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DEFENSE SYSTEMS MANAGEMENT COLLEGE



PROGRAM MANAGEMENT COURSE INDIVIDUAL STUDY PROGRAM

CONCURRENT DEVELOPMENT OF TACTICS
DURING
WEAPON SYSTEM ACQUISITION
IN THE
NAVAL SEA SYSTEMS COMMAND

STUDY PROJECT REPORT
PMC 77-1

Eric Lee Washam
LCDR USN

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CONCURRENT DEVELOPMENT OF TACTICS

DURING

WEAPON SYSTEM ACQUISITION

IN THE

NAVAL SEA SYSTEMS COMMAND

Individual Study Program
 Study Project Report
 Prepared as a Formal Report

Defense Systems Management College
 Program Management Course
 Class 77-1

by

Eric Lee Washam
 LCDR USN

May 1977

Study Project Advisor
 Mr. Frederick J. Kelley

This study project report represents the views, conclusions and recommendations of the author and does not necessarily reflect the official opinion of the Defense Systems Management College or the Department of Defense.

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DEFENSE SYSTEMS MANAGEMENT COLLEGE

STUDY TITLE: Concurrent Development of Tactics During Weapon System Acquisition in the Naval Sea Systems Command

STUDY PROJECT GOALS:

Identify current policy directives that bear on tactics during the acquisition process.
Identify significant aspects of current "environment" of weapon system acquisition, vis-a-vis impact on tactical thinking.
Identify current perceptions within NAVSEA as to tactics role of the Developing Agency.
Identify significant observations and potential problems/need for change.

STUDY REPORT ABSTRACT:

The purpose of this study project was to investigate the role of the Developing Agency in incorporating tactics into the design and development of weapons systems. The ultimate aim was for visibility into this "gray area".

The method of reporting paralleled the method of research. First, directives pertinent to the development of tactics during system acquisition were reviewed. Next, a review of current public dialog provided a perspective on the environment of system acquisition. With this perspective on directive and environment in mind, key personnel within and without NAVSEA were interviewed, with the objective of determining their perceptions of their tactics responsibilities. Further questioning was intended to determine what guidance is provided, what tactics "resources" are available, and what methods are used to "do tactics."

A significant lack of useful directive, explicit guidance, and public dialog was discovered. As perceived by acquisition community personnel, there is a definite requirement for NAVSEA involvement in tactics, although there appears to be a broad lack of appreciation for how tactics are a part of, not apart from, a weapon system.

The reader of this report may find the observations and conclusions useful in further pursuit of the subject.

SUBJECT DESCRIPTORS

Tactics
Development of Tactics
Weapon System Tactics
Tactical Development of Weapons Systems

NAME, RANK, SERVICE
Eric Lee Washam, LCDR USN

CLASS
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11 May 1977

EXECUTIVE SUMMARY

The purpose of this study project and report was to investigate and illuminate the role of the Developing Agency (Naval Sea Systems Command) in incorporating tactical considerations into the development of weapons systems. The report parallels the research effort, proceeding from a review of pertinent directives and overview of the current environment of weapon system acquisition, to interview of key personnel within the Naval Sea Systems Command.

The review of those directives that provide policy guidance for acquisition management found that they consider tactics in only the briefest form. In essence, tactics are portrayed as a fallout of the latter phases of Operational Test and Evaluation, and thus become primarily the responsibility of COMOPTEVFOR.

An overview of the current acquisition environment revealed two important points of interest to the Developing Agency. First, Congress and the GAO are demonstrating particular interest in mission performance in order to evaluate services' requests for new weapons systems. In conjunction with this interest is an increased emphasis on proving new systems in a realistic operational environment. Second, there appears to be a growing awareness, particularly in the Fleet, that weapon system utilization and effectiveness are directly

impacted by tactical considerations that can be recognized and considered during system design and development. In fact, tactical considerations appear to be taking on new significance in the earlier stages of concept evaluation.

The objective of the interviews was to determine the perceptions of acquisition managers as to their role in injecting tactics into the system acquisition process. The primary findings were that most personnel saw the need for such a role, and consequently most were actively involved with tactics to some degree. Important reasons for tactics being involved in system acquisition include the need to test and evaluate systems in an operational environment, and the imprudence of separating tactics and technology.

Based on the research and interview responses, the author concluded that, if not already appreciated, the Naval Sea Systems Command is heavily engaged in the heretofore Fleet's business of tactics. It was further concluded that this delving into tactics is necessary, but probably is not being prosecuted in a systematic manner that reflects a complete respect for the broadest implications of "tactics."

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SECTION I

INTRODUCTION

Purpose and Scope

Modern management theory would view "tactics" as the management method by which the naval commander relates to his operational environment and carries out his assigned missions with the assets in hand. The most noticeable aspects of this environment are wind and wave, ocean and shore, and the enemy. Assigned missions range from sea control and projection of power to rescue and aid. The assets in hand are men and their ships. Tying all these elements together is the art-and-science of tactics. The age-old preference for "iron men in wooden ships" over "wooden men in iron ships" makes clear the significance of good men and good tactics to the naval commander.

The conception and development of tactics long has been the province of the sea-going sailor -- a jealously-guarded right indeed. As new ships and weapon systems enter operational service, the "Fleet" turns-to in determining how best to utilize the new assets, as well as how best to maintain them. Every Fleet "user" inevitably will form an opinion, based on peacetime drill or live confrontation, as to the military utility of a new ship or weapon system and how it could have been made better. Such sentiments notwithstanding, it is the prerogative

and problem of the naval commander to utilize it and accomplish his missions.

