program.

2.7 Selection of case study topics.

ADTECH's recommended case study topics were identified during the preliminary planning effort (paragraph 2.2) and are based on an analysis of DODD 5000.1 and DODD 5000.2. In addition, inputs from DSMC faculty members were evaluated and where appropriate incorporated into the analysis process. DSMC staffed the ADTECH recommendations and provided the approved case study topic

sequence to be used in future SX-II planning efforts by ADTECH. Appendix F contains both ADTECH's recommended and the DSMC-approved topic areas.

2.8 Case study outlines (through Milestone I).

From the approved case study topics, the first five cases (through the DSARC I milestone) were developed in an outline format (Appendix G). The outlines provide case scenarios and summarize each case's processes, issues, and intended discussion subjects. They also provide the situational information which allows the preceding cases to be linked to the on-going and subsequent cases. It must be emphasized that DSMC stressed that the development of case outlines should not be based on anything contained in SX-I material. SX-II development should be somewhat revolutionary in nature. The outlines in their present form are considered to be "first cut" and are subject to extensive revision as additional or revised requirements for supporting documentation are identified. However, they do provide a reasonable representation of the general approach to the case study development techniques envisioned for SX-II.

2.9 Identification of the overall programmatic documentation requirements.

It was agreed during the early planning stages that a principal task of the follow-on effort would be production of a complete set of programmatic documentation to support each case study. In compiling a list of documents (Appendix H), it became apparent that the scope of the requirement was broad enough to support the use of priorities which correspond to each document's criticality to the SX-II "story line." The priority also specifies the sequence in which resources will be applied to the preparation of a particular document. Priority 1 documents are essential to the conduct of the cases and where feasible will be prepared in their entirety. Priority 2 are important back-up documents which will enhance student understanding of the case issues. Preparation of these documents will be limited to extracts of pertinent portions. Priority 3 documents contain background information which rounds out the case's story line,

but which will be prepared only as the availability of resources permits.

2.9.1 The Mission Element Need Statement (MENS). One iteration of the MENS for the TOMAHAWK system was prepared before it was decided to employ the ALCM program as the basis for case study development. Several iterations of the ALCM MENS were provided to DSMC with the latest version describing a need for an improved airborne strike system to overcome the Soviet air defense threat projected for 1985. The latest ALCM MENS was reviewed by DSMC and from that review additional guidance and an approved MENS outline was provided to ADTECH. This outline will form the basis for developing the final version of that document. Appendix I contains the TOMAHAWK MENS, the latest ALCM MENS and the DSMC outline for the ALCM MENS.

2.10 Requirements for data assessment support.

In determining the data assessment requirements for each case, it was ADTECH's objective to identify the techniques and procedures utilized in the various DoD program offices and where practicable, adapt them to SX-II. In this manner, students can be exposed to "real world" automated and non-automated management information systems (MIS) which provide valid support to the decision making process. The listing of data assessment requirements (Appendix J) is intended to demonstrate the general types of computer models which are applicable to the subject matter contained in the individual cases and also to designate those cases for which use of a MIS appears desirable. In those cases where there may not be a suitable system available to support a case exercise, ADTECH recommends the development of a tailored MIS.

2.11 Coordination of planning effort with Decision Science, Inc.

It is DSMC's intent to develop and install a series of computerized decision exercises for use by students following case numbers 5, 10 and 16. ADTECH's role in the development of these decision exercises was to provide Decision Science, Inc. (DSI) with information and data describing the weapon system acquisition process. Coordinating meetings were held at least monthly to assess progress and to solve problems in the planning effort. Data provided to DSI consisted primarily of the planning documents

which were prepared by ADTECH and for which copies are appended to this report. Additionally, complete descriptions of the acquisition processes through Phase I were provided to DSI to support their feasibility/demonstration effort.

2.12 Development of material to support DSMC briefings.

In order for the Chief, Systems Management Division to provide the DSMC Commandant with reports of progress towards meeting contractual requirements and planning for continuing support of SX-II development, ADTECH upon request prepared briefing material. Appendix K contains ADTECH's input to a briefing which was intended for use in obtaining a decision to advance into the next phase of the SX-II development program. It summarized the basic management issues which are intended to be addressed during each SX-II case exercise.

3.0 CONCLUSIONS AND RECOMMENDATIONS

3.1 Conclusions.

The following principal contractual tasks have been accomplished:

(a) Development of the case study issues and presentation techniques to be employed prior to and during each classroom session (Appendices A and K):

(b) Formalization of the case study development methodology by means of a master outline technique (Appendices B and G);

(c) Identification of pertinent acquisition management issues and processes (Appendices C and F);

(d) The SX-II data collection plan and establishment of the data base (Appendix D);

(e) Identification of detailed case study topics (Appendices F and K);

(f) Establishment of documentation requirements for each case exercise (Appendices H and I); and

(g) Development of data assessment requirements for each case study (Appendix J).

3.2 Recommendations.

That the plans and documentation contained herein be accepted as the basis for the continued development of SX-II.

APPENDIX A

PRELIMINARY SX-II CASE DEVELOPMENT CONSIDERATIONS

PROCESS

PRE MILESTONE 0

PROCESS

Recognition of need with some action required

Examination of source or cause of the need (obsolescence, technological advances; existing deficiencies, increased threat)

Type of need (strategic, tactical, total weapon system, weapon system enhancement, weapon system replacement, weapon system development)

Assignment of action officer

Form task group to:

Examine existing documentation:

Area coordination papers

Mission area studies

Force guidance/JSOP

Other intelligence

Technological base

Identify alternatives to satisfy need

Existing systems application

New technology application

Use of existing subsystem technology

Non-Government systems

Other Government laboratories

Foreign systems

Assessment of alternatives (competitive - constraints)

Cost, schedule, technical, standardization, interoperability, risk, feasibility

MENS Preparation

Recommend initiation of new system acquisition programs, document mission need, essential supporting and planning information

Planning for project initiation following Milestone 0

Budget planning

PROCESS

PROGRAM INITIATION

(PRE MILESTONE I)

1. Mission need approved - SECDEF
2. DOD component to explore alternative system concepts
3. Organize PMO
   - Charter
   - Staff
   - Funds
4. Start competitive exploration of alternatives
5. Program planning and budgeting
6. Assess results of competitive exploration
7. Select alternatives for demonstration and validation
8. Develop potential contracting strategies
9. Coordinate alternatives selected with appropriate organizations
10. Plan for Post Milestone I
11. Prepare DCP for Milestone I (coordinate)
12. Prepare DSARC presentation for Milestone I

PROCESS

DEMONSTRATION & VALIDATION

(PRE MILESTONE II)

1. Review DCP thresholds/commitments and DSARC guidance
2. Prepare PMP which reflects acquisition strategy
3. Develop demonstration criteria and evaluation plan
4. Prepare demonstration plan
5. Refine contracting strategy
6. Initiate contracting process
   Prepare RFP's for Demonstration/FSED/Init Prod
   Select Contractors
7. Conduct competitive demonstration and validation
8. Assess results of demonstration against test plan and criteria
9. Conduct Source Selection for FSED
10. Prepare planning documents
11. Update PPBS (including LLT)
12. Initiate SAR process
13. Update and coordinate DCP
14. Prepare DSARC presentation
15. Plan for Post Milestone II

PROCESS

FULL SCALE ENGINEERING DEVELOPMENT

(PRE MILESTONE III)

1. Review DCP Thresholds/Commitments and DSARC Guidance
2. Complete Test Planning (TEMP) and DT II/OT II Criteria
3. Update Acquisition Strategy and Other Planning Documents
4. Conduct Final Contract Negotiations and Award Contract(s) for FSED
5. Prepare First S.A.R.
6. Restructure Staff for FSED Phase
7. Conduct Systems Engineering for FSED
   - Update system specs; prepare development specs
   - Implement Configuration Mgt. (Allocated baseline)
   - Conduct PDR/CDR
   - Risk Reduction Effort
8. Conduct DT II/OT II
9. Conduct Producibility Analysis and Production Base Assessment
10. Conduct Logistic Planning for System Support
11. Assess DT II/OT II Results Against Criteria
12. Conduct Tradeoffs: Performance vs. Cost vs. Schedule
13. Select System (Hardware) for Production
14. Reaffirm Threat and Need
15. Conduct Deployment Planning
16. Prepare Final Contractual Requirements
17. Conduct Negotiations for Production
18. Update DCP
19. Prepare for DSARC
20. Conduct Post-Milestone III Planning

ISSUES

PRE MILESTONE 0

1. Who identifies need?
2. What is process for making need known?
3. How does the nature of the need (magnitude) influence the process?
4. What organization and administrative arrangements are most effective?
5. What data are available and what documentation is involved?
6. What documentation other than MENS is prepared - by who and what is its purpose?
7. Are all feasible alternatives identified? How severe (at this stage) should the criteria be for eliminating "least competitive" alternatives?
8. Are constraints (5000.2, paragraph C1e) identified and agreed to as boundary conditions?
9. What organizational level is responsible for MENS?
10. For MENS preparation does any subparagraph of (5000.2-C1) C1 assume primacy?
11. What other planning should be conducted pending Program Initiation (Milestone 0)?

ISSUES
PROGRAM INITIATION
(PRE MILESTONE I)

1. How and when is mission element task to be accomplished reaffirmed to be essential?
2. What lines of authority and reporting channels best meet requirements (5000.1 paragraphs IV, I and K) for strong program office management?
3. How are competent PM's and staff personnel attracted, ratained, motivated and rewarded?
4. What type of organizational structure should be used for the PMO?
5. What range of choices should be given the PM to obtain and control supporting staff resources?
6. What are the program funding requirements at this time?
7. How are funds obtained prior to formal budgeting process?
8. How are appropriate competitive alternatives identified? What are the sources?
9. What are the contracting considerations at this time (negotiations, source selection, outside support, etc.)?
10. What are considerations for developing criteria (includes constraints) for assessing alternatives and for selecting best candidates?
11. How are reliable cost estimates for alternatives developed?
12. What are the long range planning requirements?

    Follow-on program planning
    Master plans including schedules
    FYDP
    Congressional coordination
    Potential contracting strategies
    Risk identification and management
    TEMP preparation
    System Engineering (requirements analysis, technical tradeoffs, etc.)
    Logistic support (maintenance, supply support)
    LCC, DTC, DTUPC, etc.
    System Specification preparation
    Configuration Management

13. What documentation is required?
14. What are the DCP preparation requirements?
15. What are the DSARC preparation requirements?
16. How are wishes, needs and biases of interested parties handled?

ISSUES

DEMONSTRATION & VALIDATION

(PRE MILESTONE II)

1. As a result of DSARC, what changes to program plans are required?

2. What is included in PMP? (each service)
   Acquisition strategy, funding, logistics, resources.

3. How can demonstration criteria assure reqponsiveness to MENS?
   - What elements are included in making system trade-offs?
   - What elements assume primacy?
   - What should be included in evaluation plan? Who evaluates, and how?

4. What should be included in demonstration plan? (Does it permit flexibility? Should it establish goals, or goals and thresholds?)

5. What factors are likely to dominate contracting strategy in this phase? How do they influence contract type?

6. What procedures are involved, and what documentation is required, in the contracting process?
   - What is included in the sections of an RFP? Should the Demo RFP be separate from the FSED and INIT PROD RFP?

7. What should the Government's policy be with respect to:
   - Surveillance of contractor activities
   - Type and conduct of reviews
   - Other gov't support (including test ranges, labs, etc.)
   - Conduct of tests (monitor - participate - hands off)
   - Contract changes
   - Configuration control
   - Specification package
   - CDRL requirements
   - Technical transfusion
   - Schedule Slip (adherence)

- Congressional influence
- Changing plan
- Changing criteria

8. With respect to assessing the results of the demonstration,
   - How closely is demonstration required to follow test plan?
   - If it deviates, how is evaluation made against criteria?
   - Are criteria still valid?
   - How much influence should PM exercise in team organization and activities?
   - What should be done if results are too close to call (good or bad)?
   - Did planning and criteria requirements preclude innovation?

9. What actions are necessary in the source selection process?

10. What are considerations for announcing selection?
    - Is it sensitive?
    - Who announces and when?
    - How is it documented?
    - Pre-announcement coordination with whom?

11. To what extent can project planning documents be prepared pending final selection by SECDEF from among preferred alternatives?
    - Cost estimates (LCC, DTC, DTUPC, O&S)
    - Production Planning (Proc. Plan)
    - ILS Planning
    - Specification Development
    - Long Lead Item Procurement
    - Risk Assessment
    - RFP
    - TEMP
    - Source Selection Plan
    - Configuration Mgt

12. What actions are necessary to correlate program planning with the budget cycle?

13. What actions are necessary for S.A.R. preparation?

14. What actions are necessary to update and coordinate the DCP?

15. What actions are necessary to prepare for DSARC presentation?

16. What other planning should be conducted for the post milestone II period?

ISSUES

FULL SCALE ENGINEERING DEVELOPMENT

(PRE MILESTONE III)

1. As a result of DSARC, what changes to acquisition strategy are required?

2. Who is responsible for TEMP preparation?

   - What should be included in TEMP?
   - With whom is it coordinated and who approves?
   - How far into future should test schedule go?
   - How is TEMP related to DSARC process?
   - How do test criteria differ from D&V phase?

3. What planning documents require updating to reflect acquisition strategy?

4. How reliable is the production phase costing at this time? What effect does the degree of reliability have on choices of contract type and award criteria? Should 7000.2 be involved at this time?

5. Who signs the SAR?

   - Should the SAR budget data be identical to that in the FYDP and POM?
   - How candid should the report be?

6. Is PMO organizational structure appropriate? What additional staff, and of what type, is needed for this phase? Who has responsibility for T&E planning? Is additional outside support necessary? If so, what type?

   What is being done to motivate the staff? What staff and outside support planning should be done for the next phase?

7. Who updates SPEC? Implements CM? Conducts PDR/CDR? Conducts DT II/OT II? What planning is necessary for CM; PDR/CDR; DT II/OT II? Documents? How is risk identification and reduction accomplished?

What is the purpose of baselines (functional, allocated, product)?

8. What is relation between production engineering and design engineering?

Should the contractors be incentivized to improve producibility? (Corporate Capitalization Considerations)

What is the role of PESO? Should the project participate in PESO reviews?

What are the R/M/A considerations? Is system supportable?

9. What are the logistic considerations at this time? What type system test equipment is required?

10. How much deviations from plans, specs, and criteria should be allowed for DT II/OT II? What should be done if performance goals (1 or more) are not met?

11. What should be done if schedule and/or costs are exceeding thresholds?

What are the trade-off considerations if one contractor meets performance goals but exceeds cost or schedule thresholds, while another contractor meets cost/schedule thresholds but cannot meet performance goals?

12. Is there a selection sensitivity problem? If so, how should it be handled?

How is door left open for possible competition during production phase?

13. Who updates threat? Who is responsible for assessing impact of threat update or need?

14. Is planning for deployment adequate? Manpower and training and other logistic resources assured? Operational considerations (integration with existing systems) taken into account? Do production rates support required deployment? Have cost/production rate trade-offs been conducted? Do GFE schedules support production rate? What is the definition of IOC?

15. Does the prime contract include flow-down provisions? Should subcontracts contain flow-down provisions? What considerations should govern mode of progress payments? How is escalation to be handled?

16. What are advantages and disadvantages of "best and final" technique? Who should participate in negotiations?

17. What is different about the Milestone III DCP update from previous updates?

18. When should DSARC preparations begin? Who should be involved in DSARC preparation? How is contractor selection sensitivity protected? Who are the principals involved?

19. What actions and events are required to begin production phase?, contracting actions?, contractor monitoring and reviews?, subcontractor monitoring?, DCAS/DCAA/Plant Reps?, ACO/PCO functions?, budgeting?, MICS?, 7000.2 reporting and surveillance?, deployment planning?, user interfaces:, DT/OT III?, Configuration Management:, Data Management, New PM and Organization for production?

APPENDIX B

SX-II COORDINATION CONSIDERATIONS AND GENERAL CASE STUDY SUBJECT REQUIREMENTS

COORDINATION CONSIDERATIONS FOR SX SUPPORT

1. We have support tasks to:

   a. develop plans & approaches for preparation of course material.

   b. develop plans for computor support.

   c. develop data bases, computer models and control programs.

   Should we also plan on developing case material?

   If so, what are the most urgently needed cases?

2. If we (ADTECH) write case material how much interface with SX staff/ functional faculty?

3. Procedures for working with functional faculty - curriculum interfaces/ schedule interfaces/case material coordination?

