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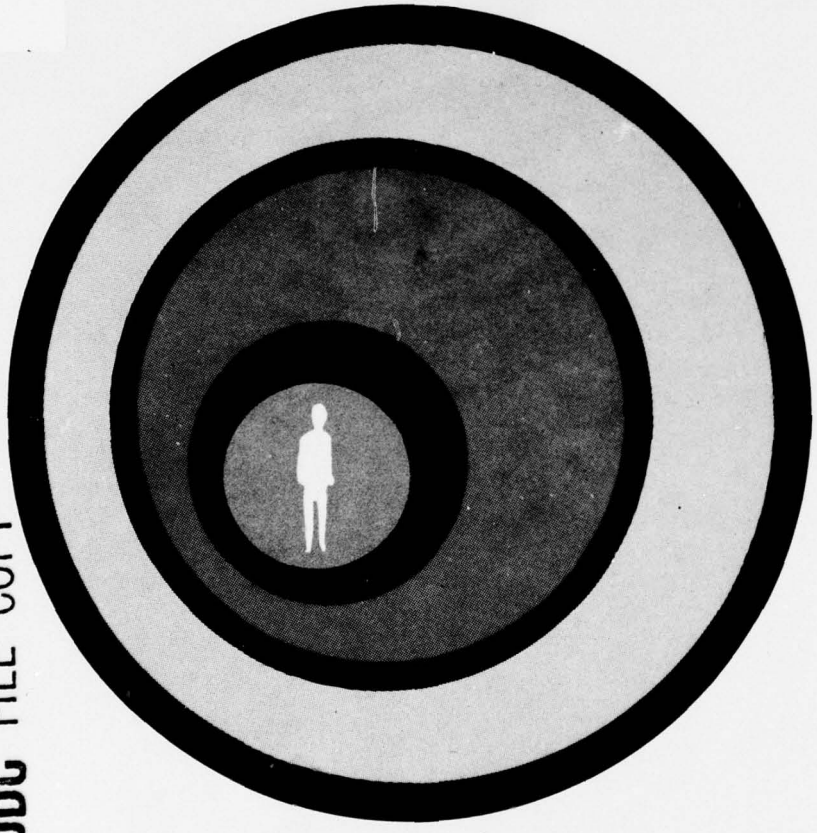

FOCUS ON THE TRAINED MAN

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Training Analysis and Evaluation Group

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This study was to determine the feasibility of the Navy providing all or part of precommissioning training. A case study of combat system maintenance management training for the CGN-38 (USS VIRGINIA) and the CGN-39 (USS TEXAS) was made. It was determined that this unique case did not provide an adequate data base upon which to base recommendations. It was proposed to expand the data base by studying a representative sample of surface ships related to acquisitions.

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FOREWORD

As the result of a successfully developed and implemented precommissioning training course by Navy personnel, it was proposed that a feasibility study be performed to determine whether this concept could be expanded to include all, or a significant portion of, precommissioning training. The Training Analysis and Evaluation Group (TAEG) was tasked to perform this study in a quick response mode during the period April through June 1977. A case study of the combat systems maintenance management training as presented to the first two ships of the CGN-38 class of Nuclear Guided Missile Cruisers was made. It was determined that general recommendations could not be made from a single, unique case. Therefore, a detailed study is proposed to provide decision makers with a comprehensive and realistic data base. This follow-on effort is proposed in a Plan of Action and Milestones appended to this technical memorandum.

SECTION I

INTRODUCTION

The maintenance concepts upon which systems training had been given, until approximately 1971, became obsolete as maintenance began crossing ship's divisional and departmental boundaries. The need for some form of systems approach to integration training, not based on the traditional organizational structure; i.e., Operations, Gunnery, Engineering, and Navigation Departments, became apparent. Formal recognition of this training requirement was first elucidated in Navy Training Plan (NTP) S30-7518, Surface Combatants Combat System Level Training Program (revised 16 July 1976). This plan designated the Combat Systems Maintenance Training Facility (CSMTF), Mare Island, as the facility to provide Combat Systems Maintenance Management Training (CSMMT), as the system integration training requirements became known.

NTP S30-7410B of 20 August 1976 for the Nuclear Powered Guided Missile Cruisers (CGN-38 Class) and CNO message 212036Z Feb 76 specifically required that a combat systems organization made up of Operations, Combat Systems, Engineering, and Navigation Departments, in lieu of the traditional organization, and CSMMT, as defined in NTP S30-7518, be implemented. The CSMTF was designated to provide follow-on training which was to be based on contractor developed initial training. Cost of initial training was approximately $236,000. The course, as given by the contractor, was determined by both the ship's crew and the Ship Acquisition Program Manager (SHAPM) to be unsatisfactory and was not acceptable to the Training Agent (CNET). In addition, the CSMTF was not completed, and the school was unable to teach CSMMT.

CSMMT remained a requirement for the CGN-38 class, therefore, the SHAPM informally solicited estimates for an update of the USS VIRGINIA (CGN-38) course for presentation to the USS TEXAS (CGN-39) crew. The rewrite and presentation was expected to cost approximately $200,000. Because of this high projected cost, the SHAPM engaged in discussions with OP-39 and the Combat Systems Training Group (COMBATSYSTRAGRU), Naval Air Technical Training Center, concerning the capability of the Group to provide requisite training. As a result of the discussions, the COMBATSYSTRAGRU was tasked to develop and present a course for the CGN-39 crew. This course, as presented, was acceptable and was considered to have been relatively inexpensive.

As a result of the methods used to successfully develop the course for the CGN-39, the Commanding Officer, COMBATSYSTRAGRU submitted a report to the Chief of Naval Operations (CNO) in CO, Naval Air Technical Training Center ltr Code 7012/RWS:mbm of 27 December 1976 (see appendix A) outlining the positive aspects of Navy-developed training for precommissioning (PRECOM) crews. In this letter, he proposed a feasibility study to assess the possibility of expanding the concept used to develop CSMMT for the CGN-39 to all PRECOM training.

CNO by letter serial 992F2/146085 of 4 March 1977 requested that the Chief of Naval Education and Training (CNET) conduct the feasibility study to include alternatives ranging from all-Navy to all-contractor PRECOM training. The Training Analysis and Evaluation Group (TAEG) was tasked to perform a quick response task to develop a reply to the requirements of the CNO letter. This initial effort was accomplished during the period April through June 1977. The output of the quick response tasking forms the basis for a detailed study of Surface Ship Initial Training Alternatives. The Plan of Action and Milestones (POA&M) for this follow-on effort is provided in appendix D.

PROBLEM IDENTIFICATION

In responding to the tasking requirements, it was determined to be necessary that a preliminary examination of the problems associated with the proposed break with traditional methods of developing and implementing PRECOM training be made. Detailed discussions were held with personnel from OP-39, OP-099, PMS-378, and the COMBATSYSTRAGRU to isolate the particular problem(s) to be addressed. A summary of the information gleaned from these discussions is contained in sections II and III. Two fundamental problems emerged:

- neither CNET nor personnel planners are involved in the development phase of a new system or new classes of vessel sufficiently early in the acquisition cycle to apply their expertise and to plan properly.

- contractor supplied courses are based on MIL-STD-1379 which does not meet the criteria of CNTT-A10 (reissued April 1976), the Chief of Naval Technical Training's (CNTECHTRA) operating instruction for course material.

PURPOSE OF THE STUDY

- Evaluate the cost and training effectiveness of the CSMMT course presented to the CGN-39 crew.

- Formulate an investigative approach for determining whether the procedures used in the development of the CGN-39 CSMMT course, or a modification of these procedures, can be made applicable in a cost-effective manner to all new equipment/new systems/PRECOM training (see POA&M in appendix D).

METHODOLOGY

To accomplish this purpose, three independent assessments were made:

- evaluate the development methods and the costs associated with the development of the CGN-39 course to determine if the method was cost-effective. Cost efficiency of the training must be determined by comparison of actual development and implementation costs with projected contractor development and implementation costs.

- determine the feasibility and practicality of applying the COMBATSYSTRAGRU CGN-39 course development concept to the development of other new equipments/new systems/PRECOM training courses.

- assess the Training Agent's involvement in the planning phases of acquisition programs and the availability of required resources for the development and presentation of initial training.

SECTION II

HISTORICAL PERSPECTIVE

OPNAVINST 3500.23B directs the Chief of Naval Material (CHNAVMAT) to provide, on an as-needed basis, contractor training for new equipments and systems as a part of the PRECOM training. The CHNAVMAT is responsible only for initial training; i.e., that training given to the operators/maintainers of the first unit delivered; CNET is responsible for all follow-on training; i.e., training for replacement crews and additional crews for subsequent acquisitions. CNET may, for example, be training PRECOM crews for certain equipments/systems being installed on new construction units if these equipments/systems are not initial acquisitions. Thus a distinction can be made between total PRECOM training and initial PRECOM training for new equipments/systems.

This section discusses the events which preceded the CSMMT course developed by the COMBATSYSTRAGRU, the course developed by the COMBATSYSTRAGRU for the CGN-39, and Navy policy with respect to the entrance of the Training Agent into the acquisition cycle.

USS VIRGINIA (CGN-38) COMBAT SYSTEM TRAINING

The USS VIRGINIA (CGN-38) was the first ship of the class, and the first new construction unit, to require CSMMT. In December 1971 a fixed-price contract for approximately $236,000 was consummated between the SHAPM and ITT Data Services to develop and conduct a combat systems training program for the CGN-38. Subsequently, the contract obligations were assumed by Control Data Corporation (CDC). Government furnished materials were to be "Appropriate *Technical Manuals*," and "*Training Facilities, Office Space and Secure Storage* for materials and manuals through the level of secret." The specification for this contract required that a two-segment, then a three-segment course be taught at two different locations. Three instructors and three slide/tape programs were required. Emphasis in the training program was to be in the area of subsystem integration, interface, and fault isolation from the system level to a specific subsystem. A curious aspect of the contract is that NAVSHIPS Form 4000/1 (rev. 10-69), Data Distribution List, covering training materials does not include the follow-on training agent (CNET), although it does include the training activity, Combat Systems Technical School (CSTS), Mare Island. A detailed cost breakdown of the contract is presented in appendix B.

During the third quarter of CY 74, and prior to course delivery, the COMBATSYSTRAGRU reviewed the Instructor/Trainee Guides which had been prepared for the CGN-38 Class Combat System Training course by CDC. After presentation, this course was determined by the ship and SHAPM to be unsatisfactory in that it did not provide the depth of information necessary for use as a CSMMT course. The primary reason for the unsatisfactory nature of the course was that development was dependent upon the availability of system level documentation, GFE, and these manuals were either late or did not arrive in sufficient time to be of value to the instructors. Hence, the instructors and students were frequently at the same level at the same time.

