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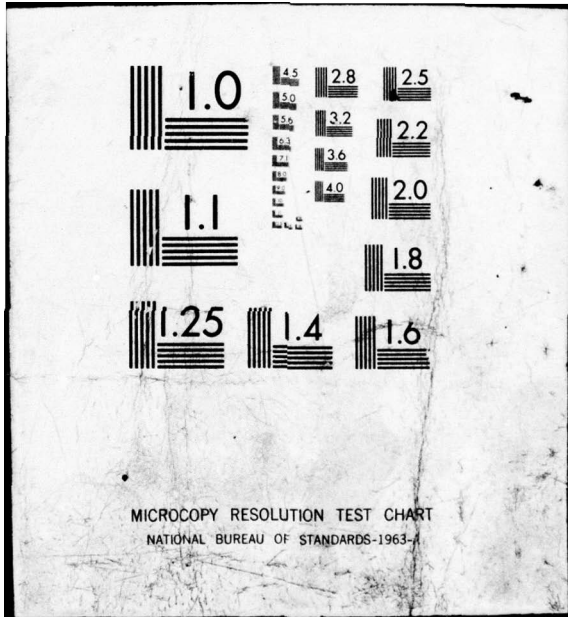
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# DEFENSE SYSTEMS MANAGEMENT COLLEGE



## PROGRAM MANAGEMENT COURSE INDIVIDUAL STUDY PROGRAM

HOW CAN WE HELP YOU TODAY?:  
 THE FUNCTIONAL COMMANDER'S SUPPORT FOR  
 THE PROJECT MANAGER

Study Project Report  
 PMC 77-1

Jeffery Bryan Frey  
 Major USA

FORT BELVOIR, VIRGINIA 22060

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THE FUNCTIONAL COMMANDER'S SUPPORT FOR  
THE PROJECT MANAGER

Individual Study Program  
Study Project Report  
Prepared as a Formal Report

Defense Systems Management College  
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Class 77-1

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by

Jeffery Bryan Frey  
Major USA

May 1977

Study Project Advisor  
Mr. Larry Birk, DAC

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: HOW CAN WE HELP YOU TODAY?: THE FUNCTIONAL COMMANDER'S SUPPORT FOR THE PROJECT MANAGER

STUDY PROJECT GOALS:

The project defines and describes the functional interfaces that exist between the PM, XMI Tank System and his Assistant PM for Tank Main Armament Development, the Armament Research and Development Command, and the Armament Materiel Readiness Command.

STUDY REPORT ABSTRACT:

The purpose of the project was to sort out the coordination and support requirements development of the Army's new main battle tank. Although some were obvious, most were not, and a substantial overview was drawn up based on a review of the literature and personal and telephone interviews. The resulting descriptions should be particularly helpful to those developing new joint support agreements. The more general reader should find that the overview here presented suggestions applicable to many organizations, some of which he may wish to use for his own organization.

SUBJECT DESCRIPTORS:

ORGANIZATION ANALYSIS, PROJECT MANAGEMENT, TANKS, MATERIEL ACQUISITION

NAME, RANK, SERVICE

Jeffery B. Frey, Major, USA

CLASS

PMC 77-1

DATE

May 1977

"Awards will become tarnished, diplomas will fade, gold will green ink will turn gray. What count, my friends, are the realities of life: the fact of competition, the purpose of accomplishment and yes, the great and good friends that you make along the way." (Jesse Owens, 1932 Olympics).

### EXECUTIVE SUMMARY

The purpose of this paper is to examine the interfaces between the Office of the Project Manager, XM1 Tank System; the Assistant PM for Tank Main Armament Development, XM1; the Armament Research and Development Command; and the Armament Materiel Readiness Command. After describing the organizational elements and defining the scope of the paper in the first section, a detailed enumeration of responsibilities is presented; this enumeration will be particularly useful as input during drafting of Joint Working Agreements. A Case Study is presented to show how the responsibility relationships have been exercised. The paper then displays findings and recommendations for developing relationships, and suggests tasks for future study.

### ACKNOWLEDGMENTS

The author wishes to acknowledge the efforts of his Defense Systems Management College Study Project Advisor, Mr. Larry Birk, during the initial shaping of the study, and during its final review. The comprehensive review and valuable suggestions of the following individuals is acknowledged with thanks: Major General (Retired) Fred J. Ascani, USC Faculty; Lieutenant Colonel David A. Appling, Assistant Project Manager (Tank Main Armament Development), XMI Tank System; and Lieutenant Colonel Robert B. Machen, Special Assistant to the Commandant, Defense Systems Management College. A special thanks is given to Mrs. Barbara L. Cox, Clerk-Typist, Defense Systems Management College for typing a readable document from a very rough draft.

