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DEFENSE SYSTEMS MANAGEMENT COLLEGE

PROGRAM MANAGEMENT COURSE
INDIVIDUAL STUDY PROGRAM

FUNDING OF THE ARMY PRODUCT IMPROVEMENT PROGRAM: AN EVALUATION

STUDY PROJECT REPORT
PMC 77-2

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FORT BELVOIR, VIRGINIA 22060

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DEFENSE SYSTEMS MANAGEMENT COLLEGE

STUDY TITLE:

FUNDING OF THE ARMY PRODUCT IMPROVEMENT PROGRAM: AN EVALUATION

STUDY PROJECT GOALS:

To ascertain if current Army procedures for the funding of Product Improvements are compatible with the DOD Budget Cycle. To evaluate the impact on the acquisition process of changes presently proposed by HQ DARCOM.

STUDY REPORT ABSTRACT:

The purpose of this report was to analyze the need for Product Improvements.(PI) A review was made of the current Army funding policies for PI's. Comments were made on the current DOD Budget Cycle. A comparison was made of the Budget Cycle and the problems related with introducing PI funding requirements into the Cycle in a timely manner.

The Program Manager (PM) is required to develop different funding strategies depending upon the production status of his weapon system. Two case histories are presented to provide the reader with some of the problems associated with equipment that is either in or out of production. The M 551 Sheridan is an example of an out of production vehicle. A master PI, encompassing 56 separate improvements with an estimated cost of $45.5 million, was discussed. The M 60A1 Tank was cited as a weapon system still in production. Management decisions associated with the M 60A1E3 PI application were commented upon.

The Report addresses two funding alternatives to the current Army procedures. The first alternative would place all PI money in a central appropriation. The elimination of the by-line justification to Congress would permit more latitude in the management of PI funds. The eventual success of this proposal is rather doubtful. The second alternative would permit PI modification kits to be procured and installed with Procurement funds. This alternative, currently under consideration by HQ DA, would provide for more effective PI funds management at the PM level.

SUBJECT DESCRIPTORS: Product Improvement (1Ø.11.Ø2)
Funding (1Ø.Ø6.Ø2.Ø2)

NAME, RANK, SERVICE	CLASS	DATE
Terence B. Inman, LTC, USA	PMC 77-2	November 1977

FUNDING OF THE ARMY PRODUCT IMPROVEMENT PROGRAM:

AN EVALUATION

Individual Study Program

Study Project Report

Prepared as a Formal Report

Defense Systems Management College
Program Management Course
Class 77-2

by

Terence B. Inman
LTC US Army

November 1977

Study Project Advisor
LTC Joe Arcieri, USAF

EXECUTIVE SUMMARY

With the current budget constraints, the upgrade and improvement of weapon systems already in the field has become a viable alternative to the design of new equipment. In addition, the cost and time delays associated with the development and fielding of a new weapon system adds credibility to the need for a stronger Product Improvement (PI) Program.

Within the Army, equipment improvement is a big business. For Fiscal Year 1977 through 1983, the Army has projected PI funding requirements of $5.611 billion. Current procedures for the forecasting, budgeting, and expenditure of funds are complex. Guidance provided by the Congress and DoD and implemented by the Army has caused the Program Manager (PM) to initiated intensive funding management procedures. For example, the funds needed to finance a particular PI may be controlled through as many as six different appropriations. Thus, intensive funding management is required to ensure that the various appropriations are received when required during PI development.

This report addresses problems encountered by the PM in the initiation of a PI. Two separate examples are discussed. The first deals with the out-of-production M 551 Sheridan Armored Reconnaissance Vehicle. The discussion includes the development of a Master PI Proposal, encompassing 56 separate improvements with an estimated cost of $45.5 million. The second example presents management decisions to be resolved by the PM M60 Tanks in the application of a PI for the M 60A1E3.

The report concludes with a discussion of two alternatives to the current complex funding procedures. The first alternative would place all

PI money in a central appropriation and eliminate the by-line justification to Congress. The success of this proposal is rather doubtful. The second alternative would permit PI modification kits to be procured and installed with Procurement funds. This alternative, currently under consideration by HQ DA, would provide for more effective management of PI funds at the PM level.

ACKNOWLEDGEMENTS

To Mr. Robert Odell, Chief, Technical Management Division, Office of Product Improvement, HQ US Army Materiel Development and Readiness Command (DARCOM), for the pleasure and joy of renewing his friendship. His knowledge and information relating to PIP management was greatly appreciated.

To Mr. Steve Richey, Chief, Program Control and Funding Division, Office of Product Improvement, DARCOM, for the time he took from his busy schedule to discuss funding and funds management.

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SECTION I

INTRODUCTION

Purpose of the Study Project

Ever since the first wheel came off a caisson during the heat of battle there have been discussions between the users and the developers over equipment improvement. The question to be resolved is: should the wagon wheel be modified with an improvement or should a new and better caisson be designed, developed, and fielded? In modern times with the rapid changes in technology and the quantity of sophisticated "gadgets" available, the tendency has been toward the replacement of defective equipment with new, better, and more expensive equipment. The cost and time involved in the development of new equipment has become a source of growing concern to Congress and the Army Leaders. On 27 May 1977, Army Chief of Staff, General Bernard W. Rogers, in an address to the Atlanta IV Army/Industrial Executive Seminar made the following comments. "Now let me kick off some concern in the Army and defense industries mutual area of interest ....., are we spending too much time developing, testing, and evaluating new equipment rather than improving a proven product." (1:31)[1]

The application of improvements to proven products has become a big business in the Army. Headquarters, US Army Materiel Development and Readiness Command (DARCOM) has the responsibility for management of the Army's Product Improvement (PI) Program. Significant growth has

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1. This 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.

occurred in the PI Program since FY 72 when the Program reflected 191 Product Improvement Proposals (PIP's) totaling $133 million. (2:13) The value of the PI Program for FY 78 is projected at $810 million (3:27). DARCOM has projected PI funding requirements for Fiscal Years '79 through '84 at approximately $6 billion (3:4)(19)

Although the selection of the PIP is a viable alternative to the development of new equipment, the initiation and completion of a PI Program is dependent upon the consideration of many significant factors. Design, development, testing, evaluation, procurement, application, and funding are all functions that contribute to the fielding of a successful PI Program. Funding is an area common to all of the functions. Too often, the developer, armed with the enthusiasm and support of the user, prepares a PIP only to find that the lack of funds may jeopardize the entire program. In many cases, availability of funds may become the driving factor. A shortage of funds may well cause program slippage and could result in the ultimate cancellation of the program.