COMBAT SYSTEM TRAINING GROUP

The COMBATSYSTRAGRU was established and became operational in the final quarter of CY 73. The primary purpose of this group was to be a focal point for the coordination, development, and evaluation of combat system training. The team consisted of one E-9, three E-8's, eight E-7's, and two E-6's, all data processing or technical electronics ratings, and a Lieutenant Commander as Commanding Officer. Four of the fifteen team members had served aboard NTDS vessels. The team personnel remained stable throughout its existence.

From its inception until its disestablishment in May 1977, the team was involved in combat system organization and combat system maintenance training. In conjunction with the CSTS, Mare Island, and the Naval Guided Missile School (NAVGMSCOL), Dam Neck, a series of courses for the System Technical Officer (STO), members of the Ship's Electronics Readiness Team (SERT), and the Electronics Readiness Officer (ERO) were developed. Other courses in combat systems maintenance training, given by Naval personnel and by vendors, were monitored.

Commencing in early 1974, the COMBATSYSTRAGRU developed, under the auspice of CNO (OP-39), NTP S30-7518 for the Surface Combatants Combat System Level Training Program. One major requirement of this plan was a proposed revised combat system organization for implementation on new construction ships. This organization was a departure from traditional shipboard organizational structures in that it was rigidly based on the identification of systems, subsytems, and subsystem components and their interfaces. In support of this organization, the COMBATSYSTRAGRU proposed a CSMMT system for all new construction crews and replacement personnel. In the third quarter of CY 74, working with personnel from the CSTS, Mare Island, and the NAVGMSCOL, Dam Neck, the Group developed terminal learning objectives and a topic outline for the CSMMT course.

During the period June through December 1975, the Group conducted an operational evaluation of the proposed combat system organization. This evaluation included an in-depth assessment of the combat system readiness of seven ships of the CG and DDG classes. Emphasis was placed on the operational status, total system status, and the interfaces between subsystems.

A review and evaluation of the vendor proposed combat system training course objectives for the FFG-7 class ship was made in early 1975. At that time one major problem was emphasized. Vendor courses were developed in accordance with MIL-STD-1379, as required in contracts prepared by SHAPMS, whereas Navy courses were developed and taught in accordance with the requirements of CNTT-A10 (reissued April 1976). The requirements of these two documents are not identical. Thus, when the CNTECHTRA received the course material from the vendor after initial training, heavy redevelopment effort was needed to convert to the requirements of CNTT-A10 (reissued April 1976). Vendor material served only as a guide to Navy instructors who developed new trainee and instructor guides prior to convening classes.

In February 1976 the COMBATSYSTRAGRU was tasked to develop and teach a CSMMT course to the CGN-39 crew. This was because the CSMMT presented by CDC to the crew of the CGN-38 did not provide the depth necessary and was considered to be excessively costly to rewrite. The Group had had over 2 years experience in all phases of combat systems organization, maintenance, and training course development prior to this tasking, and was eminently qualified for the task.

USS TEXAS (CGN-39) COMBAT SYSTEM TRAINING

The CSMMT course presented to the CGN-38 crew was classified as initial training for that class of vessel. Subsequent CSMMT courses were to be follow-on training and were to have been taught by CSTS, Mare Island. However, since the facilities at Mare Island were not completed, and the initial CSMMT course for the CGN-38 was unsatisfactory, SHAPM was forced to retain responsibility for the required CGN-39 CSMMT. SHAPM did not consider the CGN-39 course initial training.

The unofficial contractor's cost estimate to revise the CGN-38 course and present the CGN-39 CSMMT course was considered excessive; therefore, the COMBATSYSTRAGRU was asked whether they were in a position to prepare and conduct the CSMMT course for the CGN-39 crew. The affirmative answer was qualified by the following conditions:

- adequate funds were made available
- the release of the complete technical library was made to the COMBATSYSTRAGRU
- freedom of access to all commands was granted
- the curriculum which had been developed for the CGN-38 was made available
- the course was to be taught at the ship building site with the ship available to the class on a not-to-interfere basis.

The COMBATSYSTRAGRU assigned three Navy Chief Petty Officers and one civilian training specialist to the task. In preparation for the development effort two courses were given this group. The first was a 2-week course in curriculum development; the second, another 2-week technical course on the YUK-7 computer, the integration computer planned for use aboard the CGN-39. Each of the four assigned personnel had an extensive electronic background and considerable experience in combat systems.

The team developed the course in 7 months. Their specific expertise was developed in five ways:

- reading and studying the technical manuals
- attendance at the two courses previously discussed
- discussions with the ship crew and contractors
- prior experience with the COMBATSYSTRAGRU
- monitoring the CGN-38 CSMMT courses.

The instructional program was a paper course interspersed with frequent student visits to the CGN-39 to view various equipments and subsystems. It was declared by both the ship personnel and the SHAPM to have been a success.

SECTION III

POLICY, COSTS, AND OTHER CONSIDERATIONS IN CGN-39 CSMMT

POLICY AS IT AFFECTS THE TRAINING AGENT

Despite the definitions of Training Support Agent and Training Agent contained in the Navy Comptroller's Manual, volume 7, paragraph 075148, OPNAVINST 1500.2E, and NAVMATINST 1500.4A, the term Training Agent apparently has different meanings to different users. In terms of initial training; that is, the training provided for the first ship, system or equipment of a series, the Training Agent frequently is considered to be other than CNET. When one speaks of follow-on training; i.e., any training subsequent to initial training, the term is universally applied to CNET. Thus, it can be seen that a dichotomy exists which frequently contributes to training problems.

The instructions cited above also stipulate that contractor provided training will be utilized only for initial training for new or modified systems and equipments. Despite the policy directives much of the PRECOM training, initial and other, has, traditionally, been the responsibility of the contractor without regard to the resources available to the training community.

Appendix C of this report outlines the officially specified acquisition cycle for new ships, systems and equipments, and highlights the possible points of entry into that cycle for the Training Agent. It is noteworthy that OPNAVINST 5000.42A indicates the need for the inclusion of the Training Agent in the conceptual and planning phases, but does not direct his inclusion until the Second Defense System Acquisition Review Council (DSARC II), for any new acquisition. OPNAVINST 5000.46, OPNAVINST 1500.8H, and NAVMATINST 4000.20B specify the need for consultation with the Training Agent, but they do not require an input from that agent, or identify who is meant by the Training Agent. The first CNET required input to the acquisition cycle is the NTP which is supposed to occur at approximately DSARC II. In major acquisitions this input occurs only about 3 years prior to the Fleet Introduction date. In major acquisitions, there is generally a contract in existence at this time which includes an initial training plan. An existing contract severely constrains the Navy's flexibility in that CNET is restricted to only a consultative role. Since CNET receives the draft NTP 40 days prior to the Training Plan Conference, and is required to submit comments 10 days prior to the conference, a mere 30 days are available to examine available resources and estimate which applicable training can be made available, or developed.

In major acquisitions, particularly total system acquisitions as illustrated by the combat system of the CGN-38 class, there may be available to CNET resources not known by other Training Agents which could be utilized for initial training. To convert these resources to a usable training system could take an extended period of planning by CNET. Consequently, unless CNET is the Training Agent in all phases of the acquisition process, the availability and convertability of these resources do not necessarily become known to the Acquisition Manager prior to the issuance to vendors of Requests for Proposals. Hence, a contract for training may be executed even though this training could

have been performed with Navy owned resources. In addition, should the Training Agent for initial training during the conceptual and validation phases of an acquisition cycle be other than CNET, there may be insufficient time for CNET to examine his resources and plan for follow-on training.

COST of CSMMT

A detailed breakdown of the costs of the CSMMT courses for the CGN-38, the CGN-39 as was anticipated from the contractor, and for the CGN-39 CSMMT as developed from the data obtained from the COMBATSYSTRAGRU is given in appendix B. Table 1, Summary of CSMMT Course Cost, summarizes the major costs associated with the CSMMT courses. Contractor personnel costs in table 1 are burdened as they are in the final cost figures of the contract. Navy personnel costs are derived from the Bureau of Naval Personnel Billet Cost Model for Naval Personnel, and from the October 1975 General Services Salary Schedule, Step 5. Thus, Navy personnel costs can be considered to be burdened although the General Services Salary Schedule does not include these added costs.

Two additional comments are appropriate. First, the computation of contractor costs includes general and administrative (G&A) overhead under "Other" costs whereas no such costs are applied to the Navy. This leads to the false assumption that G&A is not a valid Navy cost. Overhead costs for the Navy could not be identified within the limited time available for this study. Second, in the particular case study of the CGN-39 CSMMT course there were no facilities costs, other than building maintenance and operation costs, associated with the Navy development effort. The buildings used had exceeded their life expectancy and were scheduled to be razed. This is a unique phenomena and cannot be expected to occur in all cases.

The headings for development and implementation are self-explanatory with the exception of "Other." In the case of the contractor costs, this includes G&A, profit, and certain unspecified items such as per diem and travel. For the Navy, "Other" costs include the identified residual value of the CGN-38 course and various training support costs.

In the development of the CGN-39 CSMMT course the Navy costs were 78 percent of the projected contractor costs. Excluding student costs, which were assumed to be a constant value regardless of who gave the course, the Navy cost for development and implementation of the course was 81 percent of the projected contractor cost. These statistics raise the question as to whether it was cost effective in this instance for the Navy to divert the technical and managerial expertise from the operational forces for that relatively small monetary gain. No general statement concerning the efficiency of this method of operation can be made from a single case study.

