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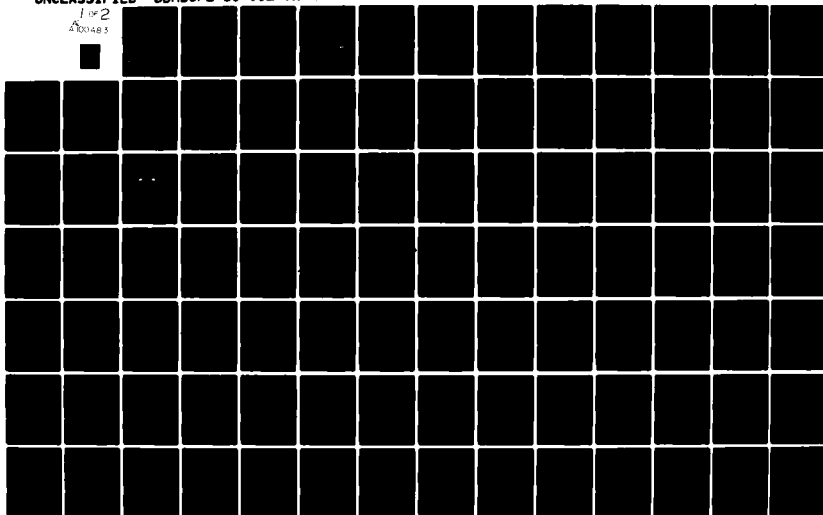
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ASSESSMENT OF THE COMBAT DEVELOPER'S ROLE
IN POST-DEPLOYMENT SOFTWARE SUPPORT (PDSS)

30 JUNE 1980 - 28 FEBRUARY 1981

FIRST INTERIM TECHNICAL REPORT

Volume II

UNITED STATES ARMY
COMBINED ARMS COMBAT DEVELOPMENT ACTIVITY
FORT LEAVENWORTH, KANSAS 66027

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) This study addresses the role of the US Army Training and Doctrine Command, as the Army's principal Combat Developer, in planning for and providing post-deployment software support to battlefield automated systems. It is a three-phase effort directed toward defining a viable, feasible, and cost effective functional and management structure for the Combat Developer to provide post-deployment software support for battlefield automated systems, (Continued on next page)		

20. Abstract (Continued)

within the framework of Army doctrine and policy, the Post-Deployment Software Support Concept Plan for Battlefield Automated Systems, and related functional requirements of the Combat Developer.

This report documents the results of Phase I. The Phase I effort was conducted to identify and describe the macro-management level and Battlefield Functional Area level post-deployment software support structure and processes, relating these processes to other Combat Developer functions, and identifying the Combat Developer's post-deployment software support requirements. The collection of data to support accomplishment of Phase I involved an extensive literature research effort; visits to organizations involved with various aspects of post-deployment software support at Headquarters, Department of the Army, the US Army Training and Doctrine Command and its Centers and Schools, and five other Army commands; and administering a questionnaire designed to obtain detailed information on each battlefield automated system being addressed. These data were then analyzed to develop a description of the current Army post-deployment software support system and processes at the macro-management and battlefield functional area levels. This description addressed organizational responsibilities, regulatory and other directive authorities, and the battlefield automated systems that must be supported.

During Phase II of the study, three alternative functional and management structures are to be defined, which would enable the US Army Training and Doctrine Command to accomplish those post-deployment software support functions that are the responsibility of the Combat Developer. Following selection of one of these three alternatives, Phase III of this study will proceed with the objective of developing an implementation plan that would provide for transitioning from the present to implementation of the selected alternative.

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UNITED STATES ARMY
COMBINED ARMS COMBAT DEVELOPMENT ACTIVITY

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ASSESSMENT OF THE COMBAT DEVELOPER'S ROLE
IN POST-DEPLOYMENT SOFTWARE SUPPORT (PDSS)
30 JUNE 1980 - 28 FEBRUARY 1981

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CONTRACT REQUIREMENT

This document contains the First Interim Technical Report of the Assessment of the Combat Developer's Role in Post-Deployment Software Support (PDSS) under Contract Number MDA903-80-C-0479 and satisfies the first requirement of Contract Data Requirements List (CDRL) Item Number 0002AC.

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The Contracting Officer's Technical Representative (COTR) is Mr. R. K. Schwabe, JINTACCS Office, Army C2/JINTACCS Division, Command, Control, Communications and Intelligence Directorate.

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ABSTRACT

This study addresses the role of the US Army Training and Doctrine Command, as the Army's principal Combat Developer, in planning for and providing post-deployment software support to battlefield automated systems. It is a three-phase effort directed toward defining a viable, feasible, and cost effective functional and management structure for the Combat Developer to provide post-deployment software support for battlefield automated systems, within the framework of Army doctrine and policy, the Post-Deployment Software Support Concept Plan for Battlefield Automated Systems, and related functional requirements of the Combat Developer.

This report documents the results of Phase I. The Phase I effort was conducted to identify and describe the macro-management level and Battlefield Functional Area level post-deployment software support structure and processes, relating these processes to other Combat Developer functions, and identifying the Combat Developer's post-deployment software support requirements. The collection of data to support accomplishment of Phase I involved an extensive literature research effort; visits to organizations involved with various aspects of post-deployment software support at Headquarters, Department of the Army, the US Army Training and Doctrine Command and its Centers and Schools, and five other Army commands; and administering a questionnaire designed to obtain detailed information on each battlefield automated system being addressed. These data were then analyzed to develop a description of the current Army post-deployment software support system and processes at the macro-management and battlefield functional area levels. This description addresses organizational responsibilities, regulatory and other directive authorities, and the battlefield automated systems that must be supported.

During Phase II of the study, three alternative functional and management structures are to be defined, which would enable the US Army Training and Doctrine Command to accomplish those post-deployment software support functions that are the responsibility of the Combat Developer. Following selection of one of these three alternatives, Phase III of this study will proceed with the objective of developing an implementation plan that would provide for transitioning from the present to implementation of the selected alternative.

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SUMMARY

1. INTRODUCTION. The requirement to provide Post-Deployment Software Support (PDSS) to the growing number of Battlefield Automated Systems (BAS) projected to enter the Army inventory during the next several years is of increasing concern within the Army. The User, Materiel Developer, and Combat Developer all have essential roles in the total effort to provide effective PDSS for BAS. The US Army Training and Doctrine Command (TRADOC), as the Army's principal Combat Developer, is responsible for the overall Army Battlefield System. This responsibility includes determining what capability is required and when it is required. The magnitude and complexity of fulfilling this responsibility, especially with respect to automated systems, necessitates that the Combat Developer maintain close coordination and interface with the User and Materiel Developer to ensure that maximum use is made of Developer capabilities and that User requirements are realized to the maximum extent possible. Within this general concept, the specific role of the Combat Developer in the evolving Army system for providing PDSS to BAS must be defined. The functional and management structure and resource requirements necessary to enable the Combat Developer to carry out this role must be identified and addressed in an implementation plan that will provide for transitioning from the current situation to achievement of the required capability to provide PDSS. This study is the first step in moving toward the definition and acquisition of this capability.

2. PURPOSE. The purpose of this study, is to define, in detail, a viable, feasible and cost effective functional and management structure for the Combat Developer to provide PDSS for BAS, within the framework of Army doctrine and policy, the DARCOM/Army PDSS Study/Management Plan and the related functional requirements of the Combat Developer.

3. DISCUSSION.

a. Background.

(1) While it has always been accepted that the development of software systems is a difficult and challenging task, it is now recognized that the maintenance of these software systems after deployment is just as challenging, if not more so, than the initial development. Furthermore, the magnitude of the effort required to provide effective PDSS to BAS is increasing rapidly as more and more systems are fielded.

(2) Recognizing the need for better planning and an improved capability for providing PDSS to BAS, the US Army Materiel Development and Readiness Command (DARCOM) initiated a study in May 1978, directed toward developing a concept for a systematic approach to the planning for and provision of PDSS for BAS on an Army-wide basis. Within DARCOM, the Communications Research and Development Command (CORADCOM) was tasked with the primary responsibility for the study. A task force of representatives from Army staff agencies, Army commands (including TRADOC and its subordinate commands), and

Army project managers was formed to work with CORADCOM in this effort. The results of this study are documented as a Department of the Army report entitled, Post-Deployment Software Support Plan for Battlefield Automated Systems, dated May 1980. Both DARCOM and TRADOC have concurred in this report which is being forwarded to Headquarters, Department of the Army for staffing.

(3) The PDSS Concept Plan addresses the need for and problems associated with PDSS for BAS. It outlines the general roles and missions of both the Combat Developer and Materiel Developer in planning for and providing PDSS. It also contains a recommended PDSS management plan and a conceptual system structure and model for providing PDSS.

(4) Within this basic conceptual framework, the Combat Developer's role and resource requirements must be further defined to provide a basis for implementation planning. This current study, An Assessment of the Combat Developer's Role in Post-Deployment Software Support, has been initiated by TRADOC as the initial step in this effort.

(5) This study focuses upon TRADOC's role, as the Army's principal Combat Developer, in planning for and providing PDSS for BAS. To further clarify the scope of this effort, Post-Deployment Software Support is defined as that part of overall system support necessary to sustain, modify, and improve a deployed system's computer software as defined by the User or his representative. It includes evaluation, development, and timely implementation of system and software modifications to accommodate trouble reports; User proposed changes; and changes to satisfy new or revised doctrinal, tactical, procedural or interoperability requirements.

b. Methodology. This study is to be completed through the accomplishment of eight tasks divided into three phases over an eight month period, which began on 30 June 1980. This First Interim Technical Report documents the results of Phase I.

(1) Phase I was directed toward analyzing the current Army PDSS system and associated processes at both the macro-management and the Battlefield Functional Area (BFA) levels, and identifying the Combat Developer's PDSS requirements at the BFA level. The BFA concept provides a systematic way of describing the actions that systems perform and the functional area in which they operate in accomplishing the commander's mission of viewing the battlefield, planning operations, allocating resources, fighting the battle, and sustaining the force. The methodology employed involved data collection, analysis, and documentation efforts. Data collection was accomplished through (a) an extensive literature review and research effort; (b) visits to 18 Army organizations including elements of the Army Staff, Headquarters, US Army Training and Doctrine Command (TRADOC), five other major commands and field operating agencies, and eight TRADOC centers and

schools; and (c) developing and administering a questionnaire designed to obtain detailed information on the BAS being addressed. These data were then collated and analyses of the macro- and BFA-level PDSS processes were developed. A description was also developed of TRADOC's PDSS requirements as perceived by elements of TRADOC Centers responsible for performing the Combat Developer's functions in providing PDSS to BAS. These analyses and the description of PDSS requirements are presented in the body of this First Interim Technical Report.

(2) Phase II of the study will be directed toward the definition of three alternative TRADOC PDSS models or systems that, when implemented, would provide TRADOC a capability to accomplish its PDSS role. These alternatives are to be documented in the Second Interim Technical Report due on 16 December 1980.

(3) Following TRADOC selection of a preferred model from among the alternatives defined during Phase II, the Phase III Study effort will proceed. During Phase III, an implementation plan is to be developed which will provide for transition from the present to implementation of the selected alternative model. This implementation plan is to be documented in the Third Interim Technical Report due on 1 February 1981.

(4) A Final Report is to be completed during the last month of the project and submitted on 28 February 1981.

c. Analysis. The Phase I research and analysis addressed three component areas of both the macro- and BFA-level PDSS structure and processes. These areas are the organizational elements involved, the applicable regulatory policies and directives, and the BAS for which PDSS must be provided.

(1) Significant elements of this analysis at the macro-management level revealed:

(a) Regulatory policy governing the acquisition and life cycle management of automated systems in the Army is divided between two separate sets of regulations--the AR 18-series and the AR 1000-1/AR 70-series. Each set of regulations is published under the proponentcy of a different element of Headquarters, Department of the Army. This is a source of irritation, differences in interpretation, and potential problems in establishing an effective system for planning and providing PDSS for BAS. Efforts are being made, in connection with recent or pending changes to these regulations, to minimize differences and harmonize, to the extent possible, the provisions of each set of regulations. A memorandum from the Assistant Secretary of Defense (Research, Development, and Acquisition), 1 July 1980, subject: "Standardization of Embedded Computer Resources", and a letter from the Deputy Commander, TRADOC, file: ATDC, 30 July 1980, same subject, bear directly on this problem and contribute to its resolution. However, some differences may remain because of the need to comply with special requirements imposed by applicable Public Law and OMB policy.

(b) Post-deployment support of automated systems in general and post-deployment software support in particular are not adequately addressed in Army regulatory documents. This situation has been improved to some extent with the recent (August 1980) issuance of revised AR 18-1 and should be further improved as a result of revisions being made to ARs 70-1 and 1000-1 which contain basic policies for system acquisition and life cycle management within the Army. Major command-level implementation of these revised regulations will be required following their publication.

(c) Despite the above problem areas, the current assignment of missions and functions to elements of the Army Staff and major commands in the AR 10-series provides an adequate framework for the development of a system for providing PDSS for BAS.

(2) Analysis at the TRADOC and BFA levels indicates that TRADOC, as the Army's principal Combat Developer, has a major role in the overall PDSS effort. This critical and increasing role is largely due to:

- The trend toward embedding more doctrine, tactics, and functional procedures in BAS software which necessitates more direct CD participation in analysis and decisions pertaining to system changes that could affect any of these areas,
- The growing number of BAS being fielded which makes definition and maintenance of functional interoperability requirements more complex, and
- The continually evolving nature of some BAS which is now an accepted system development approach per DODI 5000.2, but which has major implications for System and Combat Developers, Users, and all system support activities.

TRADOC's specific PDSS responsibilities derive primarily from the basic mission set forth in AR 10-41, Organization and Functions, US Army Training and Doctrine Command. They fall into all the principal task areas essential for effective PDSS. These task areas include:

- Management
- Analysis
- System Modification
- System Testing
- Field Support

(3) All TRADOC Centers and Schools that are designated as the proponent for one or more BAS have responsibilities in each of the functional task areas listed above. However, in most cases, additional resources are needed to effectively perform these functions. These resource needs will become more critical as additional and more advanced BAS enter the inventory and associated support requirements increase and become more complex. Tentative resource requirements have been identified by combat developments personnel

at most TRADOC doctrinal centers. These estimates were provided to the Study Team during Phase I. Further analysis is necessary during Phase II of this study to refine these requirements and develop conceptual systems for the most effective organization and application of these resources to satisfy Combat Developer PDSS responsibilities in each BFA.

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CHAPTER 1

INTRODUCTION

1-1. STATEMENT OF THE PROBLEM.

a. Need for PDSS. The requirement to provide Post-Deployment Software Support (PDSS) to the growing number of Battlefield Automated Systems (BAS) projected to enter the Army inventory during the next several years is one of increasing concern within the Army. If the Army's BAS are to function as intended, and as they must if the full effectiveness of other modern battlefield systems that are supported by or dependent upon BAS is to be realized, a means must be developed and implemented for providing timely and effective post-deployment software support.

b. General Roles in Providing PDSS. The User, Materiel Developer, and Combat Developer all have essential roles in the total effort to provide effective PDSS for BAS. The US Army Training and Doctrine Command (TRADOC), as the Army's principal Combat Developer and the "battlefield architect", is responsible for the overall Army Battlefield System (ABS). This responsibility includes determining what capability is required and when it is required. The magnitude and complexity of fulfilling this responsibility, especially with respect to automated systems, necessitates that the Combat Developer maintain close coordination and interface with the User and Materiel Developer to ensure that maximum use is made of Materiel Developer capabilities and that User requirements are realized to the extent possible. This Combat Developer responsibility applies to both the initial system development and to any subsequent post-deployment changes to a system.

c. Need for this Study. Within this general concept, the specific role of the Combat Developer in the evolving Army system for providing PDSS to BAS must be defined. The functional and management structure and the resource requirements necessary to enable the Combat Developer to carry out this role must be identified and addressed in an implementation plan that will provide for transitioning from the current situation to achievement of the required capability to provide PDSS. This study is the first step in moving toward the acquisition of this required capability.

1-2. BACKGROUND.

a. Growing Importance of PDSS. Post-deployment software support, or maintenance, of BAS is of major importance to all Users of these systems and to commanders who must depend upon them for accomplishment of their missions. While it has always been accepted that the development of software systems is a difficult and challenging task, it is now recognized that the maintenance of these software systems after deployment is just as challenging, if not more so, than the initial development. Furthermore, the magnitude of the effort required to provide effective PDSS to BAS is increasing rapidly as more and more systems are fielded.

b. Previous PDSS Study. Recognizing the need for better planning and an improved capability for providing PDSS to BAS, the US Army Materiel Development and Readiness Command (DARCOM) initiated a study in May 1978, directed toward developing a concept for a systematic approach to the planning for and provision of PDSS for BAS on an Army-wide basis. Within DARCOM, the Communications Research and Development Command (CORADCOM) was tasked with primary responsibility for the study. A task force of representatives from Army staff agencies, Army commands (including TRADOC and its subordinate commands), and Army project managers was formed to assist CORADCOM in this effort. The results of this effort are documented as a Department of the Army report entitled, Post-Deployment Software Support Concept Plan for Battlefield Automated Systems, dated May 1980. Both DARCOM and TRADOC have concurred in this report which DARCOM is forwarding to Headquarters, Department of the Army for staffing.

c. PDSS Management Plan. The PDSS Concept Plan cited above, includes a comprehensive addressal of the need for and problems associated with PDSS for BAS. It outlines the general roles and missions of both the Combat Developer and Materiel Developer in planning for and providing PDSS. The report also contains a recommended PDSS management plan and a conceptual system structure and model for providing PDSS.

(1) PDSS Center concept. This management plan recommends that eleven Materiel/System Developer-managed PDSS Software Support Centers be established to perform post-deployment software support for designated BAS. The plan provides for locating five of these PDSS Centers at TRADOC doctrinal centers. Five others are to be located at DARCOM development commands and one at the Computer Systems Command (CSC). Of the five PDSS Centers at TRADOC doctrinal centers, four would be managed by DARCOM development commands (by CORADCOM at Fort Sill, by MICOM at Fort Bliss, by ERADCOM at Fort Hauchuca, and by CORADCOM at Fort Leavenworth). The fifth one would be managed by CSC at Fort Lee. Figure 1-1 identifies all eleven PDSS Centers, their location, and the materiel/system development command that will be managing each Center. Appendix C identifies which BAS are to be supported at each PDSS Center.

(2) Concept for Combat Developer interface. The management plan cited above also recognizes the need for Combat Developer interaction with these PDSS Centers. It provides for this interface through a concept proposing the designation of Combat Development System Managers (CDSM) and the establishment of Combat Development Support Facilities (CDSF) as determined by TRADOC to be needed.

(a) CDSM concept. Under this concept, the CDSM would be the system/software Combat Developer (CD) and the principal Field User's representative for a designated system or group of systems within a Battlefield Functional Area (BFA). He would be responsible for managing and coordinating all software related actions inherent in the CD mission.

PDSS CENTERS		
CENTER	LOCATION	MANAGED BY
1	PICATINNY ARSENAL	ARRADCOM
2	FORT MONMOUTH	CORADCOM
3	FORT LEAVENWORTH	CORADCOM
4	FORT BELVOIR	CSC
5	FORT LEE	CSC
6	FORT BLISS	MICOM
7	FORT SILL	CORADCOM
8	FORT HUACHUCA	ERADCOM
9	FORT MONMOUTH	ERADCOM
10	REDSTONE ARSENAL	MICOM
11	FORT MONMOUTH	AVRADCOM

Figure 1-1. Proposed PDSS Centers

(b) CDSF concept. CDSF would be a TRADOC facility with responsibility for performing the CD PDSS role for BAS in one or more BFA. The concept envisions that the CDSF might be collocated, in whole or in part, with an MD PDSS Center or could be located separately. Also as envisioned in the PDSS Concept Plan, a CDSF would provide both the system/software analytical capability and the technical personnel necessary to perform CD PDSS functions.

d. Development and Implementation of Concept. While the PDSS Concept Plan for BAS provides a basic conceptual framework for PDSS, the Combat Developer's role and resource requirements must be further defined to provide a basis for implementation planning. This current study, An Assessment of the Combat Developer's Role in Post-Deployment Software Support, has been initiated by TRADOC as the initial step in planning for implementation of the PDSS Concept Plan resulting from the DARCOM-initiated study discussed above.

1-3. OBJECTIVE.

a. Overall Study. The objective of this study is to define, in detail, a viable, feasible, and cost effective functional and management structure through which the Combat Developer can fulfill his role in providing Post-Deployment Software Support for Battlefield Automated Systems within the framework of Army doctrine and policy, the DARCOM/Army PDSS Concept Plan for Battlefield Automated Systems and the related functional requirements of the Combat Developer.

b. Phase I. The objective of Phase I, which is documented in this report, is to gain a better understanding of PDSS requirements by identifying and describing the macro-management level and Battlefield Functional Area (BFA) level PDSS processes and associating these with the other CD functions, all within the context of the DARCOM/Army PDSS Study/Management Plan.

1-4. SCOPE.

a. General. This study focuses upon TRADOC's role, as the Army's principal Combat Developer, in planning for and providing PDSS for BAS. The BAS to be addressed are listed in Appendix C. Primary emphasis is placed on Category 1 and 2 and CSC-developed BAS, as categorized during the previous DARCOM-initiated PDSS study.

b. Definitions. To further clarify this scope, Post-Deployment Software Support is defined as that part of overall system support necessary to sustain, modify, and improve a deployed system's computer software as defined by the User or his representative. It includes evaluation, development, and timely implementation of system and software modifications to accommodate trouble reports; User proposed changes; and changes to satisfy new or revised doctrinal, tactical, procedural or interoperability requirements. Battlefield

Automated System is defined as a system employing computer resources that operates or has components that operate within the boundaries of the battle-field, regardless of the function, mission, or battle involvement. The systems may be an offensive, defensive, or direct/indirect support system. Examples of such systems are weapons, communications, command and control, intelligence, avionics, missiles, combat support and combat service support systems.

c. Relationship of PDSS and Life Cycle Management. While the study focuses on PDSS as defined above, PDSS must be addressed as an integral part of system life cycle management. Figure 1-2 illustrates the relationship of PDSS to the system life cycle. As indicated, planning for PDSS must begin early during system development (prior to Milestone II per draft AR 70-1) and continue throughout the system life cycle. Consequently, in researching and analyzing PDSS responsibilities and requirements, it has been necessary to address certain other related processes and interactions in systems development and life cycle management to include requirements definition and analysis, training development, and a broad range of User-Combat Developer-Materiel Developer interactions. It has also been necessary to consider the relationship between PDSS and the other basic functions of the Combat Developer which include:

- Research and Analysis
- Development of System Software Requirements
- Training Development
- Guidance to the Field
- Support to Contingency Planning and Operations
- Systems Testing
- Support of Wartime/Crisis Operations

d. Classification. Contract No. MDA903-80-C-0479 under which this study is being conducted states that, "The highest classification involved in the performance of this contract is SECRET." No systems, classified SECRET or lower, were identified to the study team during the Phase I research effort. Therefore, this report is unclassified. If systems exist whose identity is classified above the SECRET level, TRADOC PDSS requirements associated with such systems must be identified and addressed separately.

1.5. METHODOLOGY

a. Study Structure. Within the parameters of the scope described in Paragraph 1-4, this study is to be completed through the accomplishment of eight tasks over an eight month period divided into three phases as shown in Figure 1-3. This figure also illustrates the relationship between the tasks and phases of the study. The study began 30 June 1980 and is scheduled to be completed 28 February 1981.

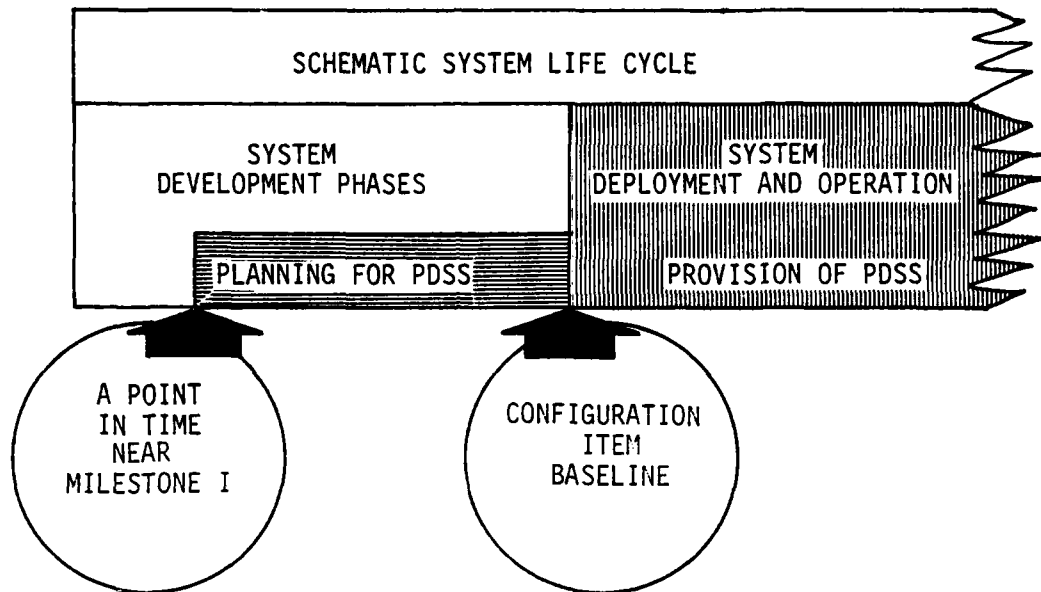


Figure 1-2. Illustration of the relationship of PDSS requirements and actions to system life cycle

AN ASSESSMENT OF THE COMBAT DEVELOPER'S ROLE IN PDSS

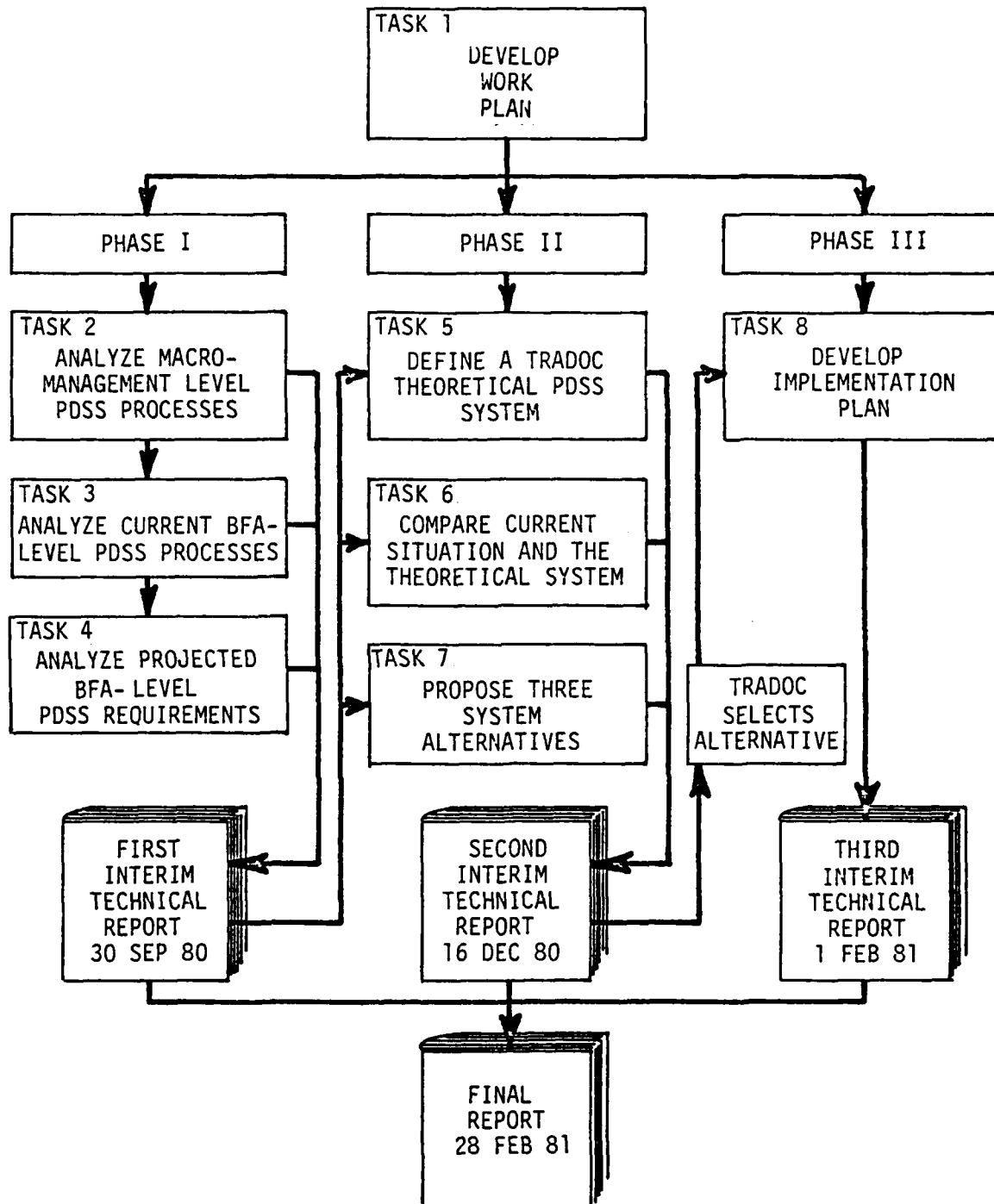


Figure 1-3. PDSS study overview

b. Phase I. Phase I began upon contract award. It consisted of Tasks 1 through 4.

(1) Task 1. The Work Plan prepared during Task 1 was delivered to the Contracting Officers Technical Representative on 17 July 1980. This plan was then presented to and approved by the Study Advisory Group (SAG) at its initial meeting on 14 August 1980.

(2) Tasks 2, 3 and 4. Tasks 2, 3, and 4 of Phase I began in early July. This First Interim Technical Report documents the results of the effort devoted to these three tasks. Their accomplishment involved data collection, analysis and documentation efforts. The data collection was accomplished through the following steps:

(a) An extensive literature review and research effort involving the reference material listed in Appendix A, plus numerous other documents that, after review, were determined not to be of sufficient significance, relevance, or currency to warrant their inclusion as references.

(b) Visits were made to the organizations listed in Figure 1-4, where interviews, briefings, and informal discussions were held.

(c) A questionnaire was administered during the visits described above. This questionnaire was designed to obtain more detailed information on the Category 1 and 2 BAS being addressed than could conveniently be obtained in the interviews and discussions held during the visits.

The data collected were then analyzed and the results documented in this report which describes the current macro- and BFA-level PDSS systems and processes and the functional and resource requirements necessary for TRADOC to fulfill its role in planning for and providing PDSS.

c. Phase II. Phase II of the study, consisting of Tasks 5, 6, and 7, will be directed toward the definition of three alternative TRADOC PDSS models or systems that, when implemented, would provide TRADOC a capability to accomplish its PDSS role. These alternatives are to be documented in the Second Interim Report due on 16 December 1980.

d. Phase III. Following TRADOC selection of a preferred model from among the alternatives defined during Phase II, the Phase III Study effort will proceed. During Phase III, an implementation plan is to be developed which would provide for transition from the present to implementation of the selected alternative model. This implementation plan is to be documented in the Third Interim Technical Report due on 1 February 1981.

e. Final Report. A Final Report is to be completed during the last month of the project and submitted on 28 February 1981.

SCHEDULE OF VISITS

<u>ORGANIZATION</u>	<u>DATE(S)</u>
TACTICAL INTEROPERABILITY SUPPORT ELEMENT	24 JULY 1980
HQ US ARMY TRAINING AND DOCTRINE COMMAND	4 and 28 AUGUST 1980
US ARMY FIELD ARTILLERY CENTER	4-6 AUGUST 1980
US ARMY TRAINING SUPPORT CENTER	5 AUGUST 1980
US ARMY LOGISTICS CENTER	5-6 AUGUST 1980
US ARMY AIR DEFENSE CENTER	6-8 AUGUST 1980
HQ DEPARTMENT OF THE ARMY	7 AUGUST 1980
HQ INTELLIGENCE AND SECURITY COMMAND	8 AUGUST 1980
HQ US ARMY MATERIEL DEVELOPMENT AND READINESS COMMAND	8 AUGUST 1980
HQ COMPUTER SYSTEMS COMMAND	11 AUGUST 1980
US ARMY SIGNAL CENTER	20-21 AUGUST 1980
US ARMY INTELLIGENCE CENTER AND SCHOOL	21-22 AUGUST 1980
HQ COMMUNICATIONS RESEARCH AND DEVELOPMENT COMMAND	26-27 AUGUST 1980
EW LAB, ELECTRONICS RESEARCH AND DEVELOPMENT COMMAND	27 AUGUST 1980
US ARMY ENGINEER CENTER	29 AUGUST 1980
ARMY RESEARCH INSTITUTE	29 AUGUST 1980
US ARMY SOLDIER SUPPORT CENTER	2-4 SEPTEMBER 1980
COMBINED ARMS CENTER	AUGUST/SEPTEMBER

Figure 1-4. Organizations visited during Phase I

1-6. ORGANIZATION OF THIS REPORT. The remainder of this First Interim Technical Report is divided into three main areas; description of the current Army PDSS System, the TRADOC requirements for PDSS involvement within the BFAs, and problems and insight implications for TRADOC.

a. Chapter 2. The first area, discussed in Chapter 2, defines the Army PDSS System in terms of a systems concept, its macro- and micro-level organizational elements, and applicable regulatory policies and procedures, and will identify which BAS are addressed by the study.

b. Chapter 3. The second area, discussed in Chapter 3, analyzes the TRADOC requirements for PDSS involvement as perceived by representatives of the BFAs. This analysis discusses each BFA in terms of the BAS to be supported, the CD PDSS functions to be performed, the impact on the organizations performing these PDSS functions, regulatory policy and procedures, and resource requirements.

c. Chapter 4. Lastly, Chapter 4 describes potential problem areas that have been identified during the course of this first phase of the study and discusses insights and implications for TRADOC.

1-7. OBJECTIVES, APPROACH, AND NATURE OF THIS REPORT. This report is a summary of material obtained from the TRADOC Centers and other sources during the Phase I data collection effort. Review and analysis of both this basic source material and the results and conclusions which may be derived from it will continue into subsequent phases of this study effort. With issue of this report the authors solicit comments, additional information, and insights that should be considered in preparation of reports in the later phases of this study.

a. General. A broad and responsible mission has been accepted by the Study Team. All types of information were solicited during the visits and interviews of the Phase I data collection effort. This information covered many subject areas and ranged from very subjective, personal judgements and opinions to documented facts and figures, supplemented with library research. This report is a summary compilation of all of this material. The intent of this report is to capture the essence of the material, which is too voluminous to play back in full detail in any single document.

b. Objectives. The primary objective in preparing this report has been to present an accurate and objective picture of the information obtained in the research phase of this effort. Two subordinate objectives existed:

(1) To provide feedback, in a depth of detail sufficient to permit SAG members and other knowledgeable reviewers to recognize and relate to the issues, and thus provide a basis for fruitful discussion.

(2) To provide a baseline document and to serve as a basis for agreement regarding the issues which are central to the research and analysis scheduled for the remainder of this study effort.

c. Approach. To accomplish the necessary summarization of the material collected, some judgements had to be made. These pertained to the choice of details to be reported and the level of summarization presented. Such judgements were exercised with the above-stated primary objective held foremost. In some instances, inductive reasoning and interpretation of source material were conducted to identify apparent gaps, issues, or problems. In most instances, however, such conditions were either identified to us in the interviews or were obvious from the facts obtained.

d. Nature of This Report. Aside from the relatively few judgements and interpretations mentioned above, this document is primarily a report of information collected. It serves as a baseline description of the current TRADOC PDSS organizational and regulatory structure and of the future requirements for PDSS-related resources as perceived by TRADOC personnel involved with Battlefield Automated Systems. Although some issues that may exist at a specific TRADOC Center or School may not be identified, the Study Team has attempted to address all significant issues that were raised during discussions with BFA representatives. Additional issues, concerns or comments that arise subsequent to delivery of this report, will be considered to the extent possible during the next phases of the study effort.