How can the Navy's ship and weapon system acquisition community ensure that the user gets what he needs and wants? This question historically has been answered by the output of new ships and weapon systems by the Naval Material Command, in response to user requirements as expressed by the missions sponsors in the Office of the Chief of Naval Operations (OPNAV). Prior to a production decision on a new ship or system, an independent Operational Evaluation (OPEVAL) by Commander Operational Test and Evaluation Force (COMOPTEVFOR) assures that the Chief of Naval Operations accepts into service only those assets that stand up well to their original program objectives. While recent changes to pertinent policy directives have updated and streamlined certain aspects of this process, the basic import and results remain the same.

Prime measures of the Developing Agency's (DA) success are the achieved values for OPEVAL parameters of operational effectiveness, operational suitability, and military utility. Mindful of these parameters of success, and wary of the imperative "The Fleet does tactics," how deeply should the Developing Agency become involved in tactical considerations during the development of new combat systems?

The purpose of this independent research project was to investigate this area of Developing Agency responsibility,

and thereby to increase visibility into this gray area of user/developer interface. More specifically, what are the developer's perceptions and practices toward providing combat systems that are not only well-engineered, but also tactically well-thought-out?

The scope of the research and reporting may be likened to the first stage of a systematic analysis -- investigation and clarification of a situation, potentially leading to definition of a problem.

Limitations

Several limitations unfortunately prevailed on this study effort, which was accomplished as a part of the Program Management Course at the Defense Systems Management College. Most significant was the necessary time constraint imposed by the length of the course itself. Additionally, in order to ensure maximum potential for distribution and consumption, the report itself was constrained to unclassified status. This administrative constraint proved advantageous in that it allowed the use of telephone interviews with sources too distant for personal interview. In view of the time constraint and general logistics problems, the scope was further narrowed to a consideration of surface warfare ship/system acquisition in the Naval Sea Systems Command.

Plan of Research and Report

The plan of the research was aimed primarily at determining the perceptions and practices of key personnel and projects within the Naval Sea Systems Command (NAVSEA). Therefore, a detailed investigation of directives, program plans, trials reports, and other such documentation, was avoided. In order to provide a proper perspective on the world of weapon system acquisition, and thus enable a better understanding of the acquisition manager's viewpoint, a review was made of pertinent directives and of the current "public dialog". Subsequently, a standard line of questioning was developed for conducting interviews, which ensured that responses would be evaluated in the same context. In order to obtain the best measure of practice as well as policy, personnel at various levels were interviewed. The content of this report parallels the author's activities of review of directives, study of the environment, and interview of key personnel.

It is well-recognized nowadays that what is perceived is as important as what really is. The matter of naval tactics seems to be an emotive issue not fully susceptible to the pen, and certainly not susceptible to widespread agreement.

SECTION II

PERSPECTIVE ON DIRECTIVE

Policy

Pre-eminent in defining policy for combat system acquisition management within the Department of Defense, and indeed for all Executive branch acquisition management, is OMB Circular A-109 of 5 April 1976. Not yet fully implemented, the policies of A-109 will guide and impact all aspects of weapon system acquisition, although many of its essential principles are already well established. It might thus be perceived as a codification of the more important principles and policies that have evolved in thought or practice. Without drawing too fine a line as to policy intent, several areas are noteworthy in the context of tactics matters.

First is the paragraph 6a requirement that the need for a new system be expressed in terms of mission and not hardware. The effect of this principle is seen in the composition of the OPNAV Operational Requirement (OR), which seeks from the Developing Agency a solution for a mission need. Closer to the matter of tactics development is the imperative of paragraph 8d -- "It is essential that the Project Manager have an understanding of user needs and constraints...." The logical extension of this need for Project Manager expertise is the paragraph 11i requirement that participating contractors "...be provided with

relevant operational and support experience through the Project Manager...."

The management objectives expressed in paragraph 7 provide two final points, which collectively become pre-eminent in their own right. The requirement that each major system "operates effectively in its intended environment" is deceptive in its brevity. The subsequent amplification of this proving activity entails "...ensuring adequate system test and evaluation. Conduct such tests and evaluation independent, where practicable, of developer and user."

As previously mentioned, many of the essential principles of Circular A-109 were already extant--in original DOD Directive 5000.1 "Acquisition of Major Defense Systems," as well as in original DOD Instruction 5000.2 "DoD DCP and DSARC." Both were reissued in January 1977 to implement Circular A-109 and to update policy. Together with DOD Directive 5000.3 "Test and Evaluation," soon to be re-issued, they form the backbone of current acquisition policy and guidance.

Flowing from these directives are numerous implementing and amplifying Navy instructions. The purpose of this study is best served by selective notice of particular documents, rather than detailing a lengthy trail of data flow. There already exist several very useful guides to the documentation and process of weapon system acquisition management, which can be referred to for a narrative discussion that relates

policy and directives to the respective activities. (References 1-3) During the course of interviews, several points regarding formal directives arose repeatedly, and an insight into these areas was seen to be necessary. These areas are Test and Evaluation (T&E), and existence of adequate, agreed, stable systems requirements. A third area of particular concern to the author was the manner and degree of review of tactics aspects during system acquisition. Each area is described below in terms of the respective guidance directives.

Test and Evaluation

The principle of independent evaluation was well-established in the Navy before Circular A-109 through the office of COMOPTEVFOR, and has been strengthened by A-109 and recent trends. The separate responsibilities of Developer and Independent Evaluator are best made clear by reference to the DOD Directive 5000.3 definitions of Development Test and Evaluation (DT&E) and Operational Test and Evaluation (OT&E). DT&E is planned and conducted by the Developing Agency in order to "...demonstrate that the engineering design and development process is complete; demonstrate that the design risks have been minimized; demonstrate that the system will meet specifications; and estimate the system's military utility when introduced." Furthermore, "...prior to the first major production decision, the DT&E accomplished shall be adequate to insure:

that engineering is reasonably complete; that all significant design problems...have been identified; and that solutions to the above problems are in hand."