The purpose of this paper is to look at the funding procedures associated with the support of a PI Program. Through the years, the Army has had difficulty in effectively and efficiently funding PIP's. While there are indications that this problem still exists, DARCOM is aware of the difficulties and has proposed several alternative solutions for review.

Specific Goals of the Project

Specifically addressed will be the ability of the Army to support current year requirements with a budget developed in a past year. Since the Budget Cycle takes 29 months from start of the Planning Phase to the beginning of the fiscal year, considerable overlap occurs between the budget efforts of various fiscal years. (4:OSAM 14) As a result, under

current fiscal policy at any given period of time, the Army is expending FY (Current Year) funds, working with Congress for the enactment of FY (Year + 1) funds, programming FY (Year + 2) funds and planning FY (Year + 3) funds. Against this fiscal policy it is difficult to identify a user related problem and develop a PI Program in the Current Year and obtain adequate funding support in the Current Year and FY (Year + 1).

An additional goal of this Project will be an evaluation of the impact on the acquisition process of changes presently proposed by HQ DARCOM.

Definitions

Product Improvement Proposal (PIP) - Proposed configuration change involving substantial engineering and testing effort on major end items and depot repairable components or changes on other than development items to increase system/combat effectiveness or extend the useful military life. (5:A-4)

"In" or "Out-of-Production" - "In production" means the end item is still being produced for Active Army inventory whereas "out-of-production" means it is no longer in production for Active Army inventory. Both phases apply only to the fiscal year(s) for which the product improvement funds are requested. (5:A-4)

Program Objective Memorandum (POM) - A memorandum in prescribed format submitted to the Secretary of Defense by the Secretary of a Military Department or the Director of a Defense Agency which recommends the total resource requirements within the parameters of the published Secretary of Defense fiscal guidance. (8:4)

Five Year Defense Program (FYDP) - The official program which summarizes the Secretary of Defense approved plans and programs for the Department of Defense. The FYDP is published at least once annually. The FYDP is also represented by a computer data base which is updated regularly to reflect decisions. (8:3)

Joint Strategic Objectives Plan (JSOP) - A document prepared annually which provides the advice of the Joint Chiefs of Staff to the President and the Secretary of Defense on the military strategy and force objectives for attaining the national security objective of the United States. In addition to recommendations on major forces, it includes the rationale supporting the forces and assessment of risks associated therewith, costs and manpower estimates, and other supporting data. The JSOP is published in three volumes: I - Strategy, II - Analysis and Force Tabulations, and III - Free World Forces. (8:3)

Scope and Limiting Factors

This paper will address funding applications and restrictions of Army Product Improvements. The funding impact on a large in-production program and a small out-of-production program will be discussed. Information was gathered from existing regulations and guidance documents, a document search of the Defense Documentation Center, personal experience by the Author while working in the M 551 Project Office (1974-1975), and by conversations with personnel assigned to HQ DARCOM. Information was not obtained from other Army Activities and field commands because of the constraints on time.

SECTION II

BACKGROUND

Purpose of the Product Improvement Program

The United States Army is tasked with the requirement to develop and field the equipment necessary to support the missions assigned by the President and endorsed by the Congress. The success of the Army's development and acquisition program depends upon the cooperation and support of a number of Major Army Commands. These Commands include: the materiel developer - HQ, US Army Materiel Development and Readiness Command (DARCOM); the doctrine/user - HQ, US Army Training and Doctrine Command (TRADOC); the CONUS user - HQ, US Army Forces Command (FORSCOM); and the OCONUS user - Major Overseas Commands.

Army materiel, which no longer meets the Users' needs, is identified and the pertinent deficiencies provided to the Developer. In the past years, equipment deficiencies have been resolved in one of two ways. Changes have been brought about either through the development of an improvement to correct the deficiency or by development of a new replacement piece of equipment or complete weapon system. If the equipment is determined to be deficient because of technological lag, a revision of deployment techniques and concepts, or the identification of a new Threat, then equipment replacement may be the only alternative. This course of action will require an Army commitment of money and other resources over an extended period of time and result in the initiation of the materiel acquisition process.

In today's fiscally constrained environment the current tendency appears to be more inclined to lead away from new development and encourages

the improving of equipment already in the field. Two main reasons for this are the potential reduction in both cost and time to field the improvement. On 27 April 1977, in a speech at the National Bureau of Standards, Deputy Assistant Secretary of Defense (MA) Jacques Gansler stated: "An obvious shortcut in the acquisition process and at low risk is through improvements to already existing equipment .....We may, in the future, be forced to this approach for fiscal reasons as much as for our desire to field a capability sooner." (6:33) These two factors of cost savings and time reduction may be, in themselves, sufficient justification for favorable consideration of development improvements to an already fielded weapons system as the most acceptable course of action.

It should be understood that before a PI Program is initiated there must be a requirement identified or an established and proven need. As defined in current regulations there are six basic categories into which justification requirements for new PI's are identified. The categories are: safety; new tactical operational USER requirements; combat effectiveness (mission oriented); improved reliability and maintainability; cost production (production/logistics); and a generalized category of standardization, compatibility, others. (5:B-3) These separate categories will not be discussed further within this report. Major Alexander has given a good explanation of the six categories in his report. (7:5)

Current Funding Policy for Product Improvement Proposals (PIP's)

The current funding policy for PIP's is outlined in AR 70-15, dated 1 April 1975. Although AR 70-15 is under revision, this guidance still prevails to the MACOM's (major Army commands & DARCOM Commodity Commands).