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CHAPTER 2

THE POST-DEPLOYMENT SOFTWARE SUPPORT SYSTEM

2-1. GENERAL. This chapter presents the results of the research and analysis conducted during the accomplishment of Tasks 2 and 3 which involved analyses of Macro-Management Level PDSS Processes and BFA-Level PDSS Processes, respectively. These analyses were directed toward identifying the macro- and BFA-level organizations that have PDSS responsibilities and developing descriptions of the processes through which the planning for and provision of PDSS to BAS are accomplished. Research conducted during these tasks revealed that PDSS is addressed to a very limited degree in current Army regulatory documents and organizational charters. To the extent that it is addressed, it is discussed as an integral part of the system acquisition and life cycle management process. Thus, while the research and analyses conducted under this task were focused on PDSS functional responsibilities and associated processes, it was necessary in most cases to examine the broader functional areas of system acquisition and life cycle management in order to identify implicit PDSS responsibilities of macro- and BFA-level organizations.

2-2. BASIC COMPONENTS. Basic components of the current post-deployment software support system were identified and addressed in three general areas. These were:

- The macro- and BFA-level organizational elements involved,
- Applicable regulatory policies and procedures, and
- The battlefield automated systems supported.

Each of these component areas is discussed below.

a. Organizational Elements. The organizational elements at both the macro- and BFA-levels with principal responsibilities related to PDSS are identified and discussed briefly below. Only those organizations with major responsibilities are addressed since a discussion of other organizations with only minor, supporting PDSS roles would contribute little to this report. More detail on the roles, responsibilities, relationships, and operating procedures of the organizations identified is presented in Paragraphs 2-3 and 2-4.

(1) Macro-management level. Organizations with key roles in PDSS at the macro-management level are shown in Figure 2-1. Their responsibilities related to PDSS are discussed below.

(a) Army Secretariat.

1. Assistant Secretary of the Army (Research, Development, and Acquisition). The Assistant Secretary of the Army (RDA) is the Scientific Advisor to the Secretary of the Army. Among other areas, he

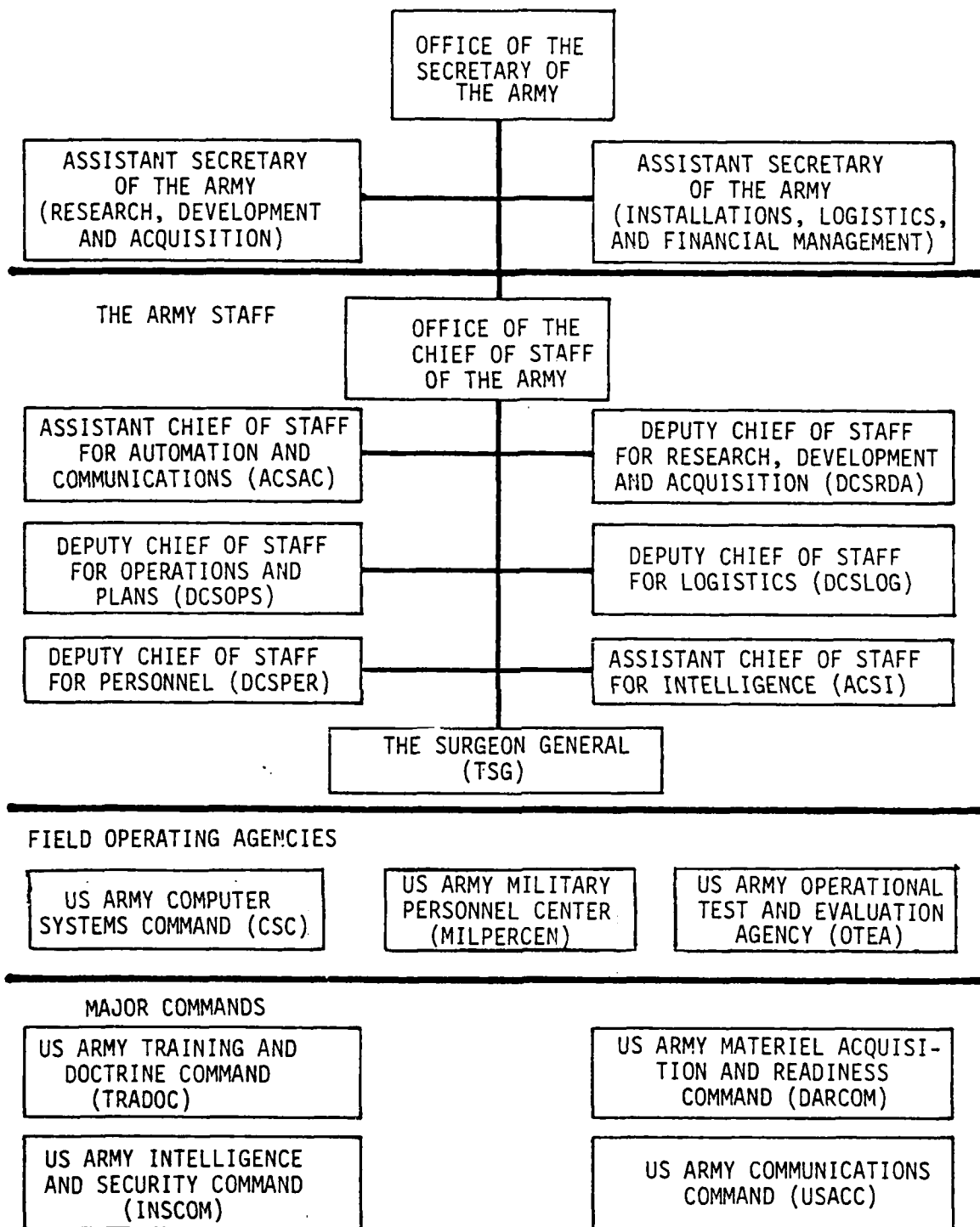


Figure 2-1. Organizational elements with key PDSS responsibilities at the macro-management level.

is responsible for research, development, test, and evaluation; materiel acquisition management; and acquisition policies and procedures. He has cognizance over Army Regulation 1000-1, Basic Policies for Systems Acquisition by the Department of the Army, and Army Regulation 70-1, Army Research, Development, and Acquisition. He serves as a member of the Army Systems Acquisition Review Council (ASARC).

2. Assistant Secretary of the Army (Installations, Logistics, and Financial Management). The Assistant Secretary of the Army (IL&FM), among other responsibilities, has direction and supervision over the Army automation program. He functions as the senior Army automatic data processing official and serves as a member of the ASARC. He has cognizance over Army Regulation 18-1, Management Information Systems Policies, Objectives, Procedures, and Responsibilities.

(b) Army Staff.

1. Assistant Chief of Staff for Automation and Communications (ACSAC). The ACSAC is responsible for promulgation of Army automation policy. As such, he is the Army Staff proponent for the AR 18-series, the basic Army automation policy regulations. He is responsible for the acquisition of commercial, general purpose automatic data processing equipment (ADPE), and services. He exercises Army Staff supervision over the Computer Systems Command, a principal system developer.

2. Deputy Chief of Staff for Research, Development, and Acquisition (DCSRDA). The DCSRDA is responsible for Army policy relevant to the acquisition of all materiel resources, including computer resources, except for commercial, general purpose ADPE as noted above. He has Army Staff responsibility for Research, Development, Test, and Evaluation (RDTE) actions involving ADP and acts as the approving authority for development, deployment, and support of ADP resources for tactical computer systems. He is the Army Staff proponent for AR 1000-1 and most of the AR 70-series pertaining to systems research, development, acquisition and life cycle management.

3. Deputy Chief of Staff for Operations and Plans (DCSOPS). The DCSOPS responsibilities include validating and establishing priorities for Army systems and establishing Army-wide automation priorities. He is the Army Staff proponent for command and control systems. He develops policy guidance for materiel requirements documents associated with the materiel acquisition process for embedded computer resources and provides guidance for the user test program. He is the Army Staff proponent for Army Regulation 71-1: Army Combat Developments.

4. Deputy Chief of Staff for Logistics (DCSLOG). The DCSLOG responsibilities include development of Army policy for integrating logistics support and maintenance engineering considerations into the materiel system life cycle. He has Army Staff responsibility for automated logistics management information systems in support of all assigned functional areas of responsibility.

5. Deputy Chief of Staff for Personnel (DCSPER). The DCSPER has Army Staff responsibility for automated management information systems of all assigned functional areas of responsibility. He has responsibility for developing personnel systems to meet the needs of new or improved doctrine, organization, and materiel.

6. Assistant Chief of Staff for Intelligence (ACSI). The ACSI has Army Staff responsibility for establishing threat validation policies and standards, and exercising ultimate Army threat validation authority. He directs the functional management of all intelligence and security automation to include intelligence and security systems which are functionally integrated at all command levels and which support the wartime mission of the Army.

7. The Surgeon General (TSG). The Surgeon General issues instructions governing the acquisition and management of automated medical systems. He exercises direction, proponentcy, evaluation, and coordination of all medical automation systems of the Army.

(c) Field operating agencies.

1. United States Army Computer Systems Command (CSC). CSC is the central design agency for standard management information systems. CSC operates under the control and supervision of the ACSAC. CSC is responsible for the design, development, programming, testing, installation, maintenance, and improvement of Army multicommand automatic data processing systems. Areas of responsibility include project management, development, and support of worldwide standard multicommand management information systems (STAMMIS). This responsibility includes most systems addressed in this study for which the US Army Logistics Center (LOGCEN) or the US Army Soldier Support Center (SSC) has functional proponentcy.

2. United States Army Operational Test and Evaluation Agency (OTEA). OTEA exercises responsibility for all Operational Testing (OT) and manages Force Development, Testing, and Experimentation (FDTE) and joint user testing for the Army. OTEA operates under supervision of the Office of the Chief of Staff. OTEA determines when, where, how, and by whom operational testing will be accomplished for all major and selected nonmajor systems. Usually, OT is conducted by OTEA for major and selected nonmajor systems and by TRADOC or another designated operational tester for other non-major systems.

3. United States Army Military Personnel Center (MILPERCEN). MILPERCEN is a Field Operating Agency under the supervision of the Deputy Chief of Staff for Personnel. MILPERCEN is responsible for executing and recommending military personnel policies, systems, and programs, and for developing and supervising procedures applicable to military personnel management and development and to support services to include personnel information systems in support of the soldier and the chain of command. MILPERCEN is designated as the proponent agency for the Standard Installation/Division Personnel System (SIDPERS) and SIDPERS Wartime. MILPERCEN is also involved, with the US Army Soldier Support Center and CSC, in the development and life cycle management of other systems in the Administration portion of the Combat Service Support BFA. This rather complex relationship and current responsibilities of both MILPERCEN and the Soldier Support Center, are discussed in Paragraph 2-4.f.(2).

(d) Major commands.

1. US Army Training and Doctrine Command (TRADOC). TRADOC is designated a major command (MACOM) of the Department of the Army and operates under the supervision of the Army Chief of Staff. The mission of the Commanding General, TRADOC, includes:

- Develop and manage training programs and supervise the training of individuals of the Army
- Conduct all combat developments not assigned by HQDA to other commands and agencies and, as the Army's principal Combat Developer, guide, coordinate, and integrate the total combat development effort.

The concept of operation within TRADOC is that within the parameters of HQDA guidance, TRADOC will accomplish its combat development mission through functional centers, service schools, and other TRADOC combat development activities, in coordination with other Army commands and agencies. The CG, TRADOC, has a broad range of functional responsibilities in the areas of training and combat developments related to systems acquisition and support to include:

- Conducting conceptual and analytical studies to support the development of doctrine, materiel requirements, organizations, and functional systems
- Conducting field experiments and participating in other force development tests and evaluations to support and validate concepts and studies associated with development of doctrine, materiel requirements, organizations, and functional systems
- Monitoring development testing and participating in or planning and conducting operational testing
- Developing or reviewing and evaluating requirements documents
- Incorporating the products of the total Army combat development effort and other development efforts into doctrinal and organizational literature and publishing or preparing this material for publication.

2. US Army Materiel Development and Readiness Command (DARCOM). DARCOM is designated a major command of the Army and operates under the supervision of the Army Chief of Staff. The mission of the CG, DARCOM includes acting as the primary Materiel Developer with responsibilities for research and development; configuration management; developmental test and evaluation; integrated logistics support planning and execution; reliability, availability, and maintainability (RAM); acquisition or procurement; production; new materiel training; distribution; wholesale requirements determination; and maintenance, storage, and disposal of all materiel systems for the US Army. Among the functions within these DARCOM responsibilities are those of addressing the materiel and training needs of the Combat Developer and ensuring man-machine interface, and ensuring that the materiel systems proposed for development meet these needs and are safe, effective, and efficient systems.

3. US Army Intelligence and Security Command (INSCOM). INSCOM is a major command of the Army, operating under the supervision of the Army Chief of Staff. The CG, INSCOM responsibilities include:

a. Threat analysis to support materiel acquisition and combat development activities.

b. In conjunction with TRADOC, formulating concepts and doctrine for establishing materiel development objectives for specific materiel requirements and evaluation of equipment developed for use in tactical electronic warfare.

c. Formulating intelligence-related user requirements for tactical data systems and developing computer-based tactical electronic warfare systems under provisions of AR 1000-1.

INSCOM's efforts are coordinated with those of the US Army Intelligence Center and School to ensure appropriate interface and relationships among intelligence and electronic warfare systems at all levels.

4. US Army Communications Command (USACC). USACC is a major command of the Army, operating under the supervision of the Army Chief of Staff. USACC is the major Army command responsible for providing nontactical communications for the Army. In addition, USACC is responsible for the interface between tactical and nontactical communications systems.

(2) Battlefield functional area components. TRADOC is organized the way the Army fights -- by battlefield functional area. Therefore, it is appropriate to address, by battlefield functional area, the organizations within TRADOC that have key roles in planning for or providing PDSS for BAS. The BFA concept, which provides for the logical grouping of related battlefield systems into battlefield functional areas, currently recognizes five BFA and two additional functional areas essential to effective operations on the battlefield. Figure 2-2 identifies the elements of this BFA concept. Each of these areas and the TRADOC organizations within each area, are identified in Figure 2-3 and are discussed in the paragraphs that follow. The way in which these organizations operate at present in planning for and providing PDSS to BAS is discussed in Paragraph 2-4, Functional Area Analysis.

(a) Force Level Control.

1. As indicated in Figure 2-2, Force Level Control is not one of the five recognized BFA, but rather it is that process through which a commander exercises his authority in directing, monitoring, and integrating the effort of all organizations and activities in all BFA.

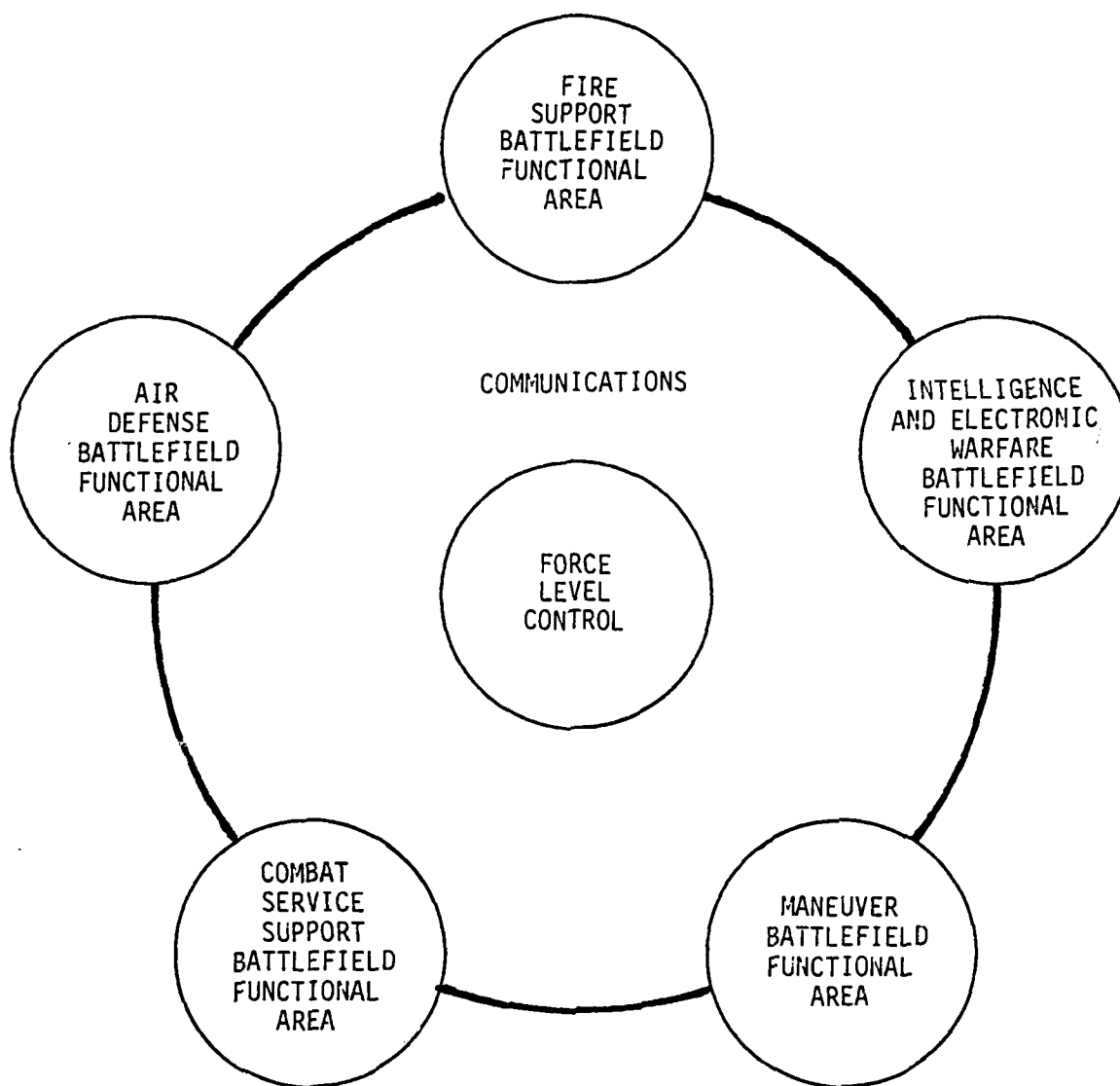


Figure 2-2. Elements of the battlefield functional area concept

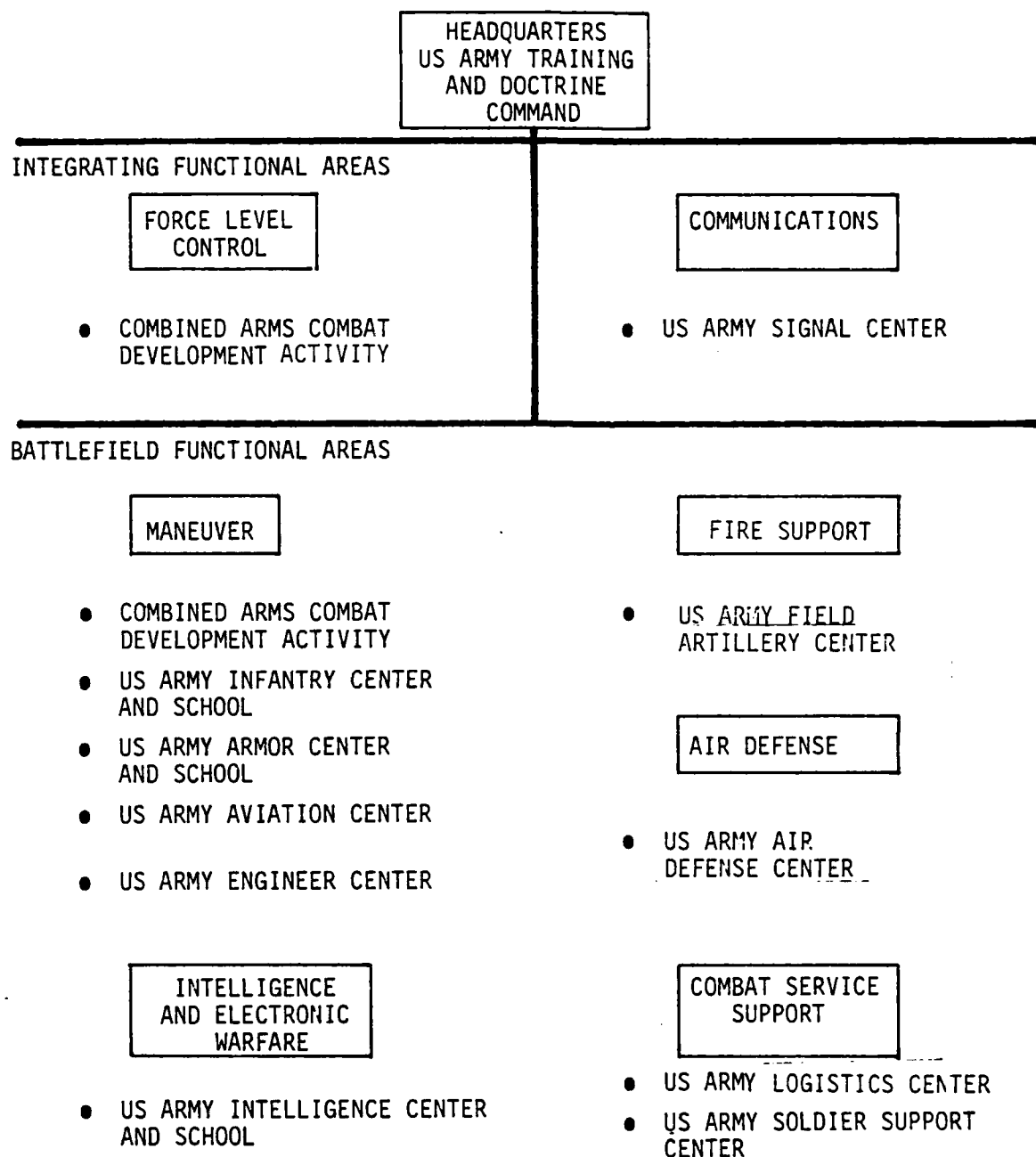


Figure 2-3. TRADOC organizational elements with key PDSS responsibilities at the BFA level

2. Within TRADOC, the Combined Arms Combat Development Activity has proponency for this functional area. Within CACDA, responsibility is assigned to the Army Command Control/Joint Interoperability of Tactical Command and Control Systems Division of the Command, Control, Communications and Intelligence Directorate.

3. Another key organizational component concerned with BAS in the command and control functional area is the TRADOC System Manager for Force Level and Maneuver Control (SIGMA) System (TSM SIGMA). The TSM SIGMA is responsible for exercising management of the SIGMA system within TRADOC. The TSM SIGMA office is not currently active.

4. Responsibilities and present operating procedures of these organizational elements related to Command and Control BAS are discussed in Paragraph 2-4.b.

(b) Fire Support battlefield functional area. This is the BFA which is the major contributor of fire support to maneuver forces. Within TRADOC, the US Army Field Artillery Center has proponency for this BFA. Field Artillery Center organizational elements with key responsibilities in the development, life cycle management, and post-deployment support of BAS in this BFA and the responsibilities and operations of these organizations at present with respect to providing PDSS for Field Artillery BFA BAS are discussed in Paragraph 2-4.c.

(c) Air Defense battlefield functional area. This is the BFA responsible for reacting to and defeating enemy aircraft and the counter-measures threat under all environmental and tactical conditions in all intensities of combat. The US Army Air Defense Center has proponency for this BFA. Air Defense Center organizational elements with key responsibilities in the development, life cycle management, and post-deployment support of BAS in this BFA and the responsibilities, and current operations of these organizations with respect to planning for and providing PDSS for Air Defense BFA BAS are discussed in Paragraph 2-4.d.

(d) Intelligence and Electronic Warfare battlefield functional area.

1. The intelligence portion of this BFA assists the commander and his staff in knowing and understanding the enemy and in seeing the battlefield. The electronic warfare element of the BFA is responsible for attacking or defending systems that employ electromagnetic energy, including command and control, weapon, and acquisition systems. The U.S. Army Intelligence Center and School is the TRADOC proponent for this BFA. Intelligence Center and School organizational elements with key responsibilities in the development, life cycle management, and post-deployment support of BAS in this BFA include:

- Directorate of Combat Developments
- Directorate of Training Developments
- TSM for Specified Corps Tactical EW/Intelligence Systems
- TSM for Specified Division Tactical EW/Intelligence Systems
- TSM for Stand-Off Target Acquisition System
- Simulation Systems Management Office

2. Within the Directorate of Combat Developments, the All-Source Analysis System Management Office (ASAS MO) serves as the focal point for all actions relating to this key intelligence system, and supports the TSM ASAS, located in CACDA, as required. Further discussion of the responsibilities and current operations of these organizations in planning for and providing PDSS to Intelligence and EW BAS is contained in Paragraph 2-4.e.

(e) Combat Service Support battlefield functional area.

1. The two major components of this BFA are logistics and administration. The logistics portion of this BFA supports decision making of each tactical echelon by providing decisive and timely logistic and/or technical expertise as far forward as possible to give the tactical command a full complement of operating equipment and weapons. The administration portion of the BFA supports the commander in seeing the battlefield (friendly personnel situation) and in sustaining the forces. Assistance and support is also provided to other BFA and to the soldiers who man them.

a. The US Army Logistics Center is the TRADOC proponent for the logistics portion of the Combat Service Support (CSS) BFA. Within the Logistics Center, the Management Information Systems Directorate has primary responsibility for developing and coordinating the functional plans, design, installation, maintenance, and customer assistance for logistics BAS in the CSS BFA.

b. The US Army Soldier Support Center is the TRADOC proponent for the administration portion of the CSS BFA. The CG, Soldier Support Center is responsible for developing and coordinating the functional design, evaluation, and extension of battlefield administration management information systems applicable to the corps level and below. Within the Soldier Support Center, this responsibility is assigned to the Directorate of Combat Developments, US Army Institute of Personnel and Resource Management.

2 Details of the organizations involved with battlefield automated systems at the Logistics Center and Soldier Support Center and the current operating procedures related to PDSS within each command are discussed in Paragraphs 2-4.f.(1) and (2), respectively.

(f) Maneuver battlefield functional area. This BFA, through its inherent subsystems of direct fire (including subelements of infantry, armor, Army aviation, and air/ground systems), engineer, and integration, provides the timely means to generate and apply decisive combat power on the modern battlefield. CACDA has overall proponentcy for the Maneuver BFA and is responsible for coordinating and integrating the activities of the US Army Infantry Center and School, the US Army Armor Center and School, the US Army Aviation Center and the US Army Engineer Center in their respective areas of responsibility. Within CACDA, this responsibility is assigned to the Directorate of Concepts and Doctrinal Management. Further discussion of this BFA is contained in Paragraph 2-4.g.

(g) Communications functional area.

1. As illustrated in Figure 2-2, communications is not one of the five currently recognized BFA, but rather it is that mechanism through which the commander directs and controls all other battlefield functions in the performance of his mission. Communications impacts on and is impacted by all BFA.

2. Within TRADOC, the US Army Signal Center and School is the proponent for the communications functional area. CACDA has responsibility for coordinating the integration of actions in the communication area with those in other BFA. Further discussion of the Signal Center's organizational elements and current operations related to PDSS for communications BAS is presented in Paragraph 2-4.h.

b. Regulatory Policy and Procedures.

(1) General.

(a) The policy governing the acquisition and life cycle management of computer resources in the Army is divided between AR 18-1, for which the ACSAC is responsible, and ARs 70-1 and 1000-1, which are the responsibility of DCSRDA. AR 18-1 was revised and published in August 1980 and is to be accompanied by a series of implementing Technical Bulletins. ARs 70-1 and 1000-1 are currently under revision.

(b) In connection with these revisions, efforts are being made to clarify the applicability of each regulation, and to harmonize the different system life cycle models and other provisions which they contain. Additionally, greater emphasis is being placed on addressing requirements for system support following deployment. The final result of the efforts to revise ARs 70-1 and 1000-1 and accomplish the objectives referred to above is not known at this time since both ARs are still in draft and AR 18-1 has just been published. However, a review of portions of drafts of each regulation indicates needed improvements are being addressed.

(c) These three basic regulations and several other key Department of Defense, Department of the Army, and Major Command regulatory documents relative to system acquisition and life cycle management (including PDSS) are identified and discussed briefly below. Additional regulatory and directive documents are identified in Appendix A.

(2) Department of Defense.

(a) DODD 5000.1: Major System Acquisition. Washington, D.C.: 19 March 1980. (This DOD Directive cancels DODD 5000.1, 18 January 1977 and DODD 5000.2, 18 January 1977.)

This directive implements for the Department of Defense the concepts and provisions of Office of Management and Budget (OMB) Circular A-109, 5 April 1976, and applies to the acquisition of major systems. Principles of this directive are to also be applied to other systems not designated as major.

Among other things, this directive lists as objectives:

1. Ensuring that an effective and efficient acquisition strategy is developed and tailored for each system acquisition program.
2. Minimizing the time from need identification to introduction of each system into operational use.
3. Integrating support, manpower, and related concerns and activities into the acquisition process.

This directive also establishes the milestone decisions and phases of activity in the acquisition process and specifies the principal documentation needed to support each milestone decision.

(b) DODI 5000.2: Major System Acquisition Procedures. Washington, D.C.: 19 March 1980. (This DOD Instruction replaces DODD 5000.2, 18 January 1977.)

This instruction provides supplementary procedures for Department of Defense use in implementing DODD 5000.1, 19 March 1980. Paragraph 12 states that acquisition of embedded computer resources for operational military systems (including command and control systems) shall be managed within the context of the total system. It provides that:

1. Requirements for interfaces between computers and plans to achieve that interface must be identified early in the life cycle.
2. Plans for software development, documentation, testing, and update during deployment and operation require special attention.

3. Computer resource planning shall be accomplished before Milestone II and continue throughout the system life cycle.

4. Computer hardware and software shall be treated as configuration items (CI).

Paragraph 13 describes an alternate evolutionary acquisition management procedure for command and control systems (which meet certain criteria) that would allow early implementation of a prototype system using existing hardware and software. The prototype system would then be developed further through an evolutionary process.

(c) DODD 5000.3: Test and Evaluation. Washington, D.C.: 26 December 1979.

This directive establishes policy for the conduct of test and evaluation in the acquisition of defense systems designated by the Secretary of Defense as major. Management of other systems (nonmajor) shall also be guided by the principles set forth in this directive. PDSS has been addressed indirectly in this directive. It provides that after Milestone III:

1. Development, Test, and Evaluation (DT&E) shall be an integral part of the development, acceptance, and introduction of systems changes to improve the system, react to new threats, and reduce life cycle costs.

2. The DOD Component Operational Test and Evaluation (OT&E) agency will manage follow-on OT&E as necessary to ensure that the initial production items meet operational effectiveness and suitability thresholds and to evaluate system improvements to meet mature system readiness and performance goals.

(d) DODD 5000.29: Management of Computer Resources in Major Defense Systems. Washington, D.C.: 26 April 1976.

This Directive establishes policy for the management and control of computer resources during the development, acquisition, deployment, and support of major defense systems. It provides that computer resources in defense systems must be managed as elements or subsystems of major importance during conceptual, validation, full-scale development, production, deployment, and support phases of the life cycle, with particular emphasis on computer software and its integration with the surrounding hardware.

(3) Department of the Army.

(a) AR 10-5: Organization and Functions, Department of the Army. Washington, D.C.: 1 November 1978.

This regulation sets forth the organization and functions of the Department of the Army and the general responsibilities of the heads and commanding generals of its major elements. It addresses the Office of the Secretary of the Army and the Army Staff. Major commands are identified but their organization mission and functions are described in other regulations in the AR 10-series.

(b) AR 10-11: Organization and Functions, US Army Materiel Development and Readiness Command (DARCOM). Washington, D.C.: 9 March 1977.

This AR prescribes the mission and principal functions of the Commanding General, DARCOM and sets forth command and staff relationships with higher and collateral headquarters. For all classes of supplies, except those managed by other agencies, DARCOM has the mission to:

1. Act as the primary materiel developer.
2. Develop and provide materiel maintenance and related logistic services to DA and other agencies as directed.
3. Provide worldwide technical and professional guidance and assistance for readiness planning and logistical support for Army materiel in coordination with US Army Logistics Center in its area of responsibility.

While PDSS is not specifically addressed in this AR, the responsibility for PDSS is inherent in DARCOM's primary mission as the Army's principal Materiel Developer. PDSS is also included within DARCOM's responsibility for planning, programming, funding, system integration, and implementation of the Product Improvement Plan (PIP).

(c) AR 10-41: Organization and Functions, US Army Training and Doctrine Command (TRADOC). Fort Monroe: 1 May 1980.

This AR prescribes the mission and principal functions of the CG TRADOC and sets forth command and staff relationships with higher and collateral commands and agencies of the US Army. One of TRADOC's missions is to conduct all combat development not assigned by HQDA to other commands, and as the Army's principal Combat Developer, to guide, coordinate, and integrate the total combat development effort of the Army. In furtherance of TRADOC's mission as the Army's principal Combat Developer, CG TRADOC is authorized and required to task and provide parameters and guidance to other Army Commands and agencies having combat development functions assigned by HQDA and to integrate the resultant products into the overall combat development effort. While there is no specific assignment of PDSS responsibility, PDSS functions are inherent in the mission described above.

(d) AR 18-1: Army Automation, Army Automation Management. Washington, D.C.: 15 August 1980.

This regulation and implementing TBs prescribe policies and responsibilities and delegate authority for the management of Army automation. This regulation does not apply to computers and other automatic data processing equipment integral to a combat weapon system. Computer-based tactical systems that provide combat or combat support assistance are acquired and managed under AR 1000-1 and AR 70-1. Software development and support associated with computer elements of combat weapons systems also fall within the scope of AR 70-1 and project manager charters.

AR 18-1 prescribes a new system life cycle which recognizes five distinct phases--project initiation, concept development, definition/design, system development, and deployment--and places added emphasis on the deployment (and post-deployment) period in the life cycle. This is an effort to harmonize the life cycles prescribed by AR 18-1, AR 70-1, and AR 1000-1.

(e) AR 1000-1: Basic Policies for Systems Acquisition, 1 April 1978. (This AR is being revised. The revision will implement the revised DODD 5000.1, 19 March 1980 and DODI 5000.2, 19 March 1980.)

This regulation establishes basic Army policy for acquisition of materiel systems and together with AR 70-15 implements the 18 January 1977 DODDs 5000.1 and 5000.2. The general principles of AR 1000-1 apply to the development and acquisition of all Army materiel systems, including those multi-service programs for which DA is the lead service. It describes the system acquisition process and the responsibilities at the macro-management level for the Army Secretariat, DA Staff, DARCOM, TRADOC, USACC and other Department of the Army agencies. This regulation is not applicable to automatic data processing equipment, services, or supplies that come under the purview of AR 18-1.

(f) AR 70-1: Research and Development, Army Research, Development, and Acquisition, 1 February 1977. (This regulation is currently being revised.)

This regulation implements DODD 5000.1 (18 January 1977), and AR 1000-1 (1 February 1977) as they apply to research, development and acquisition of new systems and equipment. This regulation establishes responsibilities, policy, and general procedures for:

1. Conducting research and development in DA.
2. Acquiring developmental, nondevelopmental items, or systems to satisfy HQDA approved requirements for materiel systems.

3. Conduct of developmental product improvements to satisfy HQDA approved requirements for materiel systems.

A new chapter, "Research, Development, and Acquisition of Battlefield Automated Systems," is being added to the revised AR 70-1. This chapter will apply to computer resources in all systems managed under AR 1000-1 and the AR 70-series of regulations whether the systems are major or nonmajor. It will implement DODD 5000.29, and provide for cost effective life cycle management of computer resources in systems managed under AR 1000-1. It will apply to BAS and embedded (integral and direct support) computer resources as defined by the revised AR 18-1.