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## SECTION I

### INTRODUCTION

#### Purpose and Goals of the Project:

An Army Project Manager can jump on Tennessee Williams' Streetcar and "always depend on the kindness of others" to get his job done. Or he can take himself - and Lieutenant General George Sammet's designation<sup>(9)\*</sup> as a "Prince of the Realm" - too seriously, and ungraciously demand the undying support of the Army's Functional Research and Development Commanders. Realistically, he must choose some middle ground.

A Functional Commander on the other hand, can give more help than a PM needs by overcontrolling the available technical assets (killing him with kindness), or-by using selective noticing-can withdraw needed support and advice, and let the PM flail away at problems well within the Functional Command's ability to resolve. The Functional Commander needs to develop a way to support - but not direct - the project. Hopefully, the Project Manager and the Functional Commander will realize the wisdom of Fran Tarkenton's observation that "All of us are smarter than one of us." Hopefully too, the project will fare better than the Vikings at their three Superbowl football contests.

This paper will present the results of a systematic investigation of the relationship between the Project Manager, XM1 Tank System and his Staff, and the Commander and Staff of the Army's Armament Research and Development Command (ARRADCOM). The relationship has been, and remains, excellent. This

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<sup>(9)</sup>refers to the ninth reference listed in the List of References

fine state of affairs has persisted through adversity, budget shortages, political decisions, and high-level reviews, and is expected to continue through reorganizations and changes of key personnel. This agreement and trust has been built upon an open-handed and honest dealing with problems, coupled with a lot of advanced planning for the conduct of the work. Perhaps the key element to this relationship was the attitude expressed by the ARRADCOM Commander - Major General Ben Lewis - as a challenge to his staff: "If the XMI Project succeeds, we succeed; if it fails, we fail."

After describing the organizational elements involved and discussing procedural matters in this chapter, the evolution of the support agreements will be presented. Having done that, a specific case will be presented to illustrate the working relationship between the office of the Project Manager (PMO) and the Functional Command. Finally, some findings and recommendations, and suggestions for future effort will be made. The goal of this study is to document a case where the critical PM/FC relationship worked well. The case study may be useful for other Project Managers and Functional Commanders to adapt features to suit - and hopefully to improve - their organizations.

## DESCRIPTION AND BACKGROUND OF THE ORGANIZATIONAL ELEMENTS

### Office of the Project Manager, XM1 Tank System (PMO, XM1)

The Program was initiated in December 1971 when Congress directed the termination of the development of the XM803 Tank System as unnecessarily complex, excessively sophisticated, and too expensive. Congress, however, supported the concept of a new tank for the Army, and provided funds for the Army to initiate the prototype development program on a competitive basis of a relatively inexpensive [italics added] but highly maneuverable, hard-hitting main battle tank for our Armed Forces<sup>(7)</sup>.

On 12 November 1976, the Secretary of the Army announced that the Chrysler Corporation prototype concept had been selected as the winner of the Validation Phase and would be the sole United States contractor to enter Full Scale Engineering Development. During the three years of this phase, XM1 pilot vehicles with associated hardware will be produced in the Detroit Arsenal Tank Plant. A full scale production contract is targeted for award in mid-1979<sup>(11)</sup>.

The Office of the Project Manager, XM1 Tank System, is located near the United States Army Tank Automotive Research and Development Command at Warren, Michigan. The PMO is responsible for project management of the XM1 Tank System, ancillary equipment and assigned tank main armament development programs. This responsibility includes development of the XM1 Tank System producibility engineering and planning, and management of the procurement program for the XM1 Tank System<sup>(7)</sup>.

Assistant Project Manager for Tank Main Armament Development for the XM1 Tank System (APM (TMAD), XM1)

One of the keys to the XM1 achieving its firing performance objectives while staying within stated weight and configuration goals, as well as time constraints, is the use of significantly improved ammunition in the United States' standard 105mm tank cannon. This cannon, originally developed by the British, has been standard in the United States since 1959, and is a de facto standard for NATO. During late 1975 and 1976, the question arose as to whether the main armament for the XM1 would remain as planned, or if standardization considerations would force the program to adopt another tank gun. The Germans advocated their smooth-bore 120mm system (despite rather convincing proof of the effectiveness of the US 105mm System during the recent Trilateral (FRG-US-UK) Trials). The British, observing that there existed no compelling threat to force an early adoption of a new large gun, preferred to study the problem and come up with a superior 120mm gun, but in a rifled bore configuration. In this climate it became quickly apparent that immediate and continuing attention had to be paid to the tank main armament area to keep the gun system from forcing the rest of the tank to suboptimization by reducing stowed load, adding yet additional weight, and incurring schedule slippages and cost overruns.