A review is made by DARCOM of each PIP submitted by a MACOM. The intent is to determine the purpose of the PIP. In addition, a review is made of the end item to determine: production status (in or out of production);and whether improvement application will be made in the field as part of a modification kit or as part of a depot retrofit program. This analysis is necessary to permit the programming of funds to the appropriate category. Funding categories in support of the PI Program include: (3:2,3)

Maj Eng: Procurement engineering funds used for engineering of product improvements for end items which are in production or scheduled for production.

Maj HDW: Procurement hardware funds used to procure product improvement kits.

Proc Sec: Procurement secondary funds used to purchase spare parts support for projects.

RDTE: Research and Development funds used for development of product improvements supported by new requirements.

Stock Fund: Funds used to purchase kits for stock fund items and for support items which are stock funded.

32207: Funds used for application of product improvement kits for end items out of production. (OMA 7M)

32897: Funds for training in use of product improvement kits. (OMA 7M)

38017: Funds used for engineering and prototype development for items not in production. (Except stock fund items)(OMA 7M)

7 S Appl: Funds used for application of kits for stock fund items.

7 S Eng: Funds for engineering improvements to stock fund items.

The actual effort to accomplish a product improvement is divided into two phases. Phase I will address all actions taken prior to actual production, application or procurement of modification kits. As such, Phase I

includes work done under redesign, development, engineering, test, and evaluation. Phase II is initiated with the release of any engineering changes to equipment in production. For that equipment out of production it will include the publishing of modification work orders (MWO's) or other documents authorizing the mass application of the change.

From the general statements outlined here it is apparent that, depending upon the nature of the proposed improvement and the current status of the major end item, a number of separate funding categories may be involved. Later within the report the application of funding requirements will be presented for two separate weapons systems: one in production, the M 60 Tank; and one out-of-production, the M 551 Sheridan Armored Reconnaissance/Airborne Assault Vehicle. In that analysis the application of funds by category will be discussed.

Current DoD Budget Cycle

The approved funding plans and programs of the Department of Defense (DoD) are summarized by the Secretary of Defense (Sec Def) in the Five Year Defense Program (FYDP). In terms of funding data, the FYDP provides cost data and information for prior, current, and succeeding fiscal years. Specifically included is the information on costs for the prior fiscal years, current fiscal year, budget year, and the four succeeding fiscal years. In addition, the Sec Def issues on an annual basis, tentative Five Year Fiscal Guidance to define the total financial constraints within which the DoD force structure will be developed and reviewed. Following review of the Joint Strategic Objective Plan (JSOP), the Sec Def issues revised fiscal guidance to the Secretaries of the Military Departments.

The Secretary of the Army (Sec Army), as well as the other Service Secretaries, participate in the development of the revised fiscal guidance. "In developing the revised fiscal guidance, consideration will also be given to the current budget, the FYDP, program deferrals, inflationary trends, gross national product estimates, and other economic considerations." (8:6) For planning purposes, the Sec Army considers as firm, the totals of the fiscal guidance for each program year. For increased flexibility the Sec Army is authorized to reallocate funds between major mission and support categories unless specifically restricted by Sec Def guidance.

On an annual basis, the Sec Army prepares and submits to the Sec Def a Program Objective Memorandum (POM) which reflects guidance outlined in the JSOP and modified by the Sec Def. The Army POM is intended to support total program requirements and provide cost data to support these requirements. In addition, justification and rational are provided for any proposed changes to the previously approved FYDP. These procedures permit the Sec Army to revise the POM submission provided there is sufficient rational to show that the revisions would provide a better balanced program and the recommended POM changes will be received, processed, and analyzed prior to a Sec Def decision on the original POM. Although it is possible to make changes to the POM, procedures are so defined that only those changes which will have a significant impact on the Army mission will be considered or initiated during the same year. The majority of newly identified funding requirements are held and submitted in the subsequent year POM.

Because of the complexity of the DoD Budget Cycle a number of budgeting actions relating to separate years are taking place at the same time. At any given period of time the Army is doing: funding planning for one year; programming and budgeting for a second year; preparing for budget enactment for a third year; and, budget execution in the fourth year. This complicated budget process is graphically portrayed in Figure 1. (4:14/B2)

BUDGET CYCLE OVERLAP

Since the Budget Cycle takes 29 months from start of the Planning Phase to the beginning of the fiscal year, considerable overlap occurs between the budget efforts of various fiscal years. For instance, as depicted in the chart below, in June of each year, one fiscal year is in its Execution Phase, the next is in its Enactment Phase, the next in its Programming Phase, and the last in its Planning Phase.