(g) AR 70-15: Research and Development, Product Improvement of Materiel, 15 June 1980.

The purpose of this AR is to set policies and procedures for the management of product improvement (PI). It specifically applies to all Army developing agencies and project managers or activities that use or give logistic support for operational systems. Included in the wide variety of product improvements made under this program are computer software changes of battlefield automated systems (BAS), managed under AR 1000-1, which expand the system performance envelope.

Ideas for PI may come from the User, Combat Developer, Trainer, Logistician, Industry, other Service Users, or Materiel Developer. The idea must first be coordinated with the CD and then the MD (who is assigned technical proponentcy for the end item).

(h) AR 70-37: Configuration Management. Washington, D.C.: 19 July 1976.

This AR prescribes uniform policies and guidance for the Military Services and Defense Agencies responsible for implementation of Configuration Management within the Department of Defense. It applies to:

1. Major defense systems under DODD 5000.1.
2. Other designated systems (less than major programs) requiring Service/Agency decision processing.
3. Selected end item/prime equipments for reason of systems integration or interface control.

One of the objectives of this AR is to ensure that the configuration of configuration items (CI) for operational and nonoperational use is known and pertinent physical and functional interfaces between systems, equipments, and computer programs are documented and controlled. During the

Deployment/Operational Phase of the life cycle, configuration items (CI) will be subject to configuration management and integrated with modification management throughout the CI's life cycle until the CI is removed from the DOD inventory.

(i) AR 71-3: Force Development User Testing. Washington, D.C.: 8 March 1977.

The purpose of this AR is threefold:

1. To establish policies and procedures and assign responsibilities for initiating, planning, programming, conducting, and reporting User testing.
2. To describe responsibilities, functions, and procedures of the DA Test Schedule and Review Committee (TSARC).
3. To govern operational testing (OT), force development testing and experimentation (FDTE), and joint User testing.

OT and FDTE are used to support the materiel acquisition process. The principles of this regulation apply to product improvements and, thus, to PDSS.

(j) AR 700-127: Logistics, Integrated Logistic Support. Washington, D.C.: 11 April 1975.

This regulation implements DOD Directive 4100.35 and establishes US Army Policy for integrating life cycle logistic support considerations into the materiel acquisition process. It is applicable to:

1. All developmental, nondevelopmental, and product-improved Army materiel systems, to include support equipment and training devices.
2. All Army commands and agencies having responsibility for materiel development, combat development, training, test and evaluation, materiel management and other aspects of logistic support to include ballistic defense systems.

(k) DA Pamphlet 11-25: Life Cycle System Management Model for Army Systems. Washington, D.C.: 21 May 1975.

Illustrated in this pamphlet is the flow chart of the Life Cycle System Management Model (LCSMM) by which Army materiel systems are initiated, validated, developed, deployed, supported and modified. The principles and general acquisition guidelines may also be applied to nonmateriel systems acquisition when applicable. This pamphlet will require revision to implement changes in revised ARs 1000-1 and 70-1, discussed in (e) and (f), above.

(l) Memorandum from the Assistant Secretary of the Army (RDA). Standardization of Embedded Computer Resources. Washington, D.C.: 1 July 1980.

This memorandum issues policy for standardization of programming language and hardware for Battlefield Automated Systems (BAS). This policy provides that:

- Ada and its associated software development environment will be used in all new software developments or major modifications to BAS software developments starting after January 1980
- A single standard Instruction Set Architecture (ISA) will be adopted by the Army in 1981 and will be used in all systems entering Advanced Development in 1983
- All BAS entering Engineering Development in 1984 will use the standard Military Computer Family (MCF) hardware.

This memorandum applies to embedded computer resources and systems developed under the provisions of AR 1000-1 and the AR 70-Series. It applies to all functions which are integral to BAS regardless of the type of system such as fire control, command and control, or administration/logistics. This policy memorandum was promulgated within TRADOC by a letter from the Office of the Deputy Commander, file ATDC, subject: Standardization of Embedded Computer Resources, 30 July 1980. This letter states that, "In particular, all Combat Service Support BAS "intended for use by the Army in the field" will be developed and procured under AR 1000-1 and the AR 70-Series vice the traditional AR 18-1 approach".

(4) Major Command.

(a) TRADOC Regulation 10-5: Organization and Functions.
Fort Monroe: 10 December 1979.

This TRADOC regulation defines the organization of HQ TRADOC and delineates staff organization, responsibilities and functions. One of the stated policies is that operational control of mission activities will be decentralized to TRADOC's integrating centers, installations, and specialized activities to the maximum possible extent. The HQ TRADOC staff includes the Deputy Chief of Staff for Combat Developments. Subordinate to the Deputy Chief of Staff for Combat Developments is the Telecommunications, Command and Control, and Computer Systems Directorate. This directorate is responsible for the tactical data systems automation management function for HQ TRADOC.

(b) TRADOC Regulation 10-41: Organizations and Functions, Mission Assignments. Fort Monroe: 1 May 1980.

This regulation prescribes missions and principal functions of the major elements of TRADOC, and sets forth command and staff relationships within TRADOC and with higher and lateral commands. Within the major TRADOC function of combat development is the task to develop requirements statements for materiel systems. These statements must accurately specify performance characteristics dictated by operational concepts for modern battle fighting and will be specified in terms of personnel mental and physical capabilities. The task also includes the translation of these requirements into materiel acquisition programs to equip the Army with resultant systems as rapidly as possible.

(c) DARCOM-TRADOC Materiel Acquisition Handbook: Advance Copy,
1 January 1980.

This jointly prepared handbook describes policies, procedures, documentation, and responsibilities for implementing the materiel acquisition concept contained in ARs 1000-1 and 70-1. Its primary thrust is to provide guidance at the action officer level for accomplishing each principal action in the materiel acquisition process.

(d) DARCOM Regulation 70-16: Management of Computer Resources in Battlefield Automated Systems. Alexandria, VA: 16 July 1979.

This regulation implements DODD 5000.29. It establishes policy and assigns responsibilities for planning, development, acquisition, testing, training and support of major and nonmajor Army battlefield automated systems employing computer resources. The systems subject to the provisions of this regulation are those that employ computer resources and operate or have components that operate within the boundaries of the battlefield (Army Battlefield Automated Systems). The objective is to ensure that computer resources in Army BAS are planned, developed, tested, acquired, fielded, and supported in a cost effective and timely manner. This regulation specifies that:

1. During the Demonstration and Validation Phase of system acquisition, a Computer Resource Management Plan (CRMP) will be prepared for each Army BAS, identifying important computer resource acquisition and life cycle planning factors and establishing specific guidelines to ensure that these factors are adequately considered in the acquisition planning process. It will be prepared by the Materiel Developer, in coordination with the Combat Developer, Development and Operational Testers, Development and Operational Evaluators, and the designated readiness activity.

2. Army battlefield automated system computer resources, including both computer hardware and computer software, will be specified and treated as configuration items. The Configuration Control Board (CCB) will be the primary medium for managing hardware and software control and release throughout the remaining system life cycle.

c. Battlefield Automated Systems Supported. The third major component of the current post-deployment software support system analyzed during this study is the BAS supported within each BFA.

(1) BAS definition. For purposes of this study, the definition of battlefield automated system contained in the PDSS Concept Plan for BAS was used. This definition states:

Battlefield Automated System (BAS) - A system employing computer resources that operates or has components that operate within the boundaries of the battlefield, regardless of the function, mission, or battle involvement. The system may be an offensive, defensive, or direct/indirect support system. Examples of such systems are weapons, communications, command and control, intelligence, avionics, missiles, combat support and combat service support systems.

(2) BAS addressed in this study.

(a) In the DARCOM-initiated study effort conducted to develop the PDSS Concept Plan for BAS, 110 such systems including 91 DARCOM systems and

19 CSC-developed/maintained systems were identified. The DARCOM systems were categorized during that study effort based on their size (lines of code) and likelihood of change as explained in Appendix C. Specific categories established were:

- Category 1 - large evolutionary systems
- Category 2A - small evolutionary systems
- Category 2B - large stable systems
- Category 3 - small stable systems

This categorization effort resulted in identifying 6 systems as Category 1, 27 as Category 2, and 58 as Category 3. The CSC systems were not categorized.

(b) Research conducted during Phase I of this current TRADOC-sponsored PDSS study has resulted in some modifications to the listing of the 110 BAS referred to above. Seven of the 110 BAS have been deleted from further consideration during this study because the programs have been discontinued and six have been added for reasons discussed in Paragraph 2-4 and Chapter 3. This results in a modified listing of 109 BAS identified for further consideration during this study. Figure 2-4 shows a breakdown of these BAS by category within each BFA or functional area. Appendix C provides a listing of all Category 1, 2 and 3 systems and the CSC-developed BAS organized by BFA. It also identifies the category, proponent, developing command, readiness command, and projected PDSS center for each of these BAS.

(c) While all 109 BAS will continue to be addressed to some extent during this study, the Study Advisory Group (SAG) guidance provides that the Study Team's effort should be focused primarily on Category 1 and 2 and CSC systems. This guidance results from TRADOC being principally concerned with software in these large and/or evolutionary systems. Software in Category 3 systems is not expected to change significantly once the system is fielded. Thus, primary effort during the remainder of this study will be focused on the 29 Category 1 and 2 systems and the 22 CSC systems identified in Appendix C.

2-3. MACRO-MANAGEMENT LEVEL ANALYSIS.

a. General. This paragraph contains a discussion and analysis of the macro-management level PDSS system. The macro-management level organizations identified in Paragraph 2-2.a.(1), the applicable regulatory documents discussed in 2-2.b., and organizational responsibilities, relationships, and operating procedures are addressed.

b. Role of Macro-Management Level Structure. The role of the Army macro-management level structure with respect to PDSS for BAS is primarily one of establishing and promulgating applicable policy and guidance, and acquiring and allocating resources necessary to provide effective post-deployment support to battlefield systems. This role is carried out at the Headquarters, Department of the Army and major command levels.

FUNCTIONAL AREA OR BFA	NUMBER OF SYSTEMS				
	CATEGORY 1	CATEGORY 2	CATEGORY 3	CSC	TOTAL
FORCE LEVEL CONTROL	1				1
MANEUVER		1	13		14
FIRE SUPPORT	1	2	14		17
AIR DEFENSE	2	3	3		8
INTELLIGENCE/EW	1	7	11		19
COMBAT SERVICE SUPPORT	1		2	21	24
COMMUNICATIONS	2	8	15	1	26
TOTAL	8	21	58	22	109

Figure 2-4. BAS by category and functional area

c. Organizations Involved. The specific Army Staff elements and other organizations addressed in this study at the macro-management level were identified in Figure 2-1 and discussed briefly in Paragraph 2-2.a., along with their missions and principal responsibilities associated with systems acquisition and life cycle management. No significant gaps or duplications were identified among the mission/responsibility statements of these organizations. No changes appear to be needed in organizational missions pertaining to systems acquisition and life cycle management at the macro-management level. However, AR 10-5: Organization and Functions, Department of the Army, needs to be revised and republished to clarify the responsibilities of the ACSAC and the relationship between the ACSAC and DCSRDA in this functional area. The Study Team agrees with the statement in the PDSS Concept Plan for BAS, May 1980, that the current missions and functions of the Army Staff and MACOMs form an acceptable framework for developing an effective PDSS system for BAS.

d. Current Policy.

(1) Applicable regulations. Current Army policy applicable to system acquisition and life cycle management (to include post-deployment support of BAS) is contained in ARs 1000-1, 70-1, and 18-1. AR 1000-1 contains basic policy for system acquisition and life cycle management. The AR 70-series provides additional details necessary to implement AR 1000-1. These regulations, which are issued under the proponentcy of DCSRDA and the control of the Assistant Secretary of the Army (Research, Development and Acquisition), implement the basic Department of Defense and Office of Management and Budget procurement policies. They are applicable to the acquisition of all BAS addressed in this study except those involving commercial, general purpose automatic data processing systems which must be acquired under AR 18-1. AR 18-1 governs the acquisition of these latter systems, in accordance with DOD directives and provisions of Public Law 89-306 (The Brooks Bill). This bill prescribes special management requirements and procedures intended to insure the economic and effective purchase, lease, maintenance, operation, and utilization of commercial ADP equipment. The ACSAC is the Army Staff proponent for AR 18-1 which is under the supervision of the Assistant Secretary of Defense (Installations, Logistics and Financial Management). Thus, two separate and distinct sets of policy documents exist (AR 1000-1/AR 70-1 and AR 18-1) that are applicable to the acquisition and life cycle management of BAS.

(2) Implications. This dual set of policy documents has implications with respect to the BAS addressed in this study. In general, the CSC-developed systems for which the Logistics Center or the Soldier Support Center has combat developer proponentcy are developed under provisions of AR 18-1 while other BAS are developed under AR 1000-1 and the AR 70-series. However, there are some differences of opinion regarding the applicability and scope of these regulations. Efforts are being made through the recent revision of AR 18-1 and the revisions currently being made to ARs 1000-1 and 70-1 to clarify the applicability of each set of regulations and to harmonize the requirements and procedures of each. To the extent that this effort is successful, it should eliminate problems resulting from different interpretations and perceived disparities in the provisions and applicability

of these policy documents at the macro-management level. Also bearing directly on this subject is the memorandum from the Assistant Secretary of the Army (RDA), 1 July 1980, subject: Standardization of Embedded Computer Resources, and the implementing letter from the Deputy Commander, TRADOC, 30 July 1980, both of which were cited in Paragraph 2-2.b.(2)(1). When implemented, the policy and guidance contained in these two documents will provide for more standardized system development procedures within TRADOC.

(3) Adequacy. A serious inadequacy of Army regulatory documents has been that while purporting to address the entire life cycle of a system from initiation through development and deployment to eventual disposal upon obsolescence, little emphasis is placed on post-deployment support in general or on post-deployment software support in particular. So great has been the need for additional policy and guidance in this area that, in the absence of an Army Regulation, DARCOM proceeded to publish DARCOM Regulation 70-16: Management of Computer Resources in Battlefield Automated Systems. This DARCOM regulation provides, among other things for the documentation of PDSS requirements, plans, and resource estimates early in the acquisition phase. With respect to improving Army regulations which address this area, the new AR 18-1 does place increased emphasis on the Deployment and Operation Phase of the system life cycle. However, changes are also needed in ARs 70-1 and 1000-1 to provide for appropriate attention to PDSS and to preclude the type of difficulties experienced by users as a result of system deficiencies and inadequate support planning to accomplish corrective actions and needed system improvements. Review of a new draft chapter to be incorporated in a revised AR 70-1 indicates this problem is being addressed and that adequate guidance will exist after publication of the new AR 70-1. Following revision to ARs 1000-1 and 70-1, DA Pamphlet 11-25 will need to be revised to correspond with the revised regulatory provisions.

2-4. FUNCTIONAL AREA ANALYSIS.

a. General. This paragraph contains a discussion and analysis of the current BFA-level PDSS system. The BFA and organizational elements identified in Paragraph 2-2.a.(2) are addressed, along with the BAS supported within each BFA. Also discussed are organizational responsibilities, operating procedures, and gaps or duplications in present methods of planning for and providing PDSS.

b. Force Level Control Functional Area.

(1) BAS addressed within this functional area. The Force Level and Maneuver Control System (SIGMA) and the Position Location Reporting System (PLRS) are the only BAS within this functional area at the present time. Although PLRS is a command and control support system, it is discussed primarily in Paragraph 2-4.h. under the Communications Functional Area since the US Army Signal Center is the combat development proponent for the system and it is in that area that the requirement for PDSS resources associated with the system will be the greatest. Under the command, control, and subordinate systems (CCS²) concept, SIGMA is intended to satisfy the Army's requirements for force level

control and maneuver control in the 1980s. This system is in the conceptual phase of development. CACDA has prepared a Mission Element Needs Statement (MENS) (9 July 1980) and a Letter of Agreement (LOA) is being prepared. Current plans provide that further development of this system will follow the special evolutionary acquisition process described in Paragraph 13, DODI 5000.2, 19 March 1980. This DOD instruction authorizes special management procedures in the acquisition of large command and control systems that are to be acquired in small numbers. In accordance with this flexible, evolutionary development concept, a limited capability developmental system is being configured for fielding and testing in USAREUR beginning in October 1980.

(2) Organizational elements involved in planning for and providing PDSS. Three military organizations and one contractor are primarily involved in planning for the provision of PDSS to this system at present. These are:

- The Combined Arms Combat Development Activity (CACDA), the Combat Developer (CD) proponent for this system
- The Communication's Research and Development Command (CORADCOM), the system Materiel Developer (MD)
- USAREUR and subordinate elements, the User organizations of the initial prototype system
- The current contractor -- Singer-Librascope

Current plans provide that during the initial evolutionary development and support effort, representatives of the CD, MD, and contractor will all operate on-site in Europe. These representatives will provide training and logistical and technical support and collect operational data on which further system development may be based. Plans also provide for the establishment of a major Software Support Center at Fort Leavenworth managed by CORADCOM, for the continued development and post-deployment support of the SIGMA system.

(3) Responsibility/charters. As stated above, CACDA is assigned responsibility as the CD proponent for SIGMA. Within CACDA at present, the Chief, Army C2/JINTACCS Division, C3I Directorate, is assigned this responsibility. The C2 Development Branch performs functions to fulfill this responsibility to include serving as CD point of contact with the system developer, CORADCOM. CD responsibilities with respect to PDSS for SIGMA (both the initial developmental system and subsequent versions) include those shown in Figure 2-5. During the initial fielding and testing of the developmental system in USAREUR over the next year, the on-site representatives of CACDA will be involved in evaluating the operational effectiveness of the initial system and collecting data for use in formulating and refining User operational requirements.

(4) Regulatory/directive authorities. The principal regulatory authorities from which the CD responsibilities listed above are derived are those cited in Paragraph 2-2.b., particularly:

- DODI 5000.2
- AR 10-41
- AR 70-1
- AR 71-3
- AR 1000-1
- TRADOC REGULATION 10-41

1. Specifying functional system change requirements including interoperability requirements to the MD
2. Participation on the Computer Resources Working Group (CRWG) and Configuration Control Board (CCB)
3. Monitoring Development Testing (DT)
4. Representing the user as appropriate
5. Participating in or planning and conducting (as directed) Operational Testing of system changes
6. Planning and monitoring or conducting User Acceptance Testing
7. Addressing user-reported system problems
8. Analyzing proposed system changes
9. Prioritizing approved system changes and in coordination with the MD, establishing target completion dates
10. Analyze training development requirements resulting from system changes
11. Initiating action to address training requirements concurrently with system development or changes
12. Coordinating with the MD, the release of system change packages to the field
13. Performing periodic reevaluation of system suitability

Figure 2-5. Basic CD PDSS responsibilities

- TRADOC REGULATION 71-12
- DA PAMPHLET 11-25
- CAC AND FORT LEAVENWORTH REGULATION 10-1

(5) Operating procedures. At present, CD efforts associated with PDSS for SIGMA are limited to the coordinated MD-CD planning described above, and initial implementation actions.

(6) Gaps and duplications. There are no apparent gaps or duplicative efforts in the actions related to SIGMA at this time. At this early stage in the Conceptual Phase of the system development effort, CD emphasis is on specifying system functional requirements and coordinating actions associated with fielding the initial developmental system. In this respect, the flexible system development process authorized by DODI 5000.2 provides for the system to evolve over a period of time. This process may necessitate greater attention to configuration management and System User documentation and may also impose additional training requirements as different versions of the system evolve, all of which are of major concern.

c. Fire Support BFA. The Fire Support BFA is the major contributor of fire support for maneuver forces. The focal point for activities in this BFA is the Field Artillery Center and School at Fort Sill, Oklahoma.

(1) BAS addressed within this BFA. The Category 1 and 2 systems which are addressed within this BFA are as follows:

(a) Tactical Fire Direction System (TACFIRE). This system is already partially fielded (IOC-1979), and therefore, has PDSS activity taking place. The proponent is USAFAS and the developing command is CORADCOM. Category is 1.

(b) Battery Computer System AN/GYK-29 (BCS). This system's life cycle status is DT II. When ready for deployment (IOC-1982), the BCS will replace the Battery Display Unit in TACFIRE (1982), be used in the MLRS launcher, and be used with the LANCE missile. The proponent is USAFAS and the developing command is CORADCOM. Category is 2A.

(c) Pershing II Tactical Missile System (PII). This system's life cycle status is DT/OT I with an expected fielding date of 1983. Although this system contains primarily embedded firmware, it may still require PDSS activity. The proponent for PII is USAFAS and the developing command is MICOM. Category is 2B.

(d) Field Artillery Digital Automatic Computer (FADAC). This system is currently being phased out and will be replaced by the BCS. Therefore, it will have no PDSS activity associated with it and will not be considered further in this study. Category is 2A.

(2) Organizational elements involved in planning for and providing PDSS. For the BAS listed above, there are currently nine major organizational elements (with various subelements) which are involved in planning for and providing PDSS. These organizational elements are listed below and their PDSS functions are described in Paragraphs 2-4.c(3) through 2-4.c(6).

- TRADOC System Manager (TSM) for Field Artillery Tactical Data Systems (FATDS)
- Tactical Data Systems Division (TDS), Combat Developments Directorate (CD), USAFAS
- The TRADOC System Manager (TSM) for the Multiple Launch Rocket System (MLRS) Fire Direction System (FDS)
- The Software Validation Branch, Computer Test and Technical Support Division, US Army Field Artillery Board (USAFABD)
- The TRADOC System Manager (TSM) for Pershing II Tactical Missile System (PII)
- The local Software Configuration Control Board (SCCB)
- The Field Artillery Interoperability Configuration Control Board (FAICCB)
- The Systems Configuration Control Board
- The DARCOM TACFIRE Software Support Group (TSSG) at Fort Sill.

(3) Responsibilities/charters.

(a) The mission, authority, and responsibilities of the TSM-FATDS are spelled out in the TRADOC System Manager Charter, Field Artillery Tactical Data Systems (FATDS), dated 1 November 79. By this charter, his mission is to "conduct total system management within TRADOC for FATDS to include TACFIRE, Battery Computer System (BCS), Digital Message Device (DMD), and other follow-on system enhancements." One of the responsibilities of the TSM-FATDS which is delineated in that charter is "Managing the TRADOC aspects of Post-Deployment Software Support (PDSS) for FATDS and other Field Artillery systems requiring software support." Included in these PDSS duties is coordination with other organizations to ensure that plans for training, personnel, logistics, testing, and new doctrine/tactics are timely and fully integrated into the materiel development program.

(b) The Tactical Data Systems Division (TDS), Combat Developments Directorate (CD), USAFAS has maintenance and support responsibilities for all FA systems which have reached IOC. Included in these responsibilities is the front-end development, definition, and design of system changes to meet User needs before release to the Materiel Developer. The TDS-CD also analyzes and develops requirements for training devices and procedures for fielded BAS as software changes occur.

(c) The TRADOC System Manager (TSM) for the Multiple Launch Rocket System (MLRS) Fire Director System (FDS) monitors overall management of the MLRS-FDS during production and deployment phases. He acts as user representative in the writing of the Computer Resources Management Plan (CRMP) for MLRS-FDS. He ensures User participation in all ECP's. In addition, the TSM-MLRS participates as a principal member on the TACFIRE/MLRS Executive Committee dealing with all aspects of TACFIRE-FDS interoperability.

(d) The Field Artillery Board at Fort Sill is one of eight US Army test boards and as such is assigned the following missions under TRADOC Regulation 10-41:

- Plan, conduct, and report on operational and other User tests
- Participate in other testing as directed
- Provide advice and guidance on test matters to Combat, Training, and Materiel Developers, other services and private industry
- Conduct other tests and selected specific evaluations as directed by CG TRADOC.

On 10 August 1977, the USAFABD was designated by HQ TRADOC (via TRADOC Msg, ATCD-TM, 101918Z Aug 77, subject: TACFIRE Tape Validation) as the responsible agency for User validation of TACFIRE system master tapes developed by the DARCOM TACFIRE Software Support Center, Fort Sill (TSSG). In accordance with this tasking, the Software Validation Branch, Test and Technical Support Division, USAFABD, has been performing acceptance testing of new TACFIRE software releases. Depending on requirements, this testing has been or can be OT, DT, or command post exercise oriented. In addition to its testing responsibilities, this organization is also a member of the local Software Configuration Control Board.

(4) Regulatory/directive authorities. Listed below are the regulations and other documents which prescribe the responsibilities for and govern or impact upon PDSS functions in the Field Artillery BFA.

- AR 10-5: Organizations and Functions of the US Army, 1 November 78
- AR 10-41: Organization and Functions, United States Army Training and Doctrine Command, 27 June 1973
- TRADOC Regulation 10-41: Organization and Functions, 1 May 1980.
- USAFACFS Regulation 10-1: Manual of Organization and Functions
- Pamphlet 11-25: Life Cycle System Management Model for Army Systems, 21 May 1975
- Department of Defense Directive 5000.1: Major System Acquisitions, 18 January 1977
- Department of Defense Directive 5000.2: Major System Acquisition Procedures, 19 March 1980
- Department of Defense Directive 5000.3: Test and Evaluation, 26 December 1979
- Post-Deployment Management Plan for Fire Direction System, Artillery AN/GSG-10(v) (TACFIRE). Draft.

(5) Relationship with Users, Materiel Developers, Training Developers.

(a) Within the Field Artillery BFA community, one of the approved documents which addresses day-to-day working relationships among Users, Materiel Developers, and Training Developers is the TSM-FATDS Charter. This charter specifies that the TSM-FATDS is authorized to coordinate directly with the following organizations on matters relating to FATDS:

- HQDA
- HQ TRADOC
- USADARCOM, PM and Major Subordinate Commands
- USAOTEA
- USAMACOM (USAFORSCOM, USAREUR, Eighth US Army)
- CDR MILPERCEN
- Other agencies and services as required.

Operating under these guidelines, the following working relationships have been established:

1. TSM-FATDS interacts bi-weekly with HQDA on fielding, scheduling, program status, and program decisions.
2. TSM-FATDS interacts with HQ TRADOC monthly on training support.
3. TSM-FATDS interacts weekly with CERCOM PM on NETT coordination.
4. TSM-FATDS interacts daily with CORADCOM PM-FATDS on system requirements.
5. TSM-FATDS interacts weekly with USAFABD on software acceptance testing, system problem areas, and recommended changes.
6. USAFAS-CD-TDS interacts daily with PM-FATDS on system requirements, interoperability, data base, Basis of Issue Plans (BOIP), Qualitative and Quantitative Personnel Requirements Information (QQPRI), and maintenance support.
7. USAFAS-CD-TDS interacts daily with TRADOC FA Branch on the same topics as 6. above.
8. USAFAS-CD-TDS interacts weekly with USAFABD on acceptance testing of software.

(b) A second document which addresses day-to-day working relationships for the Field Artillery BFA is a TRADOC Msg, ATCD-TM, 101918Z Aug 77, subject: TACFIRE Tape Validation. Based on this message, the

USAFABD developed a concept for TACFIRE software validation in coordination with the US Army Field Artillery School (USAFAS), DARCOM TACFIRE Software Support Group (TSSG), and Program Manager, Operational Tactical Data Systems (PM-OPTADS).

From this concept has evolved the following working relationships:

1. USAFABD interacts daily with TSSG on testing, system problem areas, and technical questions on software functions.

2. USAFABD interacts weekly with PM-FATDS on system problem areas

3. USAFABD interacts weekly with HQ TRADOC on testing coordination and approval.

(c) In addition to the working relationships described above, several informal working groups have been established as described below:

1. A local Software Configuration Control Board (SCCB) has been formed to review software problems. The group currently reviews all TACFIRE software problems and adds those which it approves to a prioritized list for subsequent correction. The SCCB is chaired by the Chief, TSSG and has as voting members the TSM-FATDS and USAFAS-TDS-CD.

2. A Field Artillery Interoperability Configuration Control Board (FAICCB) has been formed to monitor and maintain interoperability between all Field Artillery systems and subsystems. The FAICCB is chaired by TSM-FATDS.

3. A System Configuration Control Board has been formed to handle Army-NATO and Army-Other Services interoperability problems. Chairman is PM-OPTADS.

(6) Operating procedures. Within the Field Artillery BFA, the only PDSS operating procedure which has been established and is currently being used is one which supports TACFIRE. Figure 2-6 (which was furnished by USAFAS-CD-TDS) depicts in general terms the operating procedure which is currently being used to implement software changes in the TACFIRE system. In this procedure, requests for system changes may be initiated as the result of problem reports from the field, improvement requests from the User, policy and/or procedural changes, or the introduction of a new Configuration End Item (CEI). These change requests are channeled to the PM-FATDS who determines if the request involves a hardware change or a software change.

If a software change is involved, the request is passed on to the Software Configuration Control Board which then makes the determination as to whether the requested change will or will not be made. If the SCCB decides that the change will be made, TSM-FATDS assigns a priority to it and

SOFTWARE CHANGE PROCESS

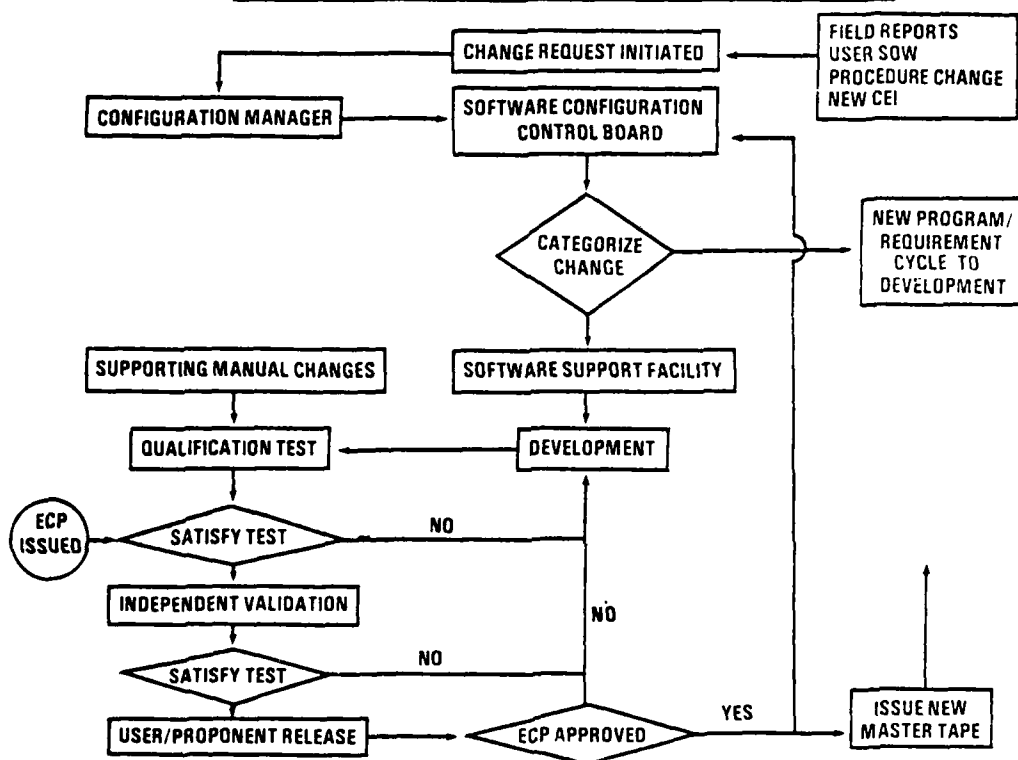


Figure 2-6. TACFIRE software change process

adds it to a prioritized list of other TACFIRE software changes. This prioritized list is then passed on to the Software Support Facility (currently represented by USAFAS-CD-TDS) who perform the evaluation and definition, and establish requirements for the software changes which they then release to the Materiel Developer (TSSG).

The TSSG performs the development of the software modifications. The resulting code is then validated and verified for correctness by TSSG under the guidance and observation of USAFABD. An independent validation is then performed by USAFABD to evaluate the modified system's operational capabilities. Once the software changes have passed acceptance testing, they are added to a master system update tape along with other approved software modifications. At the appropriate time, which must be coordinated with the hardware deployment schedule, copies of the master tape are issued to all locations where TACFIRE is deployed. After this update tape has been distributed, any subsequent software changes will be added to a new master tape as the process continues.

An issue of some concern at Fort Sill has arisen in connection with such testing. This issue involves who should perform operational type testing, particularly where the software changes are relatively minor and are not anticipated to significantly change system characteristics. This issue stems from varying interpretations of DODD 5000.3, Test and Evaluation, and the term "operational testing". One interpretation, held by some people at OTEA and TRADOC HQ, would call for OTII and OTEA involvement in all such cases. Other interpretations are that it is not the fundamental intent of the regulations to require a massive and expensive process to be imposed where less complex methods can serve the purposes satisfactorily.

(7) Chains, gaps, and duplications in current PDSS process.

Since the PDSS process which is supporting TACFIRE is getting the job done, one might say there are no gaps. However, a closer analysis reveals that several gaps have been bridged temporarily through ingenuity and "gentlemen's agreements". The personnel performing PDSS for TACFIRE have identified the following gaps:

(a) There is a need for a regulatory document or documents which will address these issues:

- The establishment of a direct working relationship between the DARCOM software support group and the TRADOC software support group,
- The formal establishment of various configuration control boards such as SCCB and FAICCB,
- Provision for the updating of training documents in connection with software modifications, and
- Procedures for the funding of user acceptance testing.

(b) There is a need for a front-end requirements analysis and simulation facility.

(c) There is a need for an instrumented test facility to provide for scenario generation and the automation of test results analysis in support of user acceptance testing. This should be a DARCOM-TRADOC shared facility.

d. Air Defense BFA.

(1) BAS addressed within this BFA. Battlefield automated systems which are anticipated to have a significant impact on PDSS resource requirements within the Air Defense BFA are identified below.

(a) PATRIOT air defense missile system. The PATRIOT system and its realtime interfaces with other automated systems present a very substantial PDSS requirement. Just past the limited production decision point, PATRIOT is heavily automated (embedding in its software a broad range of functions including firing doctrine and scheduling of system resources), highly mobile, and must interoperate in an integrated air defense environment with other systems, services and nations. In this environment, realtime may be measured in microseconds. Although human override provisions are included, the system normally performs all target acquisition, identification, tracking, engagement decision and weapon assignment, missile control, and post-intercept kill assessment functions automatically, in coordination with other AD weapons (ground and air) and control systems. In addition to the software required to perform these tactical functions, additional system software supports personnel in maintenance operations and troop proficiency training. PATRIOT is designed to operate as part of an integrated air defense structure, under centralized or decentralized modes of control. The PATRIOT fire unit is designed to operate in centralized, decentralized, independent and autonomous modes vis-a-vis the PATRIOT CCS (battalion level command and control system). PATRIOT is designated as the US replacement for NIKE Hercules and, to some degree Improved HAWK. PATRIOT software includes a vast number of instructions, although it can be seen from the table below that the bulk of this lies in support software areas, and that more than half of the software in the field units of the weapon system itself are diagnostic in function.

	<u>Approximate Words (24-bit) of Instruction/ Data in Core Memory</u>	
	<u>Operations Programs</u>	<u>Maint & Diagnostics</u>
Fire Unit (ECS)		
Tactical Software	254 K	
Initialization	260 K	
Diagnostics (ECS)		93 K
Diagnostics (Radar)		519 K
MEP (Maintenance)		200 K
Radar Resident Software	37 K	
Support Software -----	700 K	
TOTAL -----		2026 K
Battalion (CCS)	193 K	UNK
Other Software -----	3000 K	
TOTAL, PATRIOT SOFTWARE -----		5200 K (Approx.)

¹ The Product Improved Vulcan (PIVADS) and the Chaparral PIP are not deemed to be of significant impact and are not included.