On the other hand, OT&E is the responsibility of a "major field agency separate from and distinct from the developing/procuring command and from the using command...." OT&E is intended "...To estimate the prospective system's military utility, operational effectiveness, and operational suitability ...and need for any modifications. In addition, OT&E provides information on organization, personnel requirements, doctrine and tactics."

Within the Navy the policy of DOD Directive 5000.3 was implemented verbatim by OPNAV Instruction 3960.10 "Test and Evaluation." (For a discussion of the impact of this instruction see Reference 4.) This instruction divides DT&E and OT&E into distinct phases keyed to the phases of weapon system acquisition. One of the specific objectives of the OT&E conducted during the Validation Phase is to "initiate tactics development." The subsequent Full-Scale Engineering Development Phase includes OT&E aimed to support the first major production decision through "...demonstration of the achievement of program objectives for operational effectiveness and operational suitability" Somewhat parenthetically, the additional objective "...and continuing tactics development...." is appended.

Program Objectives

Central to the program of test and evaluation are the basic "program objectives" cited in the directives. These objectives serve as a baseline not only for T&E but also for the design and development of an emerging combat system. The research and development province of the Developing Agency might be characterized as a large-scale systems-engineering process that involves many inter-related iterations of many separate loops. Naturally enough, DT&E is more intrinsic than extrinsic to this process. Conversely, OT&E would seem more extrinsic, in that an external agency not only defines the OT&E but also conducts it. The importance of designing and testing against the same baseline being self-evident, it is worthwhile to consider briefly the development of program objectives.

The nominal beginning of the weapon system acquisition cycle occurs with the generation of an Operational Requirement (OR). This activity is coordinated within OPNAV, and its end result is the solicitation from the Naval Material Command (in fact, from one of the Systems Commands) of a Development Proposal (DP). While the relationship of the OR to the newly-required Mission Element Needs Statement (Defense Systems Acquisition Review Council requirement for Program Initiation) is not yet clear, the role of the DP appears to be unchanged. It embodies the recommendation of alternatives intended to

satisfy the operational need.

The course of action now becomes more complicated as liaison and review intensify. The essential factor to be discerned from pertinent directives (References 5-7, and those previously mentioned) is that although "mission need" is the backbone of the OR, DP, and MENS, the first appearance of specific "program objectives comes with the Navy Decision Coordination Paper (NDCP). Reference 8 explains the timing and coordination of the NDCP, which is analogous to the Decision Coordination Paper utilized by the Defense Systems Acquisition Review Council. An essential difference is that, while the MENS is oriented to the mission need, the NDCP is directed to the program objectives. In principle then, the Navy has defined its program objectives at an early stage in the acquisition cycle.

Tying together the separate but closely-related goals of design and development/DT&E efforts and independent evaluation/OT&E activities is the Test and Evaluation Master Plan (TEMP), which is produced as a cooperative effort between the Developer and COMOPTEVFOR. This management document identifies the entire T&E program and must be approved by the CNO -- this approval becoming a mandate that the required assets be allocated and the T&E program be accomplished. The TEMP is prepared in accordance with Reference 9, which closes the program loop by ensuring that the TEMP is prepared in consonance with requirements of the

program source documents -- particularly the NDCP/DCP.

Tactics under Review

A reading of the pertinent review and approval process directives would seem to indicate no lack of opportunity for higher level visibility of tactics. Reference 8 describes the more well-known of these reviews, in which the Navy or the Office of the Secretary of Defense scrutinizes program progress and makes decisions based in great part on the information provided by the Developing Agency. In early stages of the acquisition cycle these reviews are generally intended to evaluate alternative solutions and decide with which to continue. In subsequent stages the emphasis is on a detailed assessment of the accomplishment of program objectives and preparedness to proceed with further commitment of funds.

The major "wickets" for program advancement are the DSARC milestone reviews, supported by the MENS and DCP's. Within the Navy the Department of the Navy Systems Acquisition Review Council (DNSARC) utilizes the NDCP in analogous manner, and looks in detail at the program objectives, development and testing plans, and the TEMP. Also taken into consideration is a COMOPTEVFOR report on the objectives and results of OT&E.

The foregoing discussion has touched on the specific areas

of directive that proved to be of particular significance in light of the interviews, and which comprise the visible "marching orders" of the Developing Agency.

SECTION III

PERSPECTIVE ON ENVIRONMENT

Overview

As mentioned in the Introduction, modern management theory emphasizes that a manager must be in close tune with his environment. Contact with the formal structure and methods of the acquisition organization can be established readily by reference to formal directive, as previously highlighted. Contact with the environment occurs through multitudinous interfaces, often not well-defined, and invariably subject to interpretation. The bounds of the acquisition environment must realistically include not only the formal lines of the organizational structure, but also every internal and external source liable to interface with the acquisition manager's program. The recent nationwide-television visibility of the Navy's Seafarer Communication System Project Officer attests to the extent of such interfaces.

The following discussion highlights the "view" from several angles through the acquisition manager's "window on the world." While additional examples might be cited, those discussed serve adequately as indicators of the broader issues at hand.