ADDITIONAL CONSIDERATIONS

Precommissioning technical training can be viewed, in the traditional sense, in two aspects: (1) that which is given to cover new or modified equipments or systems planned for installation and (2) that which covers existing systems or equipments. In addition, there is general ship familiarization

TABLE 1. SUMMARY OF CSMMT COURSE COST

ITEM	CGN-38 (Actual Contractor)	CGN-39 (Actual Navy)	CGN-39 (Projected Contractor)
		DEVELOPMENT PHASE	
1. Professional Hours	8,350 hrs	5,025 hrs	7,160 hrs
2. Professional Avg. Rate	$11.946/hr	$12.649/hr	$12.664/hr
3. Professional Labor	$99,749	$63,561	$90,674
4. Clerical Hours	2,200 hrs	347 hrs	1,886 hrs
5. Clerical Rate	$4.960/hr	$4.343/hr	$5.258/hr
6. Clerical Labor	$10,912	$1,507	$9,917
7. Total Hours	10,550 hrs	5,372 hrs	9,046 hrs
8. Other Costs	$81,166	$57,208	$56,585
9. Total R&D Cost	$191,827	$122,276	$157,176
		IMPLEMENTATION PHASE	
1. Professional Hours	2,080 hrs	2,426 hrs	1,840 hrs
2. Professional Avg. Rate	$12.118/hr	$12.722/hr	$12.865/hr
3. Professional Labor	$25,205	$30,864	$23,672
4. Clerical Hours	340 hrs	0	300 hrs
5. Clerical Rate	$4.960/hr	$ 4.343/hr	$5.258/hr
6. Clerical Labor	$1,686	0	$1,577
7. Total Hours	2,420 hrs	2,426 hrs	2,140 hrs
8. Material	$7,295	$1,258	$7,734
9. Other Costs	$10,605	$8,210	$9,841
10. Total Implementation Cost	$44,791	$40,332	$42,824
Total Program Cost	$236,618	$162,608	$200,000

Note: (1) Contractor labor rates and labor costs include 55% burden.
(2) Contractor material and other costs include G&A (23.05%) and profit (10.0%).

training. Familiarization training need not be included in this study since it is not technical in nature. Obviously, technical training may be subdivided into equipment training and system/system integration training. Lastly, technical training can be viewed as either team or individual training for personnel to function as maintainers, operators, some combination thereof, or users (decision makers).

A recent trend has been for new construction contracts to be all-inclusive, covering both the organization of the ship and the training of personnel. For example, the DD-963 organization, as designed by the contractor, of Operations/Weapons Departments was inviolate for a specified period even though the Navy was considering a different Combat Systems Organization for new ships. Thus training problems could be created in that two types of training may be required for a single class of vessel.

Three different ship building concepts are in vogue, each calling for a different approach to training system development. These are:

- the total package procurement as evidenced by the DD-963
- the procurement wherein the shipyard provides the platform and other vendors the equipment as evidenced by the CGN-38
- the system procurement with the platform coming later as evidenced by AEGIS.

Discussions with personnel responsible for course development and implementation at both the command and instructor level have isolated three primary problem areas in initial, system integration training.

- preliminary technical manuals are frequently incomplete and not satisfactory for course development

- because of the time required for the review cycle and many changes necessary to be made to preliminary technical manuals, usable manuals are frequently too late to be of value to course developers. This is particularly true with respect to systems integration courses where all manuals are required well in advance of the course start date.

- in system integration courses the attitude of the trainee can be a problem. Each subsystem frequently is represented by a parochial specialist (rating) who knows more about his specific system than the instructor. Unless a cooperative, positive approach is taken by students, classes can become a shambles.

SECTION IV

CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

1. Combat System Maintenance Management Training applies to system integration training and is not confined to a single rating or department aboard ship. It is an integration of the subsystems and components into a coordinated unit with each subsystem and component contributing to the output. The management aspect of this training is the identification to the subsystem level, from the total combat system level, of malfunctions which degrade the total system and a follow-up to insure the malfunction is corrected.

2. The COMBATSYSTRAGRU had developed a comprehensive understanding of maintenance management, combat system organizations, systems configurations, and required training through its activities from 1973 to 1976. Thus, when tasked to develop and implement the CGN-39 CSMMT course, the Group had the highest composite degree of expertise, within or outside of the Navy, on combat systems integration then in existence. This is a unique situation.

3. The COMBATSYSTRAGRU was able to develop and maintain its capabilities because:

- it had complete personnel stability over its entire existence
- all technical personnel assigned had extensive knowledge and experience in basic electronics as well as in their technical specialty
- the Group had access to training activities, operational units, system designers, and high level planners. They were not constrained to working for, or through, the Training Command
- adequate funding was available.

4. The CSMMT course developed and presented to the CGN-38 crew by the vendor was not satisfactory because of the lack of adequate technical manuals. The most critical missing element was the system integration manual.

5. The contractor developed the CGN-38 course at a cost to the Navy of approximately $192,000. This course was developed under the requirements of MIL-STD-1379.

6. An estimate of the cost to revise the CGN-38 course and present it to the crew of the CGN-39 by the original contractor was $200,000. Of this amount, approximately $157,000 was to be for course development. The course and all deliverables were to have been developed under MIL-STD-1379.

7. Technical training courses are developed by the CNTECHTRA under the requirements of CNTT-A10 (reissued April 1976). These requirements are not in consonance with the requirements of MIL-STD-1379. In many instances an extensive rewrite of the curriculum material is required before a contractor prepared course can be presented by CNTECHTRA personnel.

8. Actual costs for the COMBATSYSTRAGRU to develop and present the CGN-39 CSMMT course were approximately $162,000. One hundred twenty-two thousand dollars of this total were devoted to the development phase.

9. The Navy's development cost for the CGN-39 CSMMT was 78 percent of the contractor's projected development cost. Since the Navy diverted three senior chief petty officers and one civilian training specialist to the development for a period of 7 months, it is questionable whether the loss of expert personnel to the operating/training commands was cost effective.

10. The term "Training Agent" has different meanings depending upon the perception of the user and whether initial or follow-on training is at issue. Thus, when the term appears in directives regarding the acquisition cycle, it does not necessarily refer to CNET.

11. During the acquisition cycle there are specific points, commencing with the conceptual phase, wherein CNET could be brought into the planning. The points are defined in various directives. However, except in rare instances, the training expertise in CNET is not used.

12. The Navy possesses system maintenance and system integration maintenance technical expertise equivalent to most vendors. It may not possess the equivalent level of technical expertise with respect to components of systems or individual equipments because of the possible introduction of new technology. Thus, with respect to system and system integration maintenance, the Navy should be capable of developing and teaching courses with minimum additional training for the course developers.

13. The COMBATSYSTRAGRU was composed of 14 senior electronics ratings, E-6 and above. Upon disbandment of the group over 60 percent planned to leave the Navy, all with under 30 years service. Discussions with individual members of the group, and general discussions, led to the finding that these men were leaving because the choice of duty offered them was not conducive to their life style or training. These men are among the most highly trained system administrators/technicians in the Navy. Some consideration should be given to a method of retaining these persons.

14. The greatest deterrent to the initial course development by any but a prime contractor for an equipment, component, subsystem, or system is the lack of complete and up-to-date technical documentation.

15. A single sample is insufficient to determine if Navy developed initial training courses would be in the best interests of the Navy for all PRECOM training programs. A larger data base composed of a representative sample of acquisitions must be developed and made available to decision makers.

16. Specific evaluation criteria must be identified and included in a complete life cycle economic evaluation to determine (1) the feasibility of the application and (2) the cost effectiveness of Navy developed PRECOM training.

RECOMMENDATIONS

POLICY.

1. There appears to be general consistency among existing acquisition directives with respect to policy. However, the document used in training contract awards (MIL-STD-1379) is not consistent with the document used by CNTECHTRA for course development (presently CNTT-A10 as reissued April 1976). Action should be initiated to make these two documents consistent.

2. As used in existing directives the term "Training Agent" must be defined in specific and consistent terms. In order to insure CNET's participation and input to the acquisition cycle during the conceptual phase, CNET should be the Training Agent.

ADDITIONAL EFFORT. A sample of one which addresses one segment of total ship training, does not provide adequate information upon which to base a Navy policy decision with respect to total PRECOM training. A data base which considers all types of initial training rather than PRECOM training alone is needed by Navy decision makers. Using this expanded data base, the feasibility of applying the COMBATSYSTRAGRU concept for developing and implementing initial training can be determined. It is proposed that the attached POA&M (appendix D) be implemented in order to expand the information base and to determine whether it would have been cost and training effective for the Navy to have provided all or some portion of initial training in selected historical cases. In addition, the study is designed to establish a methodology to assess the relative advantages of Navy, contractor, or a mix of Navy/contractor provided initial training in a variety of circumstances.

APPENDIX A

CHIEF OF NAVAL AIR TECHNICAL TRAINING CENTER LETTER
CODE 7012/RWS:mbm OF 27 DECEMBER 1976

Technical Memorandum 77-5

NAVAL AIR TECHNICAL TRAINING CENTER
NAVAL AIR STATION MEMPHIS
Millington, Tennessee 38054

Code 7012/RWS:mbm
27 December 1976

From: Commanding Officer
To: Chief of Naval Operations

Subj: PRECOM Training; recommendations concerning

Ref: (a) COMNAVSEASYSCOM ltr PMS-378/JDM Ser 58 of 5 February 1976
(b) Informal discussion between Director, COMBATSYSTRAGRU, and NAVSEA, PMS-378, of 9 December 1976

1. As a result of reference (a), approved by CNO (OP-39), COMBATSYSTRAGRU was tasked and funded to develop and teach the Combat System Maintenance Management Course (CSMMC) for CGN-39. The course was taught during the period 12 October to 15 December 1976. Since it was designed for only the System Test Officer (STO) and Ship's Electronics Readiness Team (SERT), a concomitant officers course was taught using a distilled version of the CSMMC. Beginning 17 January 1977, a one-month course will also be provided to about 40 members of the balance crew.

2. Although a complete analysis of the development effort will be provided following the January course, certain unique characteristics can be discussed here. Specifically, tasking and funding were provided by NAVSEA with billet support from CNO (OP-39). The result was a course developed by Navy personnel of a quality at least equal to that which could have been provided by a contractor. The estimated contractor's price was $200K. The actual cost, including the additional one-month course, will be $25K. In addition, the development was done using Navy training guidelines. This means that it can, with modification, be used in its present form by COMBATSYSTECHSCOLSCOM Mare Island for CGN-40 training.

3. During reference (b), the possibility of expanding this concept was discussed. At the extreme, all PRECOM training would be either contracted or developed by an organization working within the Navy Training Command and funded by NAVSEA. There are obviously numerous tangible variables which must be addressed, e.g., personnel requirements, availability of expertise, funding requirements, etc., as well as intangibles, e.g., NAVSEA and the training command jointly developing, from its genesis, PRECOM training and the effect of Navy personnel training other Navy personnel.

4. Although the CGN-39 course was obviously only a microcosm of the concept discussed in paragraph 3., the experience gained and the benefits derived would appear to warrant further investigation. It is, therefore,

Code 7012/RWS:mbm
27 December 1976

recommended that a feasibility study be conducted to assess this possibility, to include an evaluation of possible improved senior enlisted personnel retention for such a program, i.e., those who would be willing to postpone retirement to develop and teach new courses.