(b) AN/TSQ-73, Missile Minder. The AN/TSQ-73 Missile Minder is a real time, air defense battle management/fire distribution system which provides group and battalion level command and control for currently fielded medium and high altitude surface-to-air missile fire units (I-HAWK and NIKE HERCULES). The functions of the AN/TSQ-73 are similar to those performed within the control portions of the PATRIOT System, with the exception that the AN/TSQ-73 also provides group level command and control (of I-HAWK, HERCULES and PATRIOT battalions). The Missile Minder is in the post-deployment stage (was fielded in 1979). Major enhancements are required but are delayed because of constrained core (PIP to upgrade memory expected to be funded in 1983) and no USAADS personnel resources to define requirements.

(c) SHORAD C². The Short Range Air Defense Command and Control system provides more positive and faster control of the short range air defense weapons systems such as Redeye/Stinger, Chaparral, Vulcan, ROLAND, and DIVAD Gun. Such control is now accomplished entirely manually. SHORAD C² is in early concept formulation stages. It will probably lean heavily on other systems such as the PLRS/JTIDS Hybrid (see Paragraph 2-4.h., for the Communications BFA) and will bear some resemblance to AN/TSQ-73. The SHORAD C² concept envisions automated command and control systems at platoon, battery, and battalion level, with interfaces at the battalion level to other automated C² systems.

(d) DIVAD Gun. The Division Air Defense (DIVAD) Gun system is in the Engineering Development Stage and is intended to either replace or update and substantially expand upon the capabilities of the Vulcan gun system which has been in the field for many years as an interim short range AD gun system. Because of time constraints during the DIVAD Gun conceptual design effort, design was based upon user developed ROC and RFP, neither of which contained tactical software, interoperability or command and control requirements. Consequently, user requirements for software and command and control, developed subsequent to prototype development, have not been incorporated into the DIVAD Gun system. These requirements may be "cut in" to the production system during the maturity phase of system development (after contractor selection) or added later, as enhancements/product improvements. This BAS contains a substantial amount of software, estimated to be in excess of 100K of code. However, the majority of this software is expected to be relatively stable after system development, with only that portion embedding tactics, doctrine, interoperability and command and control being highly dynamic because of the earlier neglect of these areas and because of the evolutionary nature of the interdependent SHORAD C² concept. Over 600 systems are to be fielded. Since Combat Developer involvement has been limited, many problems may remain to be worked out in final stages of development or even after fielding.

(e) I-HAWK. The Improved HAWK air defense missile system fielded in 1972, involves an application of 1960's computer technology to rudimentary and rather inflexible automation of some of the air defense engagement functions which were handled manually in the original medium range HAWK system, which has been in the field since the early 1960's. Attention is now being given to additional improvements, including increased survivability, memory, and interoperability, plus a hybrid version for co-deployment with PATRIOT. Recent I-Hawk modifications have included the development of software

which effects a fully automated interface, using ATDL-1, between the I-Hawk fire units and the AN/TSQ-73 command and control system. This data link provides for the full uplink and downlink of target information between these systems, in addition to the command and control information provided by the earlier data link and software. The multi-service and international employment of Hawk, coupled with its world-wide deployment, have resulted in a software change process which includes NATO and USMC representatives in all software decisions. An unfortunate aspect of I-HAWK software support is that a formal procedure for PDSS has never been developed for this system, despite its over eight years of tactical employment and the numerous software changes made and planned.

(f) ROLAND. The ROLAND air defense missile system was chosen to replace the Chaparral missile primarily in a way that would minimize lead-time and cost, by making use of an existing French and German development effort. Therefore, the US Combat Development community has had almost no influence over the system, although it has been adapted to production in the US. While the system involves a moderate degree of automation (possibly in excess of 70K lines of code), ROLAND software is essentially a digital emulation of earlier analog fire control logic because of the limited involvement of the combat developer in the US development of this system. Incorporation of tactical doctrine, interfacing with the SHORAD C² system and other aspects of interoperability effected through the systems' software are anticipated to present some very troublesome problems because of current hardware design which does not allow for desired software enhancements and growth. The system is now in advanced engineering development, and solution of software and interoperability problems may require a significant PDSS effort.

(g) Air Defense Electronic Warfare System (ADEWS). ADEWS is in the Conceptual Study Phase of the life cycle. It will involve a relatively large amount of software. Therefore, it is listed here because of a potentially significant impact on PDSS requirements at some time in the future.

(h) Other Systems. Other complex, sophisticated, software driven/automated air defense systems are in various stages of development and expected to be fielded by the mid-1980s. These systems, which cannot be described further because of security reasons, will interface with other members of the air defense family and will require moderate to substantial changes in the software of today's fielded and developmental systems.

(2) Organizational elements involved in planning for and providing PDSS. In the Air Defense BFA, organizational elements involved in planning for and providing PDSS can be divided into two general categories: elements involved explicitly or implicitly in all air defense systems and elements directly involved with specific, individual systems.

(a) Elements for all AD systems. For all AD systems, organizational elements involved in planning for or providing PDSS essentially consist of DARCOM (the materiel developer), TRADOC (the combat developer) and

Users. Within DARCOM principal elements involved (in addition to the project managers who will be addressed by system below) are HQ DARCOM, CORADCOM, ARRADCOM, and MICOM. Within TRADOC, principal elements involved are HQ TRADOC, CAC, and the AD Center and School. (TRASANA is also involved to a limited extent, with increased participation currently being explored.) Within the AD Center and School, in addition to the Commander/Commandant and Assistant Commandant (and in addition to the TRADOC System Managers for PATRIOT, DIVAD Gun and ROLAND) two elements are specifically involved - the Directorate of Combat Developments, and the Directorate of Training Developments. Within the Directorate of Combat Developments, the Combat Systems Software Division is the principal element involved in software development and in planning for and providing PDSS. Within the Directorate of Training Developments, the principal element involved is the Software Branch, PATRIOT/Hercules Division, Instructional Systems Development Department (emphasis on instructional and exportable training simulators and devices and training scenarios). The Army Research Institute Field Office, Air Defense and the PATRIOT Software Support Office, both located at Fort Bliss, also provide assistance in the software development and PDSS efforts. Among users, principal elements are FORSCOM, USAREUR, the 32d AADCOM (Europe) and the USMC, USAF and NATO.

(b) AN/TSQ-73, Missile Minder. Principal organizational elements involved in planning for or providing PDSS for the AN/TSQ-73 are:

- A part of the Combat Systems Software Division, DCD, USAADS
- Elements of the Directorate of Training Development, the Directorate of Training and Doctrine, and the Air Defense Board
- The Software Support Division (Bldg 1044, Fort Bliss), Project Manager, Air Defense Command and Control Systems (Redstone Arsenal). (Note: This Division was attached to CORADCOM in August 1980 but is to transfer to MICOM control on 1 October 1980. Also, this Division is currently supported by three contractors; Litton Data Systems Division, Intercon Systems Corp, and Command, Control and Communications Corp (4C's).
- Project Manager, Air Defense Command and Control Systems (Redstone Arsenal). USAMICOM
- Missile Software Support Center (Redstone Arsenal), MICOM
- 32d AADCOM, Europe
- 11th ADA Brigade (Fort Bliss), and other FORSCOM.

AN/TSQ-73 software is developed and maintained in accordance with TACS/TADS and ATDL standards. Interface with NATO systems is provided through a fully automated buffer (ABLE) maintained by the Software Support Division, Fort Bliss.

(c) PATRIOT. Principal organizational elements involved in planning for or providing PDSS for the PATRIOT system are:

- A part of the Combat Systems Software Division, DCD, USAADS. This Division also makes use of the TRADOC Data Processing Field Office (Fort Leavenworth) computers via secure terminal at Fort Bliss, and receives contractor support in development/maintenance of PATRIOT simulators (SAI).
- A part of the Directorate of Training Development, USAADS
- PATRIOT Software Support Office (Fort Bliss), Project Manager, PATRIOT

- TRADOC System Manager - PATRIOT (Fort Bliss)
- Project Manager, PATRIOT (Huntsville), DARCOM
- PM PATRIOT/DARCOM Field Office, White Sands Missile Range (Launch Complex 38)
- Raytheon Company, PATRIOT Software Support Organization, Bedford, Mass
- Raytheon System Test Facility, White Sands Missile Range (Launch Complex 38)
- Sanders Associates, Nashua, N.H. (Training Device)
- Verification and Validation (V&V) Organization, Army Missile Systems Software Center (MSSC) (Redstone Arsenal), MICOM (supported by an independent contractor)
- PATRIOT Configuration Control Board, PATRIOT Project Office (Redstone Arsenal)
- PATRIOT Software Review Board, PATRIOT Project Office (Redstone Arsenal)
- Joint Interface Test Force (JITF), Hanscom Field, Mass
- Project Manager, Air Defense Command and Control, Huntsville, Alabama
- AN/TSQ-73 Software Support Division, Fort Bliss
- 32D AADCOM and USAREUR

(d) Improved Hawk System. Principal organizational elements involved in planning for or providing PDSS for the Improved Hawk System are:

- Project Manager, Improved HAWK, USAMICOM
- Raytheon Company, Tactical Ground Defense Systems, Bedford, Mass
- USAMICOM R & E Labs
- Project Manager, AD Command and Control Systems, Huntsville, Alabama
- AN/TSQ-73 Software Division, DCD, USAADS, Fort Bliss
- NATO Hawk Project Management, Paris, France
- USMC (MCDEC and MCTSSA)
- 32D AADCOM, USAREUR
- DTD, USAADS, Fort Bliss

Note - In spite of the organizations involved in I-Hawk software development and change, no formal PDSS planning exists for this system although the software is in rapid, evolutionary development and has been throughout the the eight years of fielding.

(e) Other systems. Because the SHORAD C² system is in early concept formulation stages, no DARCOM project manager (PM) or TRADOC System Manager (TSM) exists for this system, and activity is essentially confined to the Directorate of Combat Development, USAADS. Potentially, among the organizational elements that may become involved with SHORAD C² PDSS are:

² Includes the Tactical Software Development Facility (TDSF), and the Guidance Test and Simulation Facility (GTSF).

the PM's and TSMs of the short range air defense systems, Stinger, DIVAD Gun, and ROLAND, the TSM-PLRS/JTIDS Hybrid, at Fort Gordon, the Software Support Division (Fort Bliss) of the PM, Air Defense Command and Control Systems, as well as that PM (Redstone Arsenal). With respect to planning for and providing PDSS for DIVAD Gun, the PM at Picatinny Arsenal and the TSM at Fort Bliss are among organizational elements likely to be involved. For ROLAND, both a PM (at Redstone Arsenal) and a TSM (at Fort Bliss) exist and would be similarly involved. For ADEWS, in early study, it is not now clear what elements may become involved, aside from DCD, USAADS.

(3) Responsibilities/Charters. Responsibilities of the various organizational elements involved in planning for or providing PDSS in the Air Defense BFA stem basically from two sources. One source is the chain of basic regulatory authorities, ranging from the fundamental DOD and Army Regulations, particularly AR 1000-1, the AR 70-series, and the AR 10-series, through the local 10-series regulations. The other basic source of responsibilities is the detailed plans which exist for post-deployment management of the AN/TSQ-73 Missile Minder and post-deployment software support of the PATRIOT air defense missile systems. In addition, each DARCOM Project Manager and each TRADOC System Manager has a charter from the respective headquarters. The PATRIOT Post-Deployment Software Support Implementation Plan, issued in June 1980 by the PATRIOT Project Manager, Redstone Arsenal, spells out in relatively complete detail the PDSS responsibilities of most of the involved organizational elements identified in the preceding paragraph. This document reflects a significant amount of cooperation, coordination, and thinking among the principal parties concerned with these PDSS issues for PATRIOT. The AN/TSQ-73 (Missile Minder) Post-Deployment Management Plan, second revision, June 1979, was issued by the Configuration Manager, Missile Minder/Air Defense Tactical Data Systems, in the office of the Project Manager, MM/ATDS, CORADCOM, Redstone Arsenal. (The first edition was in May 1977.) This Management Plan addresses both hardware and software support following deployment. The first 20 pages of this document include a fairly detailed overview of the functions of the principal organizational elements involved, and more detailed definition for the PM's Software Support Group (now Division) at Fort Bliss, and MICOM's Missile System Software Center (MSSC) at Redstone Arsenal. Responsibilities of the US Army Air Defense Center are reproduced in Figure 2-7. The remainder of the document consists of about 160 pages of annexes, among which are agreements regarding the establishment and support of the Software Support Group, and a copy of the configuration management plan, which contains some additional detailing of responsibilities. PDSS responsibilities for the other BAS addressed in this BFA (SHORAD C², DIVAD Gun, I-HAWK, and ROLAND, ADEWS) are not formalized at this time, except within the Combat System Software Division, DCD, USAADS.

(4) Regulatory/directive authorities. Listed below are the principal regulations and other documents which impact on the TRADOC functions and responsibilities relevant to PDSS in this BFA.

- AR 10-5, Organization and Functions of the US Army, 1 November 1978

2.2.4 US Army Air Defense Center and School, Ft. Bliss, Texas

2.2.4.1 Represents the US Army AN/TSQ-73 user community at the MM/ADTDS Level III Software Configuration Control Board (SCCB). Provides user guidance to the SCCB, the MM/ADTDS Software Support Group, and USA MIRADCOM MSSC.

2.2.4.2 Serves as the interface between the materiel developer and the user community for all matters pertaining to doctrine, tactics, and training.

2.2.4.3 Conducts, with the assistance of the MM/ADTDS Software Support Group and USA MIRADCOM MSSC, acceptance testing of software master tape versions and hardware modifications.

2.2.4.4 Participates in TM maintenance and validating activities. Accepts or rejects and recommends changes to the operational TM's.

2.2.4.5 Establishes, in coordination with the materiel developer and the AN/TSQ-73 user community, the fielding date for software master tape versions.

2.2.4.6 Establishes user priorities for implementation of software changes. Participates in the establishment of priorities for the "Authorized for Implementation" list of ECR's for software master tape versions.

2.2.4.7 Originates system design improvement requirements and conceptual studies.

2.2.4.8 Develops acceptance test procedures.

2.2.4.9 Provides host support for the MM/ADTDS Software Support Group.

Figure 2-7. Extract: ADCEN responsibilities for TSQ-73

- AR 10-41, Organization and Functions, United States Army Training and Doctrine Command, 27 June 1973
- TRADOC Regulation 10-41, Organization and Functions, 1 May 1980
- USAADS Regulation 10-1, Organization and Functions
- Charter, Directorate of Combat Developments, USAADS
- Charter, Directorate of Training Development, USAADS
- Charter, TSM-PATRIOT
- Charter, TSM-DIVAD Gun
- Charter, TSM-ROLAND
- Charter, TSM-STINGER
- Memorandum of Agreement on Modification/Validation of Operational Software for US Army Air Defense Battlefield Automated Systems Deployed to NATO, Among the Commanding General, United States Army Training and Doctrine Command, and the Commanding General, United States Army Materiel Development and Readiness Command, and the Commander in Chief, United States Army, Europe and Seventh Army, signed February 1980
- Project Manager, Missile Minder/Air Defense Tactical Data Systems, Redstone Arsenal, Alabama, and Office of the Program Manager, Army Tactical Data Systems, Fort Monmouth, New Jersey. AN/TSQ-73 (Missile Minder) Post-Deployment Management Plan, Second Revision, June 1979
- Project Manager, PATRIOT Missile System, Redstone Arsenal, Alabama. Post-Deployment Software Support Implementation Plan, June 1980
- DOD Directive 5000.29. Management of Computer Resources in Major Defense Systems. 26 April 1976
- AR 70-series
- AR 1000-1, Basic Policies for Systems Acquisition, 1 April, 1978
- Department of the Army, Office of the Assistant Secretary, Research, Development and Acquisition. Memorandum for Deputy Chief of Staff for Research, Development, and Acquisition, Subject: Standardization of Embedded Computer Resources. 1 July 1980, and letter, Office of the Deputy Commander TRADOC, 30 July 1980, same subject.

(5) Relationships with Users, Materiel Developers, Training Developers. PDSS relationships among the Air Defense Center, Users, Materiel Developers, Training Developers, and others involved in PDSS of BAS are relatively extensive. In the area of PATRIOT and TSQ-73, much effort has been expended in developing forward thinking and effective relationships, in spite of very limited personnel resources. A climate of cooperation between TRADOC and DARCOM has, especially in the last year or more, aided significantly in making this effort productive. While responsibilities, and resulting relationships, are to a considerable degree spelled out and supported by the two respective post-deployment plan documents mentioned in Paragraph

(3), above, these relationships remain relatively informal, and dependent for their effectiveness, upon the individuals involved. There is evidence of some concern that the effectiveness of these relationships could deteriorate if the current climate of cooperation and common purpose were to be damaged for any reason. These relationships, it should be noted, basically involve the broader area of the overall combat development-materiel acquisition life cycle process, of which PDSS is only one aspect. Effectiveness of relationships with Users appears to depend also upon policies which have evolved in the case of TSQ-73. These include active participation of a combined Combat Developer-Materiel Developer team in bringing information about the system, and system software changes directly to the Field User, insuring that changes, related training issues, and their implications are understood by the User, and that user problems are understood and brought back, by first-hand contact, to the site where software support is cooperatively managed and implemented. Earlier in the PATRIOT program, some serious obstacles were revealed during planning for training and training devices. It appears that some flexible "give and take" between the DARCOM and TRADOC parties has gone a long way toward solving some of these problems, although resource constraints are a continuing problem. A diagram of some of the relationships involved in AN/TSQ-73 is reproduced from the Post-Deployment Management Plan, in Figure 2-8.

(6) Operating procedures. Fairly specific operating procedures for PDSS of the TSQ-73 have evolved at the Combat Systems Software Division. One individual is devoted essentially full-time to such PDSS functions. Although these procedures are outlined in the Post-Deployment Plan, and details are apparently not formalized, they amount to a close working relationship with the Software Support Division (belonging to DARCOM and located across the street from the building housing the Directorate of Combat Developments) and its Combat Systems Software Division. Because of the complexity of the NATO integrated air defense system and the inability of CONUS test facilities to duplicate that environment, it is an operating procedure that a validation test of any software change affecting NATO be conducted by USAREUR or with USAREUR participation, before release of the change to the field. Configuration management procedures for TSQ-73 are reproduced in Figure 2-9.

(7) Gaps and duplications in current PDSS process. Research to date has not revealed any significant gaps or duplications in the detailed PDSS processes outlined pertaining to AN/TSQ-73 and PATRIOT, although there is evidence that current manning at USAADS is not consistent with the PDSS responsibilities involved. Detailed plans do not exist for the other air defense systems which need or will need PDSS. Lack of plans in some cases simply reflects that the system is in early stages. In the case of I-HAWK, DIVAD Gun, and ROLAND, however, a lack of earlier planning and resource allocation appears to be reflected.

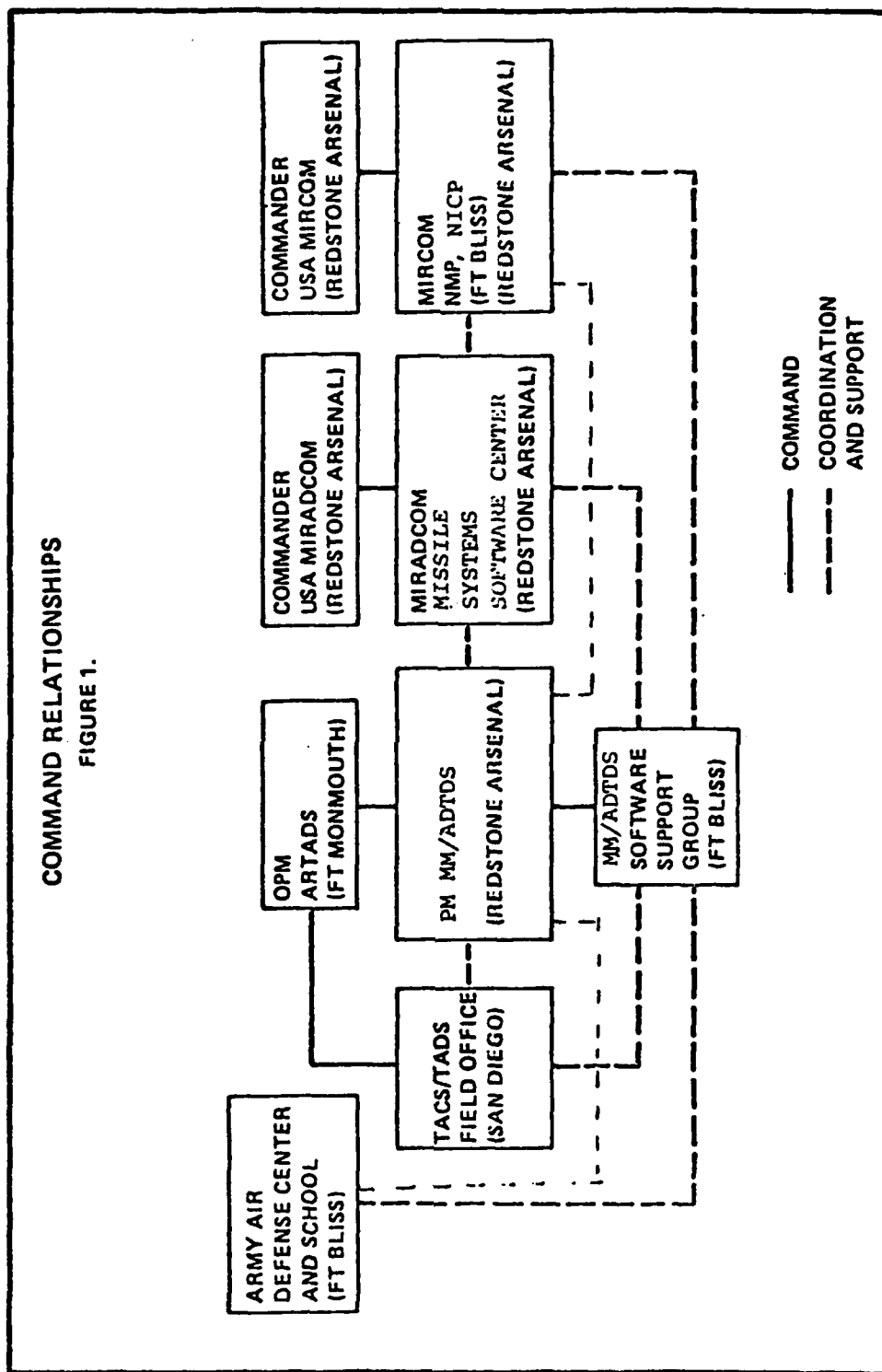


Figure 2- 8. Some TSC-73 relationships

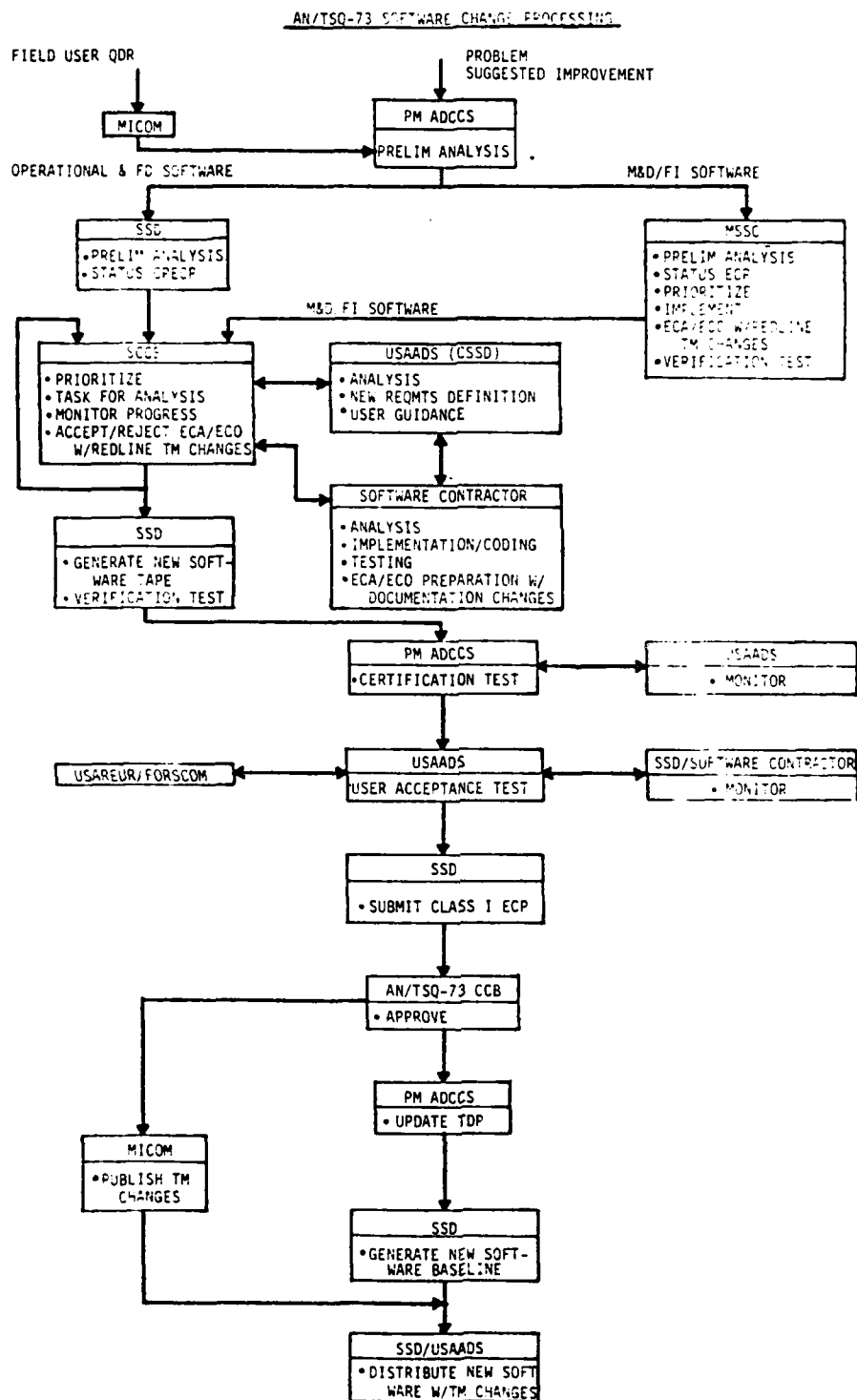


Figure 2-9. TSQ-73 Configuration Management(continued on next page)

2.3 CONFIGURATION MANAGEMENT. The Configuration Management Program, as currently defined and implemented for the development cycle, will be continued through the production, operations, and maintenance cycles. The PM MM ADTDS will be responsible for the overall Configuration Management of the AN/TSQ-73 System with the exception of ARTADS Control items.

2.3.1 Configuration Level Definition (Note: See Configuration Management Plan for Detail Annex C)

2.3.1.1 Configuration Level I

2.3.1.1.1 Controls configuration at the interface and commonality level for ARTADS Programs.

2.3.1.1.2 Approval authority for changes above a specified cost level.

2.3.1.2 Configuration Level II

2.3.1.2.1 Approval authority for all ECR's, other than Level I.

2.3.1.3 Configuration Level III

2.3.1.3.1 Assess and status ECR's

2.3.1.3.2 Prepare and submit ECPs.

2.3.1.3.3 Recommend approval/disapproval of ECPs.

2.3.2 Change Processing. Figure 2 depicts the chain of events involved in processing a change request during post-deployment of the AN/TSQ-73 system.

2.3.2.1 PM, MM/ADTDS will make the initial determination concerning the application of a hardware, software, or combined hardware/software ECR. Hardware/MSD software ECRs are forwarded to JAMF/COM MSSC for action. Software ECRs are forwarded to the MM/ADTDS Software Support Group at Fort Bliss, Texas for action. Tasking will range from a simple tasking DF transmitting a minor ECR to a full program plan for a major system modification.

2.3.2.2 The ECR package progresses through the verification, certification and acceptance testing. For hardware changes the change package, with its appropriate documentation, is made available to the NMP for distribution. Distribution will be accomplished by NMP personnel interacting with ARTADS field officers located in the appropriate operational theaters. For software changes the new tape, with its associated operational TM change pages (provided by the NMP) and other appropriate documentation, will be distributed to the user organizations by MM/ADTDS Software Support Group personnel.

2.4 TESTING The goal of the testing effort is to insure that each AN/TSQ-73 system (hardware and software) introduced to the field is operationally acceptable. The concepts of testing that this management plan applies to are:

1. **Verification Testing.** Verifies that the design modification has been accomplished in accordance with the ECP package and the hardware/software system performs correctly. A separate test plan will be prepared and submitted as part of the ECP package for each master tape version or hardware modification.

2. **Certification Testing.** The MM/ADTDS SSG and MSSC will maintain a set of detailed certification test procedures designed to exercise the system as exhaustively as possible. The test consists of a real time interaction of personnel, hardware, and software which results to the inputs provided by a detailed, step by step procedure indicating specific actions to be taken and the expected results. The procedures will be updated with each new version so that the procedures correctly represent the version under test. The procedures will consist largely of single thread actions designed to demonstrate the operation of a specific function. The test is designed to demonstrate the overall effectiveness of the total system rather than the testing of the individual changes. USSADS may observe and participate in Certification Testing. In the event that USSADS elects not to perform Acceptance Testing for a given master tape version or hardware modification, concurrence by USSADS in the results of the Certification Testing will be a valid substitute for acceptance testing.

3. **Acceptance Testing.** A procedure similar to the one described for the Certification process will be implemented for the acceptance testing. The essential difference is that greater emphasis will be placed upon utilization of actual hardware/equipment/systems and the US Army Air Defense Center and School will insure the development of systematic, rational test procedures which will be designed to duplicate, insofar as practical, the operational environment. The acceptance will tend to be a live environment, field exercise type test effort using the equipment, systems and personnel available to the MM/ADTDS Software Support Group and the US Army Air Defense Center and School or such equipment, systems and personnel as determined by USSADS. Based on the projected availability date of a new master tape version, the acceptance test period will be scheduled well in advance of its occurrence for planning purposes.

Figure 2-9. (concluded)

e. Intelligence and Electronic Warfare BFA.

(1) BAS addressed within this BFA. The eight Category 1 and 2 BAS which impose requirements for planning and providing PDSS within this BFA are identified and discussed briefly below.

(a) All-Source Analysis System (ASAS). This Category 1 system which, under the CCS² concept, is to serve as the control system within the I/EW BFA, is in the conceptual phase. An ASAS LOA was prepared in January 1980 and in May 1980, a MENS was prepared. Consideration is now being given to further development of this system jointly with the US Air Force. It is currently planned that this development would proceed following the evolution-ary process authorized by DODI 5000.2.

(b) Technical Control and Analysis Center (TCAC). Two versions of this system, TCAC(C) and TCAC(D), are being developed as Signal Intelligence (SIGINT) Subsystems (SEWS) to the ASAS. Development is under QRC-51, directed by the Army Intelligence and Security Board under provisions of AR 105-37.

(c) QUICKLOOK II. This is an airborne noncommunications emitter location identification system, employed by the Aerial Exploitation Battalion, CEWI Group, at the corps level. It is a fielded system for which PDSS is being provided. The fielding and support of QUICKLOOK has provided operational experience in addressing PDSS that should be useful in planning support for other similar BAS.

(d) GUARDRAIL V. This is an airborne SIGINT system to be employed by the Aerial Exploitation Battalion, CEWI Group, at the corps level. This system is an improved version of earlier GUARDRAIL systems. Plans provide for completing a ROC for "GUARDRAIL IMPROVED" (i.e., GUARDRAIL V) in January 1981.

(e) Stand Off Target Acquisition System (SOTAS). This airborne SIGINT system, currently in full scale development, is to be employed by the CEWI battalion at division level. Development is proceeding based on a Required Operational Capability (ROC) prepared in 1978 but which is now pending revision.

(f) Electronic Countermeasure System AN/ALQ-151 (QUICKFIX). QUICKFIX is an airborne SIGINT system, currently in low rate initial production, to be employed in support of divisions and armored cavalry regiments/separate brigades. Development has been based on a ROC for Heliborne Intercept and ECM System, November 1973.

(g) Detection System, Special Purpose AN/TSQ-114 (TRAILBLAZER).

This is an airborne SIGINT system, currently in low rate initial production, to be employed by the CEWI battalion at division level. A ROC of September 1979 is the basis for system development.

(h) Communications Facility AN/MS-67 (COMFAC). COMFAC is being developed to support CEWI Group (Corps) special communications requirements. It is presently in the Validation Phase. Development is based on a COMFAC Letter Requirement (LR), August 1977. The US Army Intelligence Center and School is the CD proponent for this system during development. The US Army Signal Center is to become the CD proponent after fielding.

(2) Organizational elements involved in planning for and providing PDSS. Organizational elements of the US Army Intelligence Center and School (USAICS) that have or are projected to have major responsibilities in planning for and providing PDSS to BAS in this BFA are identified in Paragraph (a), below. Other organizations within and external to TRADOC with which USAICS personnel must interface to a significant degree in carrying out these PDSS actions are identified in Paragraphs (b) through (e).

(a) USAICS organizations involved.

1. Directorate of Combat Developments. This directorate is involved as the CD proponent for all BAS in the Intelligence/EW BFA. Subordinate elements involved include the Concepts and Studies Division, the Materiel Division, the Threat Office, and the All-Source Analysis System Management Office.

2. Directorate of Training Developments. Elements of this directorate are involved with training developments determined to be needed as a result of changes to BAS in this BFA. Training development support for SIGINT systems is provided by the Intelligence School, Fort Devens, Massachusetts.

3. TRADOC System Manager for specified Corps Tactical EW/Intelligence Systems. This office has the normal TSM responsibilities, specified in TRADOC Regulation 71-12, for the corps level BAS identified above.

4. TRADOC System Manager for specified Division Tactical EW/Intelligence Systems. This office has the normal TSM responsibility, specified in TRADOC Regulation 71-12, for the division level BAS identified above.

5. TRADOC System Manager for Stand Off Target Acquisition System (SOTAS). This office has TSM responsibilities, specified in TRADOC Regulation 71-12, for the SOTAS.

6. US Army Intelligence and Security Board. This board has responsibilities for tactical intelligence and security systems testing as prescribed in TRADOC Regulation 10-41.

7. Computer Systems Management Office. It is anticipated this office will be assigned major responsibilities for supporting all other USAICS elements involved in planning for and providing PDSS for BAS as PDSS requirements increase. This support would provide USAICS an improved capability to fulfill CD responsibilities for PDSS to BAS in this BFA.

(b) HQ TRADOC. Intelligence/EW system staff officers in the Intelligence/EW Directorate, DCSCD, exercise HQ TRADOC staff supervision over actions involving BAS in this BFA. USAICS personnel must interface with these HQ TRADOC staff officers on various matters involving intelligence/EW BAS.

(c) CACDA. The ASAS TSM is located in CACDA. He has TSM responsibilities as prescribed by TRADOC Regulation 71-12. The USAICS ASAS Management Office interfaces with and supports the TSM as required in discharging CD responsibilities associated with the ASAS. In addition USAICS personnel must interface with the C3I Directorate of CACDA that has responsibility for integration of efforts in the intelligence/EW, command, control, and communications functional areas.

(d) INSCOM. USAICS coordinates with INSCOM with respect to interface requirements and other relationships between intelligence/EW systems within the corps area and systems at echelons above corps.

(e) DARCOM.

1. Electronic Research and Development Command (ERADCOM). ERADCOM is the Materiel Development command for all the BAS identified above in the Intelligence/EW BFA. ERADCOM's Electronic Warfare (EW) Laboratory and the Signals Warfare (SW) Laboratory are both involved. Extensive interaction is needed between USAICS and ERADCOM personnel in fulfilling their respective CD and MD roles during system development and post-deployment support.

2. Troop Support and Aviation Readiness Command. Since several of the BAS in the Intelligence/EW BFA are airborne systems, USAICS personnel must interact with TSARCOM on matters related to these platforms.