After long and thorough consideration and consultation between the PM, XM1 and the Commander. Armament Research and Development Command (then ARMCOM), the Office of the Assistant Project Manager for Tank Main Armament Development was recommended and approved in early 1976. The APM, XM1 was charged with the management of a systems approach to development, and allocation of fund resources for United States initiatives for proposed

armament systems (gun and ammunition) for the XM1 Tank System. Additionally, he was charged with complete exploitation of the potential of the standard 105mm gun. He also assumed responsibility for all international tank gun and ammunition programs which were either of a cooperative nature or constituted exchanged of information with the British, the Germans or other NATO allies based on existing or future agreements.

The APM's office was activated in mid-1976 near the ARRADCOM complex at Dover, New Jersey, where the Army's tank ammunition research is carried out in the Large Caliber Laboratory. An additional benefit of this location is its proximity to the cannon fabrication facility at Watervliet Arsenal, New York and the Ballistic Research Laboratory, and Test and Evaluation Command at Aberdeen Proving Ground, Maryland. As the office was getting underway, the United States negotiated two bilateral agreements, with the British, and with the Germans respectively, to quickly demonstrate their available systems, and to demonstrate again the United States' 105mm system (with improved ammunition) with an eye to a specified NATO standard. These trials (November-December 1976) indicated that further data and more comprehensive evaluation would be necessary before the US could select a candidate to replace, eventually, the 105mm system. A further, and more comprehensive evaluation is being conducted with the goal of making a decision by 30 December 1977.

Armament Research and Development Command (ARRADCOM)

Established officially on 31 January 1977, ARRADCOM conducts or manages basic and applied research, development, life-cycle engineering and initial acquisition through technical data finalization when procurement and management responsibilities are turned over by mutual consent, to the Armament

Materiel Readiness Command (ARRCOM) (exception: nuclear weapons, which are developed and procured throughout the life cycle by ARRADCOM<sup>(6)</sup>). For project-managed developmental systems, like the armament component systems of the XM1, ARRADCOM performs functions as requested by the PM, mutually agreed and recorded in a Joint Working Agreement. (The ARRADCOM also responds to the PM on an ad hoc basis when requested).

The recent creation of ARRADCOM was in response to the findings of the Army Materiel Acquisition Review Committee's (AMARC) very thorough study of the ways the Army could become a smart buyer of new weapon systems. Although a discussion of this Committee's findings is beyond the scope of this paper, the study resulted in the realignment most of the Army's commodity commands to form a Commodity Research and Development Command and a Commodity Materiel Readiness Command - thus miming the internal reorganization of their parent, the Army Materiel Development and Readiness Command. ARRADCOM's functions include all of those of the Research and Development Directorate of the original Armament Command (ARMCOM), plus some functions from nearly every other ARMCOM directorate. Just before the split, ARMCOM had acquired the Ballistic Research Laboratory, and responsibility for this and the chemical research activities at Aberdeen Proving Ground remains ARRADCOM's (see Figure 1). The principal interface with the XM1 Project is now between the ARRADCOM Commander and the APM (TMAD) XM1, both located at Dover, New Jersey.

As inferred above, the Armament Materiel Readiness Command at Rock Island, Illinois, picks up responsibility for armament items upon agreement of the commanders involved, and retains this responsibility throughout the