4. Who has final approval on
   - Development Plan
   - Case preparation schedule
   - Computer Program Development
   - Case material
   - Tasking beyond contract scope

5. Approval to visit Air Force, Army, Navy, OSD & others to collect information & data - blanket OK or separate?

6. Computer program interface with AD HOC Committee? Other?

SX UPGRADE CONSIDERATIONS

- Large Case
  - Weapon System to be used.
  - What service (Army/Navy/Air Force) or do we use hypothetical service
  - Should it be written so with some revision it is usable for Non DOD?
  - Objectives of Instruction
    - Major program mgt. issues other than those now in SX.
    - Limit to (No.) cases.
    - - Alternatives and decision tracking by phase
      - Data base
        - How much real program data do we collect?
        - Estimated Completion date
      - Computer Support
        - Entire Programming to be done
        - Interactive Computer graphics
      - Estimated start date _____
      - Estimated Completion date _____
      - Ad Hoc C'tee
        - Objectives?
        - How participants selected
        - Contracting method

MIDDLE SIZE CASES

- Subsystem to be used and what service
- Should it be written so that with some modification it can be used for non DOD agencies
- Objectives of case
  - Issues other than those in large case
  - Number of cases and phasing
    - Alternatives and decision tracking by phase
  - Date Base
    - How much real program data do we collect?
      - Cost
      - Schedule
      - Technical
    - Estimated time to collect and total Data Base schedule interface
  - Computer Support
    - Type programming
    - What Cost, Schedule & Technical data should be included
    - Interactive Computer graphics
      - Is it needed for middle size case?
      - Estimated Start Date
      - Estimated Completion Date
    - AD HOC C'TEE - Should it be involved?

SMALL SIZE CASE

- Component to be used
  - Is it a Subcontract to middle size case?
- Should it be written so that with minor modification it can be used for non-DOD agencies?
- Objectives of case
  - Issues other than those in middle and large cases
  - Number of cases and phasing
    - Alternatives & decision tracking by phase
- Data Base
  - How much real program data do we collect?
    - Cost
    - Schedule
    - Technical
  - Estimated Time to collect and total Data Base schedule interface
- Computer Support
  - Type programming
  - What data should be included
  - Interactive Computer Graphics
    - Is it needed for Small Case?
    - Estimated start date _____
    - Estimated completion date _____

TECHNICAL

- Weapons System to be used?
- Type of course material to be developed
  - % of total curriculum hours
  - No. of cases
    - Program Initiation
    - Demonstration Validation
    - FSED
    - Production & Deployment
  - Case mix - Large, medium, small
  - How many alternatives per case?
  - How many cases require computer support?
  - How much case material is to be Engineering oriented - about same as current SX or more?
  - Interface with functional staff
    - Do functional people integrate SX material into their class work
      - If so, how is case material to be developed to assure coordination

FINANCIAL

- Almost any alternative, for most cases, can have a cost impact. If costs are to be developed for most alternatives, it will substantially increase the amount of financial data to be tracked over that in the current SX cases. Further, additional cost tracking means more computer support. The question is, "How far do we go in providing cost data for alternatives?"

- Are we going to include "discounting" in any of the cases?

- What percentages do we use for escalation?

- Should anything be included on methods of paying escalation?

- Will progress payments and cash flow be included in any of the cases?

CASE REQUIREMENTS

PRE MILESTONE 0

1. Introduce setting and players
2. Develop comprehension of 5000.1 and 5000.2
3. Emphasis on MENS process
4. Acquaint students with:
   a. Planning early effort
   b. Task force staffing
   c. Determining what available documentation is relevant
   d. Determining alternatives
   e. Determining constraints
   f. Assessing alternatives
   g. Content of a MENS
   h. Coordination of MENS for approval
   i. Planning for what has to be done in preparation for Program Initiation

CASE REQUIREMENTS

PROGRAM INITIATION

(PRE MILESTONE I)

Acquaint student with:

1. Program implementation procedures
   - PM and staff selection
   - PMO organizational support
   - Lines of authority
   - Funding
2. Personnel considerations
3. Alternative selection and evaluation techniques
4. Imposed and general constraints
   - Directives, regulations, instructions
   - Outside direction from higher authority
   - Supporting activity impositions
5. Range of program planning requirements
   - Preparations
   - Submissions
   - Requirements
6. Contract strategies
   - Types
   - Development
   - Requirements
7. DCP and relationship to MENS
   - Preparation
   - Outside influences
8. DSARC procedures
   - Preparation
   - Technique

CASE REQUIREMENTS

DEMONSTRATION AND VALIDATION

(PRE MILESTONE II)

Acquaint student with demonstration and validation phase procedures, to wit:

1. Program Plans (PMP, PP, Production Plan, CM, DM, etc.)
2. Considerations for Conducting Demo's
   - Criteria Development
   - Operational Aspects
   - Assessment
3. Contractor Process and Actions
4. Source Selection and Evaluation Process for Demo's and FSED
5. RFP Contents
6. PPBS and Long Lead Time Material Budgeting
7. SAR Contents and Process
8. DCP Updates and Process
9. DSARC Process for Milestone II
10. Post-phase Planning

CASE REQUIREMENTS

FULL SCALE ENGINEERING DEVELOPMENT

(PRE MILESTONE III)

Acquaint the student with the Full Scale Engineering Development Phase, to wit;

1. Acquisition strategy for production and contracting process.
2. TEMP preparation.
3. Program plans updates.
4. Cost estimating, 7000.2 process.
5. SAR contents and process.
6. Organizational realignment, personnel management.
7. Specification package, CM implementation, PDR/CDR conduct, DT II/OT II, risk planning, functional/allocated/product baselines.
8. Production engineering, corporate capitalization, PESO, R/M/A.
9. Logistics problems, GFE - Test Equipment.
10. DT II/OT II criteria flexibility. Performance goals.
11. Threshold identification and utilization.
12. Selection sensitivity problems.
13. Production rates and impact, deployment planning.
14. Subcontractor management, progress payments, escalation.
15. Production contract negotiations.
16. Production phase planning.

APPENDIX C

THE PROGRAM MANAGEMENT SCENARIO

FOR THE TOMAHAWK

THE ACQUISITION MANAGEMENT PROCESS

TO DSARC I

INTRODUCTION

In order to adequately support the national military strategy, the U.S. Navy functions in two primary mission areas: sea control and Power Projection. The ability to carry out these functions will allow the U.S. to utilize the seas as desired in support of national strategy and defeat the forces of any state that would seek to deny such usage.

Sea control is a fundamental mission area of the U.S. Navy. The term is used to connote control of the air, service and subsurface areas in the time frame and degree necessary for surface operations. Sea control is usually accomplished by the destruction or neutralization of hostile air, surface or subsurface platforms. It is primarily composed of two mission elements: strategic and tactical. Strategic sea control is offensive in nature and consists of the attentuation or destruction of hostile sea denial forces at some distance from the area or units to be protected. The tactical sea control mission element involves operations conducted by naval units for self protection or in local defense of supported forces.

For the foreseeable future, the major threat to the U.S. sea control will continue to emanate from the Soviet Union. Soviet anti-ship forces have been increasing in numbers and capability for decades, and while future intelligence estimates project a decrease in total quantities, the overall effectiveness of their naval forces will increase due to substantial qualitative improvements.

The trend in Soviet anit-ship weapon system technology is toward higher performance cruise missiles. Consequently, the Soviet anti-ship missile is a direct and increasing threat to the survivability of U.S. surface naval forces. It is within this framework that the CNO conducts his Mission Area Analysis and determines his capability to meet the everchanging Soviet threat to U.S. security.

SCENARIO

MAA/MENS (Case 1)

As a result of his evaluation of a strategic sea control Mission Area Analysis (MAA) stressing the vulnerability of the U.S. Navy and maritime fleets to the increasing size and capability of Soviet cruise missile (CM) delivery systems, the CNO has expressed concern about his ability to counter what is becoming a serious threat to the free use of world-wide shipping lanes and the security of U.S. coastal cities. He directs the formation of a special study group in January of the Reference Year (RY) to analyze the MAA report, determine the adequacy of current capabilities for accomplishing the sea control mission and establish the priorities for applying resources to the mission area. The study group, comprised of representatives from the operational commands, the Center for Naval Analysis, Naval Intelligence and the CNO's office reaffirms the DIA study which concluded that the Soviet's CM has greatly multiplied the offensive power of their small surface units, submarines and aircraft. From this and other threat documents, the CNO is provided with the following summary analysis:

Current (RY-1) Soviet submarines can deliver cruise missiles with nuclear warheads to targets as far as 200 NM from launch sites. By RY+3, an increasing number of nuclear weapon CM will be deployed aboard both surface ships and submarines and will be capable of achieving ranges up to 500 NM. The primary use of these CM will be in an anti-ship role; however, the additional range capability implies an increased vulnerability of U.S. Population centers to CM-equipped Soviet ships operating in U.S. coastal waters. Furthermore, projections indicate that by RY+2, the Soviet CM inventory will be sufficient to overcome the entire U.S. Navy combat capability.

Soviet ships can detect, track and classify surface targets at ranges up to 200 NM when aircraft or forward-stationed pathfinder submarines are employed to supplement ship-borne target-detection equipment. Furthermore, the Soviets are developing an extended range submarine sonar detection capability and are experimenting with satellite tracking. With this enhanced target acquisition capability, the Soviet Navy can bring diverse and strong forces together to sever sea lines of communications, and attack enemy naval forces as well as defend deployed CM-carrying submarines and surface ships.

Various U.S. weapons systems capable of engaging an underway Soviet naval force are evaluated. The only in-being or planned capability with even a remote potential for meeting this threat is the encapsulated JAVELIN which is currently in the Full Scale Engineering

Development Phase of the acquisition process. The JAVELIN is capable of being launched from surface, subsurface or air platforms. However, its current maximum effective range is 60 NM, which is significantly less than the Soviet Navy's capability to detect, track, classify and engage targets.

From his analysis of the foregoing, the CNO determines that the Study Group must be expanded into a task force to prepare and staff a sea control MENS. This task force which contains representation from OPNAV and NAVMAT, addresses the mission area in terms of the threat, need, and the existing and planned capability to meet the need. Representation from the Army and Air Force is provided on an on-call basis; i.e., when task force deliberations touch on areas that impact on these services' missions. SALT II and NATO RSI constraints are introduced at this time along with practical business considerations such as project office manning requirements and life cycle costs for a potential weapon system acquisition program. The MENS is developed by the task force, staffed within the Navy and the other services, and in June of RY-1, forwarded by the Secretary of the Navy to the Defense Acquisition Executive following the incorporation of comments from the OJCS and OSD staff. The MENS which contains a funding projection for the Program Initiation Phase is then forwarded to the Secretary of Defense (SECDEF). Here, after assuring himself that the mission need is essential and has been reconciled with other DOD capabilities, resources and priorities, to include international political considerations, the SECDEF approves the mission need in July RY. He directs the Navy to systematically and progressively explore and develop alternative system concepts to satisfy the

approved need. He approves the MENS, containing a funding requirement for $___ million to carry the program through Milestone I. At this time, the SECDEF agrees with the CNO's need assessment, directs exploration of alternatives, and commits OSD to support correction of a mission deficiency. He also stipulates that the Navy consider both the tactical and strategic capability.

PMO Establishment (Case 2)

The program Initiation Phase begins in July of the RY with the SECNAV's issuance of a program charter to the newly-appointed Program Manager (PM). The charter serves as a means of formalizing the PM's guidance and establishing his credibility for continued operation. The functions of the task force are thereby transferred to the embryo Program Management Office (PMO).

With his charter in hand, the PM establishes the following objectives for his program

1. To provide the Navy with a highly effective, autonomous, quick-reaction, long range weapon system capable of attacking surface ships and selected land targets. (Submerged vessels will continue to be addressed by ASW).
2. To consider surface, submerged and air-launch possibilities.
3. To consider a tactical as well as a strategic capability; i.e., use of the system in self protection or in local defense of supported forces as opposed to attenuation or destruction of hostile sea denial forces at some distance from the area to be protected.

The PM's most immediate task is to identify resources to staff and operate the PMO. He finds that he must choose among several competent and experienced individuals to fill his PMO vacancies and he bases his determination on a valuated selection system. He conducts interviews, reviews information from

civilian and military personnel agencies, and attempts to rank potential PMO members in accordance with their experience, education, and expertise in the applicable program area. Finally, he makes his selection.

The PM finds that the $___ million provided by the SECDEF is insufficient to accomplish the Program Initiation Phase. He must "knock on doors" to break additional funds loose to support his project and the contracting needs in the initial stages of effort. He develops his detail Initiation Phase budget totaling $___ million of which $___ million must be released immediately for competitive exploration of alternative systems concepts.

Request for and Evaluation of Concept Studies (Case 3)

In August of the RY, Requests for Proposals (RFP) outlining the threat and the overall mission need are prepared and forwarded to competent industries, Government laboratories, federally funded R&D centers, and educational institutions. The RFP states that interested organizations and agencies should submit Firm Fixed Price estimates for the conduct of studies to identify potential systems design concepts to meet the need. In September, fifteen replies are received in the PMO. With $___ available to conduct these studies, the five most responsive sources are selected and $___ earmarked for each.

As these five are conducting their studies and developing concepts, they are providing information to the Engineering and System Analysis groups of the PMO who are reviewing interim reports and preliminary data submissions. The PMO is

also determining how systems and sensitivity analyses pertaining to the system concepts will be conducted. The primary goal of this analysis planning is to decide "what the system concept(s) are that we want to pursue?"

In January of the RY, the five contractors complete their design studies and submit their final reports to the PMO. In general, the studies identify the following concept approaches:

a. A surface-launched cruise missile guided by an inertial/radar system for sea targets and a terrain-avoidence system for land targets. This missile possesses both a nuclear and conventional warhead delivery capability.

b. An air-launched cruise missile launched from a stand-off aircraft and guided to the target with an inertial/radar system plus a unique ocean floor tracking system for flights over water. This missile would be capable of delivering both nuclear and conventional warheads.

c. An extended-range JAVELIN missile using inertial/radar guidance capable of engaging surface targets with both nuclear and conventional warheads.

d. A laser satellite capable of directing a guided missile to the target in the terminal phase of flight.

e. An extended-range, remotely-piloted vehicle (RPV), with either a nuclear or conventional warhead guided from a launch vehicle (air or surface) or handed off to a second air borne or surface system after launch.

It is at this point that the PMO becomes intensely involved in analyzing and assessing the results of the competitive exploration. He establishes a concept evaluation team containing engineering, financial, procurement, and business management expertise to analyze and evaluate the various conceptual submissions. Of the five alternative concepts submitted, the Project Manager must determine the concept(s) which have a reasonable chance of meeting the

performance requirements parameters within the time frame expressed in the MAA and the MENS.

Concurrent with the ongoing management of the conceptualization effort, the PMO is planning for documentation (PMP, DCP, ILS plan, TEMP, etc.) development and collecting parametric cost data to assist in determining budgetary requirements. This early effort is supportive of the evolving acquisition strategy. In addition, with continued calls for information to support the PPBS cycles, appropriate POM inputs are made as additional information becomes available. By March of the RY, sufficient cost data have been generated to support a briefing to the Senate Armed Service Committee regarding total funding requirements. At this time, total program requirements through RY+5 are estimated to be as indicated below:

System Analysis of Performance Parameters (Case 4)

In addition to the five contractors' conceptualization studies, the development of systems performance requirements based on analysis of information and guidance from a multitude of sources is underway. Potential users, technology forecasts, laboratory studies of similar systems are all sources of data to enable the PM to develop the performance requirements for the system. With cost, schedule and risk as co-equal considerations in the development of these requirements, the PM must have some understanding of their interrelationships as he undertakes trade-off studies to determine the practical limits of requirements attainability. For example, based on these studies, he determines that the range of a missile increases as its diameter increases up to approximately 25 inches. As the missile diameter increases above 25 inches, range increases but at a decreased rate. Tentatively, the PMO established the following requirements parameters:

PERFORMANCE REQUIREMENTS

ITEM	REQUIREMENT
Max Range	800 NM
Max Range (Growth)	to 1000 NM
Min Range	10 NM
Launch Depth	Surface to 200 ft. subsurface
Launch Condition	Air and Sea
Accuracy	0.9*
Warhead Size	1200 lbs (600 H.E.)
Flight Profile	Very Low Altitude
In-flight Reliability	0.75 to 0.9

* Solely for convenience purposes and the availability of data, accuracy is expressed as the single shot kill probability (p_k). Accuracy is more precisely expressed as damage expectancy and is the product of the following probabilities: availability, launch success, flight, penetrability, collateral damage and p_k.

The two most promising proposals involve the development of two cruise missiles: the LIMA 109 (surface-launched) and the MIKE 110 (air-launched). Numerous studies, computer models and data are available which can be used to assist the PM to describe and quantify inter-relationships of the various performance characteristics for the two candidate systems. This information enables the PMO to understand the performance/cost trade-offs which apply to the proposed concepts and the extent to which each proposal can be expected to meet the system performance requirements. Both candidates have some commonality with the subsystems of the JAVELIN anti-ship missile.

Further development of parametric cost data as part of the trade-off analysis also gives the PM an updated (June of RY) estimate of the potential systems RDT&E costs:

The PM now has a fairly complete fix on what cost, risk and schedule trade-offs apply if he is to field a system capable of meeting the need. Up to this point, he has generally depended upon cost data from other system and subsystem development, but he also strives for data which will give him a more accurate picture of costs as he progresses towards Milestone I.

Basically, three general options are still open to the PM. He must decide if progress to date warrants a recommendation for program continuance to the next phase or if more concept studies are needed to provide additional alternatives. On the other hand, a recommendation to cancel the program might be in order if in his opinion, continuance is not justified due to extreme technological uncertainity, high cost or scheduling problems.