(f) US Army Communications Command (USACC). An element of USACC, the US Army Communications and Electronics Engineering and Installation Agency (USACEEIA), has taken over responsibility from the original contractor for development of COMFAC. There is close interaction between CEEIA COMFAC developers and the USAICS COMFAC action officer.

(g) Users. USAICS systems personnel must interact with systems users in identifying, analyzing, and addressing system problems and user-initiated change proposals.

(3) Responsibilities/Charters. USAICS is the CD proponent for all BAS in the Intelligence/EW BFA. Within USAICS, this responsibility is further assigned to the Directorate of Combat Developments. With respect to PDSS for these Intelligence/EW BFA BAS, basic responsibilities are the same as those identified in Figure 2-5. Responsibilities of the three TSM in USAICS (i.e., Corps Systems, Division Systems, and SOTAS) and the TSM ASAS in CACDA are as prescribed in TRADOC Regulation 71-12.

(4) Regulatory/directive authorities. The principal regulatory authorities from which the above responsibilities derive are those cited in Paragraph 2-2.b. Most significant among these are:

- DODD 5000.1
- DODI 5000.2
- AR 10-41
- AR 70-1
- AR 1000-1
- TRADOC Regulation 10-41
- TRADOC Regulation 71-12
- DA Pamphlet 11-25
- USAICS Regulation 10-1.

(5) Operating Procedures. Among the eight Category 1 and 2 Intelligence/EW BAS are three deployed systems. Other systems are in various stages of development. This distribution of systems in various life cycle phases provides a good basis for examining CD involvement throughout the system life cycle management process.

(a) The Materiel Division of the Directorate of Combat Developments has CD responsibility for development of new, or improvement of existing, materiel systems for tactical electronic warfare and tactical intelligence organizations. The Corps, Division, and EAC/Common Systems Branches of this division have Action Officers who are assigned CD responsibility for one or more Intelligence/EW BAS. These officers perform a broad range of functions and interact with a number of other organizations as described in Paragraph 2-4.b.(2), above. These branch Action Officers, together with the respective TSMs, represent the focal point for CD involvement in the life cycle management of Intelligence/EW BFA BAS.

(b) During system development, operations proceed essentially as prescribed by regulatory and directive authority. The CD systems Action Officers participate in systems planning activities, defining functional requirements, system testing, identifying training development requirements, and other related actions. After fielding, however, with few exceptions, system changes are accomplished primarily through interaction between Users

and the MD or in some cases with the contractor who developed and maintains the system. ERADCOM coordinates with USAICS for validation of system change requirements, but the primary dialog with respect to system changes occurs between the User and the MD. In one case, in which major problems were encountered with the QUICKLOOK system in Europe, USAICS CD system personnel were sent to make an on-site analysis of the problems as a basis for formulating corrective action with the MD. However, this type of direct User-CD-MD interaction appears to be limited. Available information indicates that increased interaction is needed at the working level between the CD and User and the CD and MD throughout the system life cycle process.

(6) Gaps and duplications in current PDSS process.

(a) There are no apparent duplications of effort within the intelligence CD community or between the CD and either the Users or MD with respect to Intelligence/EW BAS life cycle management.

(b) Gaps or potential gaps exist in some functional areas. First, is the apparent limited participation of the CD in addressing User-reported system problems and proposed system changes. This area was discussed in Paragraph (5), above. A second area of concern is the capability of the CD to define functional system requirements in the detail desired and needed by the MD to guide the system development and subsequent system change efforts. A third area, related to both of those above, is the limited capability to fully analyze both the need for and the impact of system changes as a result of changes in the threat, doctrine, operational requirements or interoperability baseline. The CD requirements resulting from these limitations are discussed in Paragraph 3-5.d., Chapter 3.

f. Combat Service Support BFA.

(1) US Army Logistics Center.

(a) BAS addressed within this BFA. The BAS in the logistics portion of the Combat Service Support BFA which impose PDSS requirements on the US Army Logistics Center (LOGCEN) are identified and discussed briefly below. Additional detail on each of these systems is provided in Appendix C.

1. Direct Support Unit Standard Supply System (DS4). This is an Army-wide multicommand system designed to automate stock control and provide an improved asset management capability at the division and nondivisional direct support unit level and at selected general support unit sites. The system is operational and is scheduled to replace two other systems--the Direct Support Unit/General Support Unit (DSU/GSU) System and the Division Logistics System (DLOGS)--both of which are discussed below. The requirements document for this system is Detailed Functional System Requirements (DFSR), TM-38-L32-2 (Test), July 1976.

2. Direct Support Unit/General Support Unit (DSU/GSU). This is one of the Army's first automated multicommand information systems. It became operational in 1966 to support stock control and inventory accounting at the direct and general support levels. The system is being phased out as replacement DS4 systems are deployed.

3. Division Logistics System (DLOGS). DLOGS is a multicommand ADP system designed to apply automated methods to division level asset management. It became operational in 1968. The system is being phased out as DS4 systems are deployed.

4. Standard Army Ammunition System Level 3 (SAAS-3). SAAS is a standard multicommand conventional ammunition supply and maintenance management information system. SAAS-1 is currently operational at the major command level in USAREUR and in the Pacific. SAAS-3 is to be a feeder system employed in tactical commands and other commands below theater level. It will be used to exercise stock control over assets of one or more activities. Development of SAAS-3 is under the DFSR for SAAS-3 which was approved in September 1979.

5. Standard Army Intermediate Level Supply (SAILS) System. SAILS is a multicommand, integrated, automated supply and financial management system. By selective employment of system modules, selective exercise of managerial controls, and optional frequency of running selected modules, SAILS supports supply requirements at the intermediate level. SAILS Level A (supply management) and Level B (storage operations) are used by various command levels including Corps Support Commands (COSCOM). The various SAILS subsystems and baselines are to be incorporated into a single worldwide SAILS baseline (SAILS ABX). Extension of the SAILS capability to Field Users will be completed in 1982.

6. Standard Army Maintenance System (SAMS). SAMS is an automated logistical management information system supporting maintenance management functions from the direct support/general support retail level upward through each succeeding level of management. SAMS is in the Conceptual Phase of development. The DFSR for the retail level portion of this system was approved in November 1979.

7. Division Level Data Entry Device (DLDED). The DLDED is an interim standard multicommand system which will support supply, maintenance, and administration within the division. Development is proceeding based on a ROC of August 1979. The U.S. Army Signal Center is the proponent agency for the DLDED. However, the system is to support logistical functional application systems to include DLOGS and its follow-on, DS4, and the Maintenance Reporting and Management (MRM) System and its follow-on, SAMS. Operation of the DLDED in support of these logistical application systems will involve functional systems personnel at the LOGCEN.

8. Decentralized Automated Service Support System (DAS3). This is a data processing hardware configuration for supporting the functional software requirements of the DS4 described above. The DAS3 will replace the NCR 500 system in DSU/GSU units beginning in late 1981. Subsequently, it will be introduced into other nondivisional DSU/GSU and, depending upon further study, into divisions, separate brigades, and COSCOM.

9. Maintenance Reporting and Management (MRM) system. This is a maintenance workload and modification work order accounting system at the division level. It is scheduled to be phased out as the SAMS becomes operational.

10. Combat Service Support Control System for CCS². Preparatory combat development work on this control system architecture is already underway. The LOGCEN has been tasked to take the lead role in the design and development of this system with inputs from the coordinating proponents, the Soldier Support Center and the Academy of Health Sciences.

11. Phoenix. Phoenix is a software enhancement of the DSU/GSU (NCR 500) system discussed in 2 above. It was generated to provide an improved applications capability. Its extension to Users began in 1979 and is to continue with extension to units in Europe and Korea in January and February, 1981, respectively. The DAS3, discussed in 8 above, will accommodate this software enhancement.

(b) Organizational elements involved in planning for and providing PDSS. Organizational elements of the US Army Logistics Center that have major responsibilities in planning for and providing PDSS to BAS in the logistics portion of the Combat Service Support BFA are identified in Paragraph 1., below. Other organizations within and external to TRADOC with which LOGCEN personnel must interface to a significant degree in carrying out their PDSS responsibilities are identified in Paragraphs 2 through 5 below.

1. LOGCEN organizations involved. Included in the mission of the LOGCEN is responsibility to develop and coordinate the functional design, installation, and maintenance of multicommand intermediate and user logistics operating/management information systems and provide customer assistance in connection with these systems. Within the LOGCEN, responsibility for carrying out this mission is concentrated primarily in the Management Information Systems Directorate. This directorate consists of a Management Support Office and two major divisions--the Field Systems Division and the Supply Systems Division.

a. Management Support Office. With respect to BAS in the logistics functional area, principal functions of this office include serving as the focal point for special projects, studies, and plans for proposed systems having multifunction logistics application; assuring standardized preparation, identification, and maintenance of all products/deliverables applicable to each Army Management Information System; and performing distribution management for publications on all data systems for which LOGCEN has proponentcy.

b. Field Systems Division. This division performs combat developer functions associated with all phases of the management information system life cycle, as defined by AR 18-1, for retail level supply, maintenance, and transportation systems. These systems include SAAS, SAMS, and MRM. With respect to the Deployment and Operation Phase of the system life cycle, this division performs a broad range of functions to support assigned, deployed systems. These include:

- Preparing the necessary functional guidance to implement proponent agent approved changes
- Performing those functions (e.g., functional guidance, changes to regulations, test requirements, user documentation, training requirements) required to implement major changes to existing systems
- Providing technical assistance to the users of assigned operating/management information systems and updating functional user procedures as required
- Reviewing changes or proposed changes to Army regulations, technical documents, logistics doctrine, organization, systems, and materiel concepts for impact on multicommand intermediate and user level operating/management information systems and providing an impact statement to the proponent agent
- Developing test requirements and participating in live tests at designated installation(s) prior to final acceptance of systems change packages or emergency/urgent change packages for assigned systems as required
- Chairing System Change Request (SCR) (or Engineering Change Proposal (ECP)) reviews for assigned systems.

c. Supply Systems Division. This division performs Combat Developer functions associated with all phases of the management information system life cycle for all intermediate and user level supply systems, except ammunition. These systems include SAILS, DLDED, DS4, DSU/GSU, and DLOGS. During the Deployment and Operation Phase of the system life cycle, this division performs essentially the same functions as enumerated in Paragraph (2), (a) through (f) above, for assigned intermediate and user level supply systems.

2. Deputy Chief of Staff for Logistics, Department of the Army (DCSLOG DA). The LOGCEN maintains close coordination with DCSLOG, the functional proponent for the logistics systems addressed in this study.

3. U.S. Army Computer Systems Command (CSC). CSC is responsible for the design, development, programming, testing, installation, maintenance, and improvement of all logistics BAS addressed in this study. A major element of CSC, the Computer Systems Command Support Group, Fort Lee, is assigned this responsibility. The headquarters and major elements of this CSC Support Group are physically located near the LOGCEN Management Information Systems Directorate in Somervell Hall. This facilitates a close working relationship and continuous interaction between these organizations throughout a systems life cycle including providing customer assistance during post-deployment.

4. Users. Management Information Systems Directorate Personnel interface with systems Users extensively. This interaction with Users involves addressal of user-reported system problems and functional requirements. It also includes planning, scheduling, coordinating, and participating in customer assistance visits to System Users Army-wide.

(c) Responsibilities/charters. The LOGCEN is designated the proponent agency (PA) for all logistics BAS addressed in this study. As such, the LOGCEN is responsible for the functional design, development, implementation, and maintenance of these systems. DCSLOG DA is the functional proponent for these systems. CSC is the assigned responsible agency (ARA). ARA responsibilities include design, configuration management, development, test, deployment, and maintenance of assigned systems.

(d) Regulatory/directive authorities. The principal regulatory authorities applicable to the organizational responsibilities discussed above and the life cycle management of BAS in the logistics functional area include:

- AR 10-5
- AR 10-41
- AR 18-1
- TRADOC Regulation 10-41
- LOGCEN Regulation 10-1
- CSC Regulation 18-21
- CSC Regulation 18-23

(e) Operating procedures. The LOGCEN and CSC have had years of experience in developing, fielding, and supporting logistics systems and have well established, documented procedures for all aspects of this support. Further, the collocation, at Fort Lee, of elements of both commands involved with the development and life cycle management of logistics management information systems facilitates a very close working relationship between personnel of both organizations throughout a systems life cycle. Most importantly users benefit from this close relationship which contributes to the overall capability to respond to user problems, and address functional system requirements and proposed changes in a systematic manner.

1. System changes.

a. Source of changes. Requirements for changes to logistics systems can originate at any level. They may grow out of a user-reported problem or a user-initiated change request to satisfy a functional requirement. Additionally, system action officers in the LOGCEN Management Information Systems Directorate routinely review changes or proposed changes in Army regulations, technical manuals, logistics doctrine, organization and materiel concepts, and other automated systems, for any impact on logistics systems for which they are responsible.

b. Change control process. Each formalized change proposal is classified as either a functional change (primarily the responsibility of LOGCEN) or a technical change (primarily the responsibility of CSC). All change proposals are then addressed by a review board composed of representatives of all organizations concerned (e.g., LOGCEN, CSC, User Commands, DCSLOG DA, ACSAC DA). Approved changes are then prioritized and a schedule established for their development and extension to the field in a system change package (SCP) along with appropriate user instructions and functional and technical training materials. Major changes require the development of a Mission Element Needs Statement (MENS) and Functional and Data Requirements Documents to support the change. All changes undergo appropriate testing involving both LOGCEN and CSC elements and a selected user before installation of the change on fielded systems.

2. User assistance. Assistance to users of logistics systems is available on a continuous basis through the LOGCEN Management Information Systems Directorate and the Customer Assistance Office operated by the Data Services Directorate, CSC Support Group, Fort Lee. The Customer Assistance Office operates 24-hours per day, seven days per week, to receive and respond to User guidance calls or incident reports. CSC Regulation 18-21 establishes the policies, responsibilities and procedures governing this customer assistance program.

(f) Gaps and duplications in current PDSS processes. There are no apparent significant gaps in current PDSS processes associated with BAS in the logistics functional area. The close working relationship between the LOGCEN and the CSC Support Group, Fort Lee, provides for well coordinated efforts in their respective areas of responsibility and minimizes the likelihood of significant gaps or duplications occurring.

(2) Soldier Support Center.

(a) BAS addressed within this BFA. Battlefield automated systems which are anticipated to have a significant impact on PDSS resource requirements within this BFA at Soldier Support Center are identified below:

1. Standard Installation/Division Personnel System (SIDPERS) and SIDPERS Wartime. Although MILPERCEN appears to be officially the "proponent agency"³ of both of these systems (SIDPERS Wartime is a wholly nested subset of SIDPERS, which is fully fielded), and also performs essentially all Combat Developer functions (including training and software support) for them, these systems nevertheless appear to require a low level of monitorship by Soldier Support Center, which may properly be called the "functional proponent"³. The principal reason for such monitorship is the perceived need

³ The terms "proponent agency" and "functional proponent" appear in the current AR 18-1, 15 August 1980, and are discussed further in Paragraphs (c) and (g), below.

for a new personnel system, for which the Soldier Support Center is likely to be the proponent and Combat Developer. Such a new system is separately identified below.

2. Division Level Data Entry Device (DLDED) Personnel Software Package. While proponentcy for DLDED hardware itself resides with the Signal Center, the Personnel Software Package for DLDED is distinct. It is seen as becoming a part of SIDPERS. Although MILPERCEN is anticipated to be involved with this package in FY 81 and FY 82, and to be relatively heavily involved during fielding of the system in FY 83, Soldier Support Center currently has had and continues to have personnel devoted to preparation of functional specifications and planning for the Personnel Software Package. Soldier Support Center involvement is anticipated to continue after FY 83.² The DLDED hardware will have related applications in connection with the CCS² CSS Control System, and also PLRS/JTDS Hybrid.

3. DAS3 and other new main hardware: Software Conversion. Switching from existing IBM 360/30 (C53) to new Honeywell Series 60 (level-360/50 6 Model 47) hardware in the FY 83-84 period will require extensive software conversion and testing for SIDPERS. A need for monitoring by Soldier Support Center is seen in FY 82, followed by heavier involvement during the hardware switching period, and then some software maintenance responsibility. The need to maintain software compatibility during hardware changes is also involved in CCS²/SIGMA.

4. CSS Control System for CCS². Preparatory combat development work on this control system is already underway, and seen to continue through FY 81, followed by continued CD responsibilities during development of the system in the FY 82-84 period. LOGCEN has been tasked to take the lead role in development of this system; however, SSC is tasked for development of architectural input to the design of the CSS control system.

5. A new personnel system (SIDPERS Future). Reference to this system was made under SIDPERS, above. Requirements definition for this new system will require significant resources in FY 81, with substantially increased effort in FY 82, and further increase during development in FY 83-84. A substantial maintenance effort will be required thereafter. This system must address dynamic issues of personnel losses and replacements, and also returns to duty from the medical system.

6. Personnel interfaces with the Theater Army Medical Management and Information System (TAMMIS). TAMMIS, under development by Health Services Command, will be a source of critically needed input data in a new personnel system (above). Insurance that appropriate interfaces are achieved will require some Soldier Support Center effort, particularly in the FY 82-84 period.

7. Prisoners of War Information System (PWIS). Integrating responsibilities of the Soldier Support Center require some involvement in this system. The MP Center is proponent of this system, which is a subsystem of the Military Police Management Information System (MPMIS). The latter system, however, does not involve battlefield functions.

8. The Vertical Force Development Management Information System (VFDMIS). Soldier Support Center is only peripherally involved with this system.

9. Theater Army Personnel Rollup (TAPER) and TAPER Wartime. Soldier Support Center has an integration role in this system which serves only HQ, USAREUR. Study may be required during FY 81.

10. The Vertical The Army Authorization Document System (VTAADS). Soldier Support Center responsibilities with respect to VTAADS are essentially covered under SIDPERS.

(b) Organizational elements involved in planning for and providing PDSS. Those organizational elements which currently appear to be in any significant way directly involved in planning for or providing PDSS for those BAS identified above, within the personnel and administration portion of this BFA, fall in seven areas. These areas are SSC, MILPERCEN, Computer Systems Command, Health Services Command, TRADOC, DCSPER, and Users. Specific organizational elements are identified below. User elements generally have not been identified.

1. Management Information Systems Division, Directorate of Doctrine and Combat Development, US Army Institute of Personnel and Resource Management, SSC. This element is involved to varying degrees with all of the BAS identified above, from a combat development standpoint.

2. Directorate of Training Development, US Army Institute of Personnel and Resource Management, SSC.

3. Field Military Systems Branch, Field Activities Division, Personnel Management Systems Directorate, MILPERCEN. This element is involved with SIDPERS and DLDED.

4. Procedures and Regulations Review Branch, Field Activities Division, Personnel Management Systems Directorate, MILPERCEN.

5. TACMIS Project Management Office, Computer Systems Command. This element is the system Materiel Developer for DLDED, DAS3, and related systems.

6. Personnel Systems Division, Personnel and Force Accounting Directorate, Computer Systems Command. This element is the System Materiel Developer for SIDPERS, VFDNIS, TAPER, and VTAADS.

7. Systems Design Branch, US Army Academy of Health Sciences. This element performs the Combat Developer functions for TAMMIS.

8. Health Care Systems Support Activity, US Army Health Services Command. This element performs the System/Materiel Developer functions for TAMMIS.

9. Commander, US Army Soldier Support Center

10. Commander, US Army Military Personnel Center

11. Commander, US Army Training and Doctrine Command

12. Deputy Chief of Staff for Personnel

(c) Responsibilities/charters. Responsibilities and charters directly impacting on current and potential PDSS activities relating to the Soldier Support Center portion of this BFA have recently been in a state of flux. Further significant changes are possible, and some areas remain unclearly defined. Responsibilities of the Soldier Support Center were broadened somewhat by the revised TRADOC Regulation 10-41, dated 1 May 1980, which superseded the earlier version of 15 August 1973. The revised regulation designates Soldier Support Center (Formerly ADMINCEN) as one of three TRADOC integrating centers (the other two are the Combined Arms Center and the Logistics Center). The integrating center concept makes Soldier Support Center a major subordinate element of TRADOC, to ensure the systematic integration of combat and training developments functions within the broad operational area of administration. Soldier Support Center is thereby the proponent for operational concepts, organizations and force structures, materiel requirements, doctrine, tactics, training developments, and user testing, in assigned functional areas. Also, by this regulation, the center commander "may task and provide guidance to other Army combat and training development activities, schools, MACOM, and the field operating agencies of the DA". Among the general missions and functions of integrating centers, one of particular relevance is, "Perform continuous analysis, evaluation, and assessment of TRADOC combat development requirements to ensure the effectiveness of tactics, organizations, and systems; and to assist in planning and programming for their integration into the Army". The regulation specifically grants Soldier Support Center a coordination relationship with the Academy of Health Sciences. Among the several missions specifically provided to the CG, Soldier Support Center, the following three appear to be of particular relevance from the standpoint of PDSS:

"b. Serve as the TRADOC executive agent to ensure personnel issues are addressed in the materiel acquisition process."

- "d. Develop, review, and evaluate all concepts and doctrine pertaining to, or impacting upon, personnel management and services, administrative management and services, financial management and services, and related computer based information systems."
- "e. Develop and coordinate the functional design, evaluation, and extension of battlefield administration management information systems applicable to the corps level and below."

The relationships between TRADOC and other commands are further delineated in AR 10-41 of 1 July 1973. Specifically, "TRADOC will task and coordinate combat development activities of other major Army commands whose combat development responsibilities are delineated in AR 71-1. Combat development products of other Army commands and agencies will be provided to TRADOC for integration into the overall combat development effort". In Paragraph (b) 1., above, the Management Information Systems division at Soldier Support Center was identified as a principal organizational element involved in planning for and providing PDSS, although their involvement has only recently begun. At Soldier Support Center, responsibilities that would appear to relate to PDSS seem to fall almost entirely within that Division, one of more than eight such entities within the Directorate of Doctrine and Combat Development. The MIS Division is currently authorized 35 personnel and has 18 on hand. Its responsibilities include development of an overall battlefield administration automation architecture (BA³), as well as addressal, from a combat developments viewpoint, of the planning and/or other aspects of a number of specific automated systems, including those identified in Paragraph (a) above. The charter of this division is contained in the charter of the Directorate of Doctrine and Combat Development.

On 5-7 August 1980, a memorandum of understanding (MOU) was signed by the DCSPER, the Commander TRADOC, the Commander MILPERCEN, and the Commander Soldier Support Center. This MOU defines and realigns certain functional responsibilities and boundaries between MILPERCEN and Soldier Support Center, and specifies transfer of spaces, authorizations and other resources attendant to the realignments. Much of the content (Annexes C thru J) of this MOU appears to deal with functions other than those having direct implications for PDSS. Annex A, however, addresses the function entitled "Develop Future Standard Multicommand Personnel and Administrative Information Systems". This annex indicates that MILPERCEN is to have responsibilities for coordination and review with ODCSPER and SSC in conjunction with the Initiation, Concept Development, Definition/Design, and System Development Phases, and more specific responsibilities in the Deployment/Operation Phase. These specific responsibilities include (1) ensuring that implementation plans are sufficient and functionally correct, (2) extending to the field new systems or major revisions, (3) system maintenance, and (4) periodic reevaluation of systems, for efficiency and effectiveness. MILPERCEN is identified as the "Proponent Agency", which is apparently based on the definition appearing in the recent revision of AR 18-1. That definition is: "The element assigned responsibility by the functional proponent for the functional design, development, implementation, and maintenance of an

automated system". Annex A then proceeds to indicate that SSC, which is implicitly the "Functional Proponent", is to be responsible for the Project Initiation Phase, the Concept Development Phase, and the Definition/Design Phase. The organization directly responsible for the System Development Phase is not indicated. Transfer of three personnel positions from MILPERCEN to SSC is also specified, as a part of Annex A. Annex B of this MOU, addresses the function titled "Development of major changes to standard multicommand personnel and administration information system (SIDPERS)". Basically, Annex B states that:

- "a. MILPERCEN, by delegation from ODCSPER, is and remains the Proponent Agency (PA) for SIDPERS and is responsible for performing all of the functions of the PA as outlined in AR 18-1 and related Army ADP systems policy documents."
- "b. MILPERCEN will remain responsible for receiving, analyzing, costing, and managing through the System Change Request (SCR) approval process all SCR to SIDPERS. When the cost of implementing a given SCR exceeds \$100,000, responsibility for its development will be transferred through ODCSPER and HQ, TRADOC, to SSC. ----"
- "c. MILPERCEN is responsible for receiving completed system changes and associated materiel from SSC, incorporating the SCR into a System Change Package (SCP), transmitting the SRC to Computer Systems Command for programming, and validating the SCR as part of SCP testing."

Annex B identifies SSC as responsible for "Developing the documentation necessary to incorporate assigned SCR into SIDPERS. This documentation will include, as a minimum, changes to the Detailed Functional System Requirement (DFSR), test input transactions to validate the change and required user manual changes."

(d) Regulatory/directive authorities. Listed below are those regulations and other documents which prescribe the responsibilities and govern or impact upon the relevant functions at the Soldier Support Center in the area of PDSS.

- AR 10-5, Organization and Functions of the US Army 1 November 1978
- AR 10-41, Organization and Functions, United States Army Training and Doctrine Command, 27 June 1973
- TRADOC Regulation 10-41, Organization and Functions, 1 May 1980
- AR 18-1, Management Information Systems, 22 March 1976, and recent revision, 15 August, 1980
- AR 71-1, Force Development, 16 September 1968, with Change 1, dtd 25 June 1969
- MILPERCEN Supplement 1 to AR 10-5, Organization and Functions, 1 August 1979
- Memorandum of Understanding Between Deputy Chief of Staff for Personnel and Commander, US Army Training and Doctrine Command, and Commander, US Army Soldier Support Center, signed 5-7 August 1980

- US Army Computer Systems Command, Command Fact Sheet, February 1979
- Department of the Army, Office of the Assistant Secretary, Research, Development and Acquisition. Memorandum for Deputy Chief of Staff for Research, Development, and Acquisition, Subject: Standardization of Embedded Computer Resources, 1 July 1980
- Letter, Office of the Deputy Commander, TRADOC Subject: Standardization of Embedded Computer Resources, 30 July 1980
- AR 1000-1, Basic Policies for Systems Acquisition, 1 April 1978
- AR 70-1, Research and Development, 1 May 1975, with Change 1, dtd 1 February 1977, and revised draft, August 1980
- ADMINCEN Regulation 10-1, Organization and Functions,
- Charter, Directorate of Doctrine and Combat Development, SSC
- HQDA Ltr 18-80-1, 7 July 1980, Subject: Combat Service Support (CSS) Automation/Communications Transition Plan, from DAAC-NIP(m) (20 Jun 80), 11pp
- DF, DAPE-PBP, 16 August 1977, Subject: SIDPERS System Change Request Procedures
- Memorandum from Assistant Secretary of the Army for Financial Management, dated 28 August 1973, Subject: Standard Installation/Division Personnel System (SIDPERS). [This represents the approved requirements document for this system.]

(e) Relationships With Users, Materiel Developers, Training Developers. Soldier Support Center (SSC) involvement in the PDSS process is largely in its early stages. Therefore, PDSS relationships between SSC and Users, Materiel Developers, Training Developers, and others involved in PDSS appear to be evolving rapidly. The Management Information Systems Division (MISD) of SSC has, until recently, dealt primarily with the Field Military Systems Branch, Field Activities Division, of MILPERCEN, regarding requirements and related aspects of SIDPERS and DLDED. Interface with the System/Materiel Developer (Computer Systems Command) had been primarily with MILPERCEN. Since 25 August 1980, however, as a result of the MOU discussed above, SSC liaison people have been located at MILPERCEN and are beginning to work jointly with MILPERCEN people on areas such as the establishment of DLDED personnel software specifications. This locational change has begun to bring SSC into direct contact with both Computer Systems Command and their contractor personnel. Previously, the direct interface between MISD and SIDPERS users had been limited, while MILPERCEN's Field Military Systems Branch was in direct contact with some SIDPERS users on almost a daily basis. Again, the recent MOU will place SSC personnel in more direct contact with SIDPERS users. Relationships between MISD and Training Developers apparently are not formalized. SIDPERS training aspects have been addressed by the Procedures and Regulations Review Branch of MILPERCEN.

(f) Operating Procedures. Specific operating procedures for PDSS functions at Soldier Support Center (SSC) could not be identified during the research visit to SSC. This probably reflects the early stage of SSC involvement in PDSS functions and also the fact that support of SIDPERS, the

principal, fielded personnel system, has been provided by MILPERCEN. Some aspects of procedures followed at MILPERCEN, however, were obtained by questionnaire. The recent MOU between MILPERCEN, DCSPER, SSC, and TRADOC identifies some basic policies and procedures, as noted above, in Paragraph (c) under Responsibilities. It is evident that MILPERCEN has followed, and intends to continue to follow, procedures "outlined in AR 18-1 and related Army ADP systems policy documents," for less than "major" changes to SIDPERS. These procedures involve a System Change Request (SCR) proposal, evaluation, approval, and implementation process. This process is delineated in Section III - Change Control, of Chapter 7 - AMIS Configuration Management, of AR 18-1, 22 March 1976, and the more recent TB 18-110, Configuration Management. Specific MILPERCEN procedures are contained in DF, DAPE-PBP, 16 August 1977, Subject: SIDPERS System Change Request Procedures. Annex B of the MOU defines a "major" change as one in which "the cost of implementing a given SCR exceeds \$100,000 ---". This threshold is based on Paragraph 2-15k of AR 18-1⁴ which states, "System modifications which are estimated to cost more than \$100,000 will follow the life cycle process, starting with the MENS." The MOU also states that MILPERCEN, in arriving at the estimated cost of a given SCR, will include the following factors:

- "(1) Costs incurred in evaluating the SCR, developing the required Systems Change Directive (SCD), and staffing and controlling the SCD."
- "(2) Costs incurred in designing and developing the system documentation required to incorporate the SCR into the system and developing test data to validate it."
- "(3) All costs incurred in programming and testing the SCR, including necessary computer time."

As has been noted, when estimated cost of a given SCR exceeds the \$100,000 threshold, responsibility for its development is to be transferred to SSC. Although specific PDSS and other procedures to be followed by SSC in such cases are not known to have been specified yet, it appears reasonable to expect that the same configuration management procedures discussed above (TB 18-110) will be followed here also.

(g) Gaps and duplications in current PDSS process. Within this portion of the BFA, the current PDSS process at SSC is not sufficiently well-defined to lend itself to identification of gaps and duplications within the PDSS process itself. In the somewhat broader realm of regulations, charters, responsibilities, and definitions immediately surrounding this PDSS area, however, some issues or problems are evident. Many of these issues have the potential for fundamental impacts on the PDSS process. Therefore, these evident issues are identified and addressed individually below.

1. Apparent overlap between TRADOC and MILPERCEN organization and function regulations. An overlap in responsibilities appears to exist between those assigned to Soldier Support Center (SSC) in TRADOC

⁴ AR 18-1 of 15 August 1980 is quoted here. The MOU, however, quotes the 9 November 1979 draft revision, and lacks the words, "starting with the MENS".

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Regulation 10-41, 1 May 1980, and those stated in portions of MILPERCEN Supplement 1 to AR 10-5, of 1 August 1979. The TRADOC Regulation is essentially an elaboration of the responsibilities of TRADOC as stated in AR 10-41, 27 June 1973. Elements of this TRADOC Regulation are quoted in Paragraph (c), above. In particular, the CG, SSC, is assigned the mission to:

"Develop, review, and evaluate all concepts and doctrine pertaining to, or impacting upon, personnel management and services, administrative management and services, financial management and services, and related computer based information systems."

Also, to:

"Develop and coordinate the functional design, evaluation, and extension of battlefield administration management information systems applicable to the corps level and below."

The August 1979 MILPERCEN Supplement 1 to AR 10-5 states initially (page 3) that:

"The mission of the United States Army Military Personnel Center is to execute and recommend military personnel policies, systems, and programs; to develop and supervise procedures applicable to military personnel management and development and those directly related support services, to include personnel information systems, in support of the soldier and the chain of command."

Page 11 of that Supplement states 13 responsibilities of the Automation Management Office (AMO), which is part of the MILPERCEN Command Group. At least several of these responsibilities appear relevant to this discussion, namely:

- "1. Ensures that all automation system planning first considers mobilization and wartime operations and then provides necessary peacetime management data."
- "5. Develops the MILPERCEN Automation Master Plan and coordinates the plan with other personnel family agencies and ensures it is in accord with ODCSPER automation plan."
- "10. Provides control over system development and system change requests to ensure all system users and system interfaces are accommodated."
- "11. Executes the ODCSPER subdelegated automation functions with signature authority."

Page 129 of that Supplement states that the Office of the Chief, Field Activities Division, of MILPERCEN, among other responsibilities,

- "1. Serves as the MILPERCEN primary POC for coordination between the DA Staff and field activities on all matters pertaining to personnel services and support systems."
 - "a. Exercises proponent responsibility for the Standard Installation/Division Personnel System (SIDPERS) to include SIDPERS-Wartime (SIDPERS-WT)."
 - "b. Supervises the development, modification, coordination, testing, validation, and publication of the Military Personnel Office (MILPO) and SIDPERS Interface Branch (SIB) procedures and systems changes which support policies, programs, and systems."

2. Apparent overlap or conflict between TRADOC Regulation 10-41 and the 5-7 August MOU with MILPERCEN. An apparent overlap in responsibilities also appears to exist between those of TRADOC, as quoted from TRADOC Regulation 10-41 in the prior paragraph, and those delineated for MILPERCEN in both Annexes A and B of the MOU signed 5-7 August 1980 among DCSPER, MILPERCEN, SSC, and TRADOC. Portions of those two annexes were quoted in Paragraph (c), above, and therefore will not be repeated here.

3. New and varying definitions concerning proponency. Figure 2-10 contains six different definitions of terms containing the word "proponent". In particular, it can be seen that AR 18-1, as published 15 August 1980, defines both "proponent agency", and "functional proponent". The definition of the former is substantially different from the 1976 definition. Also, the term "functional proponent" did not appear earlier and is evidently new. Evidence suggests that misunderstandings as to the definitions being used among the various parties may be contributing significant confusion to the reaching of a common view of the responsibilities involved.

4. Split responsibility. The current MOU between DCSPER, MILPERCEN, SSC, and TRADOC, in its Annexes A and B, clearly leaves a division of responsibilities between SSC and MILPERCEN for both SIDPERS and future personnel and administration information systems. Such divided responsibilities, if they are to be exercised with full effectiveness, would appear to demand a level of cooperation and coordination which may be difficult to sustain or ensure without considerable effort, executive attention, and possibly further formalization. It should be noted that the MOU calls for establishment at MILPERCEN of a deputy of the SSC Commander.

5. Fuzziness of "battlefield" vs. "non-battlefield" automated systems. In this portion of the BFA, significant difficulty is encountered in clearly distinguishing "battlefield" from "non-battlefield" automated systems. This issue arises because the scope of this study effort specified addressal of battlefield automated systems (BAS). Of the 12 BAS identified in Table 5-4 of the PDSS Concept Plan and which could be associated with this BFA, all but DSU/GSU and TASC are either encompassed or specifically addressed in Paragraph (a), above. DSU/GSU is purely logistical in application, and the Theater ADP Service Center (TASC) no longer needs to be addressed. The original TASC concept was for major, mainframe hardware to be located at such centers. The recent CSS Transition Plan, however, has directed that the functions of those projected centers will be accomplished with assemblages of DAS3 equipment. (TAMMIS includes MEDLOG, MEDBLOOD, MEDREG, and MEDPAR.) However, several systems not in Table 5-4 are identified in Paragraph (a) above, for the reasons cited there. Further, it is possible that other systems could be included, depending on one's interpretation of the definition of BAS and the purpose of the study.