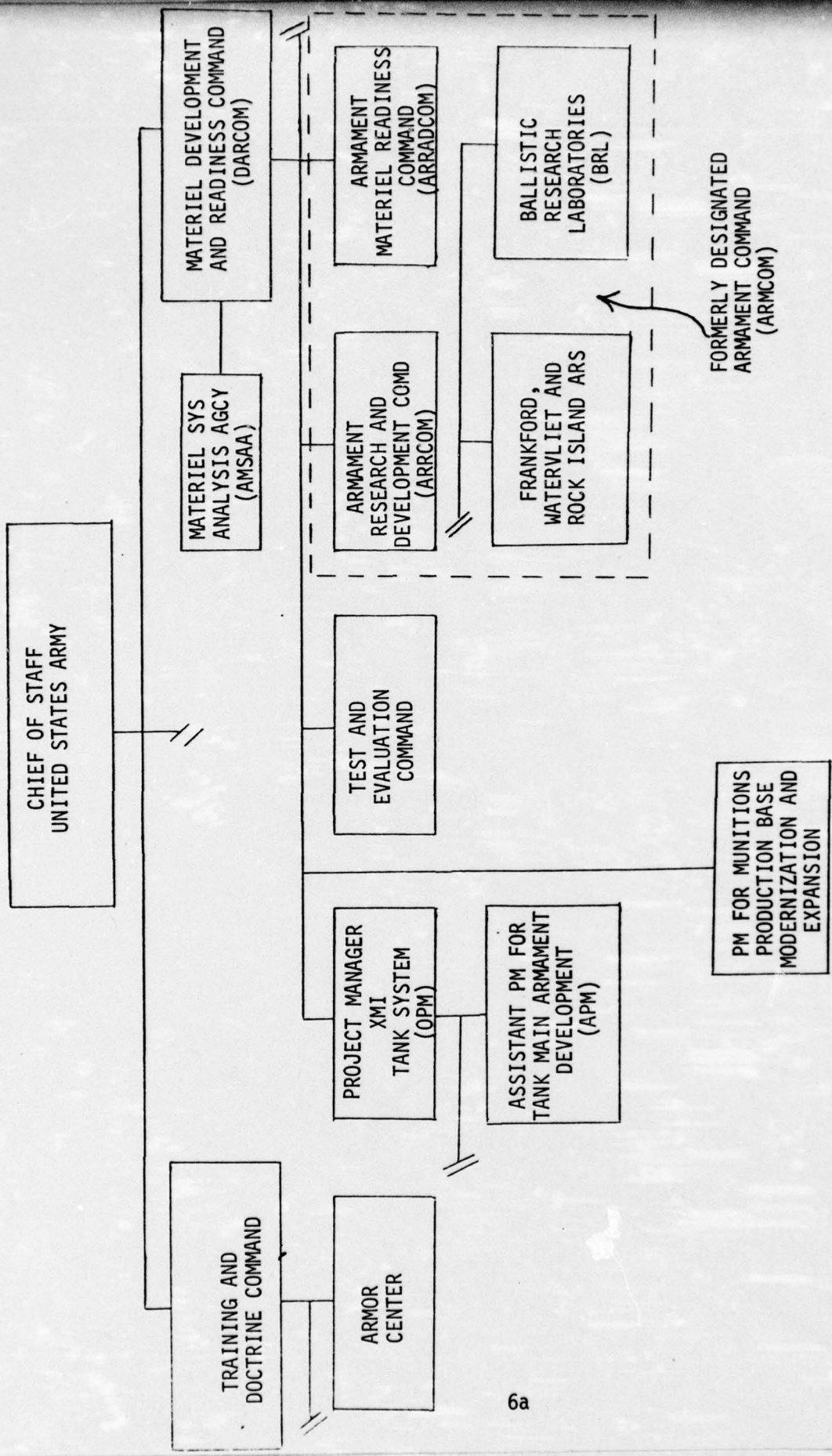


FIGURE 1 - ORGANIZATIONS DISCUSSED IN THIS REPORT

remainder of the life cycle. It has the "big picture" of supply and maintenance issues for all tank guns and ammunition in the inventory, to include worldwide assets and requirements, international logistics, and quality assurance. The production and procurement functional groups identify and pursue promising areas of manufacturing methods and technology, and work with the Project Manager for Munitions Production Base Modernization and Expansion and ARRADCOM to determine which facilities need to be created or updated. Section III of this paper will show that a great many people from ARRCOM's functional elements are needed in a successful gun/ammunition fielding effort.

#### Scope and Boundaries of the Paper

As with most research papers, especially when the author is attracted to, and is familiar with his subject, a deliberate - almost ruthless and certainly arbitrary - boundary line must be set beyond which the paper must not stray. This paper bounds the Tank Main Armament arena - and includes the ARRADCOM staff elements and those portions of the XMI Tank System Project Office that are most concerned with this area. Although mentioning other aspects for clarity, the attempt will be made to keep the focus on this one area so that the paper may explore it in depth to gain some insight into the existing relationships. Care must be taken to observe that the observations, conclusions, and recommendations of this purposely narrow point are not the general case, and caution must be exercised to avoid applying them universally.

#### Suggestions for Future Study

It is left for a future study to investigate the vehicular support aspects of the tank project. Most of the vehicle considerations were

proposed/resolved by working with the XMI development contractors - General Motors and Chrysler - with Chrysler ultimately winning the Full Scale Engineering Development Contract; however, the Army Tank-Automotive Research and Development Command, collocated in Warren, Michigan, supplies the Project Office fiscal and legal services, as well as technical advice on the vehicle, as necessary. It would be particularly interesting to investigate this relationship.

An additional study would be worthwhile: the interconnected responsibilities of the Project Manager, XMI Tank System; the Project Manager, M-60 Tank Development; and the Project Manager, M-60 Tank Production. Both of the tanks use the 105mm M68 Tank cannon/ammunition assets, test range facilities, and very importantly gun/ammunition configuration control. A study that focuses on the coordination of these three offices, how they work together, and makes suggestions to improve these working relationships would be very useful, not only to Army project managers, but other service and industry project managers whose duties require coordination of efforts with other vertical, visible, project-managed activities.

## SECTION II

### THE SUPPORT RELATIONSHIPS

#### General Responsibilities

After having introduced the organizational elements, we now turn to how these elements work together - how do the functional commanders support the Project Manager in successfully developing his Tank System? The relationships will be discussed first in a general way, and then - after an important caveat - the latter part of this section will be devoted to enumerating the day-to-day topics upon which the functional command and the Project Manager's Office interact. At the close of the section is a short note on management indicators that can be used to evaluate how well the established support relationship is working.