R. W. STAKEL
By direction

Copy to:
CNTECHTRA
CNET
COMNAVSEASYSCOM

APPENDIX B

COST ANALYSES, COMBAT SYSTEM MAINTENANCE MANAGEMENT COURSES (CGN-38 AND CGN-39)

Technical Memorandum 77-5

COST ANALYSES
COMBAT SYSTEM MAINTENANCE MANAGEMENT COURSES
(CGN-38 AND CGN-39)

PURPOSE

The purpose of this appendix is to present analyses of the actual development and implementation costs for the Combat System Maintenance Management Training (CSMMT) Course for the CGN-38 (USS VIRGINIA) and CGN-39 (USS TEXAS), nuclear-powered missile cruisers, and the projected contractor costs for the CGN-39 CSMMT Course.

BACKGROUND

The CSMMT Course for the CGN-38, the first ship of its class, was developed and conducted by Control Data Corporation (CDC) under Contract N-00024-74C-0230 with the Ship Acquisition Program Manager (SHAPM) (PMS-378). Follow-on training for the CGN-39 and remaining ships in the CGN-38 class would normally have been provided by appropriate Navy activities; however, the following combination of CGN-38 related events prevented this normal follow-on training cycle for the CGN-39 from taking place.

1. The contractor conducted CSMMT Course for the CGN-38 was not satisfactory, primarily due to inadequate documentation, and was not acceptable to the Chief of Naval Technical Training (CNTECHTRA).

2. The Combat System Maintenance Training Facility (CSMTF), Mare Island, was not complete and did not have the capability to provide CSMMT for the CGN-39.

3. The contractor's estimate of $200,000 (reference Chief of Naval Air Technical Training ltr Code 7012/RWS:mbm of 27 December 1976) to develop and conduct a CSMMT course for the CGN-39 was considered excessive.

These events led to the SHAPM and Chief of Naval Operations (CNO) decision to task and fund the Combat Systems Training Group (COMBATSYSTRAGRU) to develop and conduct a CSMMT course for the CGN-39. This Group was composed of highly experienced personnel uniquely qualified for the task. The CSMMT course and a modified version of this course were successfully presented to a total of 70 students during the periods October through December 1976 and January - February 1977. They were given in Navy controlled facilities at Newport News, Virginia.

METHODOLOGY

One measure of the efficiency of a training course is its cost relative to the cost of alternatives. In the case of the CGN-39 CSMMT only one alternative was available for comparison. This sample of one cannot be used as the final evidence upon which a Navy policy decision concerning contractor vs. Navy-developed and conducted PRECOM training is based. However this single sample of the cost of the CGN-39 CSMMT and related economic considerations will provide a base for an in-depth examination of the question of PRECOM training

It was decided to identify and examine the following economic considerations as being a sound basis for cost comparison. Rationale for assumptions and estimates required to complete certain portions of the analyses are delineated in the cost computations portion of this appendix.

1. actual contractor development and implementation costs for the CGN-38 CSMMT

2. actual Navy development and implementation costs for the CGN-39 CSMMT

3. projected development and implementation costs for the CGN-39 CSMMT if this course had been procured from a contractor. Examination was based upon accepted contractual pricing techniques and upon the concepts and procedures of economic analysis set forth in TAEG Report No. 31, A Primer on Economic Analysis for Naval Training Systems (1976).

Data used in the analysis of the CGN-38 CSMMT were obtained from contractual records maintained by the SHAPM. These costs reflect the actual labor rates, burden, profit and G&A in effect at the time of issuance of the contract. They were modified to reflect the impact of inflation and estimated necessary changes in contractual level of effort during the development of the projected CGN-39 cost estimate. Data necessary to estimate the Navy's costs for the development and implementation of the CGN-39 CSMMT were obtained from COMBATSYSTRAGRU personnel, Bureau of Naval Personnel Billet Cost Model (1975) and the General Services Salary Schedule (1975).

COST COMPUTATIONS

Separate cost analyses are presented for the contractor developed CGN-38 CSMMT, Navy-developed CGN-39 CSMMT, and for the projected contractor developed CGN-39 CSMMT. Each analysis identifies the development costs, implementation costs, and total program costs. No attempt was made to identify and compare the real benefits of the training courses such as improved job performance through reduction in accident rates, downtime, equipment failures, etc. Such detailed analysis was beyond the scope of this effort; however, it should be included as an integral part of any follow-on program.

GENERAL ASSUMPTIONS

The following general assumptions are applicable to each of the three analyses performed.

1. Student costs (i.e., salaries, per diem, travel) are common, therefore they are not included in the computation of implementation costs.

2. Training site facility and training equipment requirements are common, therefore they are not included in the computation of implementation costs.

3. All contractor labor rates include 55 percent burden.

4. Contractor burden, G&A, and profit are identical percentages for the CGN-38 and for the projected CGN-39 CSMMT development and implementation costs.

CGN-38 CSMMT COST ANALYSIS

1. Specific Assumptions. None. Data were obtained from PMS-378 and reflects actual contract data.

2. Given:

	DATA ITEM	DEVELOPMENT	IMPLEMENTATION
1.	Burden (Overhead)	55%	55%
2.	G&A	23.05%	23.05%
3.	Profit	10%	10%
4.	Average Professional Rate (includes burden)	$11.946/HR	$12.118/HR
5.	Average Clerical Rate (includes burden)	$ 4.960/HR	$ 4.960/HR
6.	Total Professional Hours	8,350 HRS	2,080 HRS
7.	Total Clerical Hours	2,200 HRS	340 HRS
8.	Material	Included in (10)	$ 5,390
9.	Travel	Included in (10)	$ 9.00/TRIP
10.	Other	$31,060	0

3. Development Cost Computations.

a. LABOR = TOTAL HOURS X AVG. LABOR RATE

(1) PROFESSIONAL = 8,350 HRS X $11.946/HR = $99,749

(2) CLERICAL = 2,200 HRS X $ 4.960/HR = $10,912

TOTAL LABOR = $110,661

b. TOTAL DEVELOPMENT COST:

$110,661	LABOR
31,060	OTHER COSTS
$141,721	SUB-TOTAL
32,667	G&A
$174,388	SUB-TOTAL
17,439	PROFIT
$191,827	TOTAL

4. Implementation Cost Computations.

a. LABOR = TOTAL HOURS X AVERAGE LABOR RATE

(1) PROFESSIONAL = 2,080 HRS X $12.118/HR = $25,205

(2) CLERICAL = 340 HRS X $ 4.960/HR = $ 1,686

TOTAL LABOR $26,891

b. TRAVEL = NO. TRIPS X COST/TRIP

= 90 TRIPS X $9.00/TRIP = $810 (VA. BEACH TO NEWPORT NEWS).

c. TOTAL IMPLEMENTATION COST:

$26,891	LABOR
5,390	MATERIAL
810	TRAVEL
$33,091	SUB-TOTAL
7,628	G&A
$40,719	SUB-TOTAL
4,072	PROFIT
$44,791	TOTAL

5. Total Cost Computation.

a. TOTAL CGN-38 CSMMT COSTS = DEVELOPMENT COST + IMPLEMENTATION COST

= $191,827 + $44,791
= $236,618

PROJECTED CONTRACTOR DEVELOPED CGN-39 CSMMT COST ANALYSIS

1. Specific Assumptions:

a. Six percent per year material cost increase due to inflation

b. Six percent per year labor rate increase due to inflation

c. CGN-39 CSMMT labor mix equal to CGN-38 CSMMT labor mix

d. CGN-39 CSMMT total program cost estimate of $200,000 is accurate

e. Fourteen-week course (same as actual Navy conducted CGN-39 CSMMT) and 1 week setup time. Travel cost $9.00/trip equal to CGN-38 actual cost

f. "Other costs" in the development phase equal to 50 percent of "other costs" identified in CGN-38 CSMMT program. This assumption is based on the fact that all of the data costs and data gathering trips performed for the CGN-38 program would not have to be duplicated for the CGN-39 program.

2. Given:

	DATA ITEM	DEVELOPMENT	IMPLEMENTATION
1.	Burden (Overhead)	55%	55%
2.	G&A	23.05%	23.05%
3.	Profit	10%	10%
4.	Average Professional Rate (includes burden)	$12.664/HR	$12.865/HR
5.	Average Clerical Rate (includes burden)	$ 5.258/HR	$ 5.258/HR
6.	Total Professional Hours	7,160 HRS	1,840 HRS
7.	Total Clerical Hours	1,886 HRS	300 HRS
8.	Material	Included in (10)	$ 5,714
9.	Travel	Included in (10)	$ 9.00/TRIP
10.	Other	$15,530	0

3. Development Cost Computations.

a. LABOR = TOTAL HOURS X AVERAGE LABOR RATE

(1) PROFESSIONAL = 7,160 HRS X $12.664/HR = $ 90,674

(2) CLERICAL = 1,886 HRS X $ 5.258/HR = 9,917

TOTAL LABOR = $100,591

b. TOTAL DEVELOPMENT COST:

$100,591	LABOR
15,530	OTHER COSTS
$116,121	SUB-TOTAL
26,766	G&A
$142,887	SUB-TOTAL
14,289	PROFIT
$157,176	TOTAL

4. Implementation Cost Computations.

a. LABOR = TOTAL HOURS X AVERAGE LABOR RATE

(1) PROFESSIONAL = 1,840 HRS X $12.865/HR = $23,672

(2) CLERICAL = 300 HRS X $ 5.258/HR = 1,577

TOTAL LABOR $25,249

b. TRAVEL = NO. TRIPS X COST/TRIP

= 75 TRIPS X $9.00/TRIP = $675

c. TOTAL IMPLEMENTATION COST:

$25,249	LABOR
5,714	MATERIAL
675	TRAVEL
$31,638	SUB-TOTAL
7,293	G&A
$38,931	SUB-TOTAL
3,893	PROFIT
$42,824	TOTAL

5. Total Cost Computation.

TOTAL CGN-39 CSMMT COST = DEVELOPMENT COST + IMPLEMENTATION COST

= $157,176 + $42,824

= $200,000

NAVY DEVELOPED CGN-39 CSMMT COST ANALYSIS

The development and implementation costs for the Navy developed CGN-39 CSMMT were determined in a somewhat different manner than the costs for the two courses previously examined. This change in procedure was necessary to accommodate the type of data available for analysis; however, the difference in analytical techniques does not detract from the validity of Navy costs, or the comparability of the costs presented in the three analyses. The formula (development and implementation) upon which this cost analysis is based is:

TOTAL COST = F + E + IMD + P + S + ST + M

WHERE F = FACILITY COST
E = EQUIPMENT COST
IMD = INSTRUCTIONAL MATERIAL DEVELOPMENT COST
P = PERSONNEL COST
S = SUPPLY COST
ST = STUDENT COST
M = MISCELLANEOUS COST

1. Specific Assumptions:

a. The development facility had no real worth as it had exceeded its life expectancy and was scheduled for razing.

b. Development equipment had no real worth as it had exceeded its life expectancy.

c. A man-year consists of 2,080 hours for purposes of converting yearly salaries to hourly rates.

d. Twenty-five percent of the CGN-38 CSMMT courses was usable in the Navy developed CGN-39 CSMMT course.

e. Personnel costs for Naval personnel are burdened; civilian Naval personnel costs are not burdened.