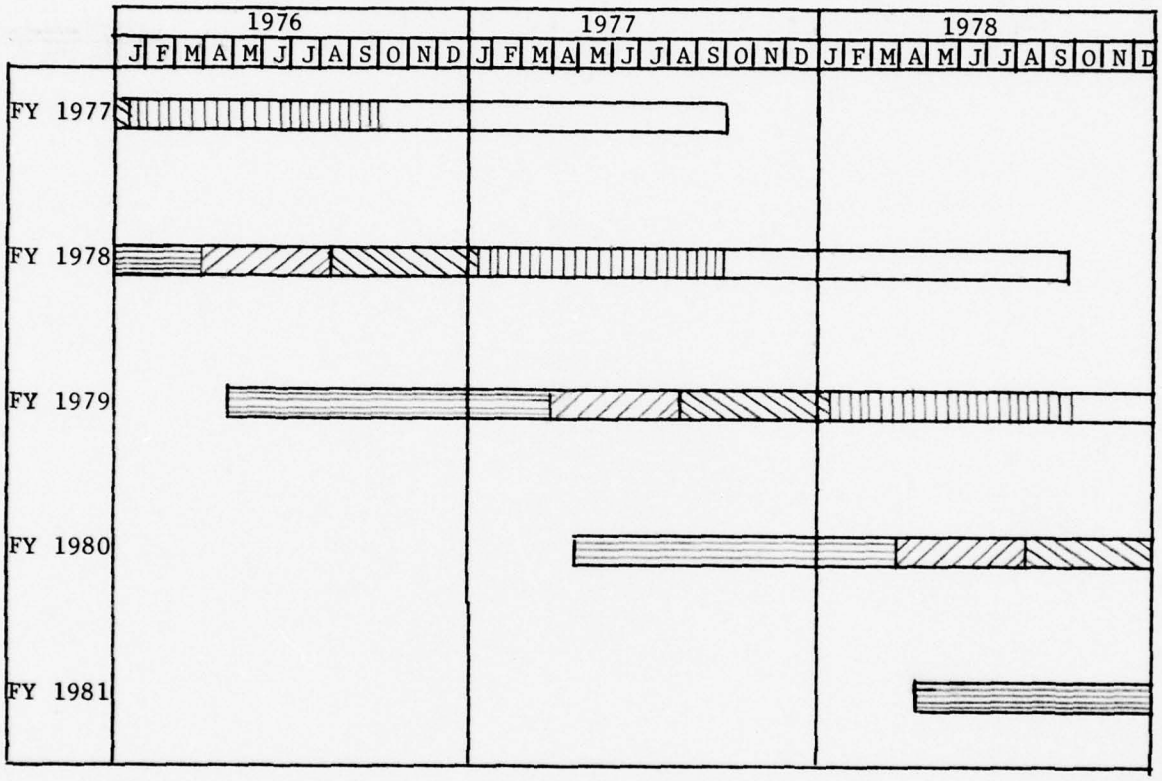
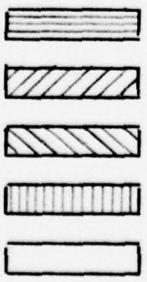


Figure 1

LEGEND



Planning Phase

Programming Phase

Budgeting Phase

Enactment Phase

Execution Phase

SECTION III

A REVIEW OF PRESENT PROCEDURES

Introduction

As previously stated, funding for an approved PI Program is applied in two phases. Phase I deals with engineering and testing while Phase II supports procurement and application. However, each Phase is funded separately and close coordination and funds management is needed to ensure that the improvements that are developed and procured are applied to the equipment in the field in a timely manner. For example, development and procurement of an investment type improvement will be funded by the Procurement appropriation but money for installation will be funded by the Operations and Maintenance - Army (OMA) Appropriation.

This split funding procedure causes problems in the overall fielding of the PI. Funding requirements are identified by project and by type of funds. In budget preparation, similar funds are summarized and identified by program elements. As a result, in the example provided, the procurement funds will be lumped into one category and the installation funds into another. If a schedule change or slippage should occur in the development or procurement it will require that this change also be reflected in the OMA funding for application. If an adjustment is not made, the budget will provide OMA funds for application while the improvement is still under development and not ready to apply. Since OMA funds are appropriated on a one year basis, this could result in the Army losing the application money. For if the OMA funds are not obligated in the year proposed they will be withdrawn. A similar problem occurs when the development and

procurement are completed on schedule; however, a budget cut in OMA has reduced or eliminated the application funds. When this occurs the Army has two options: divert approved funds for improvement application from another lower priority program; or stockpile the MWO's and wait for funds to be approved from the next year's budget. The disadvantage of the second alternative is that equipment improvements are delayed for an additional year. Mr. Robert Ruth, DSMC 76-2, provided a comprehensive report on the problems associated with the management and installation of MWO's. (9)

In past years, the realization of a smooth and efficient PI Program has been hampered by the complexity associated with the multiple funding requirements of PIP's.

Multiple Funding Requirements

In December 1975, HQ US Army Materiel Command (AMC), the previous name of the current Army developer DARCOM, convened an Ad Hoc Study Group to look into the improvement of the PI Program. One area discussed was the diversification in effort and funding authority required in order to develop and field a successful PIP. The Study Group noted: "Because of Congressional, OSD, and DA dictates, the funds needed to finance a particular PIP may be controlled through as many as six different appropriations (i.e., RDTE, PEMA, OMA, OMNG, OMAR, and the Stock Fund)." (2:29)

The total involvement in programming funds to support a PI Proposal is indicated in Figure 2 which describes Phase I, Engineering and Testing. (2:31) The multiple funding requirements associated with Phase II, Procurement and application are presented in Figure 3. (2:31, 32). With so

CURRENT PIP FUNDING

I. PHASE I (ENGINEERING & TESTING)

A. DEVELOPMENTAL PI. . . . . RDTE

B. NON-DEVELOPMENTAL PI

(1) IN-PRODUCTION

a. INVESTMENT TYPE ITEM. . . . . PEMA

b. EXPENSE TYPE ITEM (ASF). . . . . OMA 7S

(2) OUT-OF-PRODUCTION

a. INVESTMENT TYPE ITEM . . . . . OMA 7M

b. EXPENSE TYPE ITEM (ASF). . . . . OMA 7S

Figure 2

CURRENT PIP FUNDING

II. PHASE II (PROCUREMENT & APPLICATION)

A. CUT INTO PRODUCTION

(1) INVESTMENT TYPE ITEM . . . . . PEMA

(2) EXPENSE TYPE ITEM . . . . . ASF

B. APPLY TO EXISTING ASSETS

(1) PROCUREMENT OF KITS/FDT

a. INVESTMENT TYPE ITEM . . . . . PEMA

b. EXPENSE TYPE ITEM (ASF) . . . . . ASF

(2) APPLICATION LABOR . . . . . OMA

a. SKILL LEVEL	7M AMC
MECH vs NON-MECH	7S AMC
DEPOT LEVEL vs BELOW DEPOT	7M OTHERS
b. LOCATION/OWNERSHIP	7S OTHERS
CONUS vs OCONUS	P1, P2 OTHERS
INVENTORY vs USERS HANDS	P3, P8 OTHERS
c. STOCK FUND vs NON-STOCK FUND	P9 OTHERS
d. ACTIVE ARMY vs NG/RES	ASF (W)
	ASF (CC)
	OSF
	OMNG
	OMAR