The Project Manager, XM1 Tank System is responsible for project management of the XM1 Tank System, international cooperation in tank main armament development with the Federal Republic of Germany and the United Kingdom; and selected United States tank main armament development to include development and full fielding of the kinetic energy armor piercing cartridges, and research and development - funded improvement to the high explosive anti-tank cartridge and M68 cannon. Items which may become PM XM1 responsibilities in the future include a 105mm training cartridge and a 105mm high explosive multi-purpose cartridge. Turnover of these projects to ARRCOM will be at full fielding after mutual agreement by the Project Manager, Commander, ARRADCOM, and Commander ARRCOM. PM XM1 is also responsible for project management of tank ancillary equipment developed by ARRADCOM including integration of primary and secondary weapon systems. Additionally, it is

envisioned that 105mm armament licensing rights negotiations, negotiation of possible foreign military sales to FRG and/or United States purchase or manufacture under license of FRG or United Kingdom systems or components, will be the responsibility of PM XM1 (subject to delegation of the necessary negotiating authority from DOD/DA).

The Assistant Project Manager, XM1 Tank System (APM (TMAD), XM1), has responsibility for both the national and international aspects of selected tank main armament development and product improvement programs assigned to PMO, XM1. The selected programs include all RDTE 105mm work, and all cooperative work and information exchange with the FRG and United Kingdom and possibly others, especially in the 120mm area.

In view of the great importance of the main armament system to the XM1 tank, and the well-documented effects that a change in main armament would have upon the overall tank system, the Assistant Project Manager is directly under the control of the Project Manager, XM1 Tank System. This enables PM, XM1 to manage the development of the entire XM1 system, and thus to insure positively that no portion of the tank is suboptimized at the expense of overall tank system performance. This will also allow the officer (APM) in direct charge of United States tank main armament development to negotiate with foreign governments in his own behalf, and provide him the institutional stature to deal with foreign counterparts as equals.

The Commander, ARRADCOM, is responsible for development, production engineering planning, and first funded delivery period production of tank main armament materiel for the XM1 Tank System. He also is responsible for providing engineering support, upon request, for ARRADCOM mission items.

The Commander, ARRCOM, is responsible for procurement and production of the second and subsequent funded delivery periods for tank main armament materiel. He is responsible for procurement-and operations/maintenance-funded product improvements to present cartridges and the present 105mm cannon, as well as procurement of these and foreign weapons and ammunition requested by PM, XM1. His responsibility extends to procurement of secondary weapons and associated ammunition such as the 50 caliber machine gun, 7.62mm machine gun, the 40mm HV grenade launcher (when developed), the smoke projection system, and procurement of chemical-biological protection materiel to include decontamination and chemical detection devices. In addition, he is responsible for providing engineering support concerning ARRCOM mission items upon request of the XM1 Project Manager.

#### Day-to-Day Responsibilities

WARNING: The responsibilities described below, most especially those of the functional commands outlined above (ARRADCOM and ARRCOM) are somewhat dynamic at this time of writing. In fact, some of the responsibilities noted below are conjectures on the part of the author, based on a review of the Joint Support Agreement between the predecessor functional organization (ARMCOM) and the Project Office. It is hoped that this enumeration and classification will assist those who must "hammer out" new Support Agreements that reflect the responsibilities of the new functional organizations. In any event, the assembly of topics should serve the more general reader as a checklist of considerations when sorting out functional/vertical relationships for his own organization.

The PMO will manage the resources authorized for execution of the approved XMI Tank System, including all the resources required for the definition, development, initial procurement, production, distribution and logistical support of the XMI Tank System. ARRADCOM and ARRCOM will manage the resources provided by the project office so as to control cost and schedule to insure accomplishment of program objectives within established constraints.

ARRADCOM/ARRCOM will, as appropriate, publish, revise, and assist in review of the operating, maintenance, and supply publications pertaining to armament/ammunition and chemical-biological protection materiel and special test equipment as required. The PMO will insure that XMI Tank System technical publications incorporate additions or changes to the weapon system as soon as possible.

ARRADCOM will provide for developmental, and ARRCOM for fully fielded armament/ammunition and chemical-biological protection materiel required during weapon system testing and on other occasions as necessary. Ammunition required for R&D and weapon testing will be budgeted by the Project Manager and procured in conjunction with current ARRCOM procurement programs, if applicable.

ARRADCOM will provide technical advice relating to the XMI interface with GFE weapons, ammunition and chemical-biological protection, and ARRCOM will provide engineering support with reference to armament/ammunition and chemical-biological protection materiel, in addition to other items falling within the ARRCOM mission responsibility when specifically requested by the Project Manager, XMI Tank System.