Assigned Responsible Agency (ARA). The organizational element designated by HQDA to be responsible for the development, test, and maintenance of a standard ADP system. This assignment of responsibility includes a requirement for coordination with users, MACOM(s) (if applicable), the PA, and HQDA during all phases of development. The designation of the ARA will vary depending upon the type of system being developed, e.g., multicommand or command-unique systems. The ARA for Class A-1 systems will normally be USACSC. (AR 18-1, 22 March 1976.)

Assigned responsible agency (ARA). The organizational element designated as responsible for the design, configuration management, development, test, deployment, and maintenance of a standard ADP system. (AR 18-1, 15 August 1980)

Functional proponent. The Army Staff agency responsible for the subject area in which automation is used or is to be used, including automation in support of the function performed. (AR 18-1, 15 August 1980.)

Proponent Agency (PA). The organization/agency with responsibility for the particular function(s) which a management information system automates. (AR 18-1, 22 March 1976.)

Proponent agency (PA). The element assigned responsibility by the functional proponent for the functional design, development, implementation, and maintenance of an automated system. (AR 18-1, 15 August 1980.)

Proponent. A TRADOC organization, normally a school, which has been assigned primary responsibility for combat development functions relating to a new materiel item in its area of interest. (TRADOC REG 600-4, 1 June 1978.)

Proponent (proponency). An organization or staff charged with the responsibility for coordinating the accomplishment of a material or subject matter task in its area of interest. (TRADOC REG 10-41, 1 May 1980.)

Proponent. An Army organization or staff which has been assigned primary responsibility for materiel or subject matter in its area of interest (i.e., proponent school, proponent staff agency, proponent center, etc.). (TRADOC REG 71-9, 1 October 1978 and AR 71-3, 8 March 1977.)

Figure 2-10. Varying definitions

6. PDSS required in a crisis/combat environment not specified for SIDPERS. It has been indicated by MILPERCEN that a specification does not exist for the software support required in a crisis/combat environment, including target response times for both interim and permanent corrections of urgent operational deficiencies.

g. Maneuver BFA.

(1) BAS addressed in this BFA. There is only one BAS, the Advanced Attack Helicopter, a Category 2 system, to be addressed in the Maneuver BFA. It should be noted that a portion of SIGMA and PLRS are also intended to support this BFA; however, they are addressed in this report under the Force Level Control and Communications Functional Areas, respectively, where proponenty is assigned and where the impact for PDSS resources will occur. There are several additional Category 3 systems in this BFA, under proponenty of the Combined Arms Center or the US Army Aviation Center, but the focus of the study effort is defined to be primarily on Category 1 and 2 systems.

(2) Organizational elements involved in planning for and providing PDSS. The US Army Aviation Center (USAAC), Fort Rucker, Alabama, is the Combat Developer proponent for the Advanced Attack Helicopter (AAH). Development is being accomplished under the Program Manager, Advanced Attack Helicopter, Saint Louis, Missouri. The PDSS Concept Plan for BAS, May 1980, identified the AAH as a system for which a DARCOM PDSS Center is not required or for which the need has not been determined. Further coordinated action between the CD and MD is needed with respect to the future designation of a PDSS Center for supporting this system.

h. Communications Functional Area.

The communications functional area provides the mechanism by which the commander controls all other battlefield functions in the performance of his mission. The focal point for activities in this functional area is the US Army Signal Center (USASC) at Fort Gordon, Georgia.

(1) BAS addressed within this BFA.

The Category 1 and 2 systems which are addressed within the communications functional area are as follows:

(a) Position Location Reporting System (PLRS). The function of this system is to support command and control; however, it is discussed under the Communications Functional Area since USASC is the combat development proponent. This system's life cycle status is Full Scale Development with an expected IOC of 2nd Quarter, Fiscal Year 84 (2QFY84). The proponent is USASC and the developing command is CORADCOM. Category is 2B.

(b) Joint Tactical Information Distribution System (JTIDS). This system is in Full Scale Development with an expected IOC of 2QFY82. JTIDS is a joint program with the Air Force and Navy, pursuing alternative concepts. Materiel development is managed by Joint Program Office at HSSCOM AFB. Category is 2B.

(c) Position Location Reporting System/Joint Tactical Information Distribution System (PLRS/JTIDS) Hybrid. The PLRS/JTIDS Hybrid combines desirable features of both the PLRS and the JTIDS systems into a realtime data communications system. It is in the Validation Phase with a target IOC of 1985 expected through a five-phase evolutionary development plan. The proponent is USASC and the developing command is CORADCOM. Category is 1.

(d) Division Level Data Entry Device (DLDED). The DLDED is in the conceptual phase with a target IOC of 4th Qtr FY 82-1st Qtr FY 83. The proponent is USASC and the developing command is USACSC. Category is 2B.

(e) Joint Tactical Communications (TRI-TAC) Program. The TRI-TAC Program is a joint effort by the USA, USAF, USN, USMC, DCA and NCA to design, develop, and acquire switched tactical communications systems. Of the system components currently defined, the US Army has proponentcy for nine of them. Of those nine, four fall into PDSS category 2B and are listed below.

1. Automatic Telephone Central Office AN/TTC-39. This system is in production with an expected IOC of July 1983. The proponent is USASC and the developing command is CORADCOM.

2. Automatic Message Switching Central AN/TYC-39. This system is in production with an expected IOC of June 1983. The proponent is USASC and the developing command is CORADCOM.

3. Communications Terminal AN/UGC-74A(V)3. This system is in full scale production. IOC was December 1979. The proponent is USASC and the developing command is CORADCOM.

4. Communications Nodal Control Element AN/TSQ-III(V). This system is in full scale development with an expected IOC of 1984. The proponent is USASC and the developing command is ESD AFSC.

(f) Automatic Telephone Central Office AN/TTC-38. The AN/TTC-38 is fully operational, but will be replaced by the AN/TTC-39 as soon as it is ready. Therefore PDSS for this system will be of a short duration. The proponent is USASC and the developing command is CORADCOM. Category is 2B.

(g) Transportable Automatic Digital Switch (TADS) AN/MYQ-2. The TADS was produced in a very limited quantity and is being phased out in June 1981. Therefore, it will not be considered further in this study. Category is 2B.

(h) Test and Automatic Repair Facility AN/MSM-105 (V)1,2.

The AN/MSM-105 is an expanded and upgraded version of the AN/USM-410. It has an expected OT III date of 1982. The proponent is USASC and the developing command is CORADCOM. Category is 1.

(2) Organizational elements involved in planning for and providing PDSS. For the BAS listed above, there are currently ten major organizational elements (with various subelements) which are involved in planning for and providing PDSS. These organizational elements are listed below and their PDSS functions are described in Paragraphs 2-4.h.(3) through 2-4.h.(6).

- The TRADOC System Manager (TSM) for Army Data Distribution System and Mobile Subscriber Equipment (ADDS/MSE)
- The TRADOC System Manager (TSM) for Army Tactical Communication Systems (ATACS)
- The TRADOC System Manager (TSM) for Tactical Automatic Switch (TAC AU SW)
- The TRADOC System Manager (TSM) for Tactical Satellite Communications (TACSATCOM)
- The TRADOC System Manager (TSM) for Test Measurement Diagnostic Systems (TMDS)
- The Concepts and Studies Division (C&S), Directorate of Combat Developments (DCD), USASC
- Officers Department (OFF-DEPT), Directorate of Training (DT), USASC
- Communications-Electronics (C-E) Board, USASC
- Tactical Data Systems Office, Directorate of Training Developments (DTD), USASC
- Joint Tactical Communications (TRI-TAC) Office.

(3) Responsibilities/charters.

(a) The mission, authority, and responsibilities of the TSM-ADDS/MSE are spelled out in the TRADOC System Manager Charter, Army Data Distribution System and Mobile Subscriber Equipment (ADDS/MSE), dated 16 November 1979. By this charter, his mission is to conduct total system management for ADDS and MSE within TRADOC.

Acting under this charter, the TSM-ADDS/MSE is currently providing User representation for the PLRS, JTIDS, and PLRS/JTIDS Hybrid systems which were listed in Paragraph 2-4.h.(1). In terms of PDSS, this TSM will be responsible for identifying and/or communicating doctrinal changes which necessitate enhancements in the system or which may represent a new requirement thereby requiring major software, firmware, or hardware changes.

(b) The mission, authority, and responsibilities of the TSM-ATACS are spelled out in a TSM Charter dated June 1978. By this Charter, his mission is to conduct total system management for Army Tactical Communication Systems (ATACS) within TRADOC.

Acting under this charter, the TSM-ATACS is currently providing User representation for the AN/TTC-38 and the AN/UGC-74A(V)3 which were listed in Paragraph 2-4.h.(1). For these systems, TSM-ATACS and is ensuring that User requirements are being satisfied in terms of O&O concepts, hardware, software, training, fielding, and ILS support.

(c) The TSM-TAC AU SW, operating under a TSM Charter, is conducting total system management within TRADOC for Tactical Automatic Switches (TAC AU SW). Of the systems listed in Paragraph 2-4.h.(1), he is providing User representation for the AN/TTC-39, the AN/TYC-39, and the AN/TSQ-111(V).

(d) The TSM-TACSATCOM, operating under a TSM Charter dated 10 September 1978, is conducting total system management within TRADOC for Tactical Satellite Communications (TACSATCOM). All of the systems for which he currently is providing User representation are Category 3. They are not listed in Paragraph 2-4.h.(1), but are listed in Appendix C.

(e) The TSM-TMDS was recently designated and does not yet have a formal charter from TRADOC although a draft charter has been approved. TSM-TMDS will conduct total system management within TRADOC for Test Measurement Diagnostic Systems (TMDS). The systems from Paragraph 2-4.h.(1) for which he is providing User representation are the DLDED DS/ATSS and the AN/MSM-105(V)1,2.

(f) The functions of the Concepts and Studies Division (C&S), Directorate of Combat Development, USASC are delineated in USASIGS Regulation 10-2. Among its many functions, those which may impact upon PDSS are as follows:

- Provides input to general functional systems requirements and detailed systems requirements for automated communications control systems
- Assists in determining requirements and preparing proposals for force development testing and experimentation and reviewing results
- Prepares, coordinates, and reviews international standardization agreements within assigned area of proponency.
- Develops maintenance concepts and reviews the maintenance test package
- Maintains cognizance of computer simulation models used by communication system analyses in CE system design, engineering, and evaluation.

(g) The Communications-Electronics (C-E) Board at Fort Gordon is one of eight US Army test boards and as such is assigned the following missions under TRADOC Regulation 10-41:

- Plan, conduct, and report on operational and other user tests
- Participate in other testing as directed
- Provide advice and guidance on test matters to combat, training, and materiel developers, other services and private industry
- Conduct other tests and selected specific evaluations as directed by CG TRADOC.

(h) The TRI-TAC Office is chartered by DOD Directive 5148.7 to perform the following responsibilities and functions:

- Coordinate and provide management direction for the development and production of TRI-TAC systems and equipment including logistics support considerations in response to Military Services and Joint requirements
- Perform system definition and engineering of the TRI-TAC systems and equipment.
- Provide advice and assistance to the ASD (C³I), the JCS, the MILDEPS and Defense Agencies concerned with developing and implementing plans and programs for TRI-TAC
- Ensure the adequate conduct, planning and reporting of joint testing, except for follow-on OT&E, of TRI-TAC systems and equipment.

(4) Regulatory/directive authorities. Listed below are the regulations and other documents which prescribe the responsibilities for and govern or impact upon PDSS functions in the communications functional area.

- AR 10-5: Organization & Functions of the US Army, 1 November 1978
- AR 10-41: Organization & Functions, United States Army Training and Doctrine Command, 27 June 1973
- TRADOC Regulation 10-41: Organization and Functions, 1 May 1980
- USASIGS Regulation 10-2: Organization and Functions Manual, May 1977
- Pamphlet 11-25: Life Cycle System Management Model for Army Systems, 21 May 1975
- Department of Defense Directive 5000.1: Major System Acquisitions, 19 March 1980
- Department of Defense Directive 5000.2: Major System Acquisition Procedures, 19 March 1980
- Department of Defense Directive 5000.3: Test and Evaluation, 26 December 1979
- TRADOC Regulation 71-12: Total System Management-TRADOC System Manager (TSM), 15 September 1978

(5) Relationships with Users, Materiel Developers, Training Developers. The TSM Charters, under which the TSMs at USASC operate, specify that the TSMs are authorized to coordinate directly with the following organizations on matters related to the systems for which they are responsible:

- HQDA
- HQ TRADOC
- USA DARCOM, PM & Major Subordinate Commands
- USAOTEA
- USAMACOM (USAFORSCOM, USAREUR, Eighth US Army)
- CDRMILPERCEN
- Other Military Services, agencies, and organizations as required.

Operating under these guidelines, the following working relationships have been established:

- (a) TSM-ADDS/MSE interacts weekly with CORADCOM PM-PLRS/TIDS on user needs and their impact on system design.
- (b) TSM-ADDS/MSE interacts weekly with TRADOC proponent schools on user needs.
- (c) TSM-ATACS interacts as required with HQDA on requirements, PIPS, and coordination.
- (d) TSM-ATACS interacts daily with PM-ATACS on coordination and PIPS.
- (e) TSM-ATACS interacts daily with DCD, USASC on tasking and coordination.
- (f) TSM-ATACS interacts weekly with DOT and DTD, USASC on tasking and coordination.
- (g) TSM-ATACS interacts bi-weekly with C-E Test Board on testing and coordination.
- (h) TSM-TAC AU SW interacts weekly with HQDA on equipment production requirements.
- (i) TSM-TAC AU SW interacts monthly with TRI-TAC on testing, requirements, and system architecture.
- (j) TSM-TAC AU SW interacts weekly with CORADCOM PM-MSCS on testing and system requirements.

(k) TSM-TMDS interacts quarterly with all USAMACOM on fielding.

(l) TSM-TMDS interacts daily with all TRADOC proponents on fielding, training, software requirements, and specifications.

(m) TSM-TMDS interacts daily with HQDA on funding and requirements.

(n) TSM-TMDS interacts daily with CSC on all aspects of system development.

(6) Operating procedures. Since the majority of the systems listed in Paragraph 2-4.h.(1) have not yet been fielded, PDSS experience is very limited and no formal operating procedures are in use. In the past, for smaller and less complicated systems, the procedure for correcting software errors or making improvements has been for the User to submit a Product Improvement Proposal (PIP) and/or a new Required Operational Capability (ROC) to the Materiel Developer. However, since the processing of either a PIP or a ROC is very costly and time consuming, this approach may not be sufficient for the larger and more rapidly changing systems.

A PDSS plan for the AN/TTC-39 and AN/TYC-39 systems has been prepared and is being finalized. This plan provides for the creation of a Software Support Center to handle all software maintenance and provides for the use of the TRI-TAC Joint Test Facility for testing the modified software.

(7) Gaps and duplications in current PDSS processes. The major gap which exists in PDSS for the communications functional area is that for most systems PDSS has not yet been addressed since the fielding dates are several years into the future.

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CHAPTER 3

TRADOC PDSS REQUIREMENTS

3-1. GENERAL.

a. Requirements Addressed. This chapter documents the results of the research and analysis conducted during performance of Task 4 of the study. Task 4 was directed toward identifying and describing the BFA-level PDSS requirements of TRADOC Centers and Schools. HQ TRADOC requirements were also addressed. In accomplishing this task, the Study Team's effort focused initially on identifying the Combat Developers PDSS-related functional responsibilities and then on addressing the resource requirements associated with these functions. The resource requirements set forth for each BFA are those perceived by TRADOC personnel who were contacted during visits to the various Schools and Centers. The scope of the Phase I effort did not provide for study team validation or analysis of these stated resource requirements. They will be considered, however, in the development of alternative structures during Phase II and justification for these resource requirements identified within each alternative structure will be provided in the Phase II technical report.

b. Basis for Requirements. The PDSS-related functional responsibilities identified during this effort, and discussed below, derive primarily from TRADOC's basic responsibilities as set forth in AR 10-41: Organization and Functions, US Army Training and Doctrine Command, which are expanded upon in other applicable Army and TRADOC regulatory documents discussed in Chapter 2. Within the scope of TRADOC's regulatory responsibilities, specific PDSS functional requirements were then identified. In structuring this set of PDSS functional requirements, the Study Team drew upon the minimum set of tasks necessary for PDSS which were formulated by the PDSS Task Force involved in the DARCOM-initiated PDSS study and documented in the PDSS Concept Plan for BAS, May 1980. This minimum set of tasks necessary for PDSS is discussed further in Paragraph 3-3.

3-2. TRADOC PDSS ROLE. TRADOC, as the Army's principal Combat Developer, has a critical and increasing role in the development and life cycle management and support processes for battlefield automated systems. There are several reasons for the increase in this role but the driving factors are:

- The growing trend toward embedding more doctrine, tactics, and functional procedures in BAS software, thus necessitating more direct CD participation in analysis and decisions pertaining to system changes that could affect any of these areas,
- The growing number of BAS being fielded which makes definition and maintenance of functional interoperability requirements more complex, and
- The continually evolving nature of some BAS which is now an accepted system development approach per DODI 5000.2, but which has major implications for System and Combat Developers, Users, and all system support activities.

Fulfillment of this increased role in PDSS for BAS imposes additional functional requirements on HQ TRADOC and all TRADOC Centers and Schools involved in supporting battlefield systems. While most of these functional requirements are common to all Centers and Schools, their magnitude varies among the TRADOC organizations. There are also some unique requirements that must be considered. These PDSS functional requirements and the associated resources needed to effectively accomplish the PDSS functions that are identified are discussed in the paragraphs that follow.

3-3. COMMON PDSS FUNCTIONAL REQUIREMENTS.

a. Combat Developer Functions. TRADOC is the battlefield architect responsible for determining what capability is required and when it is required. TRADOC responsibilities encompass those of Combat Developer, Training Developer, and User Surrogate. In meeting these responsibilities, TRADOC Centers and Schools must routinely perform a number of functions that relate to the development, training, fielding, and maintenance of battlefield automated systems. These functions fall generally into the eight functional areas identified and briefly described in Figure 3-1.

b. PDSS Tasks.

(1) In focusing on and expanding upon the third functional area shown in Figure 3-1, Software Maintenance of PDSS, the PDSS Task Force involved with developing the PDSS Concept Plan for BAS formulated the minimum set of tasks necessary for PDSS referred to in Paragraph 3.1, above. These tasks, which were grouped into six functional areas--Management, Analysis, Modification, Test, Field Support, and Other--are presented in Figure 3-2. Review of these tasks indicates that they extend into both the Materiel Developer and Combat Developer areas of responsibility.

(2) Analysis of this set of minimum PDSS tasks, TRADOC's basic regulatory responsibilities, and the role of TRADOC in PDSS provides a basis for formulating a set of PDSS functional requirements common to all TRADOC Centers and Schools involved with PDSS for BAS. These functional requirements are presented in Figure 3-3, grouped into the same six functional task areas as shown in Figure 3-2.

c. Relationship of PDSS Tasks and Combat Developer Functions.

(1) The close relationship and dependency between these common PDSS functional requirements and the other Combat Developer functions shown in Figure 3-1 are readily apparent. Most of the PDSS functions can be viewed as processes or elements within one or more of the other seven functional areas. They should be addressed and accomplished as integral parts of the other functional areas where appropriate.

FUNCTIONS OF TRADOC CENTERS AND SCHOOLS RELATED TO
AUTOMATED SYSTEMS DEVELOPMENT, TRAINING, MAINTENANCE AND FIELDING

1. Research and Analysis: Functions in this area include development and evaluation of new concepts, threat impact, interoperability, force structure, tactics, doctrine, operating procedures, logistic and maintenance concepts, technology and other areas that relate to the employment of automation on the battlefield.
2. Development of System and Software Requirements: This area includes the definition of requirements, at both the system and the software (tactical) levels ensuring that they are valid, complete, consistent and in consonance with the mission(s), doctrine, tactics, operating procedures, and interoperability requirements they implement.
3. Software Maintenance (also called PDSS): This functional area includes evaluation of trouble reports from users; evaluation of proposed changes; identification of system changes required due to changes in threat, mission, doctrine, tactics, or operational procedures; and ensuring that interoperability requirements are met and maintained. It also includes establishing priority schemes for fixes/changes to be applied to existing systems to provide compatibility and interface with associated developmental systems.
4. Training Development: Functions in this area involve determining requirements for institutional and unit training (both initial and readiness/proficiency maintenance, for instructors and system operators) system and non-system training devices/simulators/simulations, and scenarios therefor, and for determining course content, standards of performance, programs, procedures, necessary instructor qualifications, and training literature. All of the above must be addressed at the proper time in the system development or system change cycle to insure that all changes are appropriately reflected in all training media at the time necessary to preserve/maintain overall systems readiness/effectiveness. New Equipment Training must also be addressed in coordination with the Materiel Developer.

Figure 3-1. Functions of TRADOC Centers and Schools related to development, training, maintenance, and fielding of automated systems (continued on next page)

5. Guidance to the Field: This area involves functions necessary to ensure that the User receives proper guidance to operate, maintain and "fight" the system in its field environment, especially in those situations where doctrinal parameters may need to be "tailored" for the mission, theater, situation and command strategies; also to properly orchestrate the delivery of this guidance and feedback under conditions of changes in threat, mission, doctrine, system software, and systems with which integration is essential.

6. Support to Contingency Planning and Operations: Emphasis in this area is on developing and recommending force structure and mix, command and control procedures, communications requirements and system tailoring for planned or postulated missions or operations in current or contemplated theaters of employment. System tailoring is provided through set-up of variable software parameters to optimize system performance on a mission contingency basis.

7. Systems Testing: Functions in this area involve specifying system change test conditions, monitoring development testing, participating in operational testing, and planning and conducting or monitoring User acceptance testing.

8. Support of Wartime/Crisis Operations: This area includes participation in planning and providing support to Field Users during crisis/wartime to ensure that battlefield systems are maintained in an effective operational condition, capable of performing as intended in accordance with user requirements and that "procedural workarounds" are provided when time or other factors do not permit software changes. This requires a capability to respond rapidly to User-reported operational system problems.

Figure 3-1. (concluded)

1. Management

- a. Development and maintenance of a software support plan responsive to user requirements as determined by the user representative (for example, TRADOC center or school)
- b. Planning, acquisition, and maintenance of resources
- c. Operation of the PDSS centers/support facilities
- d. Configuration management of the software system.

2. Analysis

- a. Analysis of a system to determine the nature of the problem -- whether hardware, software or both
- b. Analysis of software problem reports
- c. Analysis of proposed system changes to determine technical, operational, resource, and schedule impacts
- d. Analysis of support software changes due to hardware variations
- e. Determination of the possible impact of software changes on hardware/software
- f. Analysis of system changes due to interoperability requirements.
- g. Analysis of conceptual changes to fielded systems, such as doctrine, tactics, operating procedures, command and control, organizational concepts, training, and logistics.

3. Modification

- a. Development of system/software change requirements

Figure 3-2. Minimum set of tasks necessary for PDSS*
(Continued on next page)

* As defined in the PDSS Concept Plan for BAS, May 1980

- b. Development, design, implementation, and documentation of all software modifications
 - c. Maintenance of documentation necessary to support existing software and development systems
 - d. Distribution of changes in accordance with the Configuration Management Plan
 - e. Compliance with approved design standards
 - f. Compliance with approved programming standards
 - g. Compliance with approved documentation standards
4. Test
- a. Verification and validation of software and system changes
 - b. Testing and evaluation of the impact of changes on the operational function
 - c. User acceptance testing, including evaluation of operational suitability and operational effectiveness.
5. Field Support
- a. Provision of field support, including development and guidance to the field on operation and employment of the systems
 - b. Maintenance of communication and procedures between the field and support activity.
6. Other
- a. Development of system test and analysis software/hardware
 - b. Development and maintenance of simulations and emulations, where required

Figure 3-2. (continued)

- c. Development and conduct of the training necessary to introduce new software versions and maintain old systems
- d. Development and distribution of procedural, operational, training, and maintenance documentation and special operating instructions.

Figure 3-2. (concluded)

TASK AREA	TRADOC RESPONSIBILITY	FUNCTIONS
1. MANAGEMENT	1. PARTICIPATE WITH MD IN DEVELOPING AND MAINTAINING PDSS PLANS FOR EACH BAS.	1. PARTICIPATE IN DEVELOPMENT OF THE CRMP. 2. PROVIDE REPRESENTATION ON THE CRWG. 3. PARTICIPATE IN DESIGNATION OF PDSS CENTER FOR EACH BAS.
	2. PARTICIPATE WITH MD IN CONFIGURATION MANAGEMENT.	1. PROVIDE REPRESENTATION ON EACH BAS CCB. 2. PROVIDE REPRESENTATION ON EACH BAS SSCB. 3. PROVIDE REPRESENTATION ON EACH BAS FSCB. 4. PROVIDE REPRESENTATION ON ANY EXECUTIVE LEVEL CCB ESTABLISHED UNDER THE CCS ² CONCEPT.
	3. MANAGE CD PDSS EFFORT.	1. DETERMINE REQUIREMENTS (PERSONNEL, EQUIPMENT, FACILITIES, SIMULATION MODELS AND DEVICES, DATA BASES). 2. PLAN AND PROGRAM FOR RESOURCES. 3. ACQUIRE AND MANAGE RESOURCES.
2. ANALYSIS	1. PERFORM ANALYSIS OF BAS SOFTWARE PROBLEM REPORTS.	1. IN CONJUNCTION WITH MD, DETERMINE IF SOURCE OF PROBLEM IS FUNCTIONAL OR TECHNICAL. 2. COORDINATE WITH MD ON ACTION REQUIRED TO ADDRESS THE PROBLEM. 3. COORDINATE WITH MD IN NOTIFYING THE USER OF RECEIPT AND PLAN OF ACTION ON TROUBLE REPORTS. 4. COORDINATE WITH MD ON PROVIDING SOLUTION TO THE FIELD. 5. ESTABLISH, IN COORDINATION WITH MD, PRIORITY OF CHANGE AND TIME FRAME FOR CHANGE TO BE EFFECTED.
	2. ANALYZE USER-STATED REQUIREMENTS.	1. RECEIVE REQUIREMENT FROM USER. 2. EXAMINE BASIS FOR REQUIREMENT. 3. COORDINATE WITH MD REGARDING ACTION TO SATISFY VALIDATED REQUIREMENTS. 4. INFORM USER OF PLANNED DISPOSITION OF REQUIREMENT.
	3. ANALYZE FUNCTIONAL IMPACT OF CONCEPTUAL CHANGES ON SYSTEMS (E.G., CHANGES IN DOCTRINE TACTICS, OPERATING PROCEDURES, COMMAND AND CONTROL, ORGANIZATIONAL CONCEPTS, TECHNOLOGY, THREAT).	1. DETERMINE AND EXAMINE, IMPACT ON INDIVIDUAL SYSTEMS AFFECTED. 2. DETERMINE AND EXAMINE IMPACT ON SYSTEM INTEROPERABILITY BASELINE.

Figure 3-3. TRADOC PDSS responsibilities and functions
(continued on next page)

TASK AREA	TRADOC RESPONSIBILITY	FUNCTIONS
2. ANALYSIS (CONTINUED)	4. ANALYZE FUNCTIONAL IMPACT OF PROPOSED SYSTEM CHANGES.	1. IDENTIFY OPERATIONAL IMPACT. 2. IDENTIFY USER-RESOURCE REQUIREMENT IMPACT. 3. IDENTIFY TRAINING IMPACT. 4. IDENTIFY LOGISTICAL IMPACT. 5. IDENTIFY IMPACT ON ALL PERSONNEL ASPECTS. 6. IDENTIFY HUMAN FACTORS IMPACT. 7. IDENTIFY SYSTEM INTEROPERABILITY IMPACT.
3. SYSTEM MODIFICATION	1. DEVELOP FUNCTIONAL CHANGE REQUIREMENT.	1. DEFINE REQUIREMENT IN APPROPRIATE REQUIREMENTS DOCUMENT. 2. SPECIFY ANY INTEROPERABILITY CHANGE REQUIREMENT. 3. PROVIDE REQUIREMENT TO MD. 4. COORDINATE WITH MD IN ESTABLISHING CHANGE PRIORITIES AND OBJECTIVE IOC DATE. 5. MAINTAIN COORDINATION WITH MD DURING DEVELOPMENT OF CHANGE TO CLARIFY REQUIREMENTS AS REQUIRED.
4. SYSTEM TESTING	1. MONITOR, PARTICIPATE IN, OR CONDUCT SYSTEM TESTING AS APPROPRIATE.	1. COORDINATE TYPE/DEGREE OF TESTING NECESSARY FOR EACH ISSUE/REVISION OF SOFTWARE PROGRAM. 2. DEVELOP SYSTEM CHANGE TEST CONDITIONS AND CRITERIA. 3. PARTICIPATE IN DESIGN OF THREAT SCENARIOS. 4. MONITOR DEVELOPMENT TEST (DT). 5. PARTICIPATE AS TASKED BY HQDA IN OPERATIONAL TESTING (OT) CONDUCTED BY OTEA. 6. PLAN AND CONDUCT OTHER SYSTEM OT. 7. PLAN AND CONDUCT OR MONITOR USER ACCEPTANCE TESTING 8. EVALUATE OPERATIONAL SUITABILITY AND EFFECTIVENESS. 9. PROVIDE APPROVAL FOR SOFTWARE RELEASE TO THE FIELD.
5. FIELD SUPPORT	1. MAINTAIN INTERFACE WITH AND PROVIDE FUNCTIONAL GUIDANCE TO FIELD USERS	1. MAINTAIN COMMUNICATIONS WITH USERS. 2. FUNCTION AS USER SURROGATE. 3. DEVELOP AND PROVIDE GUIDANCE ON DOCTRINAL/TACTICAL ASPECTS OF SYSTEM EMPLOYMENT. 4. COORDINATE WITH MD ON THE SCHEDULE AND METHODOLOGY FOR DISTRIBUTION OF SYSTEM SOFTWARE CHANGE PACKAGE TO THE FIELD.

Figure 3-3. (continued)

TASK AREA	TRADOC RESPONSIBILITY	FUNCTIONS
5. FIELD SUPPORT (CONTINUED)	2. DEVELOP AND MANAGE TRAINING PROGRAM REQUIRED BY SYSTEM CHANGE (EXCEPT FOR NEW EQUIPMENT TRAINING (NET)).	1. DETERMINE TRAINING/RETRAINING DEVELOPMENT REQUIREMENTS. 2. DETERMINE TRAINING DEVICE REQUIREMENTS. 3. DEVELOP TRAINING PLAN FOR MEETING REQUIREMENTS. 4. DEVELOP AND DISTRIBUTE UPDATED OR NEW TRAINING LITERATURE AND MATERIALS. 5. DEVELOP TRAINING SCENARIOS FOR INSTITUTION AND FIELD USE. 6. DEVELOP TRAINING SUPPORT SOFTWARE REQUIREMENTS. 7. VALIDATE/VERIFY TRAINING MATERIALS. 8. PARTICIPATE IN FIELD USER TRAINING AND NET.
6. OTHER	1. JOINT AND INTERNATIONAL INTEROPERABILITY REQUIREMENTS	1. IDENTIFY REQUIREMENTS. 2. SPECIFY IN REQUIREMENTS DOCUMENT.
	2. SUPPORT TO CONTINGENCY PLANNING.	1. COORDINATE WITH MD IN PLANNING FOR REQUIRED PDSS SUPPORT TO BAS IN THE CONTINGENCY FORCE. 2. PROVIDE FOR "TACTICAL TAILORING" OF FIELDED SOFTWARE TO CONTINGENCY MISSION.
	3. SUPPORT TO CRISIS/WARTIME OPERATIONS.	1. SPECIFY PDSS RESPONSE REQUIREMENTS. 2. EXAMINE ALTERNATIVES FOR PROVIDING THE MOST TIMELY AND EFFECTIVE PDSS UNDER VARIOUS SCENARIOS. 3. COORDINATE WITH THE MD IN PLANNING PDSS SUPPORT. 4. DEVELOP PROCEDURAL WORK-AROUNDS WHEN SITUATION DOES NOT PERMIT SOFTWARE CHANGES. 5. THROUGH FRONT-END ANALYSIS, DESIGN FLEXIBILITY INTO THE SOFTWARE TO ALLOW FIELD USER RESPONSE TO ANTICIPATED CONTINGENCIES.
	4. ASSESS CONTINUED TACTICAL SUITABILITY OF BAS.	1. CONDUCT PERIODIC REEVALUATIONS OF BAS TO DETERMINE CONTINUED TACTICAL SUITABILITY AS CHANGES OCCUR IN THREAT, DOCTRINE, AND OPERATIONAL REQUIREMENTS.

Figure 3-3. (continued)

(2) The extent to which the common PDSS functional requirements (Figure 3-3) must be addressed within each BFA, additional unique functional requirements of the Centers and Schools, and the resultant capability and resource requirements generated, are discussed in Paragraph 3-5 below.

3-4. HQ TRADOC REQUIREMENTS.

a. Functions to be Performed.

(1) HQ TRADOC must be cognizant of major PDSS activities within the command. With respect to these activities, the HQ TRADOC role is one of receiving directions or requirements from Headquarters, Department of the Army or requests from Users, analyzing and translating these into requirements or instructions for subordinate commands, exercising staff supervision, reviewing the subsequent activity, and acting upon the products of the subordinate commands.

(2) Within HQ TRADOC, the Deputy Chief of Staff for Combat developments (DCSCD) has primary staff responsibility for PDSS. This stems from his responsibility for monitoring all user aspects of materiel systems throughout their life cycle to insure integration of doctrine, tactics, training, personnel, and logistics requirements. Within DCSCD, coordinating responsibility for PDSS is assigned to the Systems Integration Branch, Telecommunications, Command and Control, and Computer Systems (TC4S) Directorate. Each of the "hardware directorates" (e.g., Firepower Systems, Intel & EW, and Maneuver Systems) within DCSCD has HQ TRADOC staff responsibility for PDSS within its associated Center(s) and School(s). Within these DCSCD directorates, designated staff officers are responsible for exercising this responsibility for one or more systems within their functional area. Among these directorates, the Intelligence and EW Directorate plays a particularly prominent role with respect to systems in the Intelligence/EW BFA because of the relationships and interaction between Intelligence/EW BAS and intelligence systems that operate at or support echelons above corps (EAC) and strategic levels. The TC4S Directorate has HQ TRADOC staff responsibility for Combat Service Support (CSS) and Command and Control (C²) systems.

b. Requirements. An element is needed within DCSCD to serve as the focal point for PDSS activities and to actively coordinate all PDSS actions with other elements involved both within and external to HQ TRADOC. While such a focal point has been designated, as stated above, staffing of that element does not appear to be adequate to handle this responsibility, particularly as PDSS requirements and HQ TRADOC's involvement continue to increase. A minimum of one staff officer (military or civil service) is needed to handle these expanding responsibilities in a timely and effective manner.

3-5. FUNCTIONAL AREA REQUIREMENTS.

a. Force Level Control Functional Area.

(1) Systems to be supported. The Force Level and Maneuver Control System (SIGMA) and the PLRS are the only BAS projected to require PDSS support in the command and control area at this time. PDSS requirements associated with PLRS are discussed in more detail in Paragraph 3-5.g., under the Communications BFA since the US Army Signal Center is the system proponent and the PDSS resource impact will be greatest in that area. As stated in Paragraph 2-4.b., current plans provide for this system to be developed under the evolutionary process authorized by DODI 5000.2. An initial, Phase 1 version of this system, called the Operations Control and Command Information System, is to be deployed to USAREUR beginning in October 1980, in accordance with the USAREUR Implementation Plan, Phase 1, 12 June 1980. PDSS will be required for this Phase 1 version of the system following its deployment as shown in Figure 3-4. Present plans provide for this initial Phase 1 system to be expanded and extended in USAREUR and to other US Army corps and divisions in an evolutionary manner. As this plan is implemented, PDSS requirements will increase in both magnitude and complexity. Also, PDSS planning for the objective system that ultimately evolves from the SIGMA development effort must begin and be continued as an integral part of system development as it proceeds.