2. Given: (Based on COMBATSYSTRAGRU Data and Assumptions)

	DATA ITEM	DEVELOPMENT	IMPLEMENTATION
1.	Average Professional Rate	$12.649/HR	$12.722/HR
2.	Average Clerical Rate	$ 4.343/HR	$ 4.343/HR
3.	Total Professional Hours	5,025 HRS	2,426 HRS
4.	Total Clerical Hours	347 HRS	0
5.	Total Facility Area	11,088 FT^2	NA
6.	COMBATSYSTRAGRU Facility Area	750 FT^2	NA
7.	Facility Maintenance Cost/yr.	$ 8,175/YR	NA
8.	Facility Utility Cost/yr.	$ 9,500/YR	NA
9.	Supplies	$644	$1,258
10.	Support Cost	$ 6,083	$8,210
11.	CGN-38 CSMMT Development Cost	$191,827	NA

3. Development Cost Computations.

a. F = MAINTENANCE + UTILITY COSTS

$$F = (\$8,175 + \$9,500)\left(\frac{7 \text{ Mos}}{12 \text{ Mos}}\right)\left(\frac{750 \text{ FT}^2}{11,088 \text{ FT}^2}\right)$$

$$F = (\$17,675)\ (.583)\ (.068)$$

$$F = \$701$$

b. E = 0

c. IMD = $6,083

d. P = TOTAL HOURS X AVERAGE LABOR RATE

(1) PROFESSIONAL = 5,025 HRS X $12.649/HR = $63,561

(2) CLERICAL = 347 HRS X $ 4.343/HR = 1,507

P = $65,068

e. S = $644

f. ST = 0

g. M = 0 (No actual expenditures could be identified for this category.)

This cost analysis is based on the identification of the total actual costs incurred or avoided by the Navy in the development of the CGN-39 CSMMT course. However, it is apparent from the study investigation that the contractor's CGN-38 CSMMT course material and development effort provided a significant contribution to the COMBATSYSTRAGRU's timely and successful development of the CGN-39 CSMMT course. The COMBATSYSTRAGRU estimated that 25 percent of the CGN-38 CSMMT course material was used, and thus this amount of development effort was avoided in the development of the CGN-39 CSMMT course. This means that in terms of time and monetary savings, the CGN-38 CSMMT program was of value to the COMBATSYSTRAGRU, and this value must be considered in decisions regarding the cost.

Technically, a monetary figure representing the value of the CGN-38 CSMMT program should not be included in a cost analysis concerned with the total actual costs incurred in the development of a training course. However, the Navy developed CGN-39 CSMMT course represents a unique situation with broad implications for future initial training programs. The study investigation suggests the importance of recognizing all cost considerations to include the avoidance of cost value of the CGN-38 CSMMT course to the CGN-39 CSMMT course development effort. Failure to include this value (i.e., monetary avoidance to the CGN-39 CSMMT course development effort) of the CGN-38 CSMMT program in the total cost computation of the CGN-39 CSMMT course development effort would create a misleading baseline for future initial training program decisions. The impact, in terms of estimated value, of the CGN-38 program was significantly relevant to the total cost to the Navy. For this reason, a deviation from standard cost analysis techniques is justified and the estimated cost avoidance value of the CGN-38 CSMMT program is included in the total cost of the Navy developed CGN-39 CSMMT course. The actual total Navy expenditure for the CGN-39 CSMMT course is determined by subtracting the Navy avoidance of costs of development of the CGN-38 CSMMT course from the total costs presented.

CGN-38 Value = (CGN-38 Development Cost plus Material Cost) 25%

= (191,827 + 5,390 + (5,390 X 23.05%) + (5,390 + (5,390 X 23.05%)) (10%)) 25%

= (191,827 + 5,390 + 1,242 + 663) 25%

= 199,122 X 25%

= $ 49,780

h. TOTAL DEVELOPMENT COST = F + E + IMD + P + S + ST + M

= $701 + 0 + $6,083 + $65,068 + $644 + 0 + $49,780

TOTAL DEVELOPMENT COST = $122,276

4. Implementation Cost Computations.

a. F = 0

b. E = 0

c. IMD = $8,210

d. P = TOTAL HOURS X AVERAGE LABOR RATE

(1) PROFESSIONAL = 2,426 HRS X $12.722/HR = $30,864

(2) CLERICAL = 0

P = $30,864

e. S = $1,258

f. ST = 0

g. M = 0

h. TOTAL IMPLEMENTATION COST = F + E + IMD + P + S + ST + M

= 0 + 0 + $8,210 + $30,864 + $1,258 + 0 + 0

TOTAL IMPLEMENTATION COST = $40,332

5. TOTAL NAVY CGN-39 CSMMT COST = DEVELOPMENT COST + IMPLEMENTATION COST

= $122,276 + $40,332

= $162,608

ANALYSIS

Reconstruction of the actual costs associated with the contractor developed CGN-38 CSMMT formed the basis for the projected contractor development and implementation costs for the CGN-39 CSMMT. The projected contractor costs establish a baseline for estimating the cost efficiency of the Navy developed CGN-39 CSMMT. From an analysis of the two (projected contractor and actual Navy) CGN-39 CSMMT costs it is found that:

1. Navy development cost was 22 percent less than the projected contractor development cost.

2. Navy implementation cost was 6 percent less than the projected contractor implementation cost.

3. total program (development and implementation) Navy cost was 19 percent less than the projected total program contractor costs.

The above findings lead to the apparent conclusion that the Navy developed CGN-39 CSMMT was more cost efficient than the projected contractor developed CGN-39 CSMMT. However, the validity of this conclusion must be assessed in conjunction with the following facts:

- Navy civilian labor rates were not adjusted to reflect a burden value as were the Navy military and projected contractor labor rates.

- no monetary value was attached to the special training (i.e., the two Course Development Courses) provided to Navy personnel.

- the Navy cost analysis does not address whether or not the Navy resources (personnel, facilities, services, etc.) consumed to develop and implement the CGN-39 CSMMT could have been redirected to other uses which may have made a greater contribution to the accomplishment of the Navy mission.

- approximately 41 percent of the Navy's development costs are attributed to the real value realized from the contractor developed CGN-38 CSMMT course. This represents a significant percentage of the Navy's total development cost.

CONCLUSIONS

The cost analyses lead to the following conclusions which must be considered in addressing the cost efficiency of Navy developed training.

1. There is no significant difference between the projected contractor average professional labor rate and the Navy's average professional labor rate.

2. The projected contractor clerical labor rate is 21 percent higher than the Navy clerical labor rate. This may be attributed to the fact that burden was not included in the Navy clerical labor rate.

3. The projected contractor professional labor for the development effort is 42 percent higher than the Navy professional labor required for the development effort.

4. The projected contractor clerical labor for the development effort is over 5 times the Navy clerical labor required for the development effort.

5. The Navy's professional labor required for the implementation effort was 32 percent higher than the professional labor projected for the contractor implementation effort.

6. The Navy required no clerical labor for the implementation effort.

7. The projected contractor material cost is over 5 times the material cost of the Navy developed CGN-39 CSMMT. This difference may be attributable to such factors as G&A and profit.

8. Navy facilities used for development of the CGN-39 CSMMT had exceeded their life expectancy and therefore had no monetary value. This is a unique situation that will not occur in most Navy course development efforts.

9. One of the most significant contributions of the cost analyses presented in this appendix is the identification of alternatives and issues to be considered in future Navy vs. contractor trai ing analyses. They are:

- the basic cost analysis techniques used in this appendix should be refined and combined with the cost estimation techniques described in TAEG Technical Memorandum 75-4, Acquisition Cost Estimating Using Simulation (1975), to estimate Navy projected initial training costs.

- Navy civilian labor rates should include burden.

- future initial training cost analyses should be based on a representative sample of case studies, each case being treated as a specific situation.

- the value and alternative use of Navy facilities, equipment, and personnel should be included in future initial training cost analyses.

- future initial training economic analyses should address the impact upon the total Navy mission of redirecting Navy personnel to develop and conduct initial training.

- future initial training economic analyses should include but not be limited to the following alternatives:

  a. all contractor developed and conducted initial training

  b. all Navy developed and conducted initial training

  c. all contractor developed and/or conducted initial training for selected acquisition programs

  d. all Navy developed and/or conducted initial training for selected acquisition programs

  e. mix of Navy and contractor developed and conducted initial training programs based on available expertise, system commonality analysis, and operational needs of the Navy.

- these analyses were based on a unique set of events which may not be applicable in all acquisition programs. Each case study must be treated individually based on actual events occurring in that case.

APPENDIX C

A SUMMARY OF CURRENT NAVY SYSTEMS ACQUISITION TRAINING POLICY

Technical Memorandum 77-5

A SUMMARY OF CURRENT NAVY SYSTEMS ACQUISITION TRAINING POLICY

PURPOSE

The purpose of this appendix is to summarize current Navy policy with respect to the required and implied points of entry for the Training Agent into the systems acquisition cycle.

BACKGROUND

Unacceptable initial training for the CGN-38, incomplete training facilities at Mare Island for follow-on training in Combat Systems Maintenance Management Training (CSMMT), and anticipated unacceptable high costs for a revision to the CGN-38 CSMMT caused the Chief of Naval Operations (CNO) to direct the Combat Systems Training Group (COMBATSYSTRAGRU) to develop and teach a CSMMT course for CGN-39 personnel. The efforts of the COMBATSYSTRAGRU proved to be successful and apparently less expensive than contractor furnished training. In addition, that approach represented a new concept to precommissioning (PRECOM) training in that the Navy rather than a vendor prepared and presented the course.

The Training Analysis and Evaluation Group (TAEG) was requested to examine the feasibility of expanding the new concept to include all PRECOM training.