Acquisition Strategy (Case 5)

As part of the effort to obtain a decision to advance into the Validation/Demonstration Phase, the PM develops what he considers to be the optimum acquisition strategy which will lead to a successful system definition and, eventually, the attainment of a favorable decision for subsequent major milestones. The PM considers various alternatives for conducting the Validation/Demonstration Phase. For example, based on the anticipated success of the contractors in overcoming the technical risks inherent in the proposed engineering designs, the PM selects the type of prototype that will best demonstrate solutions to technical problems. The PM must also tailor his procurement concept to the level of technical risk in the program. In this

case, because the guidance and propulsion systems appear to be the principle risk areas, a CPIF contract based on improving the CEP parameter thresholds may be a viable alternative. Furthermore, SECDEF guidance stresses the importance of affordability, "fly before buy," competitive prototyping and design-to-cost goals as a means of increasing the probability of success for development programs as they proceed towards the Production Phase.

The PM documents recommendations concerning the acquisition strategy developed in a draft procurement plan which describes the integration and coordination of efforts required for development and production of the system. Identified in the procurement plan are those milestones at which decisions should be made to facilitate attainment of the procurement objectives. Procurement considerations discussed in the procurement plan include the following:

1. Program funding (through production);
2. Delivery requirements;
3. DSARC/Internal service review milestones;
4. Program risk (technical, cost and schedule);
5. Integrated Logistics Support (ILS) planning;
6. Design-to-Cost/Life Cycle Cost/Should Cost application;
7. Reliability and Maintainability (R&M) objectives;
8. Test and Evaluation (T&E) approach;
9 Management Information and Program Control Requirements:
10. Approval for Service use;
11. Government-furnished material/facilities/information;
12. Acquisition milestones;
13. Procurement approaches for proposed contracts;

The acquisition strategy for this phase, as described in the draft procurement plan, is generally based on the following:

1. Responsiveness of operational design to performance parameters.
2. Test and evaluation program ability to confirm performance levels.
3. Overall program management.
4. Cost (design-to-cost demonstration).
5. Test and evaluation criteria
   a. Completeness and realism of proposed test program.
   b. Cohesiveness of test schedule.
   c. Adequacy of test schedules for decoupling tests.

Preparation for DSARC I (Case 6)

Additional planning for actions beyond Milestone I must be accomplished at this time in order that required information for the DSARC staffing process can be developed. A PMP, TEMP, ILS plan, RFP and PP should be available for higher level review because a favorable decision at DSARC I will depend in large measure on how well the PM has planned and documented the total program.

The PM must convince the staffers and the decision makers in the chain that he has properly assessed his program.

In August, RY+1, DEPSECDEF provides additional guidance:

1. In view of SALT II, preparation for the Validation Phase should proceed without delay.
2. Delay selection of launch platform.
3. Conduct competitive flight demonstrations in RY+3.
4. Demonstrate underwater, air, and surface launch with existing operational platforms.
5. Cooperate with USAF in developing mutual technologies.
6. Navy is authorized to release RFP.

The program will include both strategic and tactical versions concentrating on both guidance and advanced small engine technology. IOC will be RY+7. Two RFP's for the Validation Phase are dispatched in January RY+1 to Global Design

Inc. and Volume Products for total system prototype development. Estimated effective ranges for both the LIMA and MIKE versions of the missile exceed 1000 miles.

In December RY+1, the culmination of the Program Initiation Phase comes into view. The primary PMO task at this time is completion of the documentation and preparation for the DSARC presentation scheduled for Feb. RY+1. Updated inputs to the POM are made as part of the PPBS process. PMO/Congressional coordination is directed at informing selected committee and staff members of the threat and need, and the system concept(s) which are being considered to meet the need.

Concurrently, an increasing amount of the Project Manager's time is involved with preparation and review of the DCP. A "For Comment" draft is promulgated containing updated Validation/Demonstration Phase funding requirements through RY+2. Resource Projections for the later phases are also provided in terms of program objectives and constraints. Comments and recommendations from the various service reviewing agencies are received, areas of disagreement are resolved and the "For Coordination" draft is released by the Secretary of Navy to the Defense Acquisition Executive.

Early DSARC coordination between the Navy and the OSD staff is conducted to define issues. The DSARC presentation is prepared, dry-run and changed, murder-boarded and rewritten, reviewed and revised, previewed by the OSD staffers where last minute issues are resolved. At long last, it is presented to the Principals in February, RY+1.

Following the actual DSARC I presentation, the DOD Acquisition Executive reaffirms the mission need and approves the LIMA and MIKE missile concepts for competitive demonstration and validation. He directs the establishment of a coordination link to the Air Force's air-launched cruise missile program and provides for program continuance that permits the PM to enter the Validation/ Demonstration Phase.

ALTERNATIVE CONCEPTS

The Extended Range (ER) JAVELIN

This weapon system is the result of a product-improvement effort for the JAVELIN missile which is currently operational and capable of being fired from air, surface or subsurface launch vehicles. The JAVELIN (ER) would be expensive because in its original conception, the missile's primary mission was small missile launching boats. Extension of the JAVELIN's mission to the destruction/neutralization of larger surface ships is primarily accomplished by an increase in warhead size to accommodate nuclear as well as larger conventional warheads. This extension also implies a requirement to improve the system's ability to find targets and guide warheads to targets beyond the missile's current range of 70 miles. As a result, the improved JAVELIN must address improved targeting and low-level, over-water guidance capabilities.

Several methods of obtaining necessary improvements are considered viable. The most reasonable at this point appears to be the high altitude, manned aircraft which is capable of not only detecting targets but also directing a JAVELIN ship or air-launched missile to the target while staying out of range of the enemy's SAM capability.

A second method is the use of the surveillance RPV which appears to be conceptually feasible, but which requires resolution of several high risk technology problems including the recovery of the vehicle at the completion of the mission.

In all, the basic missile technology employed by the JAVELIN appears to be sound. The JAVELIN (ER) will require the exploration of improved surveillance and guidance techniques as well.

Air-Launched Cruise Missile

This weapon system concept proposal envisions the use of relatively large, high-performance aircraft capable of long range surveillance and utilizing air-launched cruise missiles (ALCM) to attack enemy land targets. The aircraft itself can be either land-based or carrier-launched, and is capable of successfully defending itself and loitering over the surveillance area until relief on station is provided by another aircraft. Under normal circumstances, the aircraft's RADAR will be able to maintain effective surveillance for ranges up to 1500 miles when the aircraft is operating at flight levels above FL300.

When the order to engage the target is received in the aircraft, an air-launched cruise missile is fired. The missile which is capable of being fitted with either a conventional and nuclear warhead, dives immediately to less than 200 ft msl where it is guided to the general proximity of the target by auto-pilot instructions received from the launch aircraft. Terminal guidance is provided by active radar in the missile. The range of the missile after launch would be in excess of 1500 miles, but the practical limit is based on the capability of the launch aircraft to provide course correction information when the active radar becomes operational.

The SMART BOMB

This weapon system is dependent upon the reliable operation of a sychronous satellite for the accomplishment of the entire mission, from identification, surveillance and tracking to eventual penetration by the attacking platform. A data link between the satellite, the stand-off aircraft and the National Command Center enables the latter to direct the strike and to change orders if required prior to or during the conduct of this mission. Satellite data describing the potential target are input to the national command center. Upon appropriate command, an order is issued to destroy the enemy target. The aircraft maintains its data link with the command center through the satellite during the entire mission. The aircraft operating in a low level regime to penetrate Soviet air defenses is guided to the target area by the satellite and engages the target with the THINKROC smart bomb.

The THINKROC weapon system consists of a 500-pound MK82 laser-guided bomb mated to the ASROC rocket motor. Depending on the nature and size of the target, the THINKROC is armed with either a conventional or a nuclear warhead. The extended range version is currently capable of 24,000 yards (13.64 miles) in a primarily ballistic mode. The range could be further extended to 50,000 yards (28.41 miles) by optimized gliding design. The system requires the satellite's laser for target illumination and can use forward-looking infrared (FLIR) for night operations. The estimated cost of the THINKROC missile exclusive of surveillance requirement is $6100 perround. It could be implemented in 15 months at a cost of $4.9 million.

Improved Short Range Attack Missile(SRAM)

The SRAM is a nuclear-typed, air-launched missile designed to destroy hardened, point targets. The B-52 is currently configured to carry a mix of SRAM and gravity bombs and is the principal weapons system to be employed in manned-bomber penetration missions against the Soviet homeland. It can be utilized within two flight envelopes, semi-ballistic and low inertial. The effective ranges of the missile is these two envelopes are 65 miles and 30 miles respectively.

In light of the improved Soviet air defense capability projection for the 1980s, the SRAM's current effective range must be improved if it is to maintain its effectiveness as a contributor to the strategic TRIAD.

A suitably improved SRAM is a logical alternative to the warhead carrier proposed in the "THINKROC," the JAVELIN (ER), and the EVILEYE I missile provided SRAM's range capability can be improved without a corresponding degradation in other performance parameters.

The current SRAM is launched at less than 300 feet altitude at speeds in excess of Mach 1. The improved SRAM must exceed the optimum 500 feet CEP attainable with the version currently deployed.

The SEADOG RPV

This weapon system is dependent upon the use of a Remotely-Piloted Vehicle (RPV) as a means of accomplishing over-the-horizon (OTH) surveillance. The RPV, preferably rotary-wing to minimize take-off and landing space requirements, would operate as far as 200 miles from the launch ship and beyond that point, would possess a 200-mile surveillance range at 10,000 ft msl. A link from the RPV to the launch vessel transceives data which enables the ship's command center to localize, track and classify potential enemy surface ships. A decision can then be made to destroy/neutralize an enemy vessel which could be operating as far as 400 miles from the RPV launch vessel.

At this time, the anti-ship system consisting of a SEADOG fixed-wing RPV with an attached EVILEYE I missile is launched by the command vessel. Mid-course corrections from the surveillance RPV are transmitted simultaneously to the SEADOG and the launch vessel where mission modification can be initiated as required. Flying at low level until within 7 miles or less of the target, the SEADOG rapidly climbs to 5000 ft where it launches the 0.8 mach EVILEYE I missile for the last leg of the flight to the target.

Depending on the nature and size of the target, the EVILEYE I can be fitted with either a nuclear or conventional warhead, the latter containing 415 lbs of linear-shaped charge. The missile after launch is guided to the target with automatic contrast TV tracking by the launch vessel from signals relayed through the surveillance RPV. The extended range version of the missile is capable of engaging a target from a maximum range of 30 nautical miles to a minimum of 7000 ft slant range, but requires the installation of a sustainer to maximize its utility.

APPENDIX D

THE SX-II DATA COLLECTION PLAN

SYSTEM DESCRIPTION

The SX II Information System will consist of information files and two card files. The information files will include documentation collected during data gathering activities. The files will be organized into at least four major categories: briefings, articles, documents, and printouts. Each category will be further broken down into classified and unclassified files. The eight files will be organized independently in numerical order by an alphanumeric designation. This designation will consist of two elements: a unique serial element and a file location element. The serial element will indicate (1) whether the data item is classified or unclassified, (2) the major file category, and (3) the number of the document within that file category. As an example, the serial number CB12 indicates that the data item is the twelfth item in the classified briefing file. The second designation element will denote the physical location (file locator) of the data item. This designation will identify the location by office and whenever possible, container number and drawer number. An example of a file locator might be CCO, File 1, Drawer 2.

The two card files will consist of a Master Shelf List File and a Subject Reference File. The cards for each file will be identical, however, each card file will be organized in a different manner. A sample card is provided in Attachment A. The Master Shelf List will be arranged sequentially within the eight major

categories of the information file. This Shelf List will provide individual item inventory control for the subject card file as well as the information/data files.

Each document will be classified according to one or more subject headings which will be identified on the file card (see Attachment A). Multiple cards will be provided for each document that is classified by more than one subject heading, one for each heading. The only difference between the multiple cards will be the subject heading at the top. The Subject Reference File will be arranged in accordance with the subject headings and will also delineate the appropriate DSMC Acquisition Management Taxonomy number. In addition, each item will be classified according to the system acquisition phase(s) in which the information is useful. This subject file will be a major research/reference tool in the development of SX II case studies. It will be capable of providing general subject retrievability, i.e. all the items relevant to particular subject. In addition, the system will provide individual item subject retrievability.

Access control and individual item accountability will be maintained through the use of a "sign out" procedure. This will be accomplished through the use of a consolidated check-out log, containing ADTECH serial, name of individual, date and time of check-out, and time of return. A sample check-out log is provided in Attachment B.

SUBJECT HEADING: SX II subject index headings are comprised of the appropriate subject heading(s) and the corresponding DSMC Acquisition Management Taxonomy number, succeeded by a slash (/) and the appropriate system acquisition cycle phase(s) as delineated below:

- Conceptual (C)
- Validation/Demonstration (V)
- Full Scale Development (F)
- Production (P)
- Total Cycle (T)

ADTECH SERIAL: The ADTECH alphanumeric serial element is unique for each item of information/data. The first character designates the classification of the document (U or C). The second characher represents the major category: Briefings (B); Documents (D); Articles (A); Printouts (P); etc. These first 2 characters will be followed by a unique number within the major category assigned sequentially.

FILE LOCATION: The physical location of the data item will be provided by office and, whenever possible, by container and drawer number.

SUBJECT/TITLE: The title of the document or report or the major subject of interviews including the names of participants is indicated. The subject/title should be underlined, and the classification of the document or report will be noted.

ABSTRACT: A brief description of the major issues which were addressed by the document or during the interview. When reporting specific facts or figures discuss major impacts, if known.

SOURCE INFORMATION:

ORIGINATOR: The issuing authority or corporate author/originator as it

is identified on the document is recorded.[1] When reporting raw data item or an interview, indicate the source of information.

REPORT NUMBER: The report access or document number(s) assigned by the issuing authority or corporate author(s) is provided.

DATE: The publication or issuance date of any document should be recorded. If no date appears on the document use the designation N/A. Interview/survey dates should be indicated when appropriate.

SUBJECT HEADINGS: A cross-reference system is provided by listing all subject headings applicable to each data item. The subject heading(s) and appropriate DSMC Acquisition Management Taxonomy number will be succeeded by a slash (/) and the appropriate system acquisition phase.

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[1]When the orginator is not identified use the designation N/A (not applicable).

ATTACHMENT A

SX II Information System
File Card

Subject Heading

ADTECH Serial
File Location

Subject/Title:

Abstract:

Source Information:

Originator:
Report #:
Date:

Subject Headings:

ALL DOCUMENTS ARE TO BE RETURNED TO THE SAFE BY COB.

DOCUMENT CHECK-OUT LOG

DOCUMENT #	CHECKED-OUT BY	DATE	OUT	IN

APPENDIX E

SX-II PROGRAM MANAGEMENT ISSUES

SX-II Areas of Investigation or Examination

Summarized by Milestone within the Weapon System Acquisition Process

A. ACQUISITION PHASE: Pre-Milestone "0" - The Mission Element Need Statement.

From a Strategic Sea Control Mission Area Analysis describing a threat to the Navy's anti-ship warfare Mission Element Need Task, develop the perceived need into the initiation of a weapon system program through the MENS approval process.

B. ACQUISITION PHASE: Program Initiation.

1. As part of the initial action to generate concept proposals to meet the need, develop the optimum organization and determine the resource requirements for the establishment of the program office.

2. Evaluate five concept proposals and determine whether they:

   a. Meet the mission element need.

   b. Reflect adequately the technology base.

   c. Provide an acceptable competitive environment.

3. Develop the overall strategy for the entire weapon system acquisition process with emphasis on identifying the specific strategy for the Demonstration/Validation Phase. Evaluate an OPNAV proposal to bypass the Demonstration/Validation phase and proceed directly into the Full Scale Development Phase (FSED).

4. Overcome other "roadblocks" and objections to program continuance arising during the DCP staffing and pre-DSARC I briefings.

C. ACQUISITION PHASE: Demonstration and Validation.

1. Assess contractors' objections to the PM's "unreasonable and unattainable" D/V goals and determine evaluation criteria which can be applied to the prototype competition.

2. Establish system support concepts (ILS) which are consistent with D/V phase goals and which can be demonstrated during the prototype competition.

3. From the results of SLCM prototype competition, determine the preferred system(s) for FSED.

4. Reconfirm the acquisition strategy for the FSED phase and beyond by developing the RFP and justifying incentive fee contracts. Determine the optimum source selection evaluation criteria for the SLCM proposals and from these, select and negotiate FSED contracts with two contractors, both of which participated in the D/V phase flyoffs.

5. Establish program control measures (including a potential internal MIS capability) to assess the risk associated with the integration of the engine under development by the Navy's small jet engine program office. Identify an alternative engine and determine what effect its selection would have on SLCM program cost, performance and schedule.

6. Prepare to meet DSARC II - address potential issues including:

   a. The potential redundance associated with two similar but separate weapon systems development programs (ALCM and SLCM).

   b. The SLCM's potential producibility.

   c. The ability of the program to provide an operational weapons system within the time frame specified in the MENS.

D. ACQUISITION PHASE: Full Scale Engineering Development.

1. With the implementation of the SecDef directive to establish a Joint Program Office for SLCM/ALCM development in FSED and beyond, identify the new PMO structure and management procedures which will maximize consolidation benefits and minimize the duplication that existed in separate program development. Identify and resolve problems associated with dissimilar ALCM and SLCM program development rates.