OTHER SUPPORT COSTS

C. PRINTING OF PUBLICATIONS . . . . . OMA 7M

D. NEW EQUIPMENT TRAINING . . . . . OMA 7M

E. TECHNICAL ASSISTANCE . . . . . OMA 7M

F. TOOLS & EQUIPMENT REQUIRED TO SUPPORT . . . . . PEMA
OMA 7M
MISSION

G. REPAIR PARTS SUPPORT . . . . . PEMA
ASF

H. TRANSPORTATION OF ITEM TO RECONFIGURATION POINT . . . . OMA 7S (AMC)
MISSION (OTHERS)

Figure 3

many funding categories to be considered, the magnitude of the accounting procedures soon becomes apparent. Schedule slippages, reprogram efforts, and new urgent improvement requirements all contribute to the frustration reflected in PI management. DARCOM has decentralized funding approval authority by [illegible]ting PI budget and management, within specified dollar thresholds, t[illegible]nate Commodity Commands. While this provides for better management at the Commodity Command level it increases the frustration of total budget management. As a result, "An urgently needed reprogramming action becomes a formidable if not an insurmountable task." (2:30)

The full impact of this diverse funding is felt at the Program Office (PO) level. Working in an environment where User satisfaction and the development of a successful product are the driving factors, it is difficult to orient one's thinking to ensure that funding demands and restraints are identified and resolved during the development of the PI.

Identification by itself is not enough. If a program is to be successful it is necessary that funding restrictions be eliminated or at least reduced. In addition, each appropriation area has a Funding Baron who must be pacified or placated. These Barons must be recognized early in the program development and there must be the realization that they will make or break any PIP planned by the PO.

Examples of two programs are provided to explain some of the funding difficulties and decisions associated with a PIP.

Case History - M 551 Sheridan

The Armored Reconnaissance/Airborne Assault Vehicle, M 551, commonly called the Sheridan is a light weight, air-transportable, armored

reconnaissance vehicle. The Sheridan was developed to replace the M 41 Light Tank and the M 56 Self-Propelled 90 mm Anti-Tank weapon.

The development contract for the M 551 Sheridan was awarded to Cadillac Division, GMC, in June 1960. The first R&D design prototype was delivered in December 1961. The development contract was terminated shortly after delivery of Prototype 12 in February 1965. A multi-year production contract was awarded in April 1965 to the Allison Division, GMC, with production to be accomplished at the Cleveland Army Tank Automotive Plant. A total of 1662 vehicles were produced prior to contract completion in November 1970. No subsequent production contracts were awarded. An overhaul program was initiated at Anniston and Letterkenny Army Depots in 1970. In October 1973, Letterkenny completed their portion of the program leaving Anniston Army Depot the prime rebuild facility for the Sheridan Vehicle.

In April 1974, HQ AMC, directed the Project Office M 551 to conduct a Mid-life Review of the M 551 Sheridan. In conjunction with the User, and other AMC Commodity Commands, the PO M 551 chaired a series of meetings. The User was taksed to identify their current problems, their recommendations for improvement and their future operational requirements for the Sheridan. The AMC community, as the developer, was asked to identify proposed improvements intended to upgrade the overall RAM (reliability, availability, maintainability) of the vehicle and weapons systems. In subsequent joint meetings between the Developer and the User a total of 56 specific improvements were recommended to provide timely corrective action to known system deficiencies. These proposed improvements addressed problems related to system performance, deficiencies with

safety implications and proposals to improve the reliability, availability, and maintainability of the M 551 Sheridan. Total cost of the PIP was estimated at $45.5 million over a six year period with an immediate requirement for an estimated $6.7 million during the first year.

Although the Review was initiated in April 1974, it was May 1975 before the Developer and User forwarded a coordinated PIP to HQ DA with the request that the program be initiated in FY 76. This submission to DA was in fact a request that an additional $6.7 million ($2.9 PEMA and $3.8 OMA) be added to a budget currently under review by Congress and ready for execution in less than 60 days. The response to this would have been negative, causing an additional year in delay until the first year's funding requirement could be submitted into the POM.

Fortunately for the PO M 551, a frequent attendee at many of the early planning sessions was a HQ DA staffer who served as the DASC (Dept Army Systems Coordinator) for the PEMA Appropriation. He was sympathetic to the cause, recognized the need for Sheridan improvements, sensed a wimming team, and was willing to gamble. As a result, while the PO M 551 was fighting in the "Pits" with the User and other Developers, the DASC was inking into the FY 76 POM a projected new appropriation of $2.89 million PEMA for the Sheridan PIP. Despite the objections of other DA Staffers, the DASC remained true to his convictions and was ultimately rewarded in May 1975 when the formal request finally reached HQ DA. Because of the support of this particular Financial Baron, the Sheridan PIP remained in the DA budget and was funded in FY 76.

In the final analysis the PO M 551 had several strikes against him.

The Sheridan was out of production, so there was no contractor or production base to call upon. Although the Sheridan had high visibility, it was all bad. Field commanders, worldwide, were demanding system improvements with their demands being echoed by DA and AMC staffers. No one, however, had stepped forward with an open checkbook and offered to provide funds for improvements. The PIP, finally approved by AMC and forwarded to HQ DA, identified the requirement and requested funding to cover the improvements. Under the complicated funding procedures in effect, funds were required in eight separate funding categories: two in PEMA; one in ASF; and five in OMA. While the battle of funding authority had been won the real war of funding management for the Project Office M 551 had just begun.