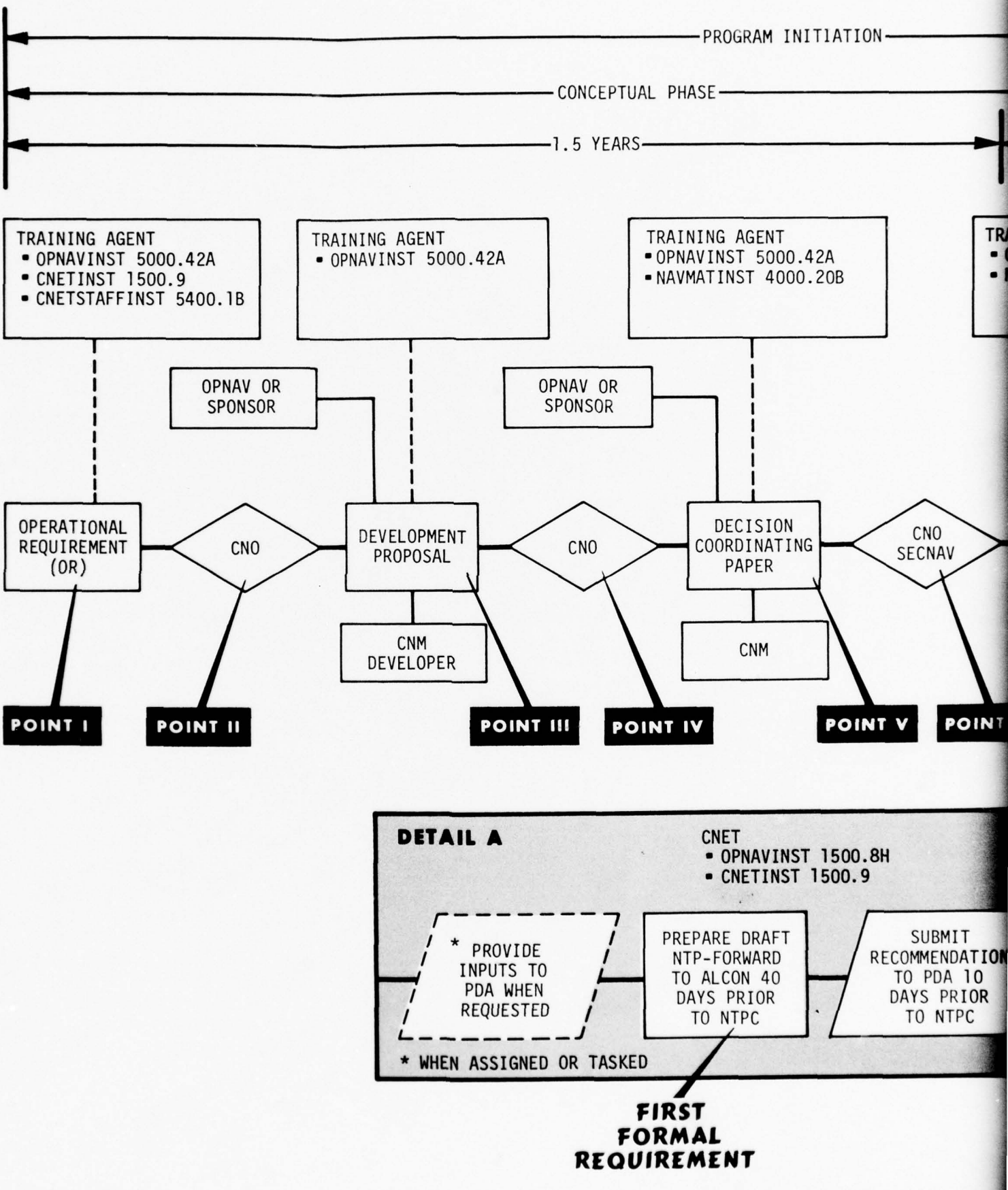
As illustrated by the combat systems training given the CGN-39 crew, the Chief of Naval Education and Training (CNET) possessed training resources of which other Training Agents were not aware. In order to insure existing training resources are known to acquisition managers, and to maximize the use of these resources during planning, CNET must become involved in all phases of the acquisition cycle. Then CNET can serve as an ongoing consultant, may be capable of providing initial training, and will have sufficient time to prepare for the assumption of follow-on training.

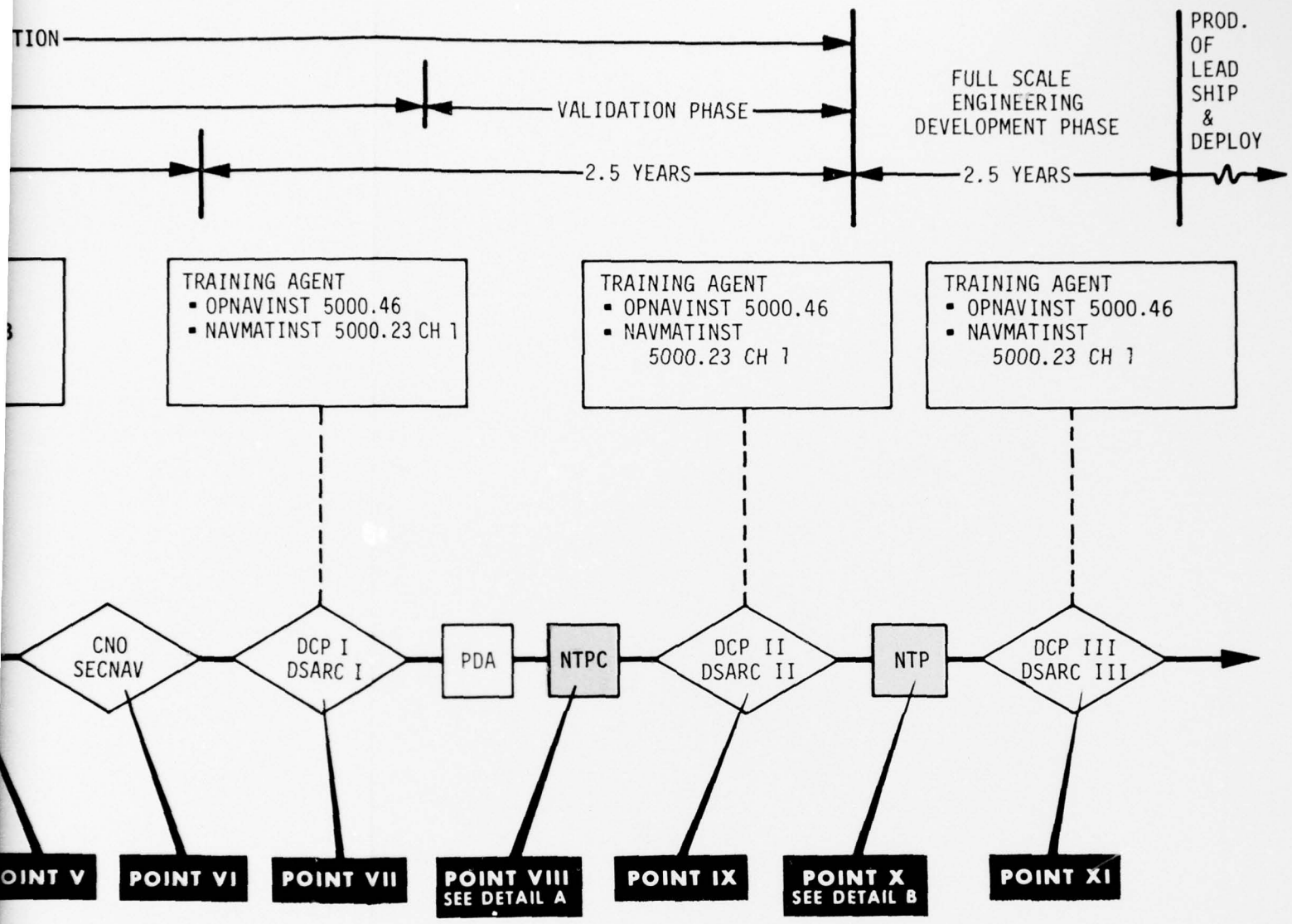
DISCUSSION

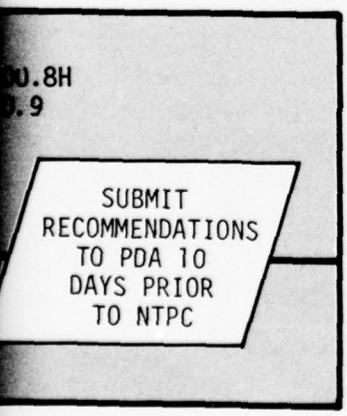
Figure C-1, Typical Training Acquisition Flow Diagram, was developed to depict the implied and required entry points of the Training Agent into the acquisition cycle of all new equipments/new systems/PRECOM training. Data supporting figure C-1 were derived from official documents which address the acquisition cycle. The following discussions are keyed to each numbered point on figure C-1, and state the applicable policy as mandated in Navy policy documents.

POINT I

The Operational Requirement (OR) is a concise statement of operational needs. It is the basic requirements document for all Navy acquisition programs which necessitate research and development effort. The OR response is a Development Proposal (DP) from an acquisition manager.


PROGRAM INITIATION
CONCEPTUAL PHASE
1.5 YEARS
TRAINING AGENT
• OPNAVINST 5000.42A
• CNETINST 1500.9
• CNETSTAFFINST 5400.1B
TRAINING AGENT
• OPNAVINST 5000.42A
TRAINING AGENT
• OPNAVINST 5000.42A
• NAVMATINST 4000.20B
OPNAV OR SPONSOR
OPNAV OR SPONSOR
OPERATIONAL REQUIREMENT (OR)
CNO
DEVELOPMENT PROPOSAL
CNO
DECISION COORDINATING PAPER
CNO SECNAV
CNM DEVELOPER
CNM
POINT I
POINT II
POINT III
POINT IV
POINT V
POINT
DETAIL A
CNET
• OPNAVINST 1500.8H
• CNETINST 1500.9
* PROVIDE INPUTS TO PDA WHEN REQUESTED
PREPARE DRAFT NTP-FORWARD TO ALCON 40 DAYS PRIOR TO NTPC
SUBMIT RECOMMENDATION TO PDA 10 DAYS PRIOR TO NTPC
* WHEN ASSIGNED OR TASKED
FIRST FORMAL REQUIREMENT





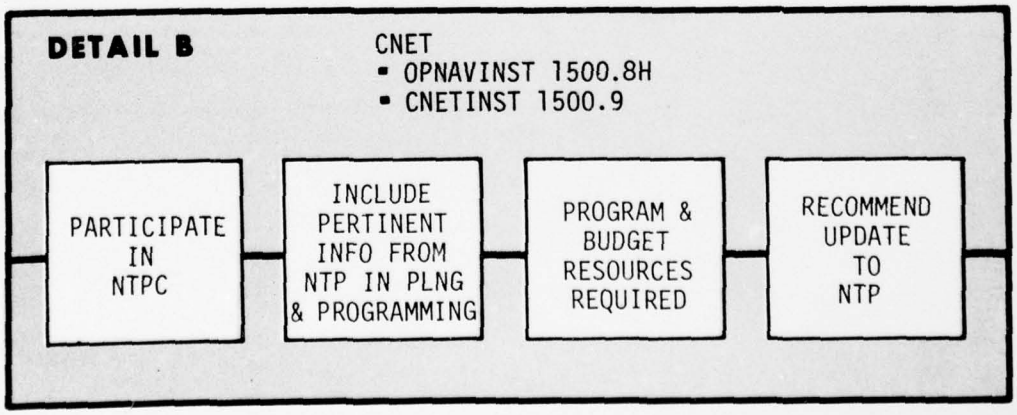


Figure C-1. Typical Training Acquisition Flow Diagram

The three documents cited below either state or imply that the Training Agent, who may or may not be CNET, should input at this point in the acquisition cycle. It is important to note that the term "Training Agent" is not defined as it pertains to initial training.