Secretary of Defense

There have been several noteworthy outputs from the level

of the Secretary of Defense, whose appointment itself might be considered an indicator of the new administration's interests. Taken chronologically, the January 1977 Statement to Congress by Dr. Malcolm Currie (then Director of Defense Research and Engineering) included discussion of efforts being taken to ensure good acquisition management and good weapons systems. "We are emphasizing independent and more realistic operational testing early in the development cycle to discover problems. The result is better products."(8,I-10)¹ The correlation with the previously-discussed directives is evident, and adds emphasis to the current faith in independent test and evaluation.

Dr. Currie's statement also provides a stimulating insight into an area of much current interest in more than tactics circles. "...Cruise missiles -- already changing military thinking -- ...offer revolutionary potential. Future characteristics such as 'Zero CEP' accuracy...will fundamentally change land, sea, and air warfare."(8,I-10)

The current state of **cruise** missile thinking and development is suggested in the 3 March 1977 issue of Commanders Digest, wherein Dr. Harold Brown states that "We plan to delay somewhat the full-scale development effort on the antiship version of the Navy's Tomahawk cruise missile in order to bring it into

¹This notation will be used throughout the report for sources of quotations and major references. The first number is the source listed in the bibliography. The second number is the page in the reference.

balance with essential related programs."(9,13-14) More central to the issues of weapons acquisition is his discussion of our force needs and acquisition methods. With respect to the US/Soviet maritime balance and our Navy's ability to carry out its tasks, he indicates that "...we still need to examine systematically what constitutes the most effective and efficient ways to improve our performance of the sea control mission in the future...."(9,9) This high-level planning inevitably will result in further requirements for new weapons systems, and Dr. Brown warns that "We must limit our requests for production to those items that have been proved out in development and can be related to specific military missions and objectives."(9,12)

It is still "early days" for the new administration, but the reader of such unclassified statements as the above can hardly fail to draw conclusions, if only to note the boost given to test and evaluation, and to definition of military needs in terms of missions and objectives -- not hardware.

Congress

The paths of weapons systems acquisition will repeatedly interface with Congress -- constitutionally empowered to provide for the nation's defense. It is within the budget authorization and appropriation processes that such interface is most visible, and the issues are highly charged. Inspection of the Congressional Record readily provides an awareness of the impact of

Congressional concern and action.

For example, in a 17 March 1977 statement to the Senate on the future Naval program, Senator Gary Hart indicates that the Navy shipbuilding plans for fiscal year 1978 and the period 1978-82 do not reflect "...the realization that the rapid technological change which characterizes our era permits and even requires major changes in military concepts and force structure." (10,S4219) Further, the Senator sees no rationale for continuing a "massive building program" of frigates -- "...not a type of ship which is readily adaptable to changes in weapons/sensors technology" -- until "...alternatives embodying new technology and reflecting new concepts of how to perform the assigned mission are thoroughly investigated." (10,S4219) In summary, Senator Hart perceives the true debate to be not over the numbers of ships in certain years, but rather "...what conceptual alternatives we have to serve each concept, and by what ideas we orient our approach to shipbuilding so as to find technological change our friend." (10,S4221)

This new impetus to get ahead of the conceptual/technological power curve is augmented by the General Accounting Office, whose activities provide valuable insight into Congressional concerns. A particularly meaningful description of the current GAO outlook and efforts is provided in a Comptroller General statement for Congress in June 1976. Mr. Elmer Staats details the new GAO efforts in analyzing the services' requirements for

new weapons systems, based on the "mission area" approach. GAO opinion is stated to be that "...the congressional consideration of funding and requirements for new weapon systems should be made in the context of the agencies' overall objectives, systems already in the inventory or in development, and long-range budget implications."(11,5) This "new" approach has in fact already commenced in a very tangible way with the FY1979 Budget, which was required by the 1974 Congressional Budget and Impoundment Act to be based on national needs, agency missions based on those needs, and "Basic Programs" based on those missions.

One of the three completed mission area analyses cited by Mr. Staats is the March 1976 report "Navy Sea Control Mission." The stated purpose of the study was to "...provide members of Congress with information on the concept of sea control and the probabilities of various combat situations to be considered in assessing the reasonableness of the requests for weapons systems."(12,cover) A portent of the result of such studies might be perceived in the GAO's suggestion, in considering the current shipbuilding program, that "...the limited capabilities of a large portion of these new ships raises the question as to the degree to which they will improve the overall capability of the fleet in its mission of sea control."(12,24)

Perhaps the bottom line to a judgement of what Congress is thinking and what the services must anticipate is evidenced in

the conclusions of the "Navy Sea Control Mission" report. Noting the highly subjective nature of the analysis of the military missions, the GAO suggests that "While it is true that professional military judgement must play a large role in these decisions, the Congress should be in a position to evaluate program requests in light of strategies, roles, missions and complementary weapons programs."(12,30)

In broad terms then, the high-level focus on system acquisition parameters of cost/schedule/performance is placing increased emphasis on service mission performance, as opposed to hardware technical performance. This shift of focus has been paralleled by increased emphasis on proving new systems in the operational environment -- the domain of the weapon system user. Thus the bottom line still is that, whatever the worth of the well-designed/well-tested weapon system, the responsibility of mission accomplishment belongs to the user -- more commonly known as "the Fleet."

The Fleet

The widely-accepted principle exists that "The Fleet does tactics." This belief is the cornerstone if not the foundation of the user/developer interface vis-a-vis system utilization at sea, and therefore drives much of the **tactical** thinking in the acquisition community. While the Fleet's public dialog on tactics seems unusually limited, some important observations can

be made as to the objectives and methods of tactics development.