2. In consideration of the competitive nature of the FSED effort for the ALCM and SLCM contractors, determine the extent to which beneficial cost, performance, and schedule trade-offs can be implemented for those program elements that are common to each version.

3. From the results of DT II/OT II, determine the extent to which the four FSED weapon systems meet the requirements specified in the SLCM and ALCM contracts and are capable of performing successfully in operational environments.

4. At a production review for the SLCM and ALCM, contractor A indicates that he is experiencing technical problems integrating the GFE engine into his version of the system. Determine the cost and schedule trade-offs associated with implementing the contractor's proposed fix and its effects on the total program accomplishment.

5. To what extent can potential cost and performance benefits be incorporated into ALCM production if they adversely affect the attainment of the IOC date?

6. Determine production lead time required to support the deployment of weapon systems by the IOC date. Conduct production contract negotiations with primary and secondary sources.

7. With both ALCM and SLCM versions ready for production and deployment, develop appropriate ALCM production plan changes which recognize that B-52 launch aircraft cannot be modified at a rate consistent with cruise missile production.

8. As part of the preparation for DSARC III, evaluate a British proposal to incorporate a Rolls Royce ram jet engine as the standard power plant for all CM versions utilized to support the NATO strategic defense mission.

E. ACQUISITION PHASE: Production.

1. A strike at American Steel who provides stainless steel airframe components for both the ALCM/SLCM jeopardizes the production schedule. Determine the availability of an alternate subcontractor and the cost and schedule impact of utilizing the alternate for CM production.

2. A request by Israel to purchase ALCM is received in the PMO through appropriate State Department and DOD channels. Evaluate the impact of this request on US deployment schedules and total program cost.

3. Improved circuitry for the ALCM terrain avoidance guidance system becomes available. Evaluate the impact of this potential production change on program cost, performance and schedule.

4. Operational readiness rates for the SLCM do not meet minimum acceptable standards established by OPNAV. Evaluate various alternatives for improving OR rates to include the retention of the Joint PMO after completion of deployment.

SX-II PRINCIPAL THRUST AREAS AND ASSOCIATED ISSUES

A. ACQUISITION PHASE: Pre-Milestone "O" - The Mission Area Need Statement (MENS)

From a Strategic Sea Control Mission Area Analysis describing a threat to the Navy's anti-ship warfare Mission Element Need Task, obtain SECDEF approval for the MENS and initiate the weapons systems acquisition process.

Pre-Milestone "O" issues:

1. How is the responsibility for developing the MENS determined?

2. How is it determined that all feasible existing and planned capabilities to meet the need have been investigated?

3. Does the MENS meet the entire need as expressed in the MAA?

B. ACQUISITION PHASE: Program Initiation

The thrust of this phase is the establishment of a program office for the exploration and evaluation of concept proposals to meet the need, and the definition of the acquisition strategy to carry one or more of these concept proposals into subsequent phases of the acquisition process.

Pre-Milestone 1 issues:

1. How should the Program Office be organized? How much real authority has the Program Manager been provided?

2. Who should receive RFPs for the generation of concept proposals?

3. How does the PM determine if concept proposals:

   a. Meet the mission element need
   b. Reflect adequately the technology base
   c. Provide an acceptable competitive environment?

4. What should the overall strategy be for the entire weapon system acquisition process? For the Demonstration/Validation (D/V) Phase? Should the D/V Phase be bypassed and the Full Scale Engineering Development Phase be entered immediately after the DSARC I?

5. How are proposed changes to the program ("what if" questions) handled to minimize disruption to the program and still satisfy the requirement?

C. ACQUISITION PHASE: Demonstration and Validation (D/V)

The general thrust of this phase is the expansion of the SLCM concept into a full-scale prototype for demonstration in realistic operating environments. During this phase, the preferred system is developed and actions are taken to obtain resources required to enter the Full Scale Engineering Development and subsequent phases.

Pre-Milestone II issues:

1. How does the PM determine the evaluation criteria to be applied to the prototype competition?

2. How does the PM establish system support concepts (ILS) which are consistent with phases of activity and which can be demonstrated during the prototype competition?

3. How is the preferred system(s) for FSED determined from the result of prototype competition? What action does the PM initiate when there is no clear cut winner in D/V testing?

4. What information does the PM need to estimate his resource requirements and control his program effectively? What kind of a MIS will enable the PM to maintain control without being "bogged-down" in unnecessary detail?

5. What criteria apply to the establishment of program thresholds? Which of the performance parameters should be included? What is the size of the threshold "windows?"

6. How does the PM handle the high risk associated with the integration of the small jet engine into the SLCM?

D. ACQUISITION PHASE: Full Scale Engineering Development (FSED)

The general thrust of this phase is the establishment of a Joint Program Office to supervise SLCM/ALCM development in FSED and beyond, the development of an affordable and producible full scale SLCM and ALCM which can be test flown competitively and supported successfully in operational environments, and early consideration for deployment planning.

Pre-Milestone III issues:

1. What changes to the PM's organization and management structure are appropriate after DSARC II?

2. Considering the competitive nature of the FSED effort, to what degree can information be transferred from one contractor to another?

3. How is the winner of FSED fly-offs determined when there is no clear performance leader?

4. Should the small engine be incorporated into the production missile as GFE or should the prime missile contractor be responsible for the engine acquisition?

5. To what extent can potential cost and performance benefits be incorporated into ALCM production if they adversely affect the attainment of the IOC date?

6. Should a second production source be identified? If so, how does the PM incorporate this requirement into his program?

7. What production planning changes does the PM accomplish when it becomes apparent that ALCM launch platforms (B-52/B-1) will not be available at the same rate as production missiles?

8. What action does the PM take in response to a British proposal to incorporate a Rolls Royce ram jet engine into all CM missiles deployed in support of the NATO strategic defense mission?

E. ACQUISITION PHASE: Production

The thrust of this phase is the production of ALCMs and SLCMs within programmed cost and schedule goals, and the deployment and support of the missiles in the field?

Post-Milestone III issues:

1. What is the proper relationship between the PM and the prime's subcontractor? At what point should the PM become actively involved in subcontractor problems?

2. What action is taken by the PM to incorporate in Israeli FMS request for missiles into his production schedule? How will this request impact on the program?

3. How is an Engineering Change Proposal (ECP) which proposes a significance change in ALCM circuitry handled in the PMO?

4. How much contractor support is required in the field during and after missile production and deployment? What is the proper role of the PMO after missile deployment?

APPENDIX F

SX-II CASE STUDY TOPICS

ADTECH
Recommended Sequence of Cases
for SX II

Case #	Subject
1	MAA/MENS
2	Establishment of the Project Management Office
3	Concept Studies
4	Systems Analysis of Alternative Conceptual Approaches
5	Acquisition Strategy and Long Range Planning
6	Preparation for and Briefings of DSARC I
DSARC I	
7	Systems Engineering
8	Systems Support Concepts
9	Technical Demonstration and Validation
10	RFP Preparation
11	Source Selection
12	Program Planning and Control
13	Preparation for DSARC
DSARC II	
14	Engineering Design Verification
15	Test and Evaluation
16	Producibility
17	Production Planning
18	Negotiation
19	Planning for Deployment
20	Project Office Planning Activities
DSARC III	
21	Subcontracting
22	Foreign Military Sales
23	Production Management
24	Planning for Field Support

DSMC APPROVED TOPIC AREAS FOR SX-II

1. MENS

DSARC "0"

2. Preparation for Concept Formulation
3. Concept Studies
4. Systems Analysis
5. Acquisition Strategy and Management Planning

DSARC I

6. Contractor Performance Monitoring
7. Logistics Planning
8. Test and Evaluation
9. RFP, Source Selection and Contract Negotiation for FSED
10. DSARC II for FSED Decision

DSARC II

11. Software Development
12. Change Management
13. Subcontractor Management
14. Reprogramming and Restructuring
15. Production Planning
16. Second Source

DSARC III

17. FMS
18. Configuration Change in Production
19. Fielding

APPENDIX G

SX-II MASTER OUTLINES THROUGH DSARC I

SX II MASTER OUTLINE

CASE #1

A. TITLE: Mission Area Analysis (MAA)/
Mission Element Need Statement (MENS)

B. ACQUISITION PHASE: Pre-Milestone "0"

C. TOPIC: Procedures, actions and analysis required to:

1. Develop MENS
2. Establish budget wedges
3. Establish manpower needs for program initiation.
4. Develop general plan for program initiation.

D. REFERENCES:

1. DODD 5000.1
2. DODD 5000.2
3. Under Secretary of Defense, Research and Engineering Memo, subject: Mission Element Need Statement, dated 18 January 1978.
4. ALCM Program Documentation

E. PROCESS:

1. With a threat assessment as the baseline, a Mission Area Analysis (MAA) identifies a potential deficiency which cannot be met within current or projected operational capabilities or through adjustment of mission element priorities.
2. Type of need and impact (joint or single service) identified and the requirement for MENS development specified.
3. Task force formed to:

a. Examine existing documentation:

Area coordination papers
Mission area studies
Force Guidance/JSOP
Other intelligence
Technological base

b. Assess need in terms of:

Deficiency in existing capability
Technological opportunity
Force size or physical obsolescence of equipment
Cost saving opportunity, life cycle cost potential for savings
Vulnerability of existing systems

c. Identify alternatives to satisfy need:

Existing systems application
New technology application
Use of existing subsystem technology
Non-Government systems
Non-Government laboratories' systems
Foreign systems

d. Examine constraints and apply to alternatives:

Affordability
Priority within mission area
Logistics and manpower
NATO RSI
Timing of need
Political (SALT) - Perceived new threat - Upsets balance
Standardization within the service

e. Determine impact of staying with present capability in terms of:

Ability to meet threat
Cost of a quantitative increase

f. Develop general plan for program initiation establishing:

Schedule
Budget wedges
Manpower needs
Participation by other DOD and non-DOD agencies

g. Prepare and staff the MENS.

F. SITUATION:

1. Lead-in to SX II Case #1.

a. Results of MAA indicate Soviet capability threatens the successful "syngergism" of the U.S. strategic TRIAD.

b. Guidance directs MENS preparation.

2. Case content:

a. Special Study Group Report contains conclusion that Soviet capability cannot be countered with current or programmed capability.

b. Task force is formed to analyze and write the MENS.

c. MENS is staffed and presented to SECDEF for decision.

d. SECDEF approves MENS and directs development of alternative concepts to meet need.

3. Issues:

a. Who is responsible for identifying and prioritizing the need?

b. How does the nature and magnitude of the need influence the process?

c. Are there more than one applicable Mission Area Analyses (MAA)? Do these analyses provide conflicting conclusions? How is the conflict resolved?

d. How is the responsibility for developing a MENS determined?

e. What are the governing factors for determining the most effective task force organization and administrative arrangements?

f. What data are relevant and what documentation is pertinent?

g. Does the MENS clearly point toward the correction of the deficiency through the weapons system acquisition process or can it be solved some other way?

h. Is documentation other than MENS required? If so, who prepares it and what is its purpose?

i. Are constraints (DODD 5000.2, paragraph IVC1e) identified and agreed to as boundary conditions?

j. What budget and manpower planning should be conducted pending program initiation (Milestone 0)?

k. Can the MENS be applied to more than one mission area or mission element?

l. To what extent should the MENS meet the entire need as expressed in the MAA?

m. Will more than one service or agency, i.e., Army, Navy, etc., have an interest in a potential major weapons development effort?

n. What other general planning is required before Milestone "O"?

4. Case wrap-up:

a. MENS is approved and SECDEF guidance received.

b. Service Chief designates the PM and initiates the conceptual phase.

G. METHODOLOGY:

1. Prior to class meeting:

a. Students are taught principles of MENS/MAA development and the essentials of the Pre-initiation Phase (Milestone "O") decision-making process in the functional courses.

b. Students develop comprehension of issues through a study of the references and hand-out materials.

c. Results of MAA Special Study Group analysis is presented by a briefing and supporting documentation.

d. Guidance regarding MENS preparation to meet need in TV presentation.

2. In-class actions by students:

a. 5-person work groups:

(1) Receive hand-out directing formation of task force to write MENS.

(2) Each student acts as a specific member of the TF representing the appropriate agency.

(3) Analyze available documentation to include conflicts of information on mission needs and priorities for filling needs.

(4) Analyze and complete a draft MENS outline.

b. 20-person sections:

(1) One 5-person work group briefs the results of its deliberations.

(2) General discussion of approaches and problems.

(3) Next series of cases introduced.

H. SUPPORT REQUIREMENTS:

1. Audio/Visual/Video:
Guidance by staff chief on closed-circuit TV.
Film strips are utilized to support MAA briefing.

2. Data assessment support:
NA.

3. Participation by non-SX staff:
MAA guidance presented by senior faculty members.

SX II MASTER OUTLINE

CASE #2

A. TITLE: Preparation for Program Initiation

B. ACQUISITION PHASE: Program Initiation

C. TOPIC: Project office procedures, actions and analysis required to:

1. Establish technological baseline.
2. Determine scope of alternatives.
3. Develop detailed acquisition strategy to Milestone I.
4. Develop an RFP for concept studies.
5. Determine extent of other federal agency participation.
6. Establish budgetary requirements.

D. REFERENCES:

1. OMB Circular A-109-Major System Acquisitions 5 APR 76.

2. Armed Services Procurement Regulations:

   a. ASPR 3-508.3 and 3-508.4-Information to Offerors

   b. ASPR 3-805.2 and 3-805.3-Written and Oral Discussions

3. DODD 5000.1-Major System Acquisitions - 18 JAN 77.

4. DODD 5000.2-Major System Acquisition Process - 18 JAN 77.

5. DODD 7045.7-Planning, Programming and Budgeting System - 29 MAR 75.

6. ALCM Program Documentation.

E. PROCESS:

1. Obtain and examine pertinent data from available technology forecasts and data bases.

2. From technology baseline, perform preliminary assessment of the level of technology required to meet the need expressed in the MENS.

3. Initiate development of acquisition strategy and concept evaluation plans:

   a. Determination and establishment of data sources;

   b. Identification of the need for and method of obtaining additional funds

4. Plan for acquiring alternative concepts;

5. Identify and evaluate possible sources for concepts;

6. Establish evaluation team for proposals in response to concept study RFP;

7. Develop selection criteria for proposals;

8. Select sources with proposals that merit consideration;

9. Determine funding requirements of sources selected to develop alternative concepts;

10. Determine non-financial resources required to support concept development;

11. Establish evaluation team for concepts submitted as product of concept study contracts;

12. Develop broad Life Cycle Cost estimates for concepts that meet technological criteria and other constraints;

13. Establish cooperative work agreements with other federal and DOD components.

14. Determine PPBS submission requirements to support total program for Demonstration and Validation.

F. SITUATION:

1. Lead-in to SX II Case #2:

   a. SECDEF approval of the mission need as documented in the MENS.

   b. The Program Office is established:

      (1) Initial funds for Program Initiation Phase activities authorized.

      (2) Program charter provided.

      (3) Initial project office staff assigned.

(4) Technology Forecasts and data are requested from various sources.

2. Case content:

a. Project Manager and project office staff involved in the following activities:

(1) Identifying and evaluating possible concept sources;

(2) Obtaining and assessing technological data for determining the scope of alternative to meet the need.

(3) Soliciting alternative concepts:

(a) RFP issues outlining threat and mission need;

(b) Proposals received, evaluated against established criteria;

(c) Most responsive proposals selected and contracts negotiated for concept development;

(4) Preparation for concept evaluation:

(a) Evaluation team established;

(b) Concept evaluation plan weightings scoring techniques, etc. completed;

(c) Government cost estimates obtained;

(d) Alternative concept studies received for evaluation.

b. Project Manager determines requirement for other federal and DOD agency participation.

c. Contracting strategies, acquisition strategy and PPBS submission under development.

3. Issues:

a. How should the project office use the technology forecast in the concept study evaluation to determine technical feasibility and risk?

b. What evaluation of the mission element need is required prior to initiating identification of competitive alternative concepts? How does this evaluation limit the scope of alternatives to be considered?

c. What other data are required to support project office activities in this phase, what sources are available to provide the necessary data and what agreements are required to obtain the data?

d. What are the considerations in developing an acquisition strategy for the Program Initiation Phase? What objectives and milestones should be established?

e. What should the RFP for concept studies contain? On what basis should proposals be evaluated?

f. How are alternative concepts to be evaluated (cost, technical feasibility, etc.) and what expertise is required on the evaluation team?

g. What are the contracting requirements at this time (selection criteria, negotiation, source selection, outside support, etc.)?

h. Are there implications concerning other DOD components to be addressed and what means will best achieve a cooperative agreement with other services? Is OSD direction to the other services required?

i. In what manner can the most reliable cost estimates for alternatives be developed given the lack of hard data upon which to base them?

j. What are the funding requirements for the phase, are adequate funds available and how are additional funds to be obtained if necessary prior to the formal budgeting process?

k. What are the Planning, Programming and Budgeting System requirements at this point in the phase?