- OPNAVINST 5000.42A mandates that in the design and development of requirements, full consideration should be given to manpower costs and to the feasibility of providing trained personnel to maintain the installed systems. As personnel skill requirements are elements which fall under training, this consideration implies the Training Agent should provide inputs at this point.

- CNETINST 1500.9 directs CNET's entry at this point and prescribes the interface between CNET and OPNAV/SYSCOMs during the conceptual phase of program initiation. However, this instruction is policy only within the Training Command and depends upon a cooperative effort between commands for its effectiveness.

- CNETSTAFFINST 5400.1B specifies the staff sections responsible for the establishment of early liaison with appropriate OPNAV, NAVMAT, SYSCOM, and other offices to identify research and development projects which may evolve into systems/hardware acquisition programs and subsequently impact the Naval Education and Training (NET) Command.

POINT II

CNO reviews the OR with respect to the Navy's operational needs and budget, and provides approval (or disapproval) for a program start.

POINT III

The DP formally responds to approved ORs. It contains the technical approach to be followed in meeting the requirements of the OR. The Training Agent's presence at this point in the acquisition cycle is again implied.

- OPNAVINST 5000.42A, the document which prescribes the procedures to be followed in the development of the DP, directs that the DP describe the logistic support approaches and identify any significant impact on the numbers and skill levels of personnel.

Consideration of the training issues and other factors which impact on the training command during development of the DP make CNET's presence necessary. If CNET is not involved at this early time, decisions reached could impact the NET Command without CNET having adequate time to respond. Thus disruptive effects to the normal operations of the NET Command could become the rule.

POINT IV

The DP is forwarded to CNO for approval. It contains the information necessary to make operational and cost-effectiveness comparisons of all feasible technical solutions. After CNO approves or modifies the DP, a Navy Decision Coordinating Paper (NDCP) is originated by the program sponsor in cooperation with the Director, Research, Development, Test and Evaluation (OP-098).

POINT V

The NDCP defines program issues which impinge on the development and the viable alternatives which support the operational need, program objectives, the level of logistic support, and the relationship to logistic capabilities.

Two documents define the possible Training Agent's participation at this point in the acquisition cycle.

- OPNAVINST 5000.42A stipulates that all questions relative to the statement of the requirement and the development of alternatives available to fulfill the requirement, including training requirements, will be resolved in the NDCP.

The inclusion of training implies that the Training Agent should be involved in planning not later than this point. Furthermore, since training requirements are important, and possibly costly issues, it is essential that CNET be requested to provide inputs to the acquisition manager.

- NAVMATINST 4000.20B requires that logistic support planning begin during the conceptual portion of the program initiation. All involved parties, to include CNET, are to be requested to participate in the planning.

CNET's mission is to ensure that requisite and responsive training be provided beyond that provided by the Chief of Naval Material (CHNAVMAT) for all new systems/equipments acquired. This CNET mission complements CHNAVMAT who is responsible for assuring that quantitative and qualitative support system requirements, to include initial training, adhere to the DP. Since it is necessary that these training requirements be specified in project master plans, requests for proposals, and other appropriate contractual and program/project management documents, CNET involvement is mandatory.

POINT VI

The NDCP is presented to CNO/SECNAV as the basis for the CNO/SECNAV decision (preferred alternative). This decision authorizes insertion of the program in the Five-Year Defense Plan.

A derivative of the approved NDCP is the first DCP which precedes the first Defense Systems Acquisition Review Council (DSARC I) review. Future DCPs provide the basis for later DSARC reviews and their recommendation to proceed with the acquisition. DCPs are the formal documents used as the rationale for policy decisions during all acquisition phases.

The DSARC serves as an advisory body to the Secretary of Defense on the acquisition of major defense systems and provides him with supporting information and recommendations when decisions are necessary. DSARCs precede each acquisition phase--the program initiation (validation phase), the full-scale engineering development phase, and the production/deployment phase.

POINT VII

DSARC I is the decision point whereat the Secretary of Defense approves (or disapproves) the committing of resources to advanced development during the validation phase of a proposed new major defense system acquisition. Two documents imply that the Training Agent's input is necessary at this DSARC, and subsequently at DSARCs II and III.

- OPNAVINST 5000.46 lists manpower and training as one major consideration for DCPs I, II, and III.

The training considerations imply that the Training Agent make an input at this time. Provision is made for the Director of Naval Education and Training to comment on the DCP, but there is no provision for a direct input by the Training Agent.

- NAVMATINST 5000.23 CH 1 states that DSARC I will ensure that critical logistic support factors and any facilities impact be identified.

Logistics and facilities are issues which include factors which may fall within the purview of the Training Agent. Consideration of these factors implies a Training Agent input is necessary.

POINT VIII

Just before the completion of the validation phase, and prior to DCP II and DSARC II, the Navy Training Plan Conference (NTPC) is supposed to be held. NTPC participants produce an official document, the Navy Training Plan (NTP), which identifies training, training facilities, and training manpower requirements to support the introduction and operational use of new systems/equipments. The Principal Development Agency (PDA) develops the NTP. In the development of the draft NTP, the PDA may request inputs from the Training Agent, but this action is optional on his part. The draft NTP is furnished to cognizant commands (including CNET) approximately 40 calendar days prior to the convening of the NTPC in order that a complete review can be made by the NTPC participants. Comments and recommendations on the draft NTP are required at least 10 calendar days prior to the NTPC. The draft NTP is the first formal requirement for CNET to make an input to the acquisition manager. As the NTP is the sole document authorizing new training personnel, training support requirements, and training resources, CNET inputs are vital. These inputs concern the manner of participating and means to participate in initial training, pipeline training, and follow-on and replacement training. It is, therefore, imperative that CNET be given ample lead time to provide inputs to the NTP thereby ensuring that initial training formats are adequate and compatible with follow-on and/or replacement training. Two documents direct CNET participation in the NTPC.

- OPNAVINST 1500.8H specifies that, for programming purposes, the minimum lead time required to meet ready-for-training dates is 3 years for billets and funds. Facility requirements to accommodate new training must be identified at least 5 years prior to the ready-for-training date.

- CNETINST 1500.9 reiterates this policy.

CNET usually does not have even the benefit of the 3-year minimum lead time specified. Insufficient lead time in identifying and funding new training requirements is one major contributing factor to training inefficiencies.

POINT IX

DSARC II is conducted just before the end of the validation phase. Its purpose is to consider whether to commit resources to the full-scale engineering development phase. DSARC II recommends the trade-offs to be made between the anticipated operational effectiveness of the product and cost, and identifies the logistic support alternatives. The fact that logistical support alternatives are identified implies that the Training Agent's inputs are necessary for an effective and efficient review.

POINT X

The NTPC is convened at the beginning of the full-scale Engineering Development Phase and requires CNET's comments on the draft NTP. Within 30 days of completion of the NTPC, the proposed final NTP is forwarded to CNO (OP-099) for approval and promulgation. Upon receipt of the approved NTP, the Training Agent extracts pertinent information for inclusion in applicable planning and programming documents and proceeds with the necessary preparations for training. The Training Agent is charged with the responsibility of identifying needed changes in the NTP and of apprising CNO.

POINT XI

DSARC III is conducted prior to the initiation of the Production/Deployment phase--the third and final phase in the system acquisition process. DSARC III recommends to the Secretary of Defense the commitment (or noncommitment) of resources to the production of the system/equipment. Since the Training Agent is not required to input to DSARC III, the resolution of training related issues during production may be made without a Training Agent input.

APPENDIX D

POA&M FOR TASK

(SURFACE SHIP INITIAL TRAINING ALTERNATIVES)

Technical Memorandum 77-5

1. PLAN OF ACTION AND MILESTONES FOR TASK:

Surface Ship Initial Training Alternatives

Sponsoring Agents: Chief of Naval Operations

Chief of Naval Education and Training

PMS-378

2. BACKGROUND

Navy Training Plan S30-7410B of 20 August 1976 for the Nuclear Powered Guided Missile Cruisers (CGN-38) class of ships specifically required a combat systems organization for the class, and specified that Combat System Maintenance Management Training (CSMMT) as defined in NTP S30-7518 be implemented. A contractor was to provide initial training (for the first ship of the class, CGN-38), and the Combat System Maintenance Training Facility (CSMTF), Mare Island, California, was to provide follow-on training. Cost of initial training was approximately $236,000 of which $192,000 was devoted to course development. Initial training proved to be unsatisfactory and was not accepted by the Chief of Naval Technical Training (CNTECHTRA), acting as agent for CNET. In addition, CSMTF, Mare Island, was not completed, and the school was unable to accept responsibility for follow-on CSMMT.

CSMMT remained a requirement for the follow-on ships of the CGN-38 class. The responsibility for this training was assumed by the Ship Acquisition Program Manager (SHAPM) (PMS-378), who informally solicited estimates for an update of the CGN-38 course. The contractor rewrite and presentation of the revised course was estimated to cost $200,000 of which $157,000 was to be devoted to the development effort.

Because of this high and unplanned cost, SHAPM, after discussions with the Chief of Naval Operations (CNO) (OP-39) and the Combat Systems Training Group (COMBATSYSTRAGRU), tasked the COMBATSYSTRAGRU to develop and present a revised edition of the CGN-38 CSMMT course to the CGN-39 crew. The course was developed and presented at a cost to the Navy of $162,000, of which $122,000 was for development. Upon completion of this tasking the COMBATSYSTRAGRU was decremented. Prior to the disbanding of the Group, a report was submitted by the Chief of Naval Air Technical Training letter, Code 7012/RWS:mbm of 27 December 1976 to CNO which outlined the positive aspects of Navy developed training for precommissioning (PRECOM) crews. In this report a feasibility study was proposed to assess the possibility of expanding the concept used to develop the CSMMT for the CGN-39 to all PRECOM training.