(2) Functions to be performed. Basic functions to be performed by the CD in planning for and providing PDSS to SIGMA are those identified in Figure 3-3. In addition to these basic functions, personnel involved with PDSS for SIGMA will also be responsible for insuring the integration of SIGMA with other control systems since SIGMA will be the driver of CCS². Any change to another control system must be coordinated with SIGMA before being exported to the field as a system change package for implementation. Another factor to be considered is that the evolutionary process through which SIGMA is to be developed may impose increased PDSS requirements as development progresses from one version of the system to the next. Location of the CORADCOM-managed PDSS Center for SIGMA at Fort Leavenworth as provided in the PDSS Concept Plan for BAS, May 1980, will facilitate coordination and interaction between the CD and MD organizations involved with all aspects of PDSS for this system as it evolves.

(3) Requirements.

(a) At this stage of the SIGMA development effort, CD resources assigned direct responsibilities for the program (elements of the Army C²/JINTACCS Division, C²I Directorate, CACDA), appear to be adequate to handle the initial Combat Developer PDSS planning functions for this system. As system development progresses under the evolutionary concept and PDSS requirements increase, additional resources will be needed to fulfill CD responsibilities in planning for and providing PDSS for this system. In particular, since this system must interoperate extensively with other control systems (e.g., TACFIRE, ASAS, etc.) under the CCS² Concept, careful attention must be devoted to the impact of system changes on interoperability requirements.

FUNCTIONAL PROONENT	BATTLEFIELD AUTOMATED SYSTEM (BAS)	YEAR					
		80	81	82	83	84	85
CAC	OCCIS-OPERATIONS CONTROL AND COMMAND INFORMATION SYSTEM (PHASE 1 SIGMA)						

Figure 3-4. Systems requiring PDSS--Force Level Control Functional area

(b) Part of the increased resource requirement associated with PDSS for SIGMA could be satisfied by establishing/staffing the TSM SIGMA Office within CACDA. In addition to the normal resources of the TSM Office, a limited number of system/software oriented personnel will be needed to carry out detailed CD PDSS functions to include interacting as necessary at the working level with system users and with the CORADCOM-managed PDSS Center at Fort Leavenworth. Specific CD resources requirements have not been identified at this time. They are, in part, dependent upon future plans and decisions regarding SIGMA development and acquisition.

b. Fire Support BFA.

(1) Systems to be supported. Within the Fire Support BFA there are currently three systems which will require PDSS. These three systems (TACFIRE, BCS, and PERSHING II) were described in Paragraph 2-4.c. and are itemized in Figure 3-5 with an indication of when PDSS will be required.

(2) Functions to be performed. Figure 3-3 presented an extensive list of TRADOC PDSS responsibilities and functions. For the Fire Support BFA, each of the functions listed there is performed primarily by one or more of three organizations (TSM-FATDS, TDS-CD-USAFAS, and USAFABD). Figure 3-6 shows the distribution of those PDSS functions among the three organizations. At the present time, most of the functions listed are being performed in support of the TACFIRE system.

(3) Requirements.

(a) Policies and procedures. One of the gaps identified in Paragraph 2-4.c.(7), as pertains to the Fire Support BFA, is the need for a regulatory document or documents which address four particular issues. Each of these issues is discussed below:

1. A direct working relationship is needed between the DARCOM software support group and the TRADOC software support group. This relationship is currently being handled informally, but it needs to be formalized either via a TRADOC regulation or via a MOA between DARCOM and TRADOC. This relationship could be defined as a direct interface between the TSM and the MD for each system.

2. A procedure for the establishment of various configuration control boards, such as SCCB and FAICCB, needs to be spelled out in a TRADOC regulation. This procedure should spell out the numbers and types of members, the chairman, the frequency of meetings, the area of responsibility, etc. for each board.

3. Current TRADOC regulations do not provide for the updating of training documents in connection with software modifications. Since many software modifications, particularly those related to weapons system equipment updates and doctrinal changes, greatly affect the User's interface to the BAS, training documents for that BAS must be updated in parallel with the modification. A procedure for doing this needs to be formalized.

FUNCTIONAL PROONENT	BATTLEFIELD AUTOMATED SYSTEM (BAS)	YEAR					
		80	81	82	83	84	85
USAFAS	AN/GSG-10(U)--TACTICAL FIRE DIRECTION SYSTEM (TACFIRE)						
USAFAS	AN/GYK-29--BATTERY COMPUTER SYSTEM (BCS)						
USAFAS	PERSHING II--TACTICAL MISSILE SYSTEM						

Figure 3-5. Systems requiring PDSS--Fire Support BFA

TASK AREA	TRADOC RESPONSIBILITY	FUNCTION	PERFORMING ORGANIZATION		
			TSM-FATDS	TDS-CD-USAFAFAS	USAFABD
1. Management	1. Participate with MD in developing and maintain-PDSS plans for each BAS.	1.1.1 .2 .3	X X X		
	2. Participate with MD in configuration management.	1.2.1 .2 .3 .4	 X X X	X X X X	X X
2. Analysis	1. Perform analysis of BAS software problem reports	2.1.1 .2 .3 .4		X X X X	
	2. Analyze user-stated requirements.	2.2.1 .2 .3 .4	X X X X	X X X X	
	3. Analyze functional impact of conceptional changes.	2.3.1 .2	X	X	
	4. Analyze functional impact of proposed system changes	2.4.1 .2 .3 .4 .5 .6 .7	 X X X X X X	X X X	
3. System Modification	1. Develop functional change requirements.	3.1.1 .2 .3 .4 .5	X X X X	X X X X X	

Figure 3-6. TRADOC PDSS responsibilities and functions for the Fire Support BAS (continued on next page)

TASK AREA	TRADOC RESPONSIBILITY	FUNCTION	PERFORMING ORGANIZATION		
			TSM-FATDS	TDS-CD-USAFAFAS	USAFABD
4. System Testing	1. Monitor, participate in, or conduct system testing as appropriate.	4.1.1			X
		.2			X
		.3			X
		.4			X
		.5			X
		.6			X
		.7	X		
5. Field	1. Maintain interface with and provide functional guidance to field users.	5.1.1		X	
		.2		X	
		.3		X	
		.4		X	
	2. Develop and manage training program required by system change	5.2.1	X		
		.2	X		
		.3	X		
		.4	X		
		.5	X		
		.6	X		
6. Other	1. Joint and international interoperability requirements.	6.1.1	X		
		.2	X		
	2. Support to contingency planning	6.2.1	X		
	3. Support to crisis/wartime operations.	6.3.1	X		
		.2	X		
		.3	X		
	4. Assess continued tactical suitability of BAS	6.4.1	X		

Figure 3-6. (concluded)

4. Current TRADOC regulations do not provide for the funding of User acceptance testing of software updates for deployed systems. A regulation addressing this problem is needed.

(b) Organization. It is not expected that the resolution of any of the above issues will require the addition of new organizations or the restructuring of existing organizations. However, the resolution of some of the issues may require the addition of personnel to existing organizations which are understaffed.

(c) Resources. Figure 3-7 shows the types and quantities of personnel which would be required to establish a Combat Developments Software Support Facility (CDSSF) at Fort Sill. Of the personnel shown, eleven are currently on board. In addition to the personnel, a physical plant to house the CDSSF and equipment for an operational test bed would also be required.

c. Air Defense BFA.

(1) Systems to be supported. Figure 3-8 identifies the air defense systems requiring or anticipated to require PDSS. In this figure, PDSS requirements are shown as starting at the time the system is fielded. It must be understood, however, that planning for PDSS must precede that date, and in some cases the planning phase may involve significant lead times and substantial resource requirements. Reference may be made to Chapter 2, for discussion of the systems identified. In Figure 3-8, under the "Other" category (line 8), reference is included to an air defense control system to support the Command, Control and Subordinate Systems (CCS²) concept. Although the CCS² concept refers to the AN/TSQ-73 in the role of such an air defense control system, there is reason to believe that a separate entity may more appropriately evolve, oriented toward the needs of CCS². Several other potential systems are reflected in work being conducted at various levels of research. It is relatively certain that at least one of these potential systems will eventually become a responsibility under this BFA and impose significant PDSS requirements. It appears prudent to anticipate such requirements under this heading, although system identifications are premature at this time.

(2) Functions to be performed. The common functions identified in Paragraph 3-3, above, will be required for all lines shown on Figure 3-8. Additional functions or functional details have been outlined in Chapter 2, Paragraph 2-4.d., for this BFA. The functions to be performed in this BFA are at least as comprehensive as those of other BFA, and are driven by exceedingly demanding mission and technical requirements.

PDSS PLAN

COMBAT DEVELOPMENTS SUPPORT FACILITY

PERSONNEL REQUIRED (AMIM-80)

GRADE	MOS/SSI	NUMBER
O-6	13,51	1
O-5	13,49,53	4
O-4	13,49,53	4
O-3	13,49,53	6
E-7	71L	1
E-5	71L	1
GS-12	1515,855	2
GS-11	1670,301,334	4
GS-09	334,301	3
GS-07	301	1
GS-04	303	2

Figure 3-7. Personnel requirements for Combat Developments Software Support Facility

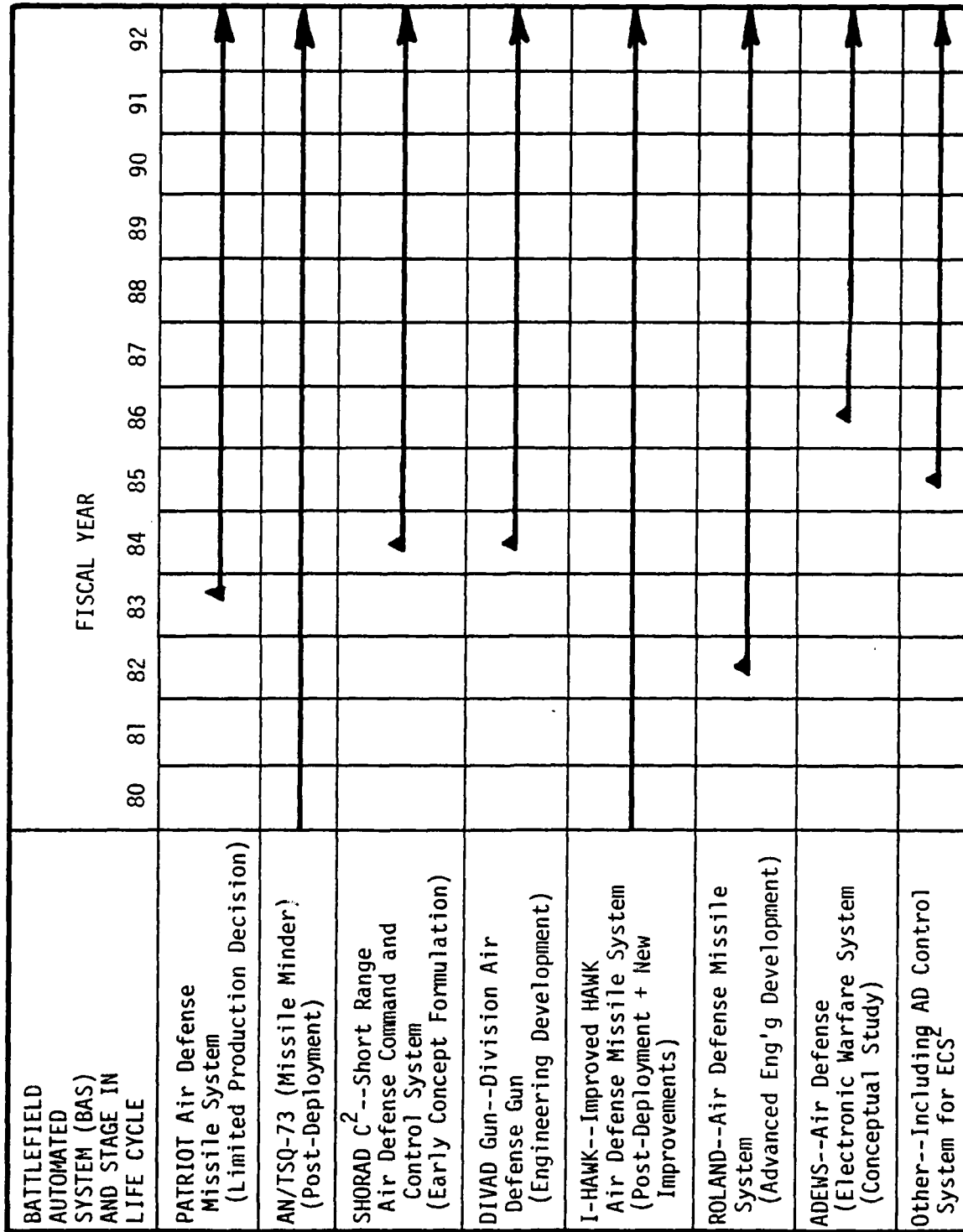


Figure 3-8. Systems requiring PDSS--Air Defense BFA

(3) Requirements.

(a) Policies and procedures. Current regulatory authority, policies, and procedures have been addressed in Paragraph 2-4.d. of Chapter 2. It is clear that implementation of PDSS for any significant system requires that detailed procedures be worked out and agreed to by the many parties involved. This action requires resources. It is also clear that PDSS plans must be worked out and agreed to well before the system is fielded, if the capabilities of the hardware and software are to be realized and if effectiveness and readiness of the system is to be achieved. This action requires that the required resources be available at the proper time in the life cycle of the system. Experience to date strongly indicates that the capability to provide effective PDSS at the necessary time is dependent on many prior actions and preparations that cannot be overlooked. To participate effectively in either the provision of software support after deployment or the planning for that support, personnel must be familiar with the various basic technologies involved, the system itself, its mission, and its development history. For example, as systems and their software increase in complexity, the requirement for clear, accessible documentation or prior participation in the development of the system becomes more of a necessity in order to know what to test for, how to test, and how to diagnose problems. It appears that current policy documents do not give appropriate attention to these realities.

(b) Organization. Research to date in this BFA does not indicate that new organization and organizational requirements are a significant problem at this time. This is not to say that future developments may not reveal such problems, particularly as the issues of how to add resources are addressed.

(c) Need for a Combat Developments Support Facility. The necessary tactical doctrine to ensure effective employment of these major BAS was never thoroughly developed by the Combat Developer before the systems were developed. The systems are about to be fielded with software-embedded tactical doctrine developed largely by the contractor and Materiel Developer. The existing software-embedded tactical doctrine has not been evaluated by the Combat Developer, and evidence suggests it may be suspect or at least less than optimum for desired system effectiveness in an integrated air defense environment. It is felt, within the AD community, that a software support facility, to vastly upgrade CD capabilities, is needed to permit CD development of the appropriate tactical doctrine and evaluation of that already embedded in system software, so that necessary corrective actions can be taken and User guidance can be provided. Because the systems will soon be fielded, the overall requirement largely falls, or will soon fall, in the category of post-deployment software support.

(d) Resources. Requirements for resources (people, facilities, and equipment) in this BFA have been and remain a principal area of concern among personnel in the AD community. Intensive attention has been given to this issue at USAADS over the past two or more years. A series of estimates of resource requirements have been made and forwarded to higher headquarters for action. While some resource requests in limited areas have been granted, evidence indicates that questions remain regarding the need for the levels of required resources estimated for PDSS.

Several obstacles to a more common agreement appear to exist. One is the relative newness of the underlying requirements, evolving as they have from an attempt to play catch-up in air defense capability deferred during the Vietnam era. A second obstacle may be the resulting sudden introduction, or imminence of fielding, of several major air defense systems, at least two of which involve a level of battlefield automation complexity and interoperability requirements far exceeding any previous Army battlefield systems. Another apparent obstacle to agreement is simply the magnitude of the requirements estimates at a time when many smaller requirements which do seem relatively understandable are facing intense scrutiny in the interest of maintaining budgetary goals. Another difficulty lies in the relationship between the emergence of these new systems and the need, and rationale for the need, for such levels of resources to make operationally effective what has already cost billions in commitments or projected commitments for systems acquisition alone.

Furthermore, there appears to be yet another dimension which is an obstacle to agreement. This relates to the definitional issue of what is clearly a post-deployment problem, at one point in time, and what may be necessary, at an earlier point in time, in order to effectively prepare for and cope with the post-deployment problem. As has already been alluded to in preceding paragraphs this "definitional issue" is really not as simple as it sounds. Also, it relates to the more fundamental issues of how the overall combat development process should be planned and conducted, in the context of the total life cycle of any system acquisition action.

Many estimates of resource requirements have been prepared at USAADS, including a very significant amount of detail. Breakdown details include personnel requirement estimates by type of personnel, by system, by year. However, because of the volume of this detail, and the nature of fundamental definitional issues also involved, only a synopsis of those estimates will be presented in this report. The summary numbers are presented in Figure 3-9. It should be noted that these numbers include not only the TRADOC requirement for support of BAS software in the post-deployment phase alone, but also significant requirements relating to software support throughout the overall combat development and system acquisition life cycle process.

	FISCAL YEAR			
	80	81	82	83
Total Personnel Required*	87	105	121	122

* Includes estimated military, civilian, and contractor support personnel in both mission-oriented and facility support functions of combat development area. Does not include a requirement within the Directorate of Training Developments for about 32 people in FY81 and subsequent years to support planning for and providing PDSS for training devices.

Figure 3-9. Estimated total personnel requirements for USAADS Combat Developments Support Facility

d. Intelligence and Electronic Warfare BFA.

(1) Systems to be supported. The Category 1 and 2 BAS that impose PDSS requirements within this BFA were identified and addressed in Paragraph 2-4.e. Figure 3-10 lists these same BAS and identifies the projected time when each system is to be deployed and PDSS for the deployed systems must begin. Early PDSS planning must, of course, be accomplished concurrently with system development prior to the projected deployment shown in Figure 3-10.

(2) Functions to be performed. The basic functions to be performed by USAICS systems personnel in planning for and providing PDSS to the BAS in this BFA are those identified in Figure 3-3. With respect to the performance of these functions, USAICS personnel must interact with system Users and with ERADCOM and USACC, the Materiel Developers for all BAS being addressed in this BFA.

(3) Requirements.

(a) Policies and procedures. No significant problems were identified with respect to regulatory authority or policies applicable to PDSS for BAS in the Intelligence/EW BFA.

(b) Organization.

1. PDSS Coordination.

a. Research conducted during Phase I of this study reveals that there is a need for a closer relationship at the working level between the USAICS and ERADCOM elements involved with PDSS for BAS in the Intelligence/EW BFA. Both CD and MD personnel expressed concern over the current situation. A related concern is the apparent need for more participation by CD personnel in addressing User-reported system problems and functional requirements.

b. As a result of these areas of concern, there appears to be a requirement for a USAICS organizational element that would serve on a dedicated basis to provide an interface with both the MD and User and promote the working level CD-MD and CD-User relationships considered to be needed. For reference purposes in this report, this element will be called the USAICS PDSS Coordination Element. To be effective, the personnel in this USAICS element must be knowledgeable of the operational and technical aspects of the User's operations as well as the BAS supporting each User. As such, they can provide a currently missing link in the PDSS process, and a communications medium between the User and the MD. This would contribute to an improved CD capability to state functional requirements to the MD. This capability would save time and resources that are currently expended

FUNCTIONAL PROONENT	BATTLEFIELD AUTOMATED SYSTEM (BAS)	YEAR					
		80	81	82	83	84	85
USAICS	AN/MS-67--COMMUNICATIONS CENTER (COMFAC)				→	→	→
USAICS	ASAS--ALL SOURCE ANALYSIS SYSTEM				→	→	→
USAICS	AN/TSQ-114--TRAILBLAZER						→
USAICS	AN/ALQ-151--QUICKFIX			→	→	→	→
USAICS	AN/TSQ-105--GUARDRAIL V						→
USAICS	AN/ALG-133--QUICKLOOK II						→
USAICS	SOTAS--STAND-OFF TARGET ACQUISITION SYSTEM				→	→	→
USAICS	TCAC(D)--TECHNICAL CONTROL AND ANALYSIS CENTER (DIVISION)			→	→	→	→

Figure 3-10. Systems requiring PDSS-Intelligence
and Electronic Warfare BFA

when requirements are not completely or properly stated initially. It would also place the CD in his proper role of examining and resolving conflicting requests and requirements from different users of the same system before MD resources are committed to their solution.

c. It should be noted that no concern was expressed regarding the working level interaction between the USAICS personnel involved with the COMFAC system and the current System Developers in USACEEIA. The close relationship that exists relative to this system can be partially attributed to the collocation of both the CD and MD organizations involved at Ft. Huachuca. In this regard, the establishment of the ERADCOM-managed PDSS Center for ASAS at Ft. Huachuca, as provided for in the PDSS Concept Plan for BAS, May 1980, should help to promote closer MD-CD working level interaction on the ASAS. PDSS for all other BAS in the Intelligence/EW BFA is to be provided by the ERADCOM PDSS Center at Ft. Monmouth. The USAICS PDSS coordination organization referred to in Paragraph b, above, would be responsible for interface with the PDSS Center at Ft. Monmouth on actions involving systems supported there.

2. Other requirements. Two additional requirements were identified during the Phase I research at USAICS that relate to the need for an improved capability to develop and state functional requirements.

a. Both CD and MD personnel indicate that, even when functional requirements are known, the CD has difficulty in stating these requirements to the MD in clear meaningful terms to facilitate system development/change programming. Despite dedicated effort by CD personnel involved, requirements usually cannot be stated in the degree of detail desirable. There is a language barrier or gap in this area. To fill this gap, there is a need for a software requirements definition language to assist the CD in stating system requirements. Such a language would be beneficial to personnel in other BFA as well.

b. There is a need for an improved analytical capability to support the definition and development of functional requirements. This capability is needed to support analysis to determine the impact that conceptual changes in doctrine, capabilities, operational procedures, or the threat, have on existing systems. This capability is also needed to analyze the impact of proposed system changes on the system being addressed as well as others with which it must interoperate.

(c) Resources.

1. PDSS Coordination Element.

a. Initial estimates indicate that the USAICS PDSS Coordination Element referred to above, should consist of 10 to 12 professional military and civilian personnel. This estimate is based on

requirements to accomplish the CD PDSS functions identified previously for the Intelligence/EW BFA systems requiring or projected to require PDSS as shown in Figure 3-3. As future PDSS requirements increase, the size of this PDSS Coordination Element may have to be increased accordingly.

b. The personnel in this PDSS Coordination Element should be specialists in the various intelligence/EW disciplines associated with BAS in this BFA, and should have secondary specialties in automatic data processing. This will facilitate their interaction with both Users and the MD in bringing together the functional and technical aspects of a system. No associated facility or equipment requirements have been identified at this time. This initial resource requirement estimate will be refined and developed in further detail during subsequent study phases.

2. Improved analytical capability to support definition and development of functional requirements. This needed capability, discussed in Paragraph (b) 2.b, above, is required to support the accomplishment of CD functions associated with both system development and system changes or PDSS. Requirements in this area are being addressed by USAICS at present in a three-phase plan for increasing the capabilities of the Computer Systems Management Office. The Simulations Systems Management Office is the subordinate organizational element that would provide the improved analytical capability under this plan. If it is determined that there is a need to address analytical capabilities to support PDSS separately from the above plan, this will be accomplished in coordination with USAICS during Phase II of this study.

e. Combat Service Support BFA.

(1) Logistics Center.

(a) Systems to be supported. The BAS that impose PDSS requirements within this BFA were identified and addressed in Paragraph 2-4.e. Figure 3-11 lists these same BAS and identifies the projected time when each system is to be deployed and PDSS for the deployed systems must begin. PDSS planning must, of course, be accomplished concurrently with system development prior to the projected deployment shown in Figure 3-11.

(b) Functions to be performed. The basic functions to be performed by LOGCEN Management Information Systems Directorate personnel in planning for and providing PDSS to BAS in the logistics portion of the CSS BFA are identified in Figure 3-3. In performing these functions, LOGCEN personnel must interact with System Users, the CSC Support Group, Ft. Lee, and other organizations as discussed in Paragraph 2-4.f.(1).

FUNCTIONAL PROONENT	BATTLEFIELD AUTOMATED SYSTEM (BAS)	YEAR					
		80	81	82	83	84	85
LOGCEN/ DCSLOG	DSU/GSU--DIRECT SUPPORT UNIT/ GENERAL SUPPORT UNIT						▶
USASC	DLDED		┌───┐				▶
LOGCEN/ DCSLOG	SAMS--STANDARD ARMY MAIN- TENANCE SYSTEM		┌───┐				▶
LOGCEN/ DCSLOG	DLOGS--DIVISION LOGISTICS SYSTEM						▶
LOGCEN/ DCSLOG	MRM--MAINTENANCE REPORTING AND MANAGEMENT						▶
LOGCEN/ DCSLOG	SAAS-3--STANDARD ARMY AMMUNITION SYSTEM	---(SAAS 1)---	┌───┐				▶
LOGCEN/ DCSLOG	SAILS--ABX STANDARD ARMY INTERMEDIATE LEVEL SUPPLY						▶
LOGCEN/ DCSLOG	DS4--DIRECT SUPPORT STANDARD SUPPLY SYSTEM		┌───┐				▶
LOGCEN	CSS CONTROL SYSTEM -1)					┌───┐	▶
LOGCEN	PHOENIX	┌───┐					▶
	-1) IN COORDINATION WITH SOLDIER SUPPORT CENTER.						

Figure 3-11. Systems requiring PDSS--Logistics Center Portion
Combat Service Support BFA

(c) Requirements. The US Army Logistics Center has many years of experience in providing PDSS to fielded systems and well established procedures for providing this support. Excellent relationships exist with the Logistics Systems Developer, the CSC Support Group, Ft. Lee, and the activities of each organization are closely coordinated to provide the most effective and responsive support possible to the user. This support ranges from emergency customer assistance to scheduled installation of system change packages designed to improve a system's capability to satisfy important user requirements. As a result of this capability, no additional PDSS functional or resource requirements were identified which affect the LOGCEN.

(2) Soldier Support Center.

(a) Systems to be supported. Figure 3-12 identifies the systems anticipated to require PDSS and indicates when such support requirements may begin and end for each system. In this figure, PDSS requirements start at the time the system is fielded, although it must be understood that some planning for PDSS must precede that date. PDSS requirements for SIDPERS, SIDPERS Wartime, and the DLED Personnel Software Package are seen as being satisfied by MILPERCEN and CSC, with SSC PDSS involvement restricted to monitoring. The third line in this figure, labeled Software Conversion for New Hardware, is not system-specific, as explained in Paragraph 2-4.f.(2)(a)3, above. In the case of this line, PDSS is construed to begin at the outset of detailed planning, since the various systems to be affected by hardware change are already fielded. Additional comments or qualifications for lines 3 through 7 are provided in the footnotes to this figure. SSC PDSS requirements with respect to VFDMIS, TAPER, and VTAADS may be restricted to monitoring and to interoperability considerations.

(b) Functions to be performed. Because substantive PDSS requirements for which SSC is anticipated to be responsible are one to three years in the future, little can be said at this time regarding specific functions to be performed, other than what has been covered in Paragraph 3-3, above. The general or common PDSS functions identified in that paragraph will apply to those systems for which SSC will have substantive responsibility (lines 3 thru 6 on Figure 3-12). In Software Conversion for New Hardware, line 3, SSC functions may well be more limited than Paragraph 3-3 might suggest. Line 6, Interfaces with TAMMIS, it should be emphasized, is to address only PDSS of the interfaces between TAMMIS and personnel systems, and not TAMMIS itself, which will be the responsibility of Health Services Command. SSC PDSS responsibilities with respect to Line 7, PWIS are not clear at this time, and may be quite limited. As noted in the preceding paragraph, SSC responsibilities for VFDMIS, TAPER, and VTAADS, may be limited primarily to interoperability issues.

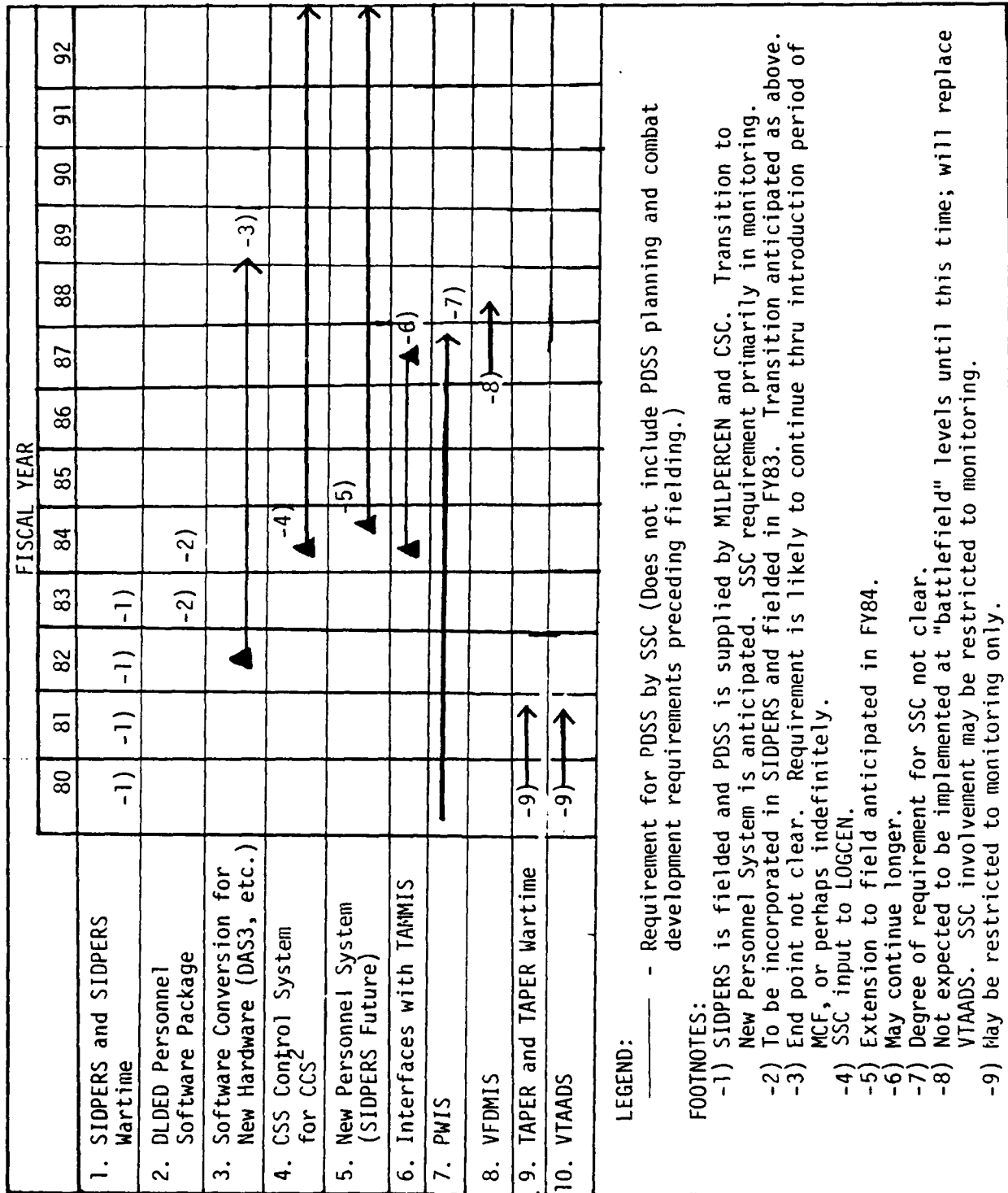


Figure 3-12. Post-deployment needs

(c) Requirements.

1. Policies and procedures. Regulatory authority, policies, and related issues have been discussed at some length, in Paragraphs 2-4.f.(2)(c),(d),(f), and (g), above. In the last of those paragraphs, a number of apparent regulatory overlaps and other problems were identified. Based on research to date, it seems that some clarification of these issues would be desirable, although no specific suggestions have yet been recorded regarding proposed vehicles, forms, or contents for such clarifications. These matters will be addressed further in later phases of this study effort.

2. Organization. Some organizational changes and realignments have been made--some very recently, as indicated in Paragraph 2-4.f. It appears that a less-than-complete understanding of these organizational changes exists among parties involved. Preliminary evidence indicates that some substantive issues may remain to be resolved.

3. Resources. A preliminary discussion of personnel resources required to perform a broad set of combat development, fielding support, and maintenance functions, with emphasis on PDSS, was held at SSC on 3 September 1980. During this discussion, estimates were made of the total number of people needed by fiscal years 1980-1986 and by system or major category, as shown in Figure 3-13. Both MILPERCEN and SSC were represented in that discussion, and the estimates are intended to represent the perceived total requirements of both those organizations. Breakout between MILPERCEN and SSC, however, is discernible. A further breakdown into specific functions, and PDSS alone is generally not identified. Also, systems appear in Figure 3-12 that were not specifically addressed in the estimates appearing in Figure 3-13. Furthermore, resources other than personnel (e.g., facilities, equipment, other) were not addressed during that discussion. Nevertheless, these estimates do provide an indication of the resource requirements, and can serve as a basis for refinement. Generally speaking, SSC and MILPERCEN representatives stated that 30 people are now needed for what is essentially combat development-side PDSS of existing personnel/admin systems. The level needed for PDSS can be anticipated to increase gradually as additional systems are involved, reaching about the 35+ level by 1985/86. These numbers do not include personnel also needed to perform other combat development functions such as requirements and concepts definition, supervision and monitoring of development, involvement in developmental testing and evaluations and operational and user issues, and extension of new systems to the field. In the 1983/84 period, if monitoring and supervising development of a new personnel system and other developments are included, the numbers are projected to reach the 90 level, not including support of fielding. In 1984, an additional 50 people are seen needed for 6 to 12 months to support fielding. None of these numbers include efforts on the system/materiel developer side of the house. Figure 3-13 provides also an indication of the difficulty involved in clearly separating PDSS from related requirements.

FISCAL YEAR							
	80	81	82	83	84	85	86
MAINTAIN CURRENT BASELINE	30 ①	30	30	30			
DLDED MILPERCEN- SSC-	2 (included in 30 above)	2 (included in 30 above)	2 (included in 30 above)	20 Fielding 2	2	goes to New System, below	
NEW MAIN HARDWARE	Software Conversion testing		monitoring 1	4	4	maintenance goes to New System, below	
CONTROL SYSTEM 2 FOR ECS ²	Preparations 4	4	4	4	4		
NEW PERSONNEL SYSTEM	Start to resolve rgmts 10		begin specs 40	75 Monitor Development	75*	maintenance 30 30	
OBJECTIVE CONTROL SYSTEM	Reintegrate with above				2	4 4	
TAMMIS INTERFACES			4	4	4	2	1
① Current MILPERCEN staff as req'd * plus another 50 for fielding extension for 6 mos to 1 yr							

Figure 3-13. Preliminary personnel estimates, personnel/admin

f. Maneuver BFA.

(1) Systems to be supported. The Advanced Attack Helicopter (AAH) is the only Category 1 or 2 BAS projected to require PDSS support in the Maneuver BFA. PDSS will be required for this Category 2 system following projected deployment in 1982 as shown in Figure 3-14. PDSS planning actions will have to be accomplished prior to that time.

(2) Functions to be performed. Basic functions to be performed by the CD in planning for and providing PDSS to this system are those identified in Figure 3-3. The US Army Aviation Center, the Combined Arms Concepts Division of the Concepts and Doctrinal Management Directorate, the Army C2/JINTACCS Division of the C3I Directorate, and the Combat Division, Materiel Integration Directorate, CACDA, are the CD organizations primarily involved with this system. They must interface with the PM AAH on matters pertaining to the development and post-deployment support of this system. At this time, no PDSS Center has been designated to support the AAH. The PDSS Concept Plan for BAS states that a Center will be designated at the time of transition.