4. Case wrap-up:

a. Responses to RFPs are received and ranked.

b. Acquisition strategy for phase is established.

c. Additional funds requirements are requested for program initiation.

d. Memoranda of Agreement with other federal and DOD agencies are coordinated and issued.

H. METHODOLOGY:

1. Prior to Class:

a. Functional Course Instruction

Students are instructed in the following:

(1) Technical data analysis
(2) Life cycle cost modeling in support of alternative analysis
(3) Risk analysis
(4) Contract types and strategies
(5) Contracting methods with contractors, government labs, universities, etc.
(6) Operational concept definition for alternative evaluation
(7) Cost estimating techniques
(8) Budget formulation
(9) RFP development and proposal evaluation
(10) Group problem solving and decision making

b. Outside Class Requirements

(1) Thorough understanding of technological forecasts;
(2) General understanding of:

(a) Acquisition strategy to Milestone 1;
(b) RFP requirements;
(c) Proposal evaluation;
(d) Cost estimating approach for concept studies

(3) Examination of appropriate references.

2. In-class Actions by Students:

a. 5-person work groups

(1) Technological forecasts provided to students;

(2) Contractor concept study proposals (in response to RFP) evaluated to eliminate those that are "far out".

(3) Technology base and technological forecast data to be assessed, provided to students via computer data base accessed through computer terminal;

(4) Each 5-person group prepares recommendations on which concepts should be considered further.

b. 20-person Section

(1) One 5-person group presents recommendations with justification;

(2) Entire group discusses considerations in concept evaluation and phase activities during this time frame.

G. SUPPORT REQUIREMENTS:

1. Audio/Visual/Video

a. Overhead projector
b. Acetates/markers

2. Data assessment support

Use of various technical data bases as a means of establishing the technology baseline for the PM.

3. Participation by Non-SX Staff

None

SX II MASTER OUTLINE

CASE #3

A. TITLE: Operational Analysis of Alternative Concept Studies

B. ACQUISITION PHASE: Program Initiation

C. TOPIC: Actions within the Program Office to:

1. Evaluate validity of concepts
2. Determine required technology and technical risk
3. Conduct operational analysis
4. Expand notional strategy for insertion of program into the POM.

D. REFERENCES:

1. DODD 5000.1
2. DODD 5000.2
3. ALCM Program Documentation

E. PROCESS:

1. The PM initiates detailed studies of the concept proposals to determine if they:

   a. Adequately reflect the technology base and provide an acceptable competitive environment.

   b. Meet the mission need as stated in the approved MENS.

2. Information from various sources (technical support agencies, Government and commercial laboratories, potential users, etc.) is obtained to assist the PM in his operational assessment of the concepts.

3. Trade-off studies of the operational characteristics associated with each alternative are conducted to determine interrelationships.

4. Concepts are war-gamed with existing and proposed systems to determine systems integration requirements.

5. A notional Program Management Plan (PMP) containing the results of the operational analyses and the ranking of acceptable proposals is developed.

6. Planning for systems analysis of concept proposals is initiated.

F. SITUATION:

1. Lead-in to SX II Case #3:

a. Contractors provide "progress reports" as their efforts to develop conceptual approaches to meeting the need mature.

b. Concurrent with the development of the concepts, the PM contracts with Governmental and non-Governmental agencies for analyses of technologies being considered by the various organizations developing the concept proposals.

c. Other documentation begins arriving in the PMO from various sources: study reports, capabilities documents, trade-off studies, etc.

2. Case Content:

a. PMO analyzes concept proposals from the various sources to determine interrelationships of their expected operational characteristics. From these analyses, assessments of concept validity are developed.

b. Conducts trade-off studies of each proposed concept's performance parameters to determine which are reasonably attainable within current or projected technology. These studies also highlight integration problems with operational systems.

c. Begins gathering parametric and engineering cost estimates as a means of projecting funding requirements for the later program phases.

d. Eliminates from competition those concept proposals which fall short of the MENS requirements.

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e. Publishes and staffs the Program Management Plan (PMP).

f. Develops notional plan to support POM submission.

3. Issues:

a. What are the most reliable and capable sources for assisting the PM in assessing the operational characteristics associated with the concept proposals?

b. What are the governing considerations for assessing alternatives and for selecting the best candidates?

c. How is the relationship between the threat and performance parameters established?

d. Should alternatives that fail to meet all operational requirements be eliminated from further consideration? If not, why should they remain within consideration?

e. To what extent should performance and risk trade-offs dictate the required system performance?

f. To what degree should current technology shortfalls dictate the establishment of required systems parameters?

g. To what extent does the performance parameter trade-off analysis influence the selection of alternative concepts for the Demonstration/ Validation Phase.

4. Case wrap-up:

a. A preliminary ranking of concept proposals based on operational analyses and trade-off studies is accomplished.

b. Action to insert the program into the POM is initiated.

c. The Project Management Plan is initiated and the results of operational analyses incorporated.

F. METHODOLOGY:

1. Prior to class meeting:

a. Students are taught basic elements of operational analysis techniques, and the essentials of trade-off and sensitivity analysis in the functional courses.

b. Students develop further comprehension of the issues through a study of reference and case handout material.

c. TV briefing stresses the importance of technical risk assessment in making the initial program decisions.

2. In-class actions by students:

a. 5-person work group:

(1) Utilizing data from various sources, evaluate alternative concepts to determine which competitive alternatives meet the MENS. The concept evaluation will be based on the following analysis:

- Degree to which the concept overcomes the threat;
- Feasibility of the concept with respect to the technology base and forecast;
- Performance and technical risk assessments of the concepts;
- Affordability comparisons among the alternatives by cost category (development, procurement, operating and support).

(2) Consider elements of a PMP, system requirements parameters, and concept selections.

b. 20-person sections:

(1) PMP and concept proposal decisions are presented and discussed as appropriate.

(2) Students are introduced to SX II Case #4.

G. SUPPORT REQUIREMENTS:

1. Audio/Visual/Video:
TV briefings (para.F1c above)

2. Data assessment support:

Extensive use of war-gaming and other predictive models as a means of developing trade-offs of operational performance parameters.

3. Participation by non-SX staff:

DSMC faculty member designated to act as service chief for operational requirements TV presentations.

SX II MASTER OUTLINE

CASE #4

A. TITLE: System Analysis* of Alternative Concept Studies

B. ACQUISITION PHASE: Program Initiation

C. TOPIC: Evaluation of each study's ability to provide realistic cost, schedule, performance and risk trade-off information as a basis for the PM's ranking of concepts for further development.

D. REFERENCES:

1. DODD 5000.1
2. DODD 5000.2
3. ALCM Program Documentation

E. PROCESS:

1. Information from various sources (technical support agencies, Government and commercial laboratories, etc.) is obtained to assist the PM in his systems analyses of the concepts.
2. Following the elimination of concepts which fail to meet MENS requirements, broad Life Cycle Cost estimates for concepts that meet technological criteria and other constraints are developed.
3. Trade-off studies of the proposed systems parameters associated with each system are conducted to determine their interrelationships. Effects of performance and schedule variances on life cycle costs are determined for the alternative concepts.
4. Concept alternatives which are capable of meeting system performance requirements within acceptable cost schedule and risk criteria are compared and selected. A determination of the role of GFE is accomplished.
5. The Program Development Plan (PDP) is updated to reflect the results of the systems analyses and the PMO's ranking of potential weapons systems concepts.

*Any analytic study of a broad and complex problem that calls for deciding on a preferred course of action.

F. SITUATION:

1. Lead-in to SX II Case #4:

   a. The concept alternatives are narrowed down to eliminate "high-risk" solutions from either an operational or technical affordability point of view.

   b. Results of various trade-off study reports begin arriving to assist the PM in his systems assessment of alternative concepts.

2. Case content:

   a. PMO analyzes trade-off studies from the various sources to determine interrelationships of the general performance specifications associated with each concept proposal.

   b. PMO conducts its own trade-off studies of each proposed concept's cost, performance, schedule and risk to verify other data and determine which systems should be carried forward into the Demonstration/Validation Phase.

   c. Obtains parametric and engineering cost estimates as a means of projecting funding requirements for the later program phases.

   d. Nominates subsystems for which GFE are available.

   e. Eliminates from contention those concept proposals which obviously provide unfavorable cost performance, schedule and risk trade-off results.

   f. Updates the Program Development Plan (PDP) to reflect the results of the systems.

3. Issues:

   a. Which cost estimation methodology must the PM rely on?

   b. What are the most reliable sources of information to assist the PM in assessing the systems performance specifications associated with each concept proposal?

   c. What are the governing considerations (in addition to previously developed criteria) for assessing alternatives and for selecting the best candidates for the Demonstration/Validation Phase?

d. Should alternatives that fail to meet all the design criteria be eliminated from further consideration?

e. To what extent can the non-quantifiable parameters (qualitative - such as growth potential and risk) be considered in the analysis?

f. To what extent should cost, schedule and risk trade-offs specify the required system performance?

g. To what extent should the timing of cost expenditures influence program decisions?

h. To what degree should current technology shortfalls dictate the establishment of required systems specifications?

4. Case wrap-up:

a. The ranking of concept proposals is completed.

b. The Project Development Plan is updated to reflect the PMO selection of the concept(s) to be carried into the Demonstration/Validation Phase of the program.

c. Action to insert the program into the POM is completed.

F. METHODOLOGY:

1. Prior to class meeting:

a. Students are taught basic elements of trade-off and systems analysis techniques in the functional courses.

b. Students develop further comprehension of the issues through a study of reference and case hand-out material.

2. In-class actions by students:

a. 5-person work group:

(1) Utilizing the results of various trade-off studies and sensitivity analysis, evaluate alternative concepts to determine which competitive alternatives will be recommended for Demonstration/Validation. The concept evaluation is based on the following:

- Cost, schedule and technical risk assessments of the concepts;

- Cost estimate comparisons among alternatives.

(2) The PDP is updated to reflect the recommended concept(s) for Demonstration/ Validation. Prepare to brief results to 20-man working groups.

b. 20-person work groups:

(1) Concept analysis results are presented and discussed as appropriate.

(2) Students are introduced to SX II Case #5.

G. SUPPORT REQUIREMENTS:

1. Audio/Visual/Video:
None

2. Data assessment report:
Use of predictive models as a means of developing trade-offs from sensitivity analysis of cost, performance, schedule parameters.

3. Participation by non-SX staff:
None.

SX II MASTER OUTLINE

CASE # 5

A. TITLE: Acquisition Strategy and Long Range Planning

B. ACQUISITION PHASE: Program Initiation (pre-Milestone I)

C. TOPIC: To develop technical, business and management plans associated with all phases of the major weapon system acquisition process.

D. REFERENCES:

1. Armed Services Procurement Regulations (ASPR)

2. DODD 5000.1 and DODD 5000.2

3. DODD 5000.3, Test and Evaluation

4. DODD 5000.28, Design to Cost

5. DODD 5000.29, Management of Computer Resources in Major Defense Systems

6. DODI 7000.2, Performance Measurement for Selected Acquisitions

7. Air Launched Cruise Missile Program documentation

E. PROCESS:

1. Identify potential acquisition strategies for the Demonstration/Validation Plan. For example:

   Technical characterization*
   Total system prototype
   Contractor subsystem/component prototype
   Field activity subsystem/component prototype
   Other combination

2. From the data generated in Case #4 regarding cost, schedule, risk and technical requirements, analyze and rank the potential acquisition strategies and determine appropriate contracting alternatives.

*Technical characterization involves analysis of all available data without resorting to development of any specific hardware. Separate testing of "on-the-shelf" hardware may be conducted in order to develop additional data.

3. Initiate program control and MIS planning activities. Insure that the resulting requirements can be tailored to the characteristics of the total program.

4. Write and staff the various supporting plans (ILS, TEMP, PP, Program Management Plan, etc.) and prepare to submit plans to higher authority for approval.

5. Select the appropriate acquisition strategy which complies with DOD/service guidance and appears to have the best chance of meeting ultimate program goals.

6. Prepare requests for Proposal (RFP) for the Demonstration/Validation Phase.

F. SITUATION:

1. Lead-in to SX II Case #5:

a. SECDEF guidance regarding overall program considerations is received.

b. Additional qualitative data addressing the level of development risk associated with specific components of the concept proposals selected are received in the PMO from external sources.

c. The PM has rejected any further consideration of bypassing the Demonstration/Validation Phase because in this case, this approach would be contrary to guidance received.

2. Case Content:

a. From analysis of concept proposals and the interrelationships of cost, schedule, performance and risk associated with the Proposals, the PMO identifies his acquisition strategy options.

b. SECDEF guidance is applied to the various strategies.

c. The PMO recommends the adoption of a particular acquisition strategy.

d. Criteria for evaluation of contractor efforts in the Demonstration/Validation Phase are developed.

e. Draft PP, TEMP, ILS and PMP are prepared, staffed and submitted as appropriate.

3. Issues:

a. In light of the SECDEF's guidance, what acquisition strategy alternatives remain open to the PM?

b. How does the contracting strategy relate to the acquisition strategy?

c. How can competition be encouraged?

d. What potential contracting strategies are justifiable at this time?

e. To what degree are contracting incentives appropriate in the Demonstration/Validation Phase of the program?

f. How are the long range planning requirements incorporated in the program and documented for review at the appropriate command levels, such as:

Follow-on program planning
Master plans including schedules
PPBS
Congressional coordination
Potential contracting strategies
Risk identification and management
TEMP preparation
Systems Engineering (requirements analysis, technical tradeoffs, etc.)
Logistic support (maintenance, supply support)
LCC, DTC, DTUPC, etc.
Configuration management
NATO RSI

g. To what extent can previously generated data (Case #4) be relied upon as the basis for program planning? How can more reliable data be obtained?

h. Assuming that the above requirements are successfully completed, at what point is the PM ready to appear before DSARC I?

4. Case Wrap-up:

a. Criteria for evaluation and source selection for the Demonstration/Validation Phase established and incorporated in the procurement plan.

b. Documentation (DCP, TEMP, ILS, PP, etc.) is prepared, staffed and submitted for approval.

c. The PMO completes the documentation and is prepared to meet with DSARC I.

G. METHODOLOGY:

1. Prior to class meeting:

a. Students are taught principles of acquisition strategy and the long-range planning process in the functional courses.

b. Students develop comprehension of SX II issues through a study of the references and handout materials.

c. On a "visit" to OSD, PMO receives SECDEF guidance by means of a TV interview with the Acquisition Executive.

2. In-class actions by students:

a. 5-person work groups:

(1) A potential acquisition strategy alternative is prepared by the student PMO who then discusses the result in the 20-person class.

(2) Student PMO's complete a draft procurement plan (PP) outline, incorporating appropriate decisions/recommendations based on data analysis and prepare to discuss in 20-person sessions.

b. 20-person work groups:

(1) PP and other pertinent documentation is presented by 5-person work groups as a means of stimulating discussion.

(2) Students are introduced to SX II Case #6.

H. SUPPORT REQUIREMENTS:

1. Audio/Visual/Video:

TV discussion with Acquisition Executive at OSD.

2. Data assessment support:

NA

3. Participation by non-SX staff:

DSMC faculty member designated as the Acquisition Executive for SECDEF guidance portion of the case lead-in.

APPENDIX H

SX-II PROGRAMMATIC DOCUMENTATION

SX-II DOCUMENTATION REQUIREMENTS*

Pre-Milestone "0"

Case #	Title	Documentation	Priority	Remarks
1	MAA/MENS	MAA	1	Summary analysis
		Threat Analysis	1	
		MENS	1	
		SecDef Memo	1	
		Charter	1	
		Conceptual Phase		
2	Preparation for Concept Formulation	Technological Forecast	1	
		Conceptual Phase Studies	1	
		RFP for Concept Studies	2	SOW +
		RSI Plan	1	
		Proposals (5) for Concept Studies	3	
		Contracts (5) for Concept Studies	3	
3	Concept Study Results	Concept Studies (5)	1	New concepts (3) Product Improvement concepts (2)
		PPBS Input	1	Projections for D/V
		Operational Analyses of Concepts	1	
		Concepts Evaluation Results Memo	1	
4	Systems Analysis	System Analysis Studies	1	Cost, performance, risk, and schedule, trade-offs
		Subsystem Improvement Studies	1	Propulsion and guidance subsystems
		Propulsion Subsystem (GFE) Evaluation Results	1	

*The cases and supporting documentation listed are intended to represent the scope of the requirement. Actual cases and documentation will be based on DSMC guidance and applicability of the case subject matter to the management issues to be developed.