A preliminary effort by TAEG (Technical Memorandum 77-5) concluded that the success of the COMBATSYSTRAGRU was due primarily to special circumstances which existed at the time. These special circumstances may not be applicable in other instances. In addition to examining these special circumstances, five other factors must be investigated in greater detail in order to establish a complete data base usable by decision makers. These are:

- the types of acquisition programs
- the applicability of this concept to equipments and systems
- identification and availability of Navy areas of expertise
- cost saving benefits compared to the loss of trained personnel to the operating and/or training forces
- concept feasibility relative to existing policy directives.

3. PURPOSE

The purpose of the proposed investigation is to determine whether it would have been cost and training effective for the Navy to provide all or some portion of initial training for new or modified equipments/systems, and system integration as well as precommissioning training in selected historical cases. The study objective is to develop a methodology for determining the effectiveness of utilizing Navy-provided training, contractor-provided training, or a mix of Navy-contractor training. An additional benefit derived from the results of this study could be the development of methods and the gathering of data useful in the determination of the training requirements reporting within the larger scale military manpower versus hardware procurement (HARDMAN) effort. One objective of the HARDMAN study was to analyze the current training requirements reporting and review structure as it applies to the systems acquisition process.

4. APPROACH

The acquisition process for major systems/equipments is a complex, long-term procedure. Requirements vary between ships, submarines and aircraft which leads to differences in acquisition methodologies. The various acquisition programs studied in this investigation will be limited to surface vessel equipments, systems and ships.

This investigation is divided into two phases. Phase I is the data acquisition process wherein individual case studies will be made of a representative sample of each type of acquisition program. Phase II will utilize the data obtained from the case studies to perform two analyses from which conclusions and recommendations can be drawn.

Phase I. Five individual tasks are required during the data collection effort. These tasks will be accomplished concurrently since data can be obtained at the same location and at the same time. The five tasks are:

Task 1. Identify Acquisition Types and Cases. The preliminary study, TAEG Technical Memorandum 77-5, identified three types of ship acquisition programs from a total of five. These were:

- total package procurement
- platform procurement with vendors other than the shipyard providing the systems
- system procurement with the platform coming later.

The remaining two are equipment and system acquisition programs with the platform already in existence (back-fit acquisitions).

The proposed study will verify that a major equipment/system and/or system integration program is applicable to each of the five types of acquisition programs. A minimum of one completed procurement will be identified for each type of acquisition. To insure a representative sample of cases, the team will select those equipment/system cases which have the operations, gunnery, and engineering departments (combat systems, operations, engineering departments on combat system organized ships) represented.

Task 2. Identify Training Methods Used. Two types of training are applicable for any major acquisition program; i.e., initial training which is the Acquisition Manager's responsibility and follow-on training which is a CNET responsibility. For each case, it will be necessary to establish how each type of training was treated during the procurement process and the point in the acquisition cycle wherein CNET made a contributory input. Contributory input is defined as one which would have an impact on the training program.

Data obtained must include identification of the events which occurred during the transition process from initial to follow-on training. The study team will determine whether major revision was necessary to contractor initial training prior to presentation by CNTECHTRA, and, if possible, whether initial training was developed for the average sailor or for a specially selected, above average group.

Task 3. Identify Resources Available to CNET. In major acquisition programs it is necessary that CNET become involved at least 5 years prior to the commencement of initial training. The rationale for this statement is based on the following:

- The POM and budget cycle is based on the Five Year Defense Plan. Required training aids, devices, and facilities modifications must be inserted in the fiscal cycle at that time.
- Contractual and program management documents, including the Navy Training Plan (NTP), require CNET involvement if CNET is to provide initial training.
- Coordination with other commands for required resources, other than funds, must be accomplished early in the process.
- CNET resources available, and resources required to be developed, must be identified in sufficient time for CNET to prepare initial training courses.

In each of the selected case studies, the team will attempt to identify which resources were available to CNET 5 years prior to initial training. They will estimate the time required to change and the economic impact of changing these resources to develop and present initial training. The depth of this analysis is dependent upon the availability of data.

Task 4. Perform Cost Analyses. Two analyses will be required for each case study.

a. Contractual data will be used as a basis for establishing, on a case by case basis, the actual and total costs of initial training. Costing is to be separated into two categories; i.e., development costs and implementation costs.

b. The factors outlined in TAEG Report No. 31, A Primer on Economic Analysis for Naval Training Systems (1976), and the estimation techniques described in TAEG Technical Memorandum 75-4, Acquisition Cost Estimating Using Simulation (1975), will be used to project the Navy development and implementation costs of initial training in each case study.

Task 5. Identify Training Responsibilities. Although it is clearly stated that the Acquisition Manager is responsible for initial training, this responsibility is frequently delegated to a Training Agent. CNET is always responsible for follow-on training and is, therefore, Training Agent for that phase. Policy directives are consistent in recommending that the Training Agent be brought into the acquisition cycle as early as possible, but the Training Agent for initial training is not necessarily CNET. The first required CNET input in the acquisition cycle is the NTP Conference, approximately DSARC II. Therefore, each case study will identify:

a. who was Training Agent for initial and follow-on training, and when each of these agents was brought into the program

b. when was CNET requested to provide inputs, and which policy documents/contracts did these inputs affect

c. what was the time span from CNET's required entry into the program to the commencement of initial training

d. was contractor provided initial training satisfactory. Was the material developed in a form usable by and acceptable to CNTECHTRA, and if not, why not.

Phase II - Two required analyses are apparent at this time. The results of these analyses will be the basis for conclusions and recommendations. These analyses will address:

1. When, and to what degree, should CNET become involved in the acquisition process in order to (a) identify and bring to an effective state the expertise needed to develop initial and pipeline training and (b) insure contractor developed training is in consonance with CNET training requirements.

2. The criteria for prospective acquisition programs to identify (a) the most resource efficient and training effective initial training alternatives, (b) the required degree of involvement of the Navy/contractor in the development of initial training, and (c) who should be the implementing agent; i.e., Navy or contractor, for initial training.

This study could provide guidelines which can be used in developing methods to be followed in pursuing the HARDMAN objectives and some representative historical data which may eventuate in better resources estimation. In addition, it is expected that this study will provide the rationale for the early entry of CNET into the acquisition cycle in order that the Training Command responsibilities can be met.

5. OUTPUTS

The primary output of this study is envisioned to be a set of criteria and/or guidelines to assist decision makers in selecting the most cost efficient and training effective means for conducting initial training for selected acquisition programs. In the development of these criteria and/or guidelines,

it will be necessary to formulate and evaluate a methodology for selecting among Navy/contractor initial training alternatives. Data availability is critical to the evaluation of the methodology.

Should sufficient data not be available to evaluate the proposed methodology, the following benefits will still accrue.

a. a costing method, not proven with empirical data, for use in the decision making process for selecting the most favorable mix of Navy/contractor involvement in initial training

b. an identification of the essential elements of information needed to evaluate the proposed costing method

c. the qualitative factors which must be considered by decision makers in selecting the most viable mix of Navy/contractor involvement in initial training.

6. RESOURCES

Manpower Requirements:

2 Professionals for a total of 18 man-months

1 Professional for a total of 6 man-months

Total man-months - 24

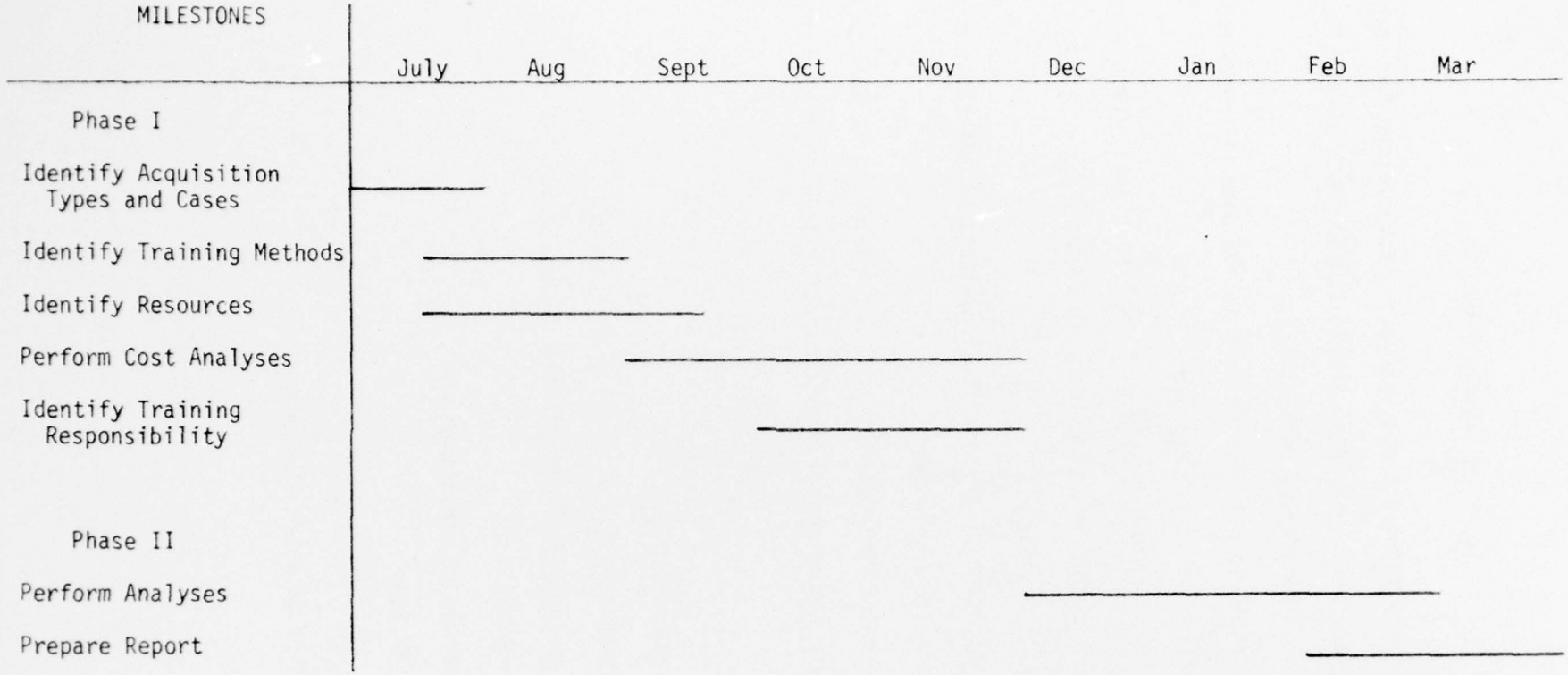
Calendar months to completion - 9

Travel Costs: $3,250

7. WORK SCHEDULE

See attached chart on work milestones.

MILESTONES FOR STUDY
SURFACE SHIPS INITIAL TRAINING ALTERNATIVES



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