"...it is characteristic of this era in the history of the U.S. Navy that the emphasis on sea duty for naval officers and the development of tactical doctrine to produce a fighting fleet has been overshadowed by the emphasis placed on management and material."(13,58) This 1974 statement by Captain R.A. Bowling USN (Ret) was followed up in the U.S. Naval Institute Proceedings 1976 Prize Essay, entitled "Tactical Development in the Fleet." Captain R.H. Smith USN (Ret) pulls the curtain away completely: "A Navy that has never yet made a truly sustained commitment to tactical development now gives it less than ever. The strong, if fitful, patterns of pressure from Washington have ebbed, and the fleet -- preoccupied with its own problems -- has not generated its own motivation to do the job."(14,22) The ultimate thrust of the essay is that only the fleet can adequately do the job of tactical development. Further, through a formal and improved Tactical Development and Evaluation program, knowledge will be generated that will be an essential input to the material commands, naval laboratories, and R&D planners. The ultimate benefit, in addition to all that would be gained within the service, should be increased credibility of the Navy's position in seeking program authorization and funding from Congress.(14,23)

A similar concern for tactical development was expressed in the same essay contest's Second Honorable Mention entry,

"Is TacAir Dead?" The broader view is advocated by Captain G.G. O'Rourke USN (Ret), who states "It is not the aircraft themselves, nor even their astronomical costs that are knocking TacAir all akilter. Instead, it is the basic philosophy concerning just how they will be used in combat."(15,38) Amplifying concern is expressed that suboptimization in such areas as speed, ordnance, and Electronic Warfare must not be accepted as the answer. Rather, "A new 'System' is needed for TacAir, and this means that a systems approach has to be used."(15,39)

Electronic Warfare as a viable form of warfare is even today not fully accepted, judging from the informative article "Passive Warfare for Destroyers" in the March 1977 NAVSEA Journal.

Dr. C.W. Fawcett points out that EW is in fact only an element of the larger discipline of Passive Warfare. With the arrival in the Fleet of new over-the-horizon (OTH) capable weapons such as Standard Arm and Harpoon, many new Passive Warfare problems must be addressed. Dr. Fawcett expresses the need for "Considerable attention to safety, targeting, command and control, force planning and resource allocation that defines the role and function of each warfare area..."(17,26) In summarizing his views, Dr. Fawcett sees the current situation thus: "In spite of the interest and concern expressed by many activities, tangible, demonstrable efforts to unify passive elements on surface ships have been slow in gaining acceptance. Until recently, the development of tactics and operational considerations has been seriously neglected."(16,29)

An illuminating sidelight to the matters of suboptimization and even acceptance of EW is the apparent difficulty in obtaining EW equipment at all. "The credibility problem of the efficacy of EW will always be a deterrent to its peacetime funding." (17,49) This from a former Commander of the Naval Electronic Systems Command clearly identifies the relationship between demonstrating the need for equipment and obtaining funding. The non-acceptance of EW as an important and integral aspect of "total warfare" appears to prolong the problem that several have identified -- a general lack of understanding of what the elements of warfare are.

The scope of tactical thinking is illustrated in the undoubtedly provocative thesis of "Fleet Commanders: Afloat or Ashore?" in the June 1976 U.S. Naval Institute Proceedings. Vice Admiral R. Peet USN (Ret) and Dr. M.E. Melich analyzed a new concept of command and control, in which a numbered fleet commander would control his fleet from a sophisticated shore command post, and great merit was seen in this proposition. The foundation of their argument is that, at such a command post, utilizing today's communications equipment, the fleet commander would be positioned at the most reliable, informative, efficient point, where the most qualified personnel would be most available. Admiral Peet's utilization of this concept in actual exercises during his tour as Commander First Fleet, proved to him the viability of the concept.(18) The

ultimate impact of the concept and the authors' analysis suggests that the management of tactics may not always be under control of the on-scene commander. Even more important, the article spurs the thought that tactics is a broader issue than is generally perceived.

An area of great promise for the naval user, and a subject of much discussion outside the services as well, is the cruise missile capability presently emerging. The euphoric start and apparent reining-in of the Tomahawk program, previously noted, would indicate that there are more new questions than answers of late. Pondering the promises and problems of this new warfare capability in his article "Cruise Missile: The Ship Killer," Captain W.J. Ruhe USN(Ret) sees the impact in all areas from ocean surveillance to formation maneuvering. The ultimate result of the new pressures on the at-sea naval commander is a tactical decision of the first order -- shoot first, or depend on instant response capability for counter-action. (19, 52)

The Public

The role of the public in tactics is admittedly small! Maintaining a broad perspective as to the nature of tactics, one can nevertheless discern valuable comment. For example, the February 1977 Scientific American article "Cruise Missile" contained one observer's analysis of some of the important

issues that Captain Ruhe may have been concerned with. Looking at the difficulty in differentiating strategic cruise missiles from tactical cruise missiles during their flight, Kosta Tsipis concluded that "The tactical SLCM is the perfect example of the misapplication of cruise-missile technology: it creates serious arms-control problems, since it is externally indistinguishable from the strategic SLCM, without incorporating any substantive military advantages."(20,28) Many of the technological, strategic, tactical and political factors involved with cruise missiles are analyzed, and a significant tactical consideration leads him to this interesting conclusion: "The mismatch of the cruise missile's range to the submarine's target acquisition range makes the tactical version of the sea-launched cruise missile weapon of dubious value."(20,25)

The viability and utility of public dialog is naturally a function of the information it receives. Perhaps not subject to a very wide distribution, the following comment from the 7 February 1977 Aerospace Daily is nonetheless of interest as an indication of what the public-at-large may see. In reference to the lead role that was assigned to the Defense Advanced Research Projects Agency for High-Energy Laser R&D, it was opined that "The implication was that this lead role was necessary because the services had not come to grips with the role of lasers in their own missions and tactics."(21,192)