The final measure of any program is its success. It would appear, from a report published ten months later, that the work of the PO M 551 and the confidence of the DASC were justified.

> "Current plans require that application of all PIP's be made by depot teams in the field or by introducing improved parts in the system through supply attrition. Using units are not expected to modify the vehicle. As we overview the total M 551 PIP, what return can we anticipate upon completion? Above all, the program will upgrade approximately 1,550 M 551 Sheridan vehicles with highly desirable improvements. The M 551 was procured originally at about a $313,000 unit cost. It is roughly estimated that acquisition of upgraded new vehicles in today's highly inflated market could almost double that figure. Total PIP cost, including research, development, test and evaluation, along with procurement and use of modification kits, is estimated at $81,300 a vehicle. The end product is expected to be a vehicle exemplary of RAM (Reliability, Availability, and Maintainability) objectives of the U. S. Army Materiel Development and Readiness Command (DARCOM)." (10:19)

Case History - M 60 Tank

In contrast to the M 551 Sheridan, the M 60 Tank program is a large well established program. Recognized as the backbone of the Army's fighting strength, PI's proposed for the M 60 receive support at the highest levels. In a report to the House Armed Services Committee on "The Posture of the Army", Secretary of the Army Hoffmann stated: "The M 60A3 Product Improvement Program is designed to incorporate improvements into new production tanks on the assembly line and to modify existing tanks with product improvements during scheduled vehicle depot overhaul. There are 10 major product improvements in the current program, making the improved tank more cost-effective and yielding improved accuracy at long range. The M 60A3 will have a striking improvement in night-fighting performance". (11) The M 60 tank program is the largest PI Program within the Army in the category of Weapons and Tracked Vehicles. The summary funding for FY 77 through FY 83 is $924 million with $81.4 million programmed for FY 77 and $112.7 million for FY 78. (3:4,27,50)

The Project Manager M 60 has considerably more options available to him in the development of a PIP than the M 551 PO. There is a large production base supported by Contractor production and a depot rebuild program. He has high visibility, both good and bad, as well as support at the HQ DA level. And finally, he has a large funding program which permits limited latitude in the development of PIP's. Looking at just one of the PI Programs in existance presents an appreciation for the funding problems associated with a larger program.

The M 60A1E3 Tank is a PI program to apply three separate improvements to the M 60A1 Tank. These improvements include: solid state computer;

laser rangefinder; and passive night sights for the commander, gunner, and driver. Three courses of action are open to the PM M 60 in the application of this PI Program. Funding strategy will vary, depending upon which course is selected. The first method of application would be through the MWO Program with application in the field to end items already in the hands of the User. In this procedure the kits are purchased with Procurement funds and distributed to the field on a one time basis as a free issue. Application of the MWO's would come out of OMA funds. Control of the application funds would be at DARCOM level with funding provided to field commanders when the applications are made. The OMA funds are held at DARCOM level to permit reprogramming in the event that the kits cannot be installed in the year programmed.

The second application method is appropriate if the end item is still in production. As the end item moves through the production line the PI is applied. In this case, "Procurement monies are used to fund the end item purchases which through the process of engineering change proposals (ECP) and configuration management will include the approved PI in the technical data package". (7:23)

The third concept would be the application of the PI's at a depot. The complexity of the application, the time to install, skills of the workers and cost of the process all play a vital role in the decision to select this course of action. Application would be by OMA funds, allocated to the depot, based upon their projected depot workload for the end items. In the Review and Command Assessment of Projects (RECAP) for M 60 Tank Development Program held on 5 August 1976 the decision presented was the alternative which made the M 60A1E3 conversion for fielded

systems at the depot. (7:24)

An Analysis

Despite the size of the program, the current funding procedures make it difficult for a PM to effectively manage his PI Program. The requirement to forecast funding needs from three separate appropriations, Procurement, OMA, and ASF only compound the difficulties of developing and fielding a PI in a timely manner. If the program is small and out of production, as in the case of the M 551, the PO must fight as hard for funding recognization as he does for engineering development. In fact it may be necessary to place more emphasis on obtaining funding to ensure that the PIP is adequately developed in a timely manner to support the User. The smaller program requires more personal interaction by the Project Officer. Close coordination with the User, other Developers and Staffers is essential. At times it may be necessary to initiate "out of channel intervention" with selected personnel such as the Financial Barons, to assist in successful Program completion. Multiple funding becomes a problem in the acquisition of 56 improvements with Procurement funds and the subsequent scheduling of their application with OMA funds. A change in current funding policy that would permit both the procurement and application with Procurement funds would permit more flexibility in the management of program funds.

In the case of a larger program like the M 60, the PM is required to resolve different funding problems. Working with a larger annual PI budget (e.g., FY 78 $112 million) there is some flexibility in budget allocation. For the PM, interaction with support elements must, for the most part, be delegated to his staff. PM attention and emphasis will be

concentrated at the Army Staff, OSD, and Congressional levels. In the example cited, the funding decision pertains to PI application. Since the intent is to apply the PIP to the current M 60 fleet, funding projections must take into consideration, weapons systems already in the hands of Users as well as those still being produced by a contractor. Separate forecasts by funding appropriation are necessary for PIP development and application. Once the application method has been selected and funding requested, if a program modification develops, it will require major funding revisions to change the application method. For instance, if the decision had been made for application by Depot rebuild and the appropriate OMA funding programmed, then it would not be possible to arbitrarily switch PI application to a Contractor team. Different funds would be required for Contractor application and a reprogramming effort with corresponding time delay could be anticipated. Management of PI funding on larger weapons systems might be more effectively achieved if different funding procedures were utilized. It should be recognized that during the life of a major weapons system,equipment modifications and improvements will be required. If PI funds were forecasted and budgeted on the basis of the total dollar inventory of the fielded weapon system, a greater latitude in PI management would be available to the PM. The possibility of this type of funding procedure will be discussed in the next section.