The PMO will coordinate the configuration management interface with ARRADCOM, and concur/nonconcur in Engineering Change Proposals (ECP) having an impact on the armament/ammunition and chemical-biological protection materiel. It will, when available, provide to ARRCOM and ARRADCOM the XM1 Tank System overall Configuration Management Plan (CMP) as guidance in accomplishing XM1 Configuration Management objectives.

The PMO will provide guidance and concurrence in the preparation of the Work Breakdown Structure (WBS) to the 3rd level for all armament/ammunition and chemical-biological protection support provided by ARRADCOM. It will provide guidance and concurrence in the preparation of the Work Breakdown Structure for tank main armament cartridge, and provide guidance on a continuing basis on matters affecting these cartridges, such as technical requirements, material requirements, schedules and release of status and performance data to United States and foreign agencies. ARRADCOM will develop and submit a budget/schedule baseline, integrated by work package, with an appropriate work breakdown structure for hardware. Changes to the established baselines will be made only with the concurrence of the Project Manager.

The PMO will manage the resources authorized for execution of assigned tank main armament materiel, including all the resources for the definition, development (including test and evaluation) and product improvement of the tank main armament projects. The PMO will coordinate producibility engineering planning and initial production of these items through ARRADCOM. It will coordinate with ARRADCOM for the preparation of XM1 System Technical Data Package as necessary.

The PMO will arrange with ARRADCOM and ARRCOM for direct communication with their subordinate elements as necessary for effective coordination of actions, and will chair bimonthly program progress/status review meetings. An information copy of direct correspondence between the PM and a subordinate element of ARRADCOM or ARRCOM will be provided to the headquarters level. ARRADCOM and ARRCOM will participate in program progress/status meetings as called on by the Project Manager, and provide monthly technical reports on the XM774 cartridge as well as other selected tank main armament program-including analysis of the impact on the XM1 development schedule to the PMO, XM1 Tank System. They will, at the request of the Project Manager, assist in the preparation and review of technical data for the XM1 Tank System.

The PMO will submit periodic reports to include Review and Command Assessment of Program (RECAP), program data sheets, and planning summaries to higher headquarters, based on data provided by ARRADCOM/ARRCOM. It will notify ARRADCOM/ARRCOM of programming and schedule changes in the XM1 Tank System. ARRADCOM/ARRCOM will inform the Project Manager of United States and foreign tank cannon and ammunition development and development of the 40mm HV grenade launcher, and coordinate proposed programs with the Project Manager, XM1 Tank System with respect to cost, schedule and performance impact on the tank program.

#### Management Controls and Indicators

PM, XM1 and Commanders, ARRADCOM and ARRCOM will be given periodic review briefings to monitor the programs.

The APM, XMI (TMAD) will provide to HQS, ARRADCOM/ARRCOM the documents noted below plus any other as he sees fit, for the purpose of informing ARRADCOM/ARRCOM and, most importantly, preventing duplication of effort.

Requests/proposals for new projects/tasks will be provided for review by the ARRADCOM Configuration Control Board. Likewise, related requests/proposals initiated by ARRADCOM will be provided to APM, XMI (TMAD) for review and comment prior to final ARRADCOM approval. Amendment of the agreement to reflect new projects/tasks will be made accordingly.

Authorization documents, such as DARCOM Forms 1095 and Program Data Sheets, as well as Progress and Cost Performance Reports, and reports of changes in scope of work in progress also will be forwarded by ARRADCOM to the PMO.

### SECTION III

#### A CASE STUDY: HOW WELL DO THE CURRENT SUPPORT CONCEPTS WORK?

Just after creation of the Office of the Assistant Project Manager for Tank Main Armament, XM1, a very sticky political problem (alluded to above) came about. The issue was how best to standardize and/or make interoperable the NATO tank fleet. The challenge was to inflict minimal disruption on the XM1 program.

The United States and Germany had tried to standardize on a tank, but had failed principally because the complexity of the project was aggravated by the differences between the two countries' design and fabrication philosophies, standards, and approval chains, requirements for complete agreement even over minor issues, national pride, and major economic considerations. While the United States does support standardization - in fact recent Congressional Legislation permits the Service Secretaries to waive the Buy America Act to so achieve - our successes in this area are conspicuous by their rarity. To try to achieve some level of standardization on tank main armament, the United States, Germany and Great Britain conducted extensive firing trials of three gun/ammunition systems - one from each country. After analyzing the results, examining the threat, and very hard negotiating, it was agreed trilaterally up to the general officer steering committee level to use the US/UK 105mm system (the de facto NATO Standard) on first production runs of the new American and German Tanks. Development was to continue on the larger 120mm size for later use if the threat so dictated.

This working level trilateral agreement was never ratified at the

German subministerial level or above, and, in fact, what appeared to be an organized attack was launched by Germany on the technical level in various NATO forums; on the political level involving very senior officials of the United States, Germany and Great Britain; and in the public press to have the German system adapted as the official NATO Standard.