One further example demonstrates the increasing importance of early tactical thinking in system development, and provides a concrete picture of how the public can become interested in heretofore purely military matters. In a Letter to the Editor in the 7 May 1977 Washington Post, the Senior Analyst at the Center for Defense Information notes the important distinction between "short" and "long" range cruise missiles vis-a-vis SALT negotiations. Pointing out the already-significant current capability of U.S. tactical aircraft against targets in the Soviet Union, Mr. Stefan Leader states that "In point of fact, there is no military requirement for tactical aircraft to carry long-range cruise missiles."(22,A10) Just as Kosta Tsipis saw no need for the tactical Surface Launched Cruise Missile due to tactical considerations, Stefan Leader sees no need for tactical long-range Air Launched Cruise Missiles based on tactical as well as strategic and political reasons. The public does get involved in tactics -- how unusual for the public to become in fact a sounding board for tactical issues!

This Perspective on Environment has focussed on the importance of keeping the mission and the method (tactics) in mind during weapons systems development. The many questions that arise are seen to be functions not only of political and strategic considerations, but also of tactical considerations. The critical role of the Developer in answering these questions is examined in the next section.

SECTION IV

TACTICS AND THE DEVELOPER -- PERCEPTION AND PRACTICE

Role and Responsibility

The previous discussion has suggested the potential impact of tactical considerations on high-level decisions regarding what mission capability to acquire, when to acquire it, and how much to pay for it. Within the Developing Agency the Project Manager is the focal point for effort to integrate cost, schedule, and performance goals into a viable product for delivery to the Fleet. The "program parameters" of cost, schedule, and technical performance become tools for tradeoff in this process, as well as highly-visible indications to the government and the public of a program's status. What of the new sensitivity for weapons systems that are not only affordable, on schedule, and capable, but also are well-thought-out tactically? The following discussion reports on interviews conducted with personnel in the NAVSEA community, and provides insight into the impact of tactics in weapon system development.

How does the DA perceive its responsibility to "think tactics," if there is such a responsibility at all? This is the heart of the issue, and there was a nearly-unanimous belief expressed that the DA does have a tactics role. Two specific aspects of DA responsibility were suggested: the consideration of tactics as they impact system design itself, and the

provision of "proposed tactical guidelines" to the Fleet upon system delivery. The latter task has in fact become a matter of policy, at the direction of the Chief of Naval Operations.

(23) The former aspect was seen to be an integral part of the overall design/development process, although there was explicitly stated a concern of not preempting the prerogative of the Fleet to "do tactics." The formally-established role of OPTEVFOR in tactics was also pointed out by nearly all, with the emphasis that NAVSEA does not have chartered authority in tactics. Thus the DA's responsibility is self-limited by a matter of principle and perceived authority.

Following up on the perception that the DA must think tactics during the design/development process, the question was asked "Why is the DA concerned with tactics during system acquisition?" Why must the DA think tactics? One of the most important reasons cited was in relation to the increased emphasis on operational test and evaluation, which in turn requires the provision of realistic operating procedures and doctrine, as well as a viable operational/threat scenario. Usually this responsibility devolves on the PM, who must get help where he can. Two cases in point illustrate this situation. NAVSEA was required by the CNO to institute and administer operational safety certification programs for the initial installations of Harpoon and Standard ARM weapon systems. In each case the PM performed this task according to his own plan. The Standard ARM approach was to

provide a nominal operational scenario within which to determine the operators' "operational" understanding of the system's safety principles. There was a marked user opposition at what was perceived to be DA involvement in tactics, although the final result was apparently quite satisfactory. The Harpoon approach, on the other hand, did not emphasize safety in such an operational scenario, and in accomplishing the objective did not appear to generate similar user resentment.

Another important reason cited was the need to answer the questions of contractors. Important questions and issues arise naturally during system design/development, and many have serious tactical implications. This situation was well-recognized by all, and the management solutions invariably hinged on using the experience of in-house Surface Warfare Officers to determine the answers. (Refer to "Perspective on Directive" discussion of Circular A-109.)

Other valid reasons were pointed out in the interviews, most of which can be considered under a final heading of "The imprudence of separating tactics and technology." The impact of such separation was seen to result in an imbalance of usefulness and technical performance, the inadequate design of man-machine interfaces, and other ills brought on by not maintaining an overall "systems approach." The real thrust was that tactics are part of the system, and therefore the DA must necessarily be concerned with tactics as one of the many

important aspects of system development.

Goals

Hand-in-hand with learning why the DA should be involved in tactics is learning what this involvement is intended to accomplish. The interviewees consistently made a logical extension of the above discussion, singling out the goal of providing the best systems possible to the Fleet. If and when tactical considerations impacted the DA's task, they would be incorporated into the process of developing this "best product." An important qualification was added in the case of ship acquisition, because it seems that by the time in the acquisition cycle that the SHAPM is in full charge, the design is fairly well locked-in. Therefore, there is actually little latitude for significant "tactical optimization" changes. A parallel sentiment was also expressed with regard to the weapon system PM's flexibility, for often his system is partially designed for him by an OPNAV requirement that is specific to the matter of the hardware itself. The bottom line is therefore to "Do the best you can."

Guidance and Know-How

These being the reasons perceived to mandate DA involvement in tactics, what guidance is provided to the PM, and where does his tactical know-how come from? Again there was remarkable

consistency in the answers. First, the various high-level policy directives were seen to provide the broad guidance for the whole acquisition process -- where tactics are concerned, these directives apply. Second, tactics per se are not addressed directly in any formal directives. As a consequence, the tactical thinking is entirely self-inspired and directed. There do exist channels for seeking advice and guidance, but there is not an extant body of policy or procedure as there is for other aspects, such as cost.