Case #	Title	Documentation	Priority	Remarks
5	Acquisition Strategy	Program Master Plan	1	
		DCP	1	
		Source Selection Report	1	Two winners
		T&E Master Plan	2	
		ILS Master Plan	2	Includes facilities and personnel plan
		PPBS Update	1	
		Demonstration/Validation Phase		
6	Contract Execution and Control	DSARC I - DCP Decision Memo (OSD)	1	
		Contracts (2)	1	Extracts - Post-award conference instruction
		Functional Baseline	1	
		Technical approach (2)	1	Refinement of concept proposals. WBS.
		Taskings to field agencies		T&E, ILS, etc. requirements
7	Operations and support Planning	ILS Master Plan (update)	1	Emphasize maintenance concepts, test equipment, manpower and training
8	Test and Evaluation	Test and Evaluation Master Plan (update)	1	Test matrix material
		Contractors', Service Agencies' software test requirements	2	

Case #	Title	Documentation	Priority	Remarks
9	RFP, Source Selection and Contract Negotiations	RFP for FSED	1	Maintain flexibility
		Proposal(s) for FSED	1	
		PPBS (update)	2	
		Source Selection Plan	1	
		Procurement Plan (update)	1	
		SSAC Instructions for Negotiations Team	1	
10	DSARC Process	Source Selection Report	1	
		DCP (MENS update)	1	
		Contract for FSED	1	
		SecDef Decision Memo	1	
		PPBS (update)	1	
		RSI Annex to DCP	1	
		Operational Concept Document	2	

SX-II DOCUMENTATION REQUIREMENTS

Full Scale Engineering Development Phase

Case #	Title	Documentation	Priority	Remarks
11	Software Development	Software Plan (design, development, schedule, test, integration)	1	Translate user requirements into computer software requirements.
		Configuration Management Plan	1	
		Software baseline documentation	1	
		Results of Software testing	1	
		Design review report	1	
12	Change Management	Government Configuration Management Plan	1	
		Contractor Configuration Management Plan	1	
		DTII/OTII Test Plans	2	
		Test Results	2	
		ECPs	1	
		ECP Evaluations	1	Sample with cost, schedule and technical information
		CCB Action/Direction documents	1	
		Changes to supporting documentation	2	ILS, TEMP plans
13	Production Planning	Production Plan	1	Includes facilitization considerations
		GFE integration plan	1	
		PESO report	2	Production Readiness Review
		Make or buy plan(s)	1	
		QA plan	1	
		DTC (DTUPC & DTLCC)	1	
		DODI 7000.2 implementation	1	

Case #	Title	Documentation	Priority	Remarks
14	Second Source	Procurement Plan	1	
		Standard Parts List	2	
15	Subcontractor Management	Make or buy plan (update)	2	
		Contractors' plan for subcontractor management	1	
		Flowdown provisions (in prime contract)	3	
		Subcontractor performance review plan	1	
16	Reprogramming Restructuring	DCP (update)	1	DSARC III version
		Proposals for Production	3	Cost/Schedule data
		POM FYDP (update)	2	
		SAR	1	
		Congressional Reprogramming Notification	1	
		Comptroller Memo of Intent	1	
		Production and Deployment Phase		
17	Foreign Military Sales	LOA	1	DD Form 1513
		LOA Checklist	1	
		Contract	2	Extracts
		Cost and schedule profiles	1	
		Logistic support plan for FMS	1	
18	Configuration Changes in Production	DTIII/OTIII Plans and Test Results	1	
		Technology report(s)	1	
		Cost and Schedule profiles	1	
		Systems analysis report (s)	1	
19	Fielding	Deployment plan	1	
		PM/Log Cmd MOU	2	
		PM/Contractor Assistance Plan	2	
		Contractor's Customer Assistance Plan	2	
		Readiness Reports	1	

APPENDIX I

MISSION ELEMENT NEED STATEMENTS

MISSION ELEMENT NEED STATEMENT (MENS)

I MISSION

A. MISSION AREA - Strategic Sea Control

B. MISSION ELEMENT NEED TASK - Strategic sea control provides for the attenuation or destruction of hostile sea denial forces at some distance from the area or units to be protected, and encompasses operations designed to locate and destroy hostile Navy combat units on the high seas.

II THREAT

The vulnerability of the US Navy and maritime fleets bears a direct relationship to the increasing size and performance capability of Soviet Cruise Missile (CM) delivery systems. Current Soviet submarines can deliver a CM with a nuclear warhead as far as 200 nautical miles (NM). By 1975, nuclear CM's will achieve ranges up to 500 NM and will be deployed aboard both surface ships and submarines. The increased accuracy of these missiles in-

dicates that they will be utilized principally in an anti-ship role; however, the additional range capability implies an increased vulnerability of US population centers as well. Table 1 lists the current and 1975 projections for the total Soviet CM's and their respective ranges. These projections indicate that by 1975, the Soviet CM inventory will be greater than the US inventory of warships.

SOVIET CRUISE MISSILES

(with nuclear potential)

SHIPTYPE	NUMBER SHIPS NOW	NUMBER SHIPS 1975	TYPE MISSILE	MISSILES PER SHIP	MAXIMUM RANGE-
NANUCHKA	6	28-32	SSN-9	6	200
DDG	8	6	SSN-1	9	150
CLGM	16	10	SSN-3B	4-8	500(200)**
SSG/SSGN	95*	95-110	SSN-3A	2-8	500(250)**
TOTAL MISSILES		NOW -- 600 1975 -- 630			

From DIA Estimates Jan 1972
* 10 with Tactical Range of 50 NM
** Tactical Ranges

Table 1

Recent studies indicate that Soviet ships with helicopter-borne radar can provide a detection capability in excess of 100 NM. When supporting aircraft or forward-stationed pathfinder submarines are employed, detection ranges are extended to 200 NM. In addition, Soviet submarine sonar developments will yield a target detection capability in excess of 200 NM and their experiments with satellite tracking point to efforts to significantly extend their target acquisition capabilities in the near future.

The employment of Soviet Naval Forces relies on redundancy in numbers and types of systems. The basic principles of coordination and integration of air, surface, and submarine forces are emphasized by Soviet Naval Force planners. It is evident that the Soviets intend to employ their forces in a manner which maximizes the advantages of this methodology.

Mutual defense of Soviet air, surface and submerged CM delivery systems is also accomplished through the application of these principles. Soviet ocean surveillance through early detection, target classification and priority assignment provides the capability of bringing diverse and strong forces together to support and defend a Soviet naval force. The Soviet CM contributes to the

efficacy of the concept by enabling Naval attack forces to launch large numbers of missiles from several widely-dispersed platforms, thereby expanding the operational area and increasing the scope of the US target acquisition problem.

Cruise missile trends are directed towards higher performance missiles launched primarily from submarines and surface ships, but which also may be launched from aircraft such as the BACKFIRE. The Soviet CM and its delivery capability pose a direct and increasing threat to the survivability of coastal population centers and to US naval forces in direct confrontation on the high seas and when within range of Soviet land-based aircraft.

It is emphasized, therefore, that dealing with the Soviet threat requires that air, surface, or subsurface elements be considered as separate components which, when properly orchestrated, contribute a synergistic effect to the entity. Conversely, reduction or elimination of the effectiveness of any one threat element would significantly contribute to the reduced effectiviness of the other elements.

III EXISTING AND PLANNED CAPABILITIES TO ACCOMPLISH THIS MISSION ELEMENT NEED TASK

A. Development of a capability to destroy Soviet missiles enroute to target areas is considered a sub-optimal approach because Soviet ECM and low level guidance capabilities provide a high probability (.5) that one or more missiles from a successful multiple launch will reach the target. Furthermore, an effective counter threat requires a strike capability of extended range equal to or greater that the launch vessel's target detection capability.

Existing and planned capabilities to accomplish this mission consist of the following systems:

1. Air-Launched Weapons. - Present air-launched weapons surveyed for applicability to the Soviet threat include those shown in Table 2. The table also denotes the deficiencies associated with each air-launched weapon.

Air-Launched Weapons Surveyed

Weapon	Deficiencies
ALPHA	No night-attack or all-weather capability. Only a glide weapon.
BETA	No night-attack or all-weather capability.
CHARLIE	Only 250-lb warhead and inadequate standoff range.
DELTA	Range limited, small warheads, and need radiating target.
ECHO	Daylight attack only.
FOXTROT	Anti-air type warhead; requires command mid-course quidance.
GOLF	Short range, small warhead.

Table 2

2. Ground Launched Weapons. The CONQUEROR missile with a gross weight of 7000 lbs is currently capable of achieving fixed ground target CEPs of 100 meters at ranges exceeding 200 miles. However, the missile flies a ballistic course which cannot be corrected in the terminal stage.

3. Ship-Launched Weapons. - The operational ship-launched weapons with capability beyond gun range are the HOTEL missile and the WHISKEY, YANKEE, and ZULU weapon systems. All of these missiles use semi-active homing and are consequently horizon-limited to about 15 to 21 nautical miles; in addition, they carry relatively small warheads. The SIERRA is a surface-launched torpedo with terminal guidance; however, its relatively short range limits its effectiveness against close-in targets.

4. Submarine-Launched Weapons. - The only weapons presently available to submarines for attack of surface ships are torpedoes. Although the lethality of an underwater detonation of a torpedo warhead is very high, torpedoes are relatively short-range weapons and are thereby restricted in their effectiveness to perform such missions as task force escort or barrier maintenance. The range for the MK 40 torpedo is only about 28,000 yards (10NM) at high speed. None of the torpedo components is readily usable for application to alternate surface or air-launched systems.

The encapsulated JAVELIN which is currently approved for Full Scale Development is intended to provide extended-range capability over torpedoes. It presents a small radar cross-section, and minimal IR signature, but has little potential reserve capacity for range growth or active ECM. Its current effective range is a maximum of 60 NM, well beyond conventional Naval gunfire, but significantly less than the Soviet Navy's capability to detect and engage targets.

B. The Navy is the lead service for the development of the JAVELIN Missile. Potential Army, Air Force and NATO applications of the system are currently under study.

IV ASSESSMENT

The need is assessed as a deficiency in existing offensive capability and is an outgrowth of the Soviet's extended range CM threat. The JAVELIN missile is the only weapon system possessing favorable ECM characteristics capable of engaging surface launch platforms for the CM. However, its current capacity for range growth limits its potential to meet an expanding Soviet CM threat.

Recent technological developments are potentially useful in improving weapons delivery capabilities. They include:

- Improved terrain avoidance guidance systems through the development and utilization of microelectronic circuitry.

- Interchangeability of conventional/nuclear warheads with minimum attendant weight penalties.

- Jet engines with increased thrust/weight ratios utilizing high energy fuels.

- Remotely piloted vehicles that can be configured to a variety of mission profiles.

- Improved ECM capabilities to overcome known Soviet electronic surveillance devices.

- Materials with high strength/weight ratios.

V CONSTRAINTS

A. Strategic Arms Limitation Talks (SALT) II in limiting the number, size and capability of individual weapons delivery systems are intended to place a ceiling on the proliferation of strategic weapons and provide a methodology for the US to verify Soviet compliance with treaty provisions. The SALT II agreements must be considered in efforts to identify means of meeting the expanded Soviet CM threat described herein.

B. As more detailed information regarding potential systems to meet the projected threat is identified, it is possible that the mission profiles will overlap with the JAVELIN. In the event this situation occurs, adjustments in the program will be accomplished. In any event, the need for a capability to meet the projected threat is required in the early 1980s and is considered second in priority only to mission support of the Navy's strategic retaliatory strike capability.

C. NATO Rationalization, Standardization and Interoperability (RSI) aspects of any potential development effort must be considered. Furthermore, the potential for foreign military needs may influence the priority of weapons system development efforts.

D. The affordability aspects of any weapons system must be considered during each phase of the acquisition process. Should a need to develop a new weapons system result from this MENS, multiple capability systems which respond to diverse threats and which are capable of being delivered from a variety of launch platforms will be afforded priority whenever possible. These factors must be identified during the early stages of the systems development process, and exploited to the maximum extend practical throughout the systems life cycle.

VI IMPACT OF STAYING WITH THE PRESENT CAPABILITY

US weapons systems planned for deployment through 1985 do not possess sufficient range nor active ECM capability to overcome Soviet capabilities projected to exist by the late 1970s and early 1980s. Assuming a reconnaissance/surveillance parity by 1985, Soviet vessels will be able to engage hostile targets from distances exceeding the US ability to launch preemptive strikes. Ultimately, unless a suitable counter threat is developed and deployed, the US capability to maintain sea control is seriously jeopardized. Furthermore, increasing the number of existing systems in all cases falls short of meeting the threat

due to lack of performance capability when compared to Soviet systems. Finally, a significant increase in existing system with a view towards saturation of the Soviet target acquisition process, establishes a cost/benefit relationship which cannot be supported.

VII OVERALL RESOURCES AND SCHEDULE TO MEET MILESTONE I

Projected requirements are for establishment of a project office to be initially staffed with a maximum of 35 professional and 10 administrative/clerical staff members. Funding requirements for pre-Milestone I efforts should not exceed $7 million dollars. The Program Initiation Phase schedule leads to a DSARC I 36 months from MENS approval.

MISSION ELEMENT NEED STATEMENT (MENS)

for

The Central Conflict Engagement Mission Area of

the Strategic Warfare System

I. MISSION:

A. Mission Area

1. The Central Conflict Engagement Mission Category (CCEMC) of the Strategic Warfare System involves the employment of an integrated weapon system to accomplish specific combat tasks against enemy heartland targets. It emphasizes the use of central systems which currently include intercontinental bombers, ICBMs and SLBMs (the strategic TRIAD).

2. A principal subset of CCEMC is the strategic attack mission area which is the employment of U.S. military forces to destroy selected vital targets within the homeland of the enemy. These vital targets which include the Soviet nuclear and conventional threats, recovery resources, population, and leadership encompass the Soviet warmaking capacity and its ability to function as a nation. The TRIAD is used to attack all five types of targets.

B. Mission Element Need Task

Included within the strategic mission area is the specific Mission Element Need Task. This task requires destruction of Soviet nuclear weapon delivery means which are the principal offensive threat to the survival of the United States. The task implies the requirement to prevent total loss of the U.S. attack capability in a pre-emptive Soviet nuclear strike,

insure the system's successful launch and flight to the initial penetration point, penetrate Soviet airspace and successfully evade defenses to the target area, and inflict an acceptable level of damage on the target system itself.

II. THREAT:

A. Soviet Nuclear Delivery Forces

1. The Soviet nuclear threat is comprised of ICBMs, SLBMs, and Long Range Bombers. All of these targets are based at fixed locations on the earth's surface. They are expected to lose most of their value as targets within 24-hours after the commencement of hostilities (time-sensitive), and all are susceptible to air bursts (area targets) except the hard and super hard silos (point targets) which are vulnerable only to highly accurate ground bursts. Total projected numbers of targets by hardness and time-sensitivity are listed at Table 1. Chart 1 contains a map depicting the location of the principal nuclear delivery targets.

2. With the deployment of its Multiple Independently Targetable Reentry Vehicle (MIRV) in 19__, the Soviets will achieve nuclear parity in warhead quantities with the U.S., and significantly increase the accuracy, megaton yield and throw weight characteristics of its total nuclear weapon delivery capability. In terms of hard target kill potential (HKTP), MIRV deployment causes a numerical shift in superiority (1977 US/Soviet HTKP Ratio = 1.6; 19__ US/Soviet HTKP Ratio = 0.28) and provides the Soviet Union a decided edge in its ability to destroy U.S. ICBM silos in a pre-emptive strike.

TABLE 1

Soviet Nuclear Weapons Targets

(19__)

Category	Yield Overpressure for destruction (psi)	Time Sensitive	Total
Superhard	≥ 1700	1361	1361
Hard	≤ 1700	367	504
Medium Hard	≤ 1150	190	205
Soft	≤ 765	1890	2200

B. Soviet Defenses

Soviet efforts to reduce the vulnerability of its nuclear weapons delivery systems recognize the current U.S. capability to employ both manned aircraft and ICBMs against targets located throughout the Soviet Union. Active and passive Soviet defenses are being designed to counter the capabilities.

1. ICBM Defenses

Two types of defensive measures are employed to counter U.S. ICBMs: the anti-ballistic missile (ABM) system and hardened silos.

The limited Soviet ABM system deployed around Moscow, is not considered a prohibitive threat to ICBM employment. Sophisticated offensive systems can easily overcome its limited capability. Instead, the Soviets see silo hardening as a more effective way to protect their ICBMs. Here they are undertaking a major construction program to upgrade their silos to the superhard category. DIA estimates (see Table 1) indicate that this program will be completed by 19__. The impact of silo hardening on ICBM mission accomplishment is assessed in Section IV below.

2. Manned Aircraft Defenses

The principal threat to U.S. manned bombers over the next ten years will be from Soviet air surveillance, manned interceptors and surface-to-air missiles. The "Best Estimate" of the projected number of Soviet forces is listed at Table 2.

a. Air Surveillance and Control: The Soviets have approximately 6800 high frequency (HF) radars located at about 1000 Ground Controlled Intercept radar sites. This sytem has a good detection and tracking capability against penetrators at medium and high altitudes. Spacing of the radar sites suggests

continuous coverage of aircraft down to about 900 feet in the weatern USSR and along the approaches to major military-industrial centers. By the middle 1980s, the Soviets will initiate deployment of an AWACS with a look-down over-land radar and an airborne controlled intercept capability which will improve coverage of aircraft down to about 250 feet.

b. Manned Interceptors: Soviet interceptor defenses are strongest in the mid and high altitude regimes (above 900 feet). A major improvement in low altitude intercept capability is under development with an airborne look-down radar capable of distinguishing moving targets against ground clutter and an air-to-air missile with the ability to pick out an airborne target when fired toward the ground.

c. Surface-to-Air Missiles: Soviet strategic SAM systems (Table 2) have limited capability against targets flying at low altitudes (below 900 feet). While engagement attempts at lower altitudes are possible, performance rapidly deteriorates as altitudes lessen and ranges extend beyond several miles. In the 1980s, the Soviets will have a more effective strategic SAM system, the SIERRA, with a low altitude capability down to about 100 feet at a maximum range of about 30 NM. Deployment of this system will probably be in defense of high value targets initially.