SECTION IV

PROPOSED FUNDING ALTERNATIVES

Introduction

Several alternatives to the current PIP funding procedure have been proposed. The purpose of any alternative would be to permit the Service, specifically the Project Office, some flexibility in the forecasting and expenditure of PI funds. An alternative that would reduce the number of separate funding categories presently required to develop and field a PI would simplify the funding management requirements presently imposed upon the PO. An alternative that would permit Phase I and Phase II work with the same funding category would also be an improvement. Such an alternative would permit the PO to develop, procure, and apply PI's using the same funds. In addition, it would permit more efficient funding management and permit the Service or the PO to make funding adjustments for delays in development or procurement without losing the previously programmed OMA application funds.

Alternative I

The problems relating to the diverse procedures utilized by the Army in the funding of PI's was discussed by the U. S. Army Materiel Command Board in May 1967. The Board noted that there was no focal point within AMC to monitor and control the Army's PI Program. The Board also noted that the Developing Agency was hampered in the development of a PIP because the funding requirements for PI changes caused the Developer to search for both the approval and the funds. The Board concluded, "Although funds have always been provided for critical changes, frustrating

delays have been experienced". (12:31) It was noted that R&D funds would not be used to develop PIP's for a weapon system already fielded and type classified, as in the case of the M 551 Sheridan. The use of OMA 7M (maintenance) money was limited by budgetary constraint, resulting in emergency requirements for equipment improvements being funded at the expense of the current Army Program. The Board noted that the Air Force Logistics Command used a different budgetary technique for funding product improvements. A specific code was used for modifications and all PI costs were included in the "Central Procurement Fund". This code did not require a by-line breakout of each modification but rather identified the cost with three large categories; aircraft, missiles, and ground equipment. Budgeting for improvements was then made upon an experience factor. As a result, the Air Force was able to take a percentage of the total inventory value and allocate that money for aircraft product improvement. Based upon their review, the Board established the following funding objective: "The product improvement budget will be based on a fixed percentage of the materiel inventory value". (12:35)

The AMC Ad Hoc Study Group again discussed the funding problem in December 1975. The Group did not recommend that PI funding be allocated based upon a percentage of inventory. Their conclusion was: "While it is quite evident that various calculations concerning dollar expenditures can be made utilizing past experience, it is apparent that such calculations cannot be used to predict a future reconfiguration requirement concerning a particular line item. At best, such calculations could be used only to establish a contingency requirement to finance potential reconfigurations

that may never materialize." (2:35)

The Group, instead recommended that HQ DA authorize AMC to consolidate the OMA application money into a single account under omnibus funding. The Group defined Omnibus Funding as "Consists of using one funding account (i.e., one appropriation/budget/program/activity account) to finance several (or many) different functions, tasks or jobs which are now financed by two or more funding accounts". (2:30)

In recent years delays in funding approval have been reflected in delayed initiation and implementation of PIP's. This has resulted in an increase in the outyear Operating and Support (O&S) Costs of weapons systems. On 28 February 1976, Deputy Secretary of Defense Clements addressed this issue in a Memorandum For the Secretaries of the Military Departments. The Secretary expressed his concern over the continuing growth of that fraction of the total DoD resources needed to operate and support current weapon systems. He specifically addressed the need for a more responsive Product Improvement Program. To the Army he gave a specific task: "Army should provide a commitment of dollars to improving equipment, stratified by types of improvement. Fund commands as a level-of-effort rather than provide HQ DA item approval. Require reports of results (what they accomplished) with allocated funds to include O&S ROI". (13:Incl 2,4) (ed note: ROI-return on investment)

A review of DARCOM files revealed that several letters have passed between HQ DARCOM and HQ DA addressing, "Product Cost Improvement". In a recent letter dated 25 January 1977, HQ DARCOM addressed to HQ DA the problem of separate budgeting for PI's. The letter to DA stated in part,

"In order to achieve maximum benefit, a portion of the cost reduction funds must be budgeted on a 'level-of-effort' or projected basis for use at the discretion of the local commander. This would allow us to respond in a timely manner, taking full advantage of cost improvement opportunities. It is recognized, however, that such a discretionary fund may be difficult to sell to Congress." (14)

During the past ten years, May 1967 thru January 1977, the Army has addressed several different approaches to total PI funding. It would appear, on the surface, that the allocation of PI funds either as a percentage of total supported inventory or a budgeted level of effort would be a workable solution. At present, this Alternative appears to be at a "status-quo" as a possible funding solution for the Program Manager or the Project Officer.

Alternative II

A second, and possibly more workable, proposal was initiated by HQ DARCOM in January 1976. Their request, presented to HQ DA, was that modification kits developed as a result of PIP's be installed with procurement funds instead of the current policy of using OMA funds.

By way of background, in 1972, Congress directed that DoD institute a policy to use OMA funds to provide for the installation of modification kits instead of the past policy of using investment type appropriations. As a result of the Congressional action, OSD, by Program Budget Decision reduced PEMA (Procurement) appropriations and increased the OMA appropriation by a corresponding amount. The problems generated by splitting these funding appropriations have been discussed throughout this paper.

In January 1976, DARCOM requested that DA prepare a recommendation to OSD and Congress to reinstate procurement funding for kit installation. (15) In a July 1976 reply, HQ DA expressed concern for the DARCOM problem. However, the DA position was,not to go forward to Congress,based upon the poor performance record of the Army in the management of the PI Program. HQ DA rationalized that it was difficult to determine if funding procedures or overall poor management was the cause of the past and current Army PI Program problems. (16)

In April 1977, DARCOM again requested HQ DA to go to OSD for reinstatement of procurement funding for kit installation. Cited in this request was the impact of the Congress imposed ceiling on FY 77 OMA application funds in July 1976. Prior to this imposed ceiling most of the procurement dollars for modification kits had been obligated. As a result, the funds ceiling had caused procured kits to be placed in storage and had generated a buildup of uninstalled kits. The DARCOM argument again stated that if procurement and installation were identified to the same appropriation Congress would have been in a better position to review the funding requirements on a system by system basis and the decision to cut FY 77 installation funds may have been avoided. (17)

In an April 1977 reply, HQ DA, indicated that a request would be made to OSD and Congress that procurement funding for kit installations be reinstated. (18)

Should OSD and Congress support this alternative, it will be a significant improvement to the funding problems currently being experienced at the Program Office level. The authority to program procurement and

application with the same funding appropriation will enhance budget preparation and funding management. Under the improved management policies presently in effect within DARCOM, this procedure should contribute to the timely development and application of improvements to weapon systems in the field.