Tactics thus appearing to be driven by in-house policy, the next question should be "From where does the DA draw its tactical know-how?" The source of answers for system contractors is indeed the source of answers for everyone, it turns out. The in-house Surface Warfare Officer is widely considered to be the tactics know-how resource within NAVSEA, and the corporate memory of experienced civilians fills the need where uniformed officers are lacking. This is not a unanimous opinion, however, for there was a minority suggestion that there was no need for Line Officers in the acquisition process once the design had been established. This suggestion notwithstanding, there is also uniform faith in the experience and knowledge of the Surface Warfare Officers in OPNAV, whose liaison with NAVSEA personnel was unanimously felt to be excellent. While it was not explicitly stated by anyone, it became apparent that the general concern that OPNAV deals too much in hardware vice capability is based

on experiences in the early processes of design, wherein the DA should be generating hardware solutions to OPNAV's requirement. This subject rapidly becomes a side issue in itself, but suffice it to say that OPNAV's capability as a tactics resource is well-recognized.

A third resource frequently mentioned was specialty contractors. As a result of the highly-matrixed program offices with small office staffs, much of the development of tactics procedures has been shifted to such local firms. This shift of effort was not seen to be bad, except that NAVSEA's corporate memory in tactics went with it to some degree.

Several other resources cited might be grouped together. The Fleet Combat Direction System Support Activity was seen to have a critical role in computer software, which of necessity must be developed in consonance with tactical considerations. The Naval Ship Weapon System Engineering Station, as NAVSEA's "T&E Agent," is naturally involved in many aspects of system acquisition, and especially in the review of important documents such as the OR, NDCP, and TEMP. However, in the matter of developing tactical procedures, NSWSES must compete with the various specialty contractors for funding. The Surface Warfare Development Group was also frequently mentioned, although the existence and role of this organization was not a matter of certitude in everyone's mind. Also mentioned was the Naval War College Center for Advanced Research, which is occasionally

referred to for tactical studies.

Another important resource is OPTEVFOR, whose overall impact on the acquisition process is not wholly without controversy. As far as tactics are concerned, OPTEVFOR's role is clearly laid out in its charter and in OPNAV Instruction 3960.10, wherein the development of tactics is addressed as one of the objectives of Operational Testing phases II and III. The most fruitful aspect of the liaison with OPTEVFOR with respect to tactics was considered to be development and execution of the TEMP. Looked on as a user-oriented organization, OPTEVFOR is a source of valuable comment and input in tactical matters, and the DA/OPTEVFOR liaison was evaluated to be very effective in this regard. The formal responsibility of OPTEVFOR in producing proposed tactical guidelines for new systems was well-noted by most, which reinforced the clear disinterest of most toward duplicating or pre-empting the tactics efforts of OPTEVFOR or the Fleet.

The final major resource of tactical know-how is of course the Fleet itself. The Fleet input to the acquisition process will be discussed below.

"Doing Tactics"

The first step toward incorporating tactics into the weapon system acquisition process, on the part of the DA, is recognizing what issues or questions actually have tactical

implications. As discussed previously, there exists little if any formal guidance for this exercise. As a consequence, the discerning of tactical issues is generally seen to be a matter of using sailor's common sense. Also seen to be important is the forum in which tactical questions are raised -- there must be adequate know-how at hand in order to get the right answer. An interesting case of a question searching for resolution was the FFG-7 ship project experience, wherein assistance was sought in developing tactical procedures for OT&E at the FFG-7 Combat System Land-Based Test Site. In seeking assistance from the "tactical community," the project staff was referred to OPNAV by the SURFLANT staff, and subsequently referred to FCDSSA by OPNAV. FCDSSA was pleased to assist, but pointed out that their tactics expertise was fairly limited to their area of primary concern -- computer software. The project eventually accomplished the task with the assistance of an ad hoc contingent of Surface Warfare Officers specially organized for the task.

While most management solutions eventually seem to depend on the expertise of in-house Surface Warfare Officers, the plethora of doctrinal issues that arose prompted the PM of the AEGIS Combat System Project to institute a more organized, formal approach. Under chairmanship of the project's T&E Manager, a tactics committee was established as the focal point of all tactical issues. The results were judged to be highly satisfactory

in that issues could be fully addressed in a recognized central forum.

The experience of most interviewees suggests that every project inevitably faces design decisions that will impact the ultimate operational capability of weapon systems through the vehicle of what the author terms "embedded tactics." These decisions shape design features that, in the user's eyes, will be inherent design features that directly affect system utilization and tactical employment. Responses to the author's query about existence of such embedded tactics ranged from ho-hum agreement that such exist, to a demonstration that special steps had been taken just for the purpose of managing embedded tactics. The most positive effort noted was that of the AEGIS project, whose Tactical Warfare Committee functions on the premise that it is necessary "...to ensure that design features instrumental to tactical performance reflect Fleet requirements and tactics."(24)

The development of weapon system computer software is nowadays seen to require the same discipline as hardware development, and it was apparent from the interviews that tactics directly impact software. While prime contractors frequently have a major role in software development, particularly the software for embedded computers (computers intrinsic to a radar, for example), there is great dependence on FCDSSA to "inject" tactics into the overall computer software package. (There was

a decidedly-minority suggestion that tactics and computers only mixed in the Tactical Data System.) The implication that tactics must be considered in the design of system software led quickly to the area of system integration, where the Naval Ship Engineering Center (NAVSEC) plays a large role.