3. Future Improvements

Continued significant improvements are expected in the quality of air defense weapons systems. Operating ranges of manned interceptors are expected to increase while radar coverage particulalry in the low altitude regimes will undoubtedly improve. In addition to the three systems described above, continued Soviet

SOVIET DEFENSE FORCES

DEST ESTIMATE

SYSTEM	NUMBER BY YEAR									
	78	79	80	81	82	83	84	85	86	87
GROUND RADARS										
GCI RADARS	6812	6936	7214	7323	7364	7389	7411	7411	7500	7500
RADAR SITES	990	1000	1000	1000	1050	1050	1050	1050	1100	1100
AIRBORNE RADARS										
AWACS/ACI	0	0	0	0	3	7	10	13	16	19
INTERCEPTOR AIRCRAFT										
ALPHA	80	40	10	0	0	0	0	0	0	0
BETA	115	66	5	0	0	0	0	0	0	0
CHARLIE	540	530	530	525	525	500	500	450	450	375
DELTA	350	520	290	260	230	200	170	140	110	60
ECHO	120	115	110	110	105	105	100	100	65	90
FOXTROT	780	790	790	780	780	760	760	760	750	750
GAMMA	400	420	435	450	470	470	510	550	570	570
HOTEL	200	250	300	350	400	450	500	550	600	650
INTERCEPTOR INDIA	0	0	6	16	50	125	200	280	360	440
TOTAL	2585	2531	2476	2491	2560	2610	2740	2830	2905	2935
SURFACE-TO-AIR MISSILES (OPERATIONAL SITES)										
ZULU	50	50	50	40	30	20	10	0	0	0
X-RAY	510	500	470	450	430	420	400	380	360	320
WHISKEY	340	356	356	356	356	356	356	356	356	356
UNIFORM	210	215	220	225	300	300	300	300	300	300
SIERRA	0	0	10	20	50	80	110	160	210	260
TOTAL	1110	1121	1106	1091	1166	1176	1176	1196	1226	1236

As of

development of improvements in command and control functions are expected. Additional development of particle beam weapons and the deployment of high power laser and electromagnet pulse weapons are expected by 1994.

III. EXISTING AND PLANNED U.S. CAPABILITIES THAT CONTRIBUTE TO THE DESTRUCTION OF THE SOVIET NUCLEAR DELIVERY SYSTEM

U.S. strategic attack capabilities reside primarily in the strategic TRIAD composed of strategic bombers, ICBMs and SLBMs. The interaction of the three U.S. strategic force elements, the "synergism" of the TRIAD, is intended to complicate Soviet attack calculations. Each component contributes a measured value to the overall effectiveness of the strategic attack mission.

A. Bombers

The strategic manned bomber provides an effective means of attacking a variety of Soviet targets and back-up against failures of the other two elements. Its capability to engage superhard targets with large payloads somewhat offset current Soviet advantages in large ICBMs. Manned bombers programmed for deployment through 19__ consist of the B-52D, B-52G/H, and the FB-111. Following penetration and the evasion of enemy air defenses, these bombers are capable of launching gravity bombs and SRAM missiles with high assurance of destroying super hard, point targets. To successfully destroy a Soviet nuclear delivery target, current and programmed bomber systems must penetrate to within 35 to 100 miles of the target before launching a SRAM, and to within line-of-site distances to destroy targets with gravity bombs.

B. ICBM Programs

MINUTEMAN and TITAN missile systems are assigned 100 percent of ICBM strategic attack mission responsibility against Soviet nuclear delivery targets until 19__. At that time, the M-X, which is being developed as the next generation of U.S. ICBM, will provide improved pre-launch survivability, reliability, penetrability, and target damage capability. These characteristics will provide each M-X warhead with high assurance of destroying a medium hard or hard target while providing less than assured destruction when employed against super hard targets. With its mobile basing concept, the M-X affords increased pre-launch survivability by requiring the Soviets to expend a greater number of ICBMs against potential M-X launch sites.

C. SLBM Programs

For the forseeable future, the SLBM force will be the most survivable element of the current TRIAD. Present and planned SLBMs are most effective against area targets. While effective against some types of hardened targets, the planned TRIDENT missile will not possess the desired accuracy to destroy super-hardened point targets.

IV. ASSESSMENT

A. U.S. Response to a Changing Soviet/U.S. Strategic Balance

1. The primary measure of our strategic offensive capability is the ability to retaliate after a Soviet first strike. Recent analyses indicate that current forces can sustain a massive Soviet first strike, penetrate Soviet air defenses, and retaliate with devastating effort. However, a projection of U.S. and Soviet strategic nuclear forces (Table 2) reveals that the

TABLE 3

MEASURE OF STRATEGIC BALANCE

(U.S. as % Soviet)

	1977	1986
Warheads	240%	104%
Megatons	35%	26%
Throw Weight	75%	48%
Hard Target Kill Potential	160%	28%

balance is becoming progressively less favorable to the U.S. over time as the Soviet missile force becomes more accurate and carries more MIRVs. As a result, Soviet planners can expect a larger percentage of their nuclear force and fewer numbers of U.S. ICBMs and manned bombers to remain after a Soviet pre-emptive strike. If a no-warning scenario is employed, the Soviets will attain a strategic nuclear balance by 1979. If a state of generated alert is considered, Soviet attainment of the balance would be delayed for two or three years.

2. An alternative to decreasing the devastating effect of a pre-emptive strike by an improved Soviet nuclear threat is the launching of a portion of the force on warning of an impending Soviet attack. This approach provides a considerable increase in the number of U.S. forces surviving. However, implementation of this option as it applies to ICBMs contains inherent risks. Such a strategy would leave no room for error. An executive level decision to launch a massive ICBM counter-attack would have to be obtained and implemented before the Soviet attack is absorbed. Besides the obvious danger of this option, the combined counter strike could only be marginally effective against remaining superhardened targets.

3. An alternative that would avoid this situation would be a strengthened air breathing capability. Bombers and their SRAM missiles currently possess the accuracy necessary to efficiently destroy superhard targets. If penetrating bombers could reach the range necessary to launch their SRAMs, they could then overcome improved Soviet defenses. The SRAM's low altitude flight pattern, high dash speeds, and small radar cross section render it practically invulnerable to enemy defenses. The SRAM's greatest

disadvantage is its limited range of approximately 35 miles at low altitude. Bombers would be vulnerable as they attempted to penetrate within SRAM range of their targets. A similar missile with a greatly increased range could alleviate this deficiency. This system would allow missile launching aircraft to stand off at greatly increased distances to launch their missiles before penetrating Soviet defenses.

4. Flying at low profiles, under 100 feet, Soviet defensive systems could not easily detect these missiles. With their small radar cross-section and low infrared output these missiles would not be easily detected by airborne radars and heat-seeking missiles, while their extremely low trajectory makes them a formidable challenge to ground radars as well.

5. To counter a threat of low-flying, air breathing missiles the Soviets would be forced to spend an estimated $10 to 15 billion for additional modernization of its air defense system - funds that otherwise would be allocated to Soviet offensive weapons programs. Improved low altitude or mobile SAM systems would have to be employed extensively throughout the Soviet Union to deny these missiles preferential entry routes. Even so, should air breathing missiles be equipped with an electronic countermeasures capability, the Soviet's improved terminal defenses and mobile SAMs probably still could be evaded. Thus a long range air breathing missile would greatly complicate the Soviet defense problem and place new constraints on military resource allocations in the Soviet Union.

B. Vulnerability of Existing and Programmed Bomber Capabilities

1. System Reliability

The current B-52 force was not designed for the demanding mission of low level penetration flights over long distances. These aircraft have also aged considerably since they were last produced 15 years ago. Consequently, the force will become increasingly difficult and costly to support in the next decade. Because a major overhaul of a B-52 airframe requires at least 2 years to complete, at any one point in time as much as 35 percent of the fleet will be in a non-operational status depending on the duration of the overhaul program.

2. Penetration Capability

a. In the face of improving Soviet air defenses, the probability that the current and programmed force will penetrate to the target area is decreasing significantly. Current penetration techniques call for bombers to enter Soviet airspace below effective ground radar coverage altitudes ($<$ 1000 feet), and to destroy or evade Soviet interceptors and SAMs with SRAM missiles, advanced ECM and abrupt changes in course and altitude. However, by 19__ improvements in Soviet radar target acquisition techniques will provide coverage above 250 feet along likely penetration corridors and in proximity to high value targets.

b. Manned bombers penetrating below 900 feet can currently expect to evade Soviet manned interceptors due to the latter's inability to discriminate low flying targets from ground clutter and the poor accuracy and reliability of their air-to-air missiles fired towards the earth's surface. The Soviets are correcting these deficinecies by deploying an improved air-to-air missile and an airborne look-down radar.

c. Prior to the deployment of the Soviet SIERRA system, over 90 percent of the B-52 and FB-111 penetrators, could be expected to reach and destroy their targets. However, by 19__, the SIERRA system will provide coverage to as low as 250 feet, reducing the numbers of bombers expected to penetrate to the target area to between 20 and 30 percent of those launched.

3. Probability of Damage

The Soviet program to convert its ICBM silos to the super-hard category greatly complicates the targeting problem. Heretofore, 87 percent of the Soviet nuclear weapons delivery capability was classified as area targets with soft to medium hardness characteristics. As such, 60 percent of these targets were assigned to ICBMs for destruction. The Soviet super-hardening program, however, reduces the proportion of this type of target to 56 percent of the total, limiting the effectiveness of ICBMs. One alternative suggests the reallocation of these improved silos to manned bombers, a course of action which reduces overall hard target coverage, and enables Soviet planners to retain larger proportions of their ICBM capability for a follow-on strike.

C. Technological Opportunity

Recent U.S. technological advances in the area of propulsion and guidance have encouraged the development of new weapon systems. More efficient turbofan engines will enable small air-breathing missiles to achieve significantly greater ranges than can be currently attained by the SRAM. Highly accurate navigation-guidance systems incorporating en route fixing and terminal guidance sub-systems enhance current terrain-fixing capabilities. New airframe materials offer minimal radar reflectivity and thus provide greater penetration ability. Multi-yield nuclear payloads

can be developed to provide increased flexibility for weapons applications in a variety of circumstances against a wide range of targets.

D. Assessment Summary

1. These considerations point out a critical need for a highly accurate system which can overcome projected improvements in Soviet air defenses. The system should provide greater penetration capability, operational reliability, and more favorable hard target kill ratios than our current bomber force.

2. Long range, air breathing missiles are considered an attractive candidate for this role. Launched at long ranges from airborne launch platforms, these missiles could penetrate Soviet defenses and destroy hardened targets. Stand-off missiles could prolong the life of the B-52 bomber by reducing greatly the need for low altitude flight, for which that aircraft is ill-equipped while lessening the danger to the aircraft itself.

3. An enhanced air breathing capability would also strengthen the TRIAD by offsetting future possible Soviet technological breakthroughs which might render our ICBMs and SLBMs less effective. Thus, the development of long range, air breathing missiles would help to bolster the nation's strategic balance in the critical period of the next decade.

V. CONSTRAINTS:

A. Affordability and Sources of Funds

1. The affordability aspects of any new weapons system must be considered during each phase of the acquisition process.

As a new weapons system evolves from this MENS, multiple capability systems which respond to diverse threats and which can be applied to more than one Mission Element Need Task will be afforded priority. These factors must be identified during the early stages of the system's development process, and exploited to the maximum extent practical through the system's life cycle. As more detailed information regarding a potential system capable of meeting more than one mission task is identified, these programs will be adjusted accordingly.

2. A total of $ __M and $__M are estimated procurement and support funding requirements to support the Strategic Attack Mission Area within the CCEMC in FY 78 and 79. The Soviet nuclear target destruction Mission Element Need Task is allocated 35 percent of the total Strategic Attack Mission Area funding requirements or $__ M. Initial funding requirements will be identified for this need within budget funds relating to currently programmed B-52 and FB-111 system upgrades.

B. Logistics Considerations

Improved capabilities must be supportable and compatible with existing and future logistic concepts. Design configurations should be appropriate to the employment environment and recognize that requirements for successful system operation in peacetime and wartime differ considerably. Candidate solutions should have inherent flexibility to permit at least limited operations from multiple austere locations.

C. Timing of Need

The current deficiency is great and advances in the projected threat (improvements in Soviet capability to detect, attack and destroy U.S. manned penetrators) will make the need

acute in the 19__ to 19__ time period. Therefore, it is imperative to obtain a Milestone 0 decision in early FY __, and to achieve some phased compatibility improvements by 19__.

D. NATO RSI Considerations

While there is no current NATO requirement, a stand-off missile could eventually be considered for deployment with the RAF bomber force. No similar system is under development by the NATO countries.

E. Application to Other Mission Areas and Mission Element Need Tasks

As more detailed information regarding potential systems to meet the projected threat is identified, it is possible that mission profiles for an enhanced Soviet nuclear threat destruction mission element capability will overlap current systems. In the event this situation occurs, adjustments in each of the overlapping programs will be accomplished.

F. Implications of SALT

There are no present SALT constraints upon the development and deployment of long range, air breathing missiles.

VI. IMPACT OF STAYING WITH THE PRESENT CAPABILITY

Current and programmed U.S. strategic warfare systems allocated to the destruction of Soviet nuclear delivery targets do not possess sufficient counter air defense capability nor accuracy/yield potential to overcome Soviet countermeasures projected for deployment during the next decade. Assuming that these Soviet systems are in place and operational by 19__, the TRIAD would no longer be considered viable due to the manned bomber's reduced damage expectancy potential. Unless a suitable counter threat is developed and deployed, one portion of our TRIAD

strategy will be seriously jeopardized. Increasing the number of existing or projected systems cannot be justified due to the aforementioned performance shortfalls when compared to the Soviet's projected defensive capabilities.

VII. PROGRAM PLAN TO IDENTIFY AND EXPLORE COMPETITIVE ALTERNATIVE CONCEPTS

A. Upon approval of this MENS, an Air Force Program Office will be activated consisting of both operational and technical personnel, to include liaison with DIA and the Department of the Navy.

B. The final product prepared by the Program Office will be a draft Decision Coordination Paper (DCP) supporting the Milestone I decisions. The DCP will recommend preferred alternatives for demonstration and validation and will include a description of acquisition strategy, a program management structure, a logistics annex, a communications annex, and a test and evaluation master plan. The recommendation made in the DCP will be supported by a detailed and comprehensive analysis of requirements, system descriptions offered by industry and DOD components, threat data, and simulations. The analysis of candidate systems will be performed individually and in concert. It will include an operational task effectiveness evaluation. The development of foreign systems and NATO compatibility will also be considered by the Program Office analysis.

VIII. RESOURCES

The Program Initiation Phase is planned for completion within 26 months after the approval of this MENS. This phase is estimated to require an average manning level of __ man years of

in-house effort. This will be supplemented by contractor support estimated to require approximately __million for a total of__ million.

SX II MENS

(outline)

I. MISSION

A. Mission Area

Strategic Offense
Discuss airborne leg of TRIAD
Airborne strike

B. MENS Task

Deep strike
Mixture of targets
Number and Types of Targets (distance and spread within Soviet Union)

II. THREAT

Present Soviet bloc capability and projection

- Surveillance and command and control
- Manned interceptors
- SAM

III. EXISTING AND PLANNED CAPABILITY

- B52, FB111 with SRAM and gravity bombs
- GBU-15 projection
- Defense suppression techniques
- Small number of manned bombers
- RAF capability

IV. ASSESSMENT

- Vulnerability to Soviet Threat
- Aging of the Fleet

V. CONSTRAINTS

- Timing = less than 50% penetrability by 1984
- Relative Priority
  - Fixed number of ICBM and SLBM due to SALT
  - Continued reduction in airborne strike capability
  - First priority is to prevent "hole" in TRIAD
- Affordability
  - 7% DOD Budget in Strategic Offense
  - 18% AF Budget in Strategic Offense
- RSI

APPENDIX J

DATA ASSESSMENT REQUIREMENTS

SYSTEM X II DATA ASSESSMENT

PRE-INITIATION PHASE

1. MENS

A. DATA ASSESSMENT

The MENS will require a MAA of the capabilities of the existing weapons system to accomplish the mission. Some of this MAA may have to be automated for the analysis to be performed during the Initiation Phase. This would be especially true if the student will be permitted to consider in either this case or follow-on case the alternative of buying more of the existing systems to eliminate the deficiency.

B. MODELS

Force Effectiveness Model

C. TYPE UTILIZATION

Case Handout

INITIATION PHASE

2. PREPARATION FOR PROGRAM INITIATION

A. DATA ASSESSMENT

The only significant data requirement is the representation of the technology forecast and risk. This would not have to be automated for this case but only the data provided needs to be consistent with the CER used in the other cases.