Adding to the confusion were two bilateral agreements (US-UK, US-FRG) to conduct additional firing trials to clean up some questions left from the previous trilateral trials; the fact that we were testing the new FRG tank with the standard 105mm gun with a possibility of buying their whole tank; the fact that the British had developed a new type of ammunition; and - not least - the fact that the XMI source selection was underway, and the PM was about to ask DSARC principals to proceed to Full Scale Engineering Development. By direction of the Defense Department, the Source Selection Evaluation Board reconvened and sought proposals from both prototype manufacturers for a tank with (among other changes) a hybrid turret, capable of accepting the 105mm or the 120mm gun. Not counting the obvious choice of staying with the 105mm gun as planned, four main options emerged: adopting the present United Kingdom 120mm rifled bore gun, adopting a new United Kingdom 120 rifled bore gun (available within a year or so); adopting the current FRG 120mm smoothbore gun; and developing a new 120mm rifled bore gun within the FRG envelope. Since the PMO was not in any way staffed to consider such options, a clear case emerged for the functional command to accomplish the mission.

ARRADCOM was requested to devise and carry out a vigorous 120mm tank gun and ammunition initiative (since the features of the 105mm system were

well known, ARRADCOM was asked not to consider it). The thrust of the initiative was to coordinate and direct the diverse elements of the United States armament community in an early (sixty days!) technical evaluation of the various available 120mm options (noted above). The evaluation had to include draft program plans for the options as well as recommendations on the relative merit of each option. Dr. John Frasier (then at Ballistic Research Laboratory but now Deputy Director, Large Caliber Laboratory, ARRADCOM) was appointed director of this project.

Dr. Frasier enlisted the aid of specialists and generalists from BRL, HQ ARRADCOM and its various supporting activities, Army Materiel Systems Analysis Agency, Frankford, Watervliet and Rock Island Arsenals, Test and Evaluation Command, Training and Doctrine Command and the Armor Center at Fort Knox. Representatives from OPM, and the Assistant PM acted as advisors (see Figure 2). These people were organized in teams to address the separate elements: one team for developing separate program plans for each option, another team for assessing each option, a third team for planning trials of guns and ammunition resulting from the previously mentioned bilateral agreements with the FRG and UK, and the last team for the overall comparative evaluation of the candidate alternatives.

This study was structured to allow clear definition of objectives and sub-objectives, taskings, roles and responsibilities, lines of communication, workflow, and reporting in order to do a complete job on time. Time was of the essence in light of the early dates facing decision makers.

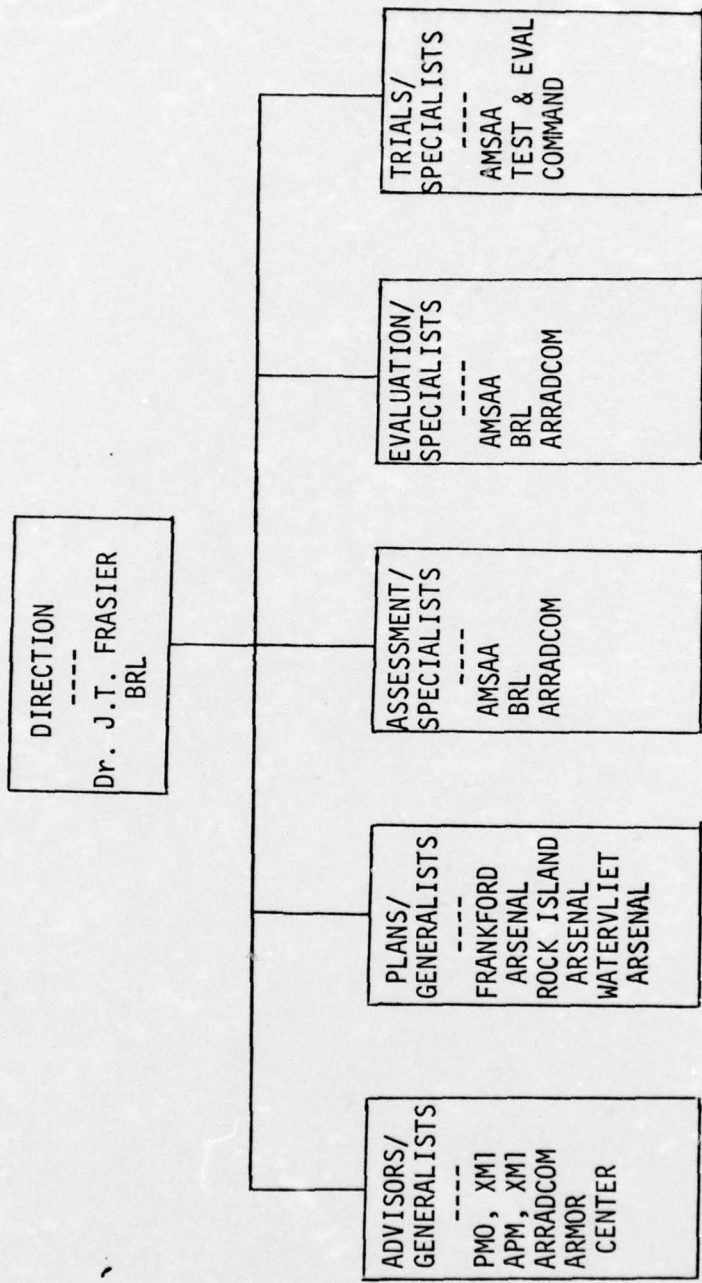


FIGURE 2 - Organization for Tank Gun and Ammunition Initiative

The following approach was used:

- Bring the purpose and objectives into focus for all involved.
- Define ground rules and development options.
- Identify requirements, desired characteristics, and issues.
- Make development estimate plans for the armament options with a view toward costs, time, potential problems, support required and the characteristics of the end item.
- Do assessments of the armament options in the style of the Trilateral Tank Main Armament Evaluation.
- Evolve inputs for definition of the trials of UK and FRG.
- Evaluate the armament options in light of the plans and assessments, the requirements and the issues.
- Reach conclusions and recommendations, and report.

The product of this great effort was two reports - a quick report after a month to inform decision-makers of the shape of the study, and a final report, after two months' effort, with summaries and recommendations. The final report grew to eight hundred pages, and will doubtless serve as a base line for United States Tank Gun System research for the next ten to twenty years. The team members also served as aide to the PM in picking out salient points to be included in a briefing to the decision-makers on the course the United States should follow. The United States position was briefed by the APM through Army channels to the Secretary of Defense. The decision was made to enter Full Scale Development with a hybrid turret; to initially produce the XM1 with a 105mm gun; and to study the developing British 120mm rifled bore gun before deciding which - if any - 120mm gun to select for use.

## SECTION IV

### FINDINGS AND RECOMMENDATIONS

#### Findings

For all the written Joint Working Agreements - a very necessary exercise - the real secret to a successful relationship between a project manager and a functional commander is the top-down attitude of the organizations, especially the leaders. The PM must realize that his small but elite organization does not have the corner on good ideas; the functional organization with its methodical, broad-brush approach to research is perfectly capable of coming up with concepts and technology which can enhance the PM's system - either with an on-stream engineering change or a subsequent product improvement. The functional organization, in turn, must realize that the project manager has a very specific goal-oriented task. Supporting him is the best possible application of defense research, since he is delivering a system to the hands of the Field Army within cost and schedule constraints.

Another reason for PMO-functional command relationship is the fact that the PMO should not - and probably cannot - grow to a size sufficient to take care of all its technical and administrative needs. Even assuming the personnel resources were available for the PMO to so expand, the ultimate effect would be to institutionalize the PMO's, and prevent the necessary interaction between the PM and his staff. If the PM is cushioned from his action people by a layer of bureaucracy, he simply will not get the critical information to plan intelligently, and to respond quickly to program disruptions.

The final reason to pursue a healthy, vital PMO - functional command relationship is that ultimately the PMO must - and should - cease to exist.

Even before the final termination of the office, the tone and tenor shift several times - most notably the shifting of gears between the threat-response parametric analysis and performance threshold engineering orientation of the advanced development phase to the production preparation, facility planning and delivery schedule orientation of the Full Scale Engineering Development Phase. Each time such a shift in emphasis occurs, some people are going to be moving out of the PMO and seeking other jobs. The functional command can perform two missions here: one is to provide a sure next place for employment of these generally above average workers so that they will satisfactorily complete their PMO tasks; and secondly to provide an atmosphere where this PM - oriented "taxi squad" can get up-to-date on their discipline (engineering, design, materials, propulsion, etc.). The functional command gains, of course, by the injection of practicality in their research by these workers-fresh from the ragged edges of reality.

#### Recommendations

The collocation of the APM office at Dover, New Jersey with ARRADCOM Headquarters and some operational elements is probably an ideal situation for the present, and for as long as international research and development and foreign manufacturing impact the tank main gun effort for the XM1.

Care must be taken that actions which are separately funded and are directive in nature are completely coordinated within the ARRADCOM staff, and operational elements; moreover, ARRCOM elements, especially production and quality assurance interfaces, must be kept up to speed on current engineering decisions and test results, and brought on board for configuration management and production leveling.

The PM, XM1 - ARRADCOM - ARRCOM relationship is very much a three-legged stool. None of the elements can deliver a new tank to the field Army without the support and assistance of the other two.

ARRADCOM must continue its initiative into examining the 120mm guns so that the United States has that option if it is ever needed. In the long run, we may be thankful for an operating 120mm system on the shelf for our use. At the same time, we must fight off the "bigger is better" approach and continue basic and applied research on new systems for the battlefield of the future.

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