NAVSEC is invariably charged with much of the responsibility for system-level design and integration of sub-systems. The actual extent of tactics in these processes would appear to be a function of the know-how and experience of the engineers involved, and the liaison between these NAVSEC engineers and the respective project offices. There does not exist any particular guidance or directive that explicitly requires that tactics be treated as a separate matter in this broad area of "combat system engineering," but it apparently is recognized that tactics are related to this engineering activity. It is interesting to note that NAVSEC also finds it necessary to resort to specialty contractors just as designated projects do, because of the limits of the in-house capacity based on manning. There are noteworthy exceptions to this NAVSEC role, as evidenced by the AEGIS Combat System and LHA Ship projects, wherein the respective prime contractors are responsible for overall combat system integration.

While there were many combinations evidenced as to how tactical issues are recognized and dealt with, and how sub-systems and systems are designed and integrated, an element that

is common to all acquisition processes is the involvement of the user. The formal interface with the user was unanimously acknowledged to be OPNAV, and when a formal user input is desired, OPNAV is consulted first. A common requirement for user comment is the appraisal of mockups of equipment layout, especially in Combat Information Center design. A basic weakness of this process was pointed out, however, in that every group of users will have different ideas about how a thing should be done. This natural phenomenon occurs not only because of the differences between groups at a particular moment, but also because group composition changes fairly rapidly over time. The net result is a decreased credibility of the overall "voice of the user," who is perceived as not knowing what he wants or changing his mind too often.

Another aspect of user input is that already mentioned -- the Surface Warfare Officers in NAVSEA, OPNAV, and other agencies, who must make decisions on a daily basis as to what is best for the Fleet. The effect of contracting tactics to specialty contractors may result in no early and direct user input to the tactical developments, but even if not the case, this practice points out the potential for others to define the user's needs and best interests from their own perspectives.

If there is any question as to who speaks for the Fleet, there is no question as to who tests for the Fleet -- COMOPTEVFOR. Always looming on the horizon of the DA,

OPTEVFOR would appear to be the natural enemy of the Developer. The close working liaison with OPTEVFOR seems to suffer a clear breakdown over the methods and interpretations of Operational Test and Evaluation. By and large, the criticism and difficulty arise because OPTEVFOR is seen to be testing and evaluating against their own specifications, as opposed to the original system requirement. Accompanying this is the lack of an agreed threat/operational scenario, or perhaps lack of agreement on what does exist. A further fundamental concern is that OPTEVFOR is seen to sit in judgement of the technology itself, and not the system operational acceptability. The end result is disagreement over the results and their interpretation, and a very real impact on the progress of the system toward acceptance into service.

Accountability

The entire issue of the Developer's role in tactics would appear to be fairly well-bounded from an external viewpoint. The role is self-perceived, self-defined for the most part, self-motivated, and self-monitored. While there is complexity and variance, there is unity of purpose. The last question that must be asked, therefore, is "To whom is the Developer accountable for his tactics responsibility?"

All things considered, there is perceived to be no real formal accountability for tactics, excepting the provision of

proposed tactical procedures per CNO requirement. While some were slower than others in coming to the same conclusion, ultimately the verdict was that the final product must satisfy the jury itself -- the Fleet.

SECTION V

SUMMARY AND CONCLUSIONS

Summary

This report has presented the salient results of a study of the current role of the Naval Sea Systems Command in the consideration of tactics during the weapon system acquisition process, as perceived by the "players."

Initial research concentrated on a survey of current literature and pertinent directives, in order to provide an "environmental background" for the subsequent interviewing of selected personnel. There was found a dearth of active dialog, to the extent that the U.S. Naval Institute Proceedings magazine appears to be the only live forum for debate. Those formal policy directives that bear on tactics were highlighted, and again there was discerned little direct address of tactics.

The surprising lack of sources for this study compels a heavier weighting be applied to the collective responses of those interviewed. The enthusiastic response of almost every interviewee to the subject -- "Wow, are you onto a good one!" -- further compels one to begin to read between the lines as well. The vested interest that everyone should have in the subject will hopefully impel interested readers to pursue the matter within their own respective tasks of providing the Fleet with the best.

Observations

There does not exist a widely-known or widely-accepted definition of "tactics," one that adopts a complete systems approach, and which differentiates art from science.

The Naval Sea Systems Command is a well-established practitioner of tactics -- scientifically speaking.

There is strong support within NAVSEA for an active role in tactics and tactical development on the part of the Developing Agency.

The major "tactics resource" of NAVSEA is its own Surface Warfare Officer community.

There is no extant central authority or resource to whom acquisition managers can look for comprehensive, consistent, credible advice and information on tactical matters.

There is little or no coordinated guidance for the systematic consideration of tactics during the weapon system acquisition process.

There are many non-Fleet people and offices who in fact speak for the Fleet and interpret its needs.

There is a new trend evident within NAVSEA toward a systems-approach integration of tactics and technology, evidenced by recent organizational changes.

There is a growing awareness in the Department of Defense, Congress, and the public, that the tactical utilization and operational effectiveness of weapons systems are vital issues.

Conclusions

The Developing Agency must be involved with tactics in order to design and develop combat systems.

There is a widespread tendency to view tactics separately from the combat system. This suggests a misunderstanding of "tactics," "system," or both.

The pervasive impact of engineering decisions on tactics is not widely appreciated.

A perception in Congress or the public that the Navy does not consider tactics an important element of system design -- and by implication an important element of mission achievement -- may well provide a short-term embarrassment in the near future.

Recommendation

An appropriate Officer must initiate the development of a new definition and understanding of tactics. Such a task would of necessity extend beyond the Naval Sea Systems Command. Within the Naval Sea Systems Command special impetus must be given to the concept of the "tactical development" of combat systems.

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