B. MODELS

Technology Forecast Model

C. TYPE UTILIZATION

Case Handout

3. OPERATIONAL ANALYSIS OF ALTERNATIVE CONCEPT STUDIES

A. DATA ASSESSMENT

The student needs to be able to determine the operational effectiveness of the alternative concepts. Depending on how varied the alternative concepts are, it may not be cost effective to automate all of the concepts. The concept to be followed throughout the rest of System X-II will definitely need to be automated. The output required would include system effectiveness, deployment requirement, and the ability of the concept to overcome the deficiency presented in the MENS.

B. MODELS

Force Effectiveness Model

C. TYPE UTILIZATION

Case Handout

4. SYSTEM ANALYSIS OF ALTERNATIVE CONCEPT STUDIES

A. DATA ASSESSMENT

Trade-off analysis of the alternative concepts as to their cost, schedule, risk and performance characteristics. In this case, the student becomes involved extensively with initial determinations of life-cycle costing and the effects of changes in these characteristics on the overall cost of the program.

B. MODELS

Force Effectiveness Model

Cost Estimating Relationship Model

C. TYPE UTILIZATION

Provide data assessment results to students as required.

5. ACQUISITION STRATEGY AND MANAGEMENT PLANNING

A. DATA ASSESSMENT

The student will require some information concerning the impact on cost, schedule and maybe risk and technical performance of various acquisition strategies. This may or may not be automated depending on the depth the student will address the pros and cons of the alternative in the case. Decision Exercise I will require similar information, so automation of the above could have a two-fold mission.

B. MODELS

Acquisition Strategy Cost and Schedule Model

C. TYPE UTILIZATION

Case Handout

DEMONSTRATION AND VALIDATION PHASE

6. CONTRACTOR PERFORMANCE MONITORING

A. DATA ASSESSMENT

None

B. MODELS

None

C. TYPE UTILIZATION

None

7. LOGISTICS PLANNING

A. DATA ASSESSMENT

The student will require a logistics model which can provide information concerning various ILS trade-offs such as maintenance levels, including contractor maintenance, skill levels, training, test equipment, etc. In general, the logistics model needs to be much more detailed than the model currently being used in System X I. This model should also be used as a subprogram of some of the later data assessment.

B. MODELS

Force Effectiveness Model

Logistics Requirement Model

Life Cycle Cost Model

C. TYPE UTILIZATION

Hands On

8. TEST AND EVALUATION

A. DATA ASSESSMENT

The student may require some way for making trade-offs concerning cost, schedule and confidence level versus number of tests on the determination of performance level achieved from the test results.

B. MODELS

Test Planning Model

C. TYPE UTILIZATION

Case Handout

9. RFP, SOURCE SELECTION AND CONTRACT NEGOTIATION FOR FSED

A. DATA ASSESSMENT

It may be desirable to use a computer program to aid in the proposal scoring or evaluation or to illustrate the possible system trade-offs. Also, the MIAP maybe required to support the contract negotiations.

B. MODELS

Proposal Evaluation Program

Multiple Incentive Analysis Program

C. TYPE UTILIZATION

Case Handout

10. DSARC II FOR FSED

A. DATA ASSESSMENT

The case will require some amounts of data from other cases which are automated. The types of data required is as follows:

a. Life Cycle Cost

b. Schedule

c. DTC or DTUPC

d. Test Plan

B. MODELS

Force Effectiveness Model

Logistics Requirements Model

Life Cycle Cost Model

Test Planning Model

C. TYPE UTILIZATION

Case Handout

FULL-SCALE ENGINEERING DEVELOPMENT

11. SOFTWARE DEVELOPMENT

A. DATA ASSESSMENT

One thing which should be considered for the case, is a handout of simulation of the hardware/software requirements similar to the idea addressed in CAPT Robert Feingold's ISP (PMC 76-1).

B. MODELS

Computer Hardware/Software Simulation

C. TYPE UTILIZATION

Case Handout

12. CHANGE MANAGEMENT

A. DATA ASSESSMENT

This case could have significant automation or more depending on whether the students only address the concepts or consider whether or not to approve an ECP. If the case has the student perform the latter all or some of the following may be required:

B. MODELS

CPR/CFSR Program

Configuration/Design Trade-off Model

CPM/PERT Based Program

Life Cycle Cost Model

C. TYPE UTILIZATION

Hands On

13. PRODUCTION PLANNING

A. DATA ASSESSMENT

The data assessment requirements are for a model which will allow the students to determine cost and schedule, implications of various production alternatives. This model should also include some force effectiveness and logistic implications.

B. MODELS

Force Effectiveness Model

Production Planning Model

Logistics Requirement Model

Life Cycle Cost Model

C. TYPE UTILIZATION

Hands On

14. SECOND SOURCE

A. DATA ASSESSMENT

Same as Case 13 except that the model needs to be able to include second source/breakout options.

B. MODELS

Force Effectiveness Model

Production Planning Model

Logistics Requirement Model

Life Cycle Cost Model

C. TYPE UTILIZATION

Case Handout

15. SUBCONTRACTOR MANAGEMENT

A. DATA ASSESSMENT

The case could require a CPM/PERT type program if the students are required to devise a work around plan for a subcontract management problem. This also may be a good place to have a Line of Balance Program.

B. MODELS

CPM Program

Line of Balance Program

C. TYPE UTILIZATION

Case Handout

16. REPROGRAMMING AND RESTRUCTURING

A. DATA ASSESSMENT

Same as Case 13 if the dollars being considered are production dollars. Otherwise a completely different program will be required.

B. MODELS

Force Effectiveness Model

Production Planning Model

Logistics Requirement Model

Life Cycle Cost Model

C. TYPE UTILIZATION

Case Handout

17. FMS

A. DATA ASSESSMENT

Same as Case 13, except that the model needs to be able to include FMS considerations such as proration of costs.

B. MODELS

Force Effectiveness Model

Production Planning Model

Logistics Requirement Model

Life Cycle Cost Model

C. TYPE UTILIZATION

Case Handout

18. CONFIGURATION CHANGE IN PRODUCTION

A. DATA ASSESSMENT

Again as in Case 12, the data assessment could be significant or more. If the students were to determine the best way to handle a configuration change all or some of the following are required:

B. MODELS

Configuration/Design Trade-off Model

Product Improvement Program

CPM/PERT Program

Logistics Requirement Model

Production Planning Model

Life Cycle Cost Model

C. TYPE UTILIZATION

Hands On

19. FIELDING

A. DATA ASSESSMENT

The case will probably require a Logistics/Life Cycle Cost Model, so that the student can determine the implications of their alternatives.

B. MODELS

Force Effectiveness Model

Production Planning Model

Logistics Requirement Model

Life Cycle Cost Model

C. TYPE UTILIZATION

Case Handout

SYSTEM X II MODELS/PROGRAMS

Force Effectiveness Model - FEM

Technology Forecast Model - TFM

Cost Estimating Relationship Model - CERM

Acquisition Strategy Cost and Schedule Model - ASCSM

Logistics Requirement Model - LRM

Life Cycle Cost Model - LCCM

Test Planning Model - TPM

Proposal Evaluation Program - PEP

Multiple Incentive Analysis Program - MIAP

Computer Hardware/software Simulation - CHSS

CPR/CFSR Analysis Program - CCAP

Configuration/Design Trade-off Model - CDTM

CPM Program - CPMP

Production Planning Model - PPM

Line of Balance Program - LOBP

Product Improvement Program - PIP

SYSTEM X-II CASE STUDIES

DATA ASSESSMENT

COMPUTER MODELS/PROGRAMS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
FORCE EFFECTIVENESS MODEL	X		X	X			X			X		X	X	X		X	X	X	X
TECHNOLOGY FORECAST MODEL		X																	
COST ESTIMATING RELATION. MODEL			X	X															
ACQ. STRAT. COST & SCHEDULE MODEL					X														
LOGISTICS REQUIREMENT MODEL							X			X		X	X	X		X	X	X	X
LIFE CYCLE COST MODEL							X			X		X	X	X		X	X	X	X
TEST PLANNING MODEL								X		X									
PROPOSAL EVALUATION PROGRAM									X										
MULTIPLE INCENTIVE ANALYSIS PROGRAM									X										
COMPUTER HARDWARE/SOFTWARE SIM.											X								
CPR/CFSR ANALYSIS PROGRAM												X							
CONFIGURATION/DESIGN TRADE-OFF MODEL												X						X	
CPM PROGRAM												X			X			X	
PRODUCTION PLANNING MODEL													X	X		X	X	X	X
LINE OF BALANCE PROGRAM															X				
PRODUCT IMPROVEMENT MODEL																		X	
TYPE OF UTILIZATION H - HANDOUT X - HANDS ON	H	H	H	X	H		X	H	X	H	H	X	X	H	H	H	H	X	H

APPENDIX K

SX-II DEVELOPMENT BRIEFING MATERIAL

INPUT FOR BRIEFING TO SX-II STEERING COMMITTEE

1. MISSION ELEMENT NEED STATEMENT

- Who is responsible for identifying and prioritizing the need?
- Mission Area analysis process
- How is the responsibility for developing a MENS determined?
- Budget and manpower planning pending program initiation
- Approval process

2. PREPARATION FOR PROGRAM INITIATION

- How does this PMO use technology forecast in the concept study evaluation to determine technical feasibility and risk?
- What are considerations in developing an acquisition strategy?
- What should RFP for concept studies contain?
- Contracting requirements at this time?
- Other DOD implications?
- Funding for phase
- RSI Planning

3. OPERATIONAL ANALYSIS OF ALTERNATIVE CONCEPT STUDIES

- How does the PM evaluate a concept from an operational point of view? To whom does he look for help?
- Should alternatives that fail to meet all operational requirements be eliminated from further consideration?
- To what degree should current technology shortfalls dictate the establishment of required systems parameters?
- To what extent does the wargaming/performance parameter trade off analysis influence the selection of alternative concepts for the D/V Phase.

Data Assessment: (ADP) Extensive use of war-gaming and other predictive models as a means of developing trade-offs of operational performance parameters. The employment of a concept under varsious scenario conditions will provide information regarding mission effectiveness of various force levels and deployment requirements. This information is essential to life-cycle cost determinations, etc.

4. SYSTEM ANALYSIS OF ALTERNATIVE CONCEPT STUDIES

- Which cost estimation methodology(s) should the PM rely on?

- Sources to assist in assessing system performance specifications associated with each concept proposal

- Considerations for assessing alternatives and for selecting best canditates for D/V phase?

- Should alternatives that fail to meet <u>all</u> design criteria be eliminated at this time?

- To what extend should cost/schedule/performance risk trade-offs influence the system performance requirements?

Data Assessment (ADP) Trade-off analyses of each concept's cost, performance, schedule and risk characteristics are conducted using parametric models to determine their interrelationships. This effort will enable the PM to determine how one characteristic reacts to changes in the other three.

5. ACQUISITION STRATEGY AND MANAGEMENT PLANNING

- What acquisition strategies can be considered based on SECDEF's guidance?

- How does contracting strategy relate to acquisition strategy?

- What potential contracting strategies are justifiable at this time?

- Long range documentation requirements

- Readiness for DSARC I

6. CONTRACTOR PERFORMANCE MONITORING

Degree of PMO visibility/monitoring/guidance

Planning for design reviews -
- amount of detail
- cost, R&M, supportability

Progress measurement -
- how is progress determined
- is it really progress

How should validation testing be accomplished?
- component
- subassembly
- system

What is measuring system?
- Go/No Go?
- Specs within $\pm$ 10%
- Other

Performance Measurement System
- Does contract meet 7000.2 criteria?
- When 7000.2 invoked
- are costs valid

7. LOGISTICS PLANNING

Determining best maintenance concept
- support philosophy (include manpower and skills)
- level of repair
- test equipment

Spares Support Concept
- failure rate
- stock level - (range and depth)

Failure Modes and Effects Analyses planning

Data Analysis (ADP) Model utilization for maintenance concept formulation in form of maintenance levels, personnel skill levels and maintenance actions - effectiveness measurement of alternative logistic support concepts through determination of the effect of the concepts on cost and operational availability - examination of parts fill levels and provisioning concepts in relation to alternative logistic support concepts for determination of cost effectiveness - determination of quantitative logistics requirements for personnel, facilities, training manhours, technical data volumes, support equipment sets, spare parts, etc... based on system design and logistic support concept specified.

8. TESTING AND EVALUATION

- TEMP development
  - test requirement
    - hardware
    - software
    - integration
  - Tradeoff product improvement analyses
  - DT&E (system)
    - who conducts
    - pass/fail criteria
    - support

Data Analyses (ADP) Determination of test sample size based on desired confidence level - analysis of observed test data in relation to current estimates of performance requirements at completion to determine pass/fail of system components

9. RFP SOURCE SELECTION AND CONTRACT NEGOTIATION FOR FSED

- RFP Genesis
- Source Selection Plan
  (4 step or other)
  - criteria
  - evaluation technique
- Negotiation
- Contractor Performance Measurement
- Source Selection Process
  - SSEB/SSAC/SSA
  - Coordination

10. DSARC II FOR FSED

- DCP preparation and coordination planning
  - MENS review and update

- Readiness for DSARC II
  - Acquisition strategy
  - Threat review
  - Need
  - Financial
  - Schedules
  - Risks and thresholds

- Service and OSD interfaces
  - Review chain
  - CAIG/PESO/T&E

- Roles of DSARC principals

11. SOFTWARE DEVELOPMENT

- Should software acquisition be treated similarly to hardware acquisition?

- Performance monitoring
  - Reviews
  - Milestones (gates)
  - Reports

- Change control considerations

- If software development is causing delays in development of critical subsystems, what are the PM's options to "get well?"

- What are the trade-offs for software development? What criteria should the PM establish to evaluate the trade-off?

- What are the software testing criteria? How does the PM evaluate software test results?

12. CHANGE MANAGEMENT

- How does the PM organize the PMO to manage ECPs? Configuration control board?

- What considerations apply in the development of the PM's change control policies?

- To what degree does the PM influence GFE change control policy?

- To what degree does definitization, defects and disputes influence the management of the PM's change control program?

- How are allowable change costs determined?

13. SUBCONTRACTOR MANAGEMENT

- What is the proper relationship between the PM and the prime's subcontractor? At what point should the PM become actively involved in subcontractor problem?

- What access does the PM have to the prime's sub-contractors?

- What supervisory authority does the PM have over the selection/performance of sub-contractors? How can the PM influence the sub's cost control?

- What data should PM require from Subs?

- Contractor Performance Measurement

14. PRODUCTION PLANNING

- What are the considerations to be included in the acquisition strategy for production of the weapons system
- How are production rates determined and what options are available regarding quantities to be produced?
- How are realistic schedule and cost estimates for production obtained? What are the applicable trade offs?
- How is production aligned with program and fiscal year thresholds?
- How does the PM identify and solve producibility problems?
- How does the PM identify potential second production source
- Contractor Performance Measurement considerations

DATA ASSESSMENT (ADP)

Utilize models to perform trade-off analysis of various production alternatives in terms of how cost and schedule are effected - determine force effectiveness over years from start of phase-out of other systems through deployment.

15. PROGRAMMING AND/OR RESTRUCTURING

- How does the PM establish data base to enable him to impart potential reprogramming/restructuring action?
- To what degree should he rely on this data base in making his assessments? What are other information sources?
- What is the role of the management reserve in a reprogramming and restructuring requirement.

Data Assessment (ADP) Develop alternatives to satisfy proposed reprogramming/restructuring actions and determine program impact based on cost, schedule and force effectiveness of each alternative - perform trade-off analysis for development of recommended strategy that takes into account cost, schedule and force effectiveness impact of the alternatives.

16. SECOND SOURCE

- What are the criteria for developing a second production source?
- What data must the PM make available to second source producers?
- What are the management options regarding identification of the second production source.

DATA ASSESSMENT (ADP)

Analyze cost and schedule implications of utilizing alternative sources for production after initial production - determine alternative production strategies for employment of a second source and perform trade-off analysis based on cost and shedule - determine cost, schedule and technical performance related to various alternative sources to perform trade-off analysis for determination of best alternative source for production.

17. FMS

- What are options regarding the requirement to support an FMS program? Second source or subcontractor?
- What is the impact of the FMS program on U.S. deliveries?
- What is the role of the PM in his advocacy of the FMS vs U.S. delivery responsibility?

DATA ASSESSMENT (ADP)

Model utilization to determine impact on production and domestic deployment of foreign military sale case - determine alternative production strategies for satisfying foreign sale requirements to include contractor plant expansion or second source utilization - perform trade-off analysis to determine recommended strategy - determine impact on force effectiveness due to alteration in production strategy to accomodate foreign sale.

18. CONFIGURATION CHANGE IN PRODUCTION (Redundent System)

- Engineering Change Proposal Analyses
  - Cost
  - Schedule
  - Performance
- Government Advantage/Contractor advantage
- Backfit Considerations
- Funding Impact

DATA ASSESSMENT (ADP)

Model utilization to determine impact of proposed baseline changes in terms of cost, schedule and technical performance - develop alternative strategies for handling proposed changes - determine impact on reliability of the system and major components caused by baseline change - analyze cost-effectiveness of implementation of the change in terms of system effectiveness

19. FIELDING

- IOC slippage potential
- Inadequate support
- Work around planning
  - Intensive management
  - Tiger Teams
- Operation Training Deficiency
  - Ground all systems
  - Emergency procedures

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