SECTION V

SUMMARY

Conclusions

The analysis of the Army PI Program made by the AMC Board in May 1967 revealed a number of glaring deficiencies in the funding management of PIP's. Based upon their recommendations and other DARCOM actions, significant improvements have been made in the past ten years in the Army's management of the PI Program. Those of noteworthy mention include:

- The establishment of the Office of Product Improvement, HQ DARCOM, to serve as a focal point to Army Developers.

- The consolidation at HQ DARCOM in July 1975 of the worldwide funding responsibility for modification kit installation below depot level. This realignment relieved the User from funding for installation with his mission funds.

- The initiation of a General Officers' Product Improvement Review Board at HQ DA focused senior level attention on the program and has succeeded in synchronizing it with the POM/Budget Cycle.

The Army has taken a positive approach in the establishment of a management structure to more effectively control the Army PI Program. If the current funding procedure could be revised it could be a significantly step toward more efficient PI management.

Under the current procedures the Program Manager is required to use several different funding appropriations to successfully pass a PIP from development through application. Alternatives currently under study within HQ DARCOM would reduce the funds management by combining PI funding requirements. This proposal would permit programming of development and

application funds under the same appropriation and could benefit the PM in three ways. First, it would allow him to deal with a single Financial Baron at HQ's DARCOM and DA, thus reducing his budget management problems. Secondly, during budget execution, it could ease planning for installation of kits when they are procured, because the funding would all be under the same appropriation. Finally, if program problems should develop in procurement or development which could delay the projected delivery, there will be no adverse impact upon the application funds.

Recommendations

A revision of the Army procedures for the funding of PIP's is needed. The current procedures initiated within DARCOM for PIP management should be stressed at OSD and with Congress. The management nucleus, presently in effect, should be used as a basis for reinforcing and strengthening Army credibility with Congress in the area of funds management for the total Army PI Program.

Efforts should continue by HQ DA to receive authorization for the funding of procurement and application with a single Procurement appropriation. This policy change would permit more equitable management of procurement and application funds. The single appropriation could support management decisions during PI development and reduce the risks associated with the transition from procurement to application.

A study should be initiated into a new concept for PIP funding. The requirement for future improvements to weapons systems should be recognized early in the development cycle. The inclusion of these improvement costs as an item of Integrated Logistics Support (ILS) would permit the cost of PI's to be computed into the total Life Cycle Costs (LCC) of the weapons

system. If the PM knows that he has funds within his program for improvements, he will have the management flexibility to respond with Product Improvements as deficiencies are determined.

Funding is the key to materiel acquisition within the Army or any of the Military Services; it is especially critical to the PI Program. Any procedure that may be implemented to reduce programming problems and provide for more efficient management will be greatly appreciated by the Program Manager in the field.

FIGURES

BIBLIOGRAPHY

1. Rogers, Bernard W., General, Army Chief of Staff, Speaking on, Army Research and Development, May - June 1977.

2. US Army Materiel Command (AMCRD-EC), In-House Ad Hoc Study of the Product Improvement Program, April 1975.

3. DARCOM Report, Product Improvement Funding Data FY 77 - FY 83, Office of Product Imporvement, 14 June 1977.

4. Study Guide, Overview of System Acquisition Management, PMC 77-2, DSMC, Ft Belvoir, VA 22060.

5. AR 70-15, Research and Development, Product Improvement of Materiel, 1 April 1975.

6. Gansler, Jacques, Deputy Assistant Secretary of Defense (MA) Speaking on, Army Research and Development, May - June 1977.

7. Alexander, Terry, Major, Product Improvement Program (PIP) for M 60 Tanks, Study Project Report, DSMC Class 76-2, November 1976.

8. Department of Defense Instruction, DODI 7045.7, The Planning, Programming and Budgeting System, October 29, 1969.

9. Ruth, Robert J., Managing the Installation of Modifications to Fielded Army Equipment, Study Project Report, DSMC Class 76-2, October 1976.

10. Kaczmarek, Robert and Major David Baron, Sheridan Product Improvement, Army Research and Development News Magazine, November - December 1976.

11. Hoffman, Martin R., Secretary of the Army, Speaking on, Army Research and Development, March - April 1976 (Inside front cover).

12. Reports, Product Improvement of Materiel, Army Materiel Command Board, (Gen F.S. Besson, Jr., Board President), 30 June 1967.

13. Clements, W.P. Jr., The Deputy Secretary of Defense, MEMORANDUM FOR The Secretaries of the Military Departments, Subject: Reduction of Outyear Operating and Support (O&S) Costs, dated 28 Feb 1976.

14. Letter, DARCOM (DRCPI), Subject: Product Cost Improvement, dated 25 January 1977.

15. Letter, DARCOM (AMCPI), Subject: Funding for Application of Product Improvement Kits, dated 5 January 1976.

16. Letter, HQDA (DAMA-PPP-C), Subject: Funding for Application of Product Improvement Kits, dated 26 July 1976.

17. Letter, DARCOM (DRCPI), Subject: Funding for Application of Product Improvement Kits, dated 12 April 1977.

18. Letter, HQDA (DAMA-PPP-C), Subject: Funding for Application of Product Improvement Kits, dated 25 April 1977.

19. Richey, Steve, Chief, Program Control and Funding Division, Office of Product Improvement, HQ DARCOM, 3 Nov 1977.