(3) Requirements. No functional or resource requirements needed for providing PDSS to BAS within this BFA have been identified at this time other than those CD personnel currently involved with the AAH.

g. Communications functional area.

(1) Systems to be supported. Within the communications functional area there are currently ten category 1 and 2 systems which will require PDSS. These systems were described in Paragraph 2-4.h.(1). and are itemized in Figure 3-15 with an indication of when PDSS will be required.

(2) Functions to be performed. The basic functions to be performed by USASC systems personnel in planning for and providing PDSS to the BAS in the communications functional area are those identified in Figure 3-3. The only unique functions which they might perform are those associated with TRI-TAC. Since TRI-TAC involves all Service branches as well as NSA and DCA, there will be some functions to be performed which are not directly covered in Figure 3-3.

(3) Requirements.

(a) Policies and procedures. The only requirement expressed in the area of PDSS procedures is the need for a streamlined, responsive procedure to effect identified improvements to a system without the requirements of developing a new Required Operational Capabilities (ROC) document and without the processing normally associated with it.

(b) Organization. Only if the solution to the above requirement should include the establishment of a Combat Developments Software Support Facility at Fort Gordon, would any new organizations be required to maintain PDSS for the communications functional area.

FUNCTIONAL PROPOSER	BATTLEFIELD AUTOMATED SYSTEM (BAS)	YEAR					
		80	81	82	83	84	85
USAAC	AAH--ADVANCED ATTACK HELI- COPTER			→			

Figure 3-14. Systems requiring PDSS--Maneuver BFA

FUNCTIONAL PROONENT	BATTLEFIELD AUTOMATED SYSTEM (BAS)	YEAR					
		80	81	82	83	84	85
USASC	PLRS--POSITION LOCATION REPORTING SYSTEM					→	→
USASC	JTIDS--JOINT TACTICAL INFOR- MATION DISTRIBUTION SYSTEM			→	→	→	→
USASC	PLRS/JTIDS HYBRID					→	→
USASC	DLDED--DIVISION LEVEL DATA ENTRY DEVICE					→	→
USASC	AN/TTC-39--AUTOMATIC TELE- PHONE CENTRAL OFFICE			→	→	→	→
USASC	AN/TYC-39--AUTOMATIC MESSAGE SWITCHING CENTER			→	→	→	→
USASC	AN/UGC-74A(V)--MODULAR RECORD TRAFFIC TERMINAL (MRTT)	→	→	→	→	→	→
USASC	AN/TSQ-111(V)--COMMUNICATION NODAL CONTROL ELEMENT (CNCE)					→	→
USASC	AN/TTC-38--AUTOMATIC TELE- PHONE CENTRAL OFFICE	→	→	→	→	→	→
USASC	AN/MSM-105--TEST AND AUTO- MATIC REPAIR FACILITY					→	→

Figure 3-15. Systems requiring PDSS--Communications Functional area

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CHAPTER 4

GENERAL ISSUES AND POTENTIAL PROBLEMS

4-1. GENERAL. This chapter describes general issues and potential problem areas that have been identified during the initial phase of this study and, where appropriate, discusses insights and implications for TRADOC based on research and analysis to date. Further research and analysis during Phase II may result in development of additional information relative to these subject areas.

4-2. AREAS IDENTIFIED.

a. Regulatory Authority and Policy. Regulatory policy governing the acquisition and life cycle management of automatic data processing systems in the Army is divided between two sets of regulations--the AR 18-series, and AR 1000-1 and the AR 70-series. Generally, BAS in the CSS BFA have been acquired under AR 18-1 while other BAS have been acquired and managed under ARs 1000-1 and 70-1. However, there are differences in interpretation with respect to the applicability of these regulations. This is a source of irritation and potential problems among organizations and personnel involved with BAS within TRADOC. Efforts have been made, through the recent revision (August 1980) to AR 18-1 and the pending revisions to ARs 1000-1 and 70-1, to clarify their applicability and minimize differences between these regulations, to the extent that this can be done and still comply with Public Law and OMB policy. The memorandum from the Assistant Secretary of Defense (Research Development, and Acquisition), 1 July 1980, subject: "Standardization of Embedded Computer Resources," and letter from the Deputy Commander, TRADOC, file: ATDC, dated 30 July 1980, same subject, discussed in Paragraph 2-3.d., also promulgate policy relative to this problem area. To further clarify this policy following publication of the revised ARs 1000-1 and 70-1, further effort should be devoted to insuring that there is full understanding and agreement on the applicability of these regulations and the recently published AR 18-1.

b. Adequacy of Army Regulations. The post-deployment period of the system life cycle in general, and post-deployment software support in particular, have not been addressed sufficiently in the basic Army regulations governing system acquisition and life cycle management (i.e., AR 1000-1, AR 70-1, and AR 18-1). DARCOM and CSC regulations have helped to fill this gap some with respect to the Materiel/System Developer's requirements but there is no comparable regulation addressing the Combat Developer's requirements. The new August 1980 AR 18-1 does address the "Deployment and Operation Phase" of the system life cycle in greater detail and a review of portions of drafts of revised ARs 1000-1 and 70-1 indicate that post-deployment requirements are also being addressed more in those regulations. For example, in the revised AR 70-1, an entire chapter is being devoted to the acquisition and management of computer resources including post-deployment support to these resources. A TRADOC companion regulation to DARCOM Reg 71-16 implementing the new provisions of AR 70-1 is needed. In addition, the DARCOM-TRADOC Materiel Acquisition Handbook needs to be updated to reflect the revised policies of these Army regulations and of DOD Instruction 5000.2.

c. Cascade of Training Requirements. In complex, heavily automated BAS, training software may be incorporated in the BAS itself to further operator proficiency. Separate training devices tend also to be required to train operators and maintainers. The separate training devices are required primarily for institutional training of new personnel, refresher training, etc. The training resource requirements implications of these built-in and separate training devices/capabilities may extend (or cascade) over several levels. First, the training software in the BAS and the separate devices must be properly specified and managed throughout its development. Second, the separate devices themselves must be properly planned and acquired, with the training goals clearly in sight. Third, the built-in and separate training devices probably will require training scenarios to exercise the training software. Fourth, preparation of the scenarios will probably require personnel familiar with the BAS and its operation, and hence, present an early-on requirement for training of these personnel. This requirement in turn poses a fifth requirement for simulators of the BAS which can be used as initial training devices. Sixth such simulators must have software and driver scenarios. When changes are made to any significant aspect of basic software in the BAS (whether that change is caused by a change in threat, doctrine, environment, interoperability conditions/requirements, or hardware itself), then corresponding changes will need to be reflected at all but the second of the six levels identified above. Implementing such changes further requires a PDSS effort almost wholly relating to the training area--new scenarios, new software, training in the changes, etc. All of these functions and steps require properly qualified personnel, and many require space, facilities, equipment, and other funding for development and maintenance support. This phenomenon of cascading training resource requirements appears not to be generally recognized, but will be encountered with many more BAS in the not-too-distant future.

d. Need for Simulation/Experimentation/Analysis Capability. Generally, a need is seen to exist, at any TRADOC center which is to carry significant combat development responsibilities, for a simulation/experimentation/analysis capability. Development of system and system software requirements is a major responsibility of both the User and the Combat Developer, as User Surrogate. At the front end of both the system life cycle and the life of system changes, development of requirements actually extends from the study phase through the end of the system life cycle. Development of requirements is more than simply identifying and describing a need. Development of requirements is an exacting function which requires detailed insight into the potential behavior of system variables, their tradeoffs, and payoffs. This requires in many cases a range of computerized models and simulations, from aggregative, low-resolution analytical models to detailed, high-resolution, high-fidelity probabilistic simulations. Such models and simulations are required because, in even a modestly complex system of variables, the interrelations among these variables are far beyond the capability of the unaided human mind to evaluate. Such analytical tools can permit detailed evaluation of user requirements to insure that they are appropriate, complete,

consistent, and testable, prior to their transfer to the Materiel Developer. The trend of embedding in software more and more of the vital doctrinal and tactical functions and operating procedures dictates a much deeper level of specificity of User requirements than is commonly provided to the Materiel Developer or is called for in procedures for writing requirements documents. This evolving trend not only demands that User Representatives amplify the depth of detail in their tactical software requirements specifications but also dictates a much closer involvement with the Materiel Developer throughout system development, testing, and post-deployment support. The alternative is to abdicate Combat Developer responsibilities to the program managers and contractors. Experience has shown such abdication to be a very costly mistake. The same analytical capabilities needed for development of system and system software requirements are needed to guide and support User acceptance and other testing, to determine training requirements for devices and programs, and to evaluate new concepts, tactics, and doctrine, in response to changes in technology, threat, mission, and environment. The rationale for these other needs for a simulation/experimentation/analysis capability is much the same as that enunciated above. Finally, it should be emphasized that such a capability is applicable to the needs of both the pre-deployment and the post-deployment combat development responsibilities, of which PDSS is one aspect.

e. System and Software Requirements Definition. One of the Combat Developer's principal functions in the PDSS process is defining system and software requirements in clear meaningful terms to the Materiel Developer. Phase I research indicates that in many cases, this poses serious difficulties for the Combat Developer even when functional requirements are well known. There appear to be communication gaps between statements of functional requirements and the software written to satisfy those requirements. The development or acquisition of a "Software Requirements Definition Language" to assist the Combat Developer in defining and stating requirements should be a major step in filling the gap that currently exists. Also closely related to the problem of requirements definition is the need for simulation and analytical capabilities to support this process as described in Paragraph d.

f. Implications of DODI 5000.2. DODI 5000.2: Major Systems Acquisitions Procedures, 19 March 1980, provides supplementary procedures for use in implementing DODD 5000.1: Major Systems Acquisition. Paragraph 13 of DODI 5000.2, authorizes an alternate acquisition procedure for major or nonmajor command and control systems that are to be acquired in limited numbers and meet certain other criteria. This alternate procedure provides that after approval by the Secretary of Defense of a MENS for such a system, the design and testing of the system may be accomplished in an evolutionary manner. The system would be configured initially as a prototype using existing military or commercial equipment to the maximum extent possible and with minimum additional software. Designated Users would test various configurations in operational environments. The end result would

be a definition of a system, including operational software, tailored to meet the User needs. While this procedure has many apparent advantages, it also has a number of implications that need to be considered with respect to configuration control, post-deployment support, training requirements, and other related areas.

g. Configuration Control Boards (CCB). The ECS² concept for battlefield automation and the requirement for interoperability among BAS within this concept appears to make the establishment of a hierarchy of configuration control boards desirable. One concept for the structure of this hierarchy would include CCB at each of the three levels of the ECS² concept as follows:

- Executive System Level: One CCB to exercise configuration management for the Executive System and the interoperability requirements between this system and the control systems with which it must interface
- Control System Level: One CCB for each control system (e.g., ASAS, TACFIRE) to exercise configuration management for each control system and its interoperability with each of its supporting systems
- Support System Level: One CCB for each system.

This concept has been partially implemented in some BFA, but needs to be fully implemented across all BFA. Also, while the Materiel Developer has primary responsibility for configuration management, the Combat Developer must participate actively in this effort. The establishment of an effective system for exercising the required degree of control over all BAS should be of concern to all organizations involved with these systems.

h. Personnel Resources. Acquisition of the required capability to fulfill the Combat Developer's role in planning for and providing PDSS for BAS will probably involve additional personnel resources although all specific requirements have not been identified at this time. The acquisition of additional resources poses a very difficult problem in view of the constraint on personnel resources throughout the Army at the present time.

i. Crisis/Wartime Support. This is one of the most important areas to be addressed in any plan or system intended to provide PDSS to BAS. There are so many unique system-related aspects of providing PDSS support in crisis/wartime that no single plan or concept can be applied to all BAS. In devising an appropriate wartime support plan and capability, the nature, role, and criticality of each system must be addressed as well as its location on the battlefield. The nature and likelihood of change in the threat with which the system must contend is a major factor in PDSS planning. The friendly plan of operations and interoperability requirements are other major factors that must be considered. There are also conflicting interests and requirements, e.g., rapid response through interim changes and work-around

procedures versus the need to maintain configuration control. All this emphasizes the need for joint Combat Developer-Materiel Developer addressal of this subject early in each system development effort. This subject will also be addressed further in subsequent phases of this study.

j. Where Do We Get The Necessary People? The software support resource requirements which appear to be emerging from this study raise some fundamental questions that may deserve addressal here. Effective performance of combat development software-oriented functions, upon which combat readiness and effectiveness of vital weapons systems increasingly is coming to depend, requires in most cases, within each individual, a demanding blend of software skills and experience, military doctrinal and weapon system understanding, and basic understanding of the technology on which the weapon systems depend. These skills also need to be reasonably up to date. Since the supply of such types of people is limited, and the numbers required appear to be relatively large, an initial question arises: Where could such additional people be obtained to satisfy requirements? This initial question raises several additional questions. First, is necessary support being given to training of the types of people who will be needed? This question would apply to both in-house Army training (e.g., note the cancellation of the 1181 missile officer course at USAADS in 1977) and possible support or encouragement that might be provided to local private educational institutions. Particularly in the area of automation and information sciences skills, projected demands of industry alone appear to far exceed the probable supply of graduates. Such scarcity may rapidly escalate compensation and otherwise present difficult or insuperable problems to Army acquisition and retention of the necessary, qualified people. Second, do the necessary educational facilities/institutions exist? And, finally, what steps should be taken to maximize Army retention and utilization of the necessary skills? For instance, should a Warrant Officer specialist career path be considered to permit the specialization and stability of tenure which may be needed in performing some of these functions?

k. Issue Concerning The Proper Scope of Study. From the inception of this study effort, it has been apparent that a basic issue or disagreement exists concerning what is the proper scope of study. While the Statement of Work and other elements of the RFP have clearly designated that this study effort was to address only post-deployment, opinions have clearly been expressed in several quarters that both pre- and post-deployment software support should be addressed. In the latter view, the proper scope would include addressal of the entire combat development process pertaining to systems acquisition and life cycle management. This view suggests a need either to expand the scope of this study or to address the larger area in another study.

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APPENDIX A

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APPENDIX B

GLOSSARY

Administration -- This functional area which is included in the Combat Service Support BFA, supports the commander in seeing the battlefield (friendly personnel situation) and in sustaining the forces. Indirect support also exists through assistance to other functional areas and to the soldiers who man them.

Air Defense Artillery -- This BFA reacts to and defeats a varied and growing aircraft and countermeasures threat under all environmental and tactical conditions and in all intensities of combat.

Air/Ground -- This functional area which is included in the Maneuver BFA, relies on the harmonious interaction of the Army Air/Ground Subsystem (AAGS) and the Air Force Tactical Air Control Subsystem (TACS), through the Air Force Tactical Air Control Center (TACC), to jointly provide the personnel, procedures, and equipment necessary to plan, coordinate and execute Tactical Air Support missions.

Automation -- The technique of incorporating computer resources within systems or processes to make those systems or processes operate, in whole or in part, automatically.

Automatic Test Equipment (ATE) -- Computer resources used to isolate facility electronic components for repair or replacement.

Battlefield Automated System (BAS) -- A system intended for use by the Army in the field which contains a computer(s) and which will not function without computer(s); e.g., AN/TSQ-73, TACFIRE.

Battlefield Functional Area (BFA) -- The concept which describes the actions systems perform and the arena in which they operate in accomplishing the commander's mission of viewing the battlefield, planning operations, allocating resources, fighting the battle, and sustaining the force.

Combat Developer -- The agency or command responsible for the formulation of concepts, doctrine, organization, and materiel objectives, and requirements for the employment of U.S. Army Forces in a theater of operations and in the control of civil disturbances. The Combat Developer formulates Army functional systems (logistics, personnel, administrative, and others, as designated) which impact directly on or extend into a theater of operations. The U.S. Army Training and Doctrine Command (TRADOC) is the Army's principal Combat Developer.

Combat Development Support Facility (CDSF) -- The CDSF is a TRADOC analytical facility which encompasses one or more BFAs and which may or may not be collocated, in whole or in part, with an MD PDSS facility at the TRADOC doctrine center or school. The CDSF has as its primary purpose the provision of both the system/software analytical capability and the technical personnel necessary to perform CD functions in the development, maintenance, application, and training for BAS in order to develop, field, use, sustain, and evolve these systems.

Combat Development System Manager (CDSM) -- The Combat Developments System Manager (CDSM) is the system/software CD and the principal field user's representative for a designated system or systems. The CDSM is responsible for managing and coordinating and/or performing all software - related actions inherent in the CD mission. The CDSM is also responsible for planning, programming, and coordinating those software tasks required to be performed by the CDSF in support of the systems for which he is responsible.

Command and Control (C²) -- This functional area is the exercise of the inherent authority of a commander to plan, direct and monitor implementation of tasks by subordinate elements within all Battlefield Functional Areas.

Communications -- This functional area provides the mechanism by which the commander controls all other battlefield functions in the performance of his mission.

Computer -- Electronic machinery which, by means of stored instructions and data, performs rapid complex calculations or compiles, correlates, and selects data. Examples are analog and digital processors, data processors, information processors, real-time control processors, electronic calculators, hybrid computers, communications processors, and micro-processors.

Computer Data -- A representation of facts, concepts, or instructions in a structured form suitable for acceptance, interpretation, or processing by communication between computer equipment. Such data can be external to (in computer-readable form) or resident within the computer equipment and can be in the form of analog or digital signals.

Computer Equipment/Computer Hardware -- Devices capable of accepting and storing computer data, executing a systematic sequence of operations on computer data, or producing computer outputs. Such devices can perform substantial interpretation, computation, communication, control, or other logical functions. Examples are central processing units, terminals, printers, analog/digital converters, tape drives, disks, micro-processors, and automatic test equipment.

Computer Firmware -- Programs or instructions that are stored in read-only memory; firmware is software in unalterable form. Firmware is software regardless of the media on which it is stored.

- Computer Program -- A series of instructions or statements in a form acceptable to computer equipment, designed to cause the computer equipment to execute an operation or operations. Computer programs include operating systems, assemblers, compilers, interpreters, data management systems, utility programs, sort-merge programs, and maintenance/diagnostic programs, as well as applications programs such as payroll, inventory control, operational flight, satellite navigation, automatic test, crew simulator, and engineering analysis programs. Computer programs may be general purpose in nature or be designed to satisfy the requirements of a specialized process or a particular user.
- Computer Resources -- The totality of computer equipment, computer programs, computer data, associated computer documentation, contractual services, personnel, and computer supplies.
- Computer Software -- A combination of associated computer programs, documentation, and computer data required to command the computer equipment to perform computational or control functions.
- Computer Software Documentation -- Technical data, including computer listings and printouts in human-readable form, which specifies the design or details of computer software, explains the capabilities of the computer software or provides operating instructions for using the computer software to obtain desired results from computer equipment. For the purpose of documentation, the term software includes all information, data, analysis, algorithms, flowcharts, etc., which have been generated, acquired, or applied in developing computer programs for the system and system support equipment. This analysis, program coding, flowcharts, algorithms, interface definitions, technical manuals, source and object decks and listings, test plans/procedures/reports, and support programs and their documentation.
- Computer System -- An interacting assembly consisting of computer equipment, computer programs, and computer data.
- Computer System Documentation -- Information that describes the technical details of the computer system over its life cycle. Documentation includes, but is not limited to, equipment design specifications, engineering drawings, operator's manuals, technical orders, computer software documentation, systems specifications, run diagrams, and interface specifications.
- Configuration -- The functional and physical characteristics of materiel, as described in technical documents and achieved in a product.

Configuration (Change) Control Board (CCB) -- A board composed of representatives from program/project functional areas such as engineering, configuration management, procurement, production, test and logistic support, training activities and using/supporting organizations. This board approves or disapproves proposed change requests with each member recording his organization's official position as regards the CCB Chairman's decision. The program/project manager is normally the board chairman and he makes the final decision on all changes unless otherwise directed by command policy. The board issues a directive to implement its decision.

Configuration Identification -- Documents which identify and define the configuration baseline characteristics of an item.

Configuration Item (CI) -- An aggregation of hardware/software, or any of its discrete portions, which satisfies an end-use function and is designated by the Government for configuration management. CIs may vary widely in complexity, size, and type, from an aircraft, electronic, or ship system to a test meter or round of ammunition. During development and initial production, CIs are only those specification items that are referenced directly in the contract (or an equivalent in-house agreement). During the operation and maintenance period, any repairable item designated for separate procurement is a CI (DoD Directive 5010.19).

Configuration Management (CM) -- A discipline applying technical and administrative direction and surveillance to (1) identify and document the functional and physical characteristics of a configuration item, (2) control changes to those characteristics, and (3) record and report change processing and implementation status. It includes configuration identification, control, status accounting and audits.

Design -- The process by which functional requirements are translated into product or procedure specifications to be used in the development of a system or subsystem.

Embedded Computer Resources (ECR) -- Computer resources dedicated to and essential to the performance of the Army BAS mission when physically incorporated in the system or when separated selection, acquisition, and/or management of the computer resources would not be feasible, or when the computer resources are integral to the BAS from a design, procurement, and operations viewpoint.

Emulation -- The imitation of an entire system with another system so that the imitating system is capable of accepting the same data, executing the same programs, and producing the same results as the original system.

Engineer -- This functional area which is included in the Maneuver BFA, brings to the battlefield a terrain-oriented system designed to enhance the capabilities of U.S. weapons systems while decreasing the effectiveness of the enemy weapons.

Engineering Change Proposal (ECP) -- A term that includes both a proposed engineering change and the documentation by which the change is described and suggested.

Fire Support -- This BFA is the major contributor of fire support for maneuver forces.

Fielded Software -- The software that is deployed in and with the tactical equipments.

Functional Proponent -- The Army Staff agency responsible for the subject area in which automation is used or is to be used, including automation in support of the function performed.

Independent Testing -- Testing not of, by, or with the Combat or Materiel Developer's design and implementation team.

Intelligence and Electronic Warfare -- This BFA assists the commander and his staff in knowing and understanding the enemy and in seeing the battlefield through surveillance and target acquisition. In its electronic capability this BFA attacks or defends systems that employ electromagnetic energy, including command and control, weapon and acquisition systems.

Interoperability -- The capability of a system to receive and process intelligible information between or among other systems regardless of whether the systems perform the same battlefield function.

Logistics -- This functional area which is included in the Combat Service Support BFA, supports decision making of each tactical echelon by providing decisive and timely logistic and/or technical expertise as far forward as possible to give the tactical command a full complement of operating equipment and weapons.

Maintenance -- Routine, recurring work, associated with correcting faults, performed to keep a system at or to achieve its intended capability or designed performance.

Major Items/Systems/Programs (AR 1000-1) -- All acquisition programs whose estimated costs exceed \$75 million in RDTE or \$300 million in procurement appropriations, unless exception is approved by VSCA or the program is exempted by SECDEF.

Major System -- Selected materiel systems acquisition programs designated by HQDA as Army major systems to be subjected to management reviews by the ASARC. This designation is normally a part of the ROC approval process accomplished as a prelude to entry into full-scale engineering development. In addition, those Army systems designated by the Secretary of Defense for DSARC review are automatically identified as Army major systems.

Maneuver -- This BFA, through its inherent subsystems of direct fire and integration, provides the timely means to generate and apply decisive combat power on the modern battlefield. Also included in this BFA are the functional areas of Air/Ground, Engineer and that portion of Command and Control in the area of planning.

Materiel Developer -- The command or agency responsible for research, development, and production validation of an item (including the system for its logistic support) which responds to DA objectives and requirements.

Post-Deployment Software Support (PDSS) -- That part of over-all system support necessary to sustain, modify, and improve a deployed systems computer software (instructions, programs, data, etc.) as defined by the user or his representative.

Post-Deployment Software Support (PDSS) Center -- A facility, managed by the Materiel/System Developer, with necessary equipment and personnel to provide PDSS to designated BAS.

Product Improvement Proposal (PIP) -- A reconfiguration of an end item of Army or multi-Service materiel type-classified standard that is funded, managed, and completed as a single project. The term "PIP" is applied to the project from its start as a proposal through its completion.

Proponent Agency (PA) -- The element assigned responsibility by the functional proponent for the functional design, development, implementation, and maintenance of an automated system.

Requirements Document -- Any of two types of documents that formally state the user's needs.

a. Acquisition documents requiring preparation of and support by a BOIP, i.e., Required Operational Capabilities (ROC), Letter Requirements (LR), Training Device Requirements (TDR), Training Device Letter Requirements (TDLR), and Letters of Agreement (LOA).

b. Tables of Organization and Equipment (TOE). A table which prescribes the normal mission, organizational structure, and personnel and equipment requirements for a military unit and is the basis for an authorization document.

Simulation -- The representation of certain features of the behavior of a physical or abstract system by the behavior of another system, e.g., the representation of physical phenomena by means of operations performed by a computer or the representation of operations of a computer by those of another computer.

Software Quality -- The composite of materiel attributes including performance which describes the degree of excellence of the computer software; features and characteristics of a product or service to satisfy a given need.

Support -- All the actions and procedures necessary to maintain and sustain a system in an operational condition acceptable to the Combat Developer.

Support Software -- The software used to develop and maintain the fielded software.

Support System -- Computer resources used to develop or support battlefield automated systems.

System -- An integrated relationship of components, aligned to establish proper functional continuity towards the successful performance of a defined (required) task or tasks.

System Baseline -- A known entity used as a control to determine system performance.

Tactical -- Deployed at or below corps echelons.

Tactical Data Systems -- An automated data processing system which supports the decision making process for combat and combat support functions, as opposed to direct control of weaponry, with respect to battlefield tactics and or employment of combat weapons systems.

Training Developer -- The training developer function is an activity performed by a variety of personnel in the training development process. The system approach to training model provides a broad framework for the development of efficient and effective training through the performance of diverse but complimentary systems functions. These functions encompass the analysis, design, development, implementation and evaluation of the training system.

User -- The command or agency ultimately intended to employ an item of equipment and so designated by DCSOPS (AR 1000-1) when approving the requirement document. The user or user representative provides guidance to the developer throughout the materiel acquisition process on matters pertaining to the expected operational employment of the item. Unless another command is so designated, TRADOC will act as the user representative and will carry out the "user" functions.

Utility -- Computer software module that performs a single, identifiable operation in the execution of a battlefield function. Examples are data collection, data dissemination, data sort, equipment control, scheduling, and interface protocol management.

Validation -- All evaluation, integration and test activities carried out at the system level to ensure that the finally developed system satisfies the requirements of the system specification.

Verification -- The iterative process of determining whether the product of selected steps of the CPCI development process fulfills the requirements levied by the previous step. The process is to ensure that CPCI development specifications reflect the requirements allocated from the system specification.

APPENDIX C

BATTLEFIELD AUTOMATED SYSTEMS (BAS)

C-1. CONTENT OF APPENDIX. This appendix contains the Battlefield Automated Systems (BAS) addressed during this Post-Deployment Software Support (PDSS) Study organized by their Battlefield Functional Area (BFA). Consistent with current doctrinal literature, there are now considered to be five BFA's and two functional areas instead of the 11 former BFA's that were recognized. Figure C-1 clarifies this new classification in relationship to the 11 former BFA's. Figures C-2 through C-8 list the systems according to this new classification and identify the system proponent, development command, readiness command, and projected PDSS center.

C-2. SYSTEM CATEGORIES. The focus of this study has been on System Categories 1, 2A and 2B as defined in the PDSS Concept Plan for BAS, May 1980, since those are the systems with which TRADOC is principally concerned with respect to PDSS:

a. Category 1 systems are defined as large (over 100K lines of code) evolutionary systems and include SIGMA, ASAS, TACFIRE, AN/TSQ-73, PATRIOT, CSS Control System, AN/MSM-105(V), and PLRS/JTIDS Hybrid.

b. Category 2A systems are defined as small (less than 100K lines of code) evolutionary systems, e.g., DIVAD GUN, Battery Computer System (BCS), and SHORAD C2.

c. Category 2B systems include large stable systems, e.g., PLRS, SOTAS, and ADDS.

d. Category 3 systems are small stable systems in which the software is normally transparent to the user and is not expected to change greatly once the system is fielded.

C-3. CATEGORIZATION SOURCE. The above system categorization, used during this study was accomplished during a previous DARCOM-initiated study, Post-Deployment Software Support (PDSS) Concept Plan for Battlefield Automated Systems, May 1980.

BATTLEFIELD FUNCTIONAL AREAS (BFA)	
FORMER CLASSIFICATION	
1. FORCE LEVEL CONTROL BFA	FORCE LEVEL CONTROL FUNCTIONAL AREA (THAT PORTION WHICH AFFECTS THE COMMANDER AND HIS STAFF IS NOW CONSIDERED TO BE IN THE FORCE LEVEL CONTROL AREA AND TO INTERACT WITH THE FIVE BFA'S LISTED BELOW.)
2. MANEUVER BFA 3. AIR GROUND BFA 4. ENGINEER BFA	1. MANEUVER BFA (ALSO INCLUDES THAT PORTION OF COMMAND AND CONTROL IN THE AREA OF PLANNING.)
5. AIR DEFENSE BFA	2. AIR DEFENSE BFA
6. FIRE SUPPORT BFA	3. FIRE SUPPORT BFA
7. LOGISTICS BFA 8. ADMINISTRATION BFA	4. COMBAT SERVICE SUPPORT BFA
9. INTELLIGENCE BFA 10. ELECTRONIC WARFARE BFA	5. INTELLIGENCE AND ELECTRONIC WARFARE BFA
11. COMMUNICATIONS BFA	COMMUNICATIONS FUNCTIONAL AREA (IS NOW CONSIDERED TO BE A SUPPORT FUNCTIONAL AREA WHICH SUPPORTS AND INTERACTS WITH THE FIVE BFA'S LISTED ABOVE.)

Figure C-1. Classification of the current functional areas in relationship to the 11 former BFA's

SYSTEM	CATE- GORY	PROPONENT	DEVELOPMENT COMMAND	READINESS COMMAND	PDSS CENTER	
					LOCATION	MANAGED BY
SIGMA (Phase I is designated Operations Control and Command Information System)	1	CAC	CORADCOM (FT. MONMOUTH)	CERCOM	FORT LEAVENWORTH	CORADCOM
PLRS Position Location Reporting System*	2	USASC	CORADCOM (FT. MONMOUTH)	CERCOM	FORT MONMOUTH	CORADCOM

* Also addressed under the Communications Functional Area since USASC is the proponent.

Figure C-2. Force Level Control System

SYSTEM	CATE- GORY	PROONENT	DEVELOPMENT COMMAND	READINESS COMMAND	PDSS CENTER	
					LOCATION	MANAGED BY
AH-1S COBRA ATTACK HELICOPTER	3	CAC	ARRADCOM (DOVER SITE)	ARRCOM	PICATINNY ARSENAL	ARRADCOM
XM-1, TANK (FIRE CONTROL SYSTEM)	3	CAC	ARRADCOM (DOVER SITE)	ARRCOM	PICATINNY ARSENAL	ARRADCOM
AN/ASN-86 INERTIAL NAVIGATION SYSTEM	3	USAAC	AVRADCOM (FT. MONMOUTH)	CERCOM	FT. MONMOUTH	AVRADCOM
AN/ASN-132 INTEGRATED INERTIAL NAVIGATION SYSTEM	3	USAAC	AVRADCOM (FT. MONMOUTH)	CERCOM	FT. MONMOUTH	AVRADCOM
AN/PSN-6 POSITION LOCATION NAVIGATION SET (LORAN)	3	TRADOC POS/NAV	AVRADCOM (FT. MONMOUTH)	CERCOM	FT. MONMOUTH	AVRADCOM
IACS INTEGRATED AVIONICS CONTROL SYSTEM	3	USAAC	AVRADCOM (FT. MONMOUTH)	CERCOM	FT. MONMOUTH	AVRADCOM
JTMLS JOINT TACTICAL MICROWAVE LANDING SYSTEM	3	USAAC	AVRADCOM (FT. MONMOUTH)	CERCOM	FT. MONMOUTH	AVRADCOM
AN/ASN-128 LIGHTWEIGHT DOPPLER NAVIGATION SYSTEM	3	USAAC	AVRADCOM (FT. MONMOUTH)	CERCOM	FT. MONMOUTH	AVRADCOM

Figure C-3. Maneuver BFA Systems (continued on next page)

SYSTEM	CATEGORY	PROPOSITOR	DEVELOPMENT COMMAND	READINESS COMMAND	PDSS CENTER	
					LOCATION	MANAGED BY
AN/ASN-43B IMPROVED HEADING REFERENCE SYSTEM	3	USAAC	AVRADCOM (FT. MONMOUTH)	CERCOM	FT. MONMOUTH	AVRADCOM
ATHS AUTOMATIC TARGET HANDOFF SYSTEM	3	USAAC	AVRADCOM (FT. MONMOUTH)	CERCOM	FT. MONMOUTH	AVRADCOM
LR-80 ATTITUDE HEADING REFERENCE SYSTEM	3	USAAC	AVRADCOM (FT. MONMOUTH)	CERCOM	FT. MONMOUTH	AVRADCOM
ADVANCED ATTACK HELICOPTER	2B	ARMOR CENTER	PM AAH (ST. LOUIS)	CERCOM/ TSARCOM/ ARRCOM/ MICOM	*	*
AN/ALQ-136 COUNTERMEASURES SET	3	USAAC	ERADCOM (FT. MONMOUTH)	CERCOM	FT. MONMOUTH	ERADCOM
AN/APR-39 RADAR WARNING RECEIVER	3	USAAC	ERADCOM (FT. MONMOUTH)	CERCOM	FT. MONMOUTH	ERADCOM

* System for which a DARCOM PDSS Center is not required or for which the need has not been determined.

Figure C-3 (concluded)

SYSTEM	CATE- GORY	PROONENT	DEVELOPMENT COMMAND	READINESS COMMAND	PDSS CENTER MANAGED BY	
					LOCATION	
DIVAD GUN DIVISION AIR DEFENSE GUN	2A	USAADS	ARRADCOM (DOVER SITE)	ARRCOM	PICATINNY ARSENAL/FT. BLISS *	ARRADCOM/ MICOM
VULCAN-IMPROVED	3	USAADS	ARRADCOM (DOVER SITE)	ARRCOM	PICATINNY ARSENAL	ARRADCOM
AN/TSQ-73 MISSILE MINDER	1	USAADS	CORADCOM (REDSTONE)	MICOM/ CERCOM	FT. BLISS	MICOM
SHORAD C2 SHORT RANGE AIR DEFENSE COMMAND AND CONTROL	2A	USAADS	CORADCOM (REDSTONE)	MICOM/ CERCOM	FT. BLISS	MICOM
PATRIOT AIR DEFENSE MISSILE SYSTEM	1	USAADS	PM PATRIOT	MICOM	REDSTONE ARSENAL	MICOM
HAWK-IMPROVED	2A	USAADS	MICOM (REDSTONE)	MICOM	REDSTONE ARSENAL	MICOM
ROLAND AIR DEFENSE	3	USAADS	MICOM (REDSTONE)	MICOM	REDSTONE ARSENAL	MICOM
ADEWS AIR DEFENSE EW SYSTEM	**	USAADS	**	**	**	**

* Process control support will be at Picatinny Arsenal. Doctrine software site to be determined (Ft. Bliss or Picatinny Arsenal).

** To be determined.

Figure C-4. Air Defense BFA Systems

SYSTEM	CATE-GORY	PROPONENT	DEVELOPMENT COMMAND	READINESS COMMAND	PDSS CENTER	
					LOCATION	MANAGED BY
FADAC FIELD ARTILLERY DIGITAL AUTOMATIC COMPUTER	2A	USAFAS	ARRADCOM (DOVER SITE)	ARRCOM	PICATINNY ARSENAL	ARRADCOM
COPPERHEAD ROLL RATE SENSOR	3	USAFAS	ARRADCOM (DOVER SITE)	ARRCOM	PICATINNY ARSENAL	ARRADCOM
APPS ANALYTICAL PHOTOGRAM-METRIC POSITION SYSTEM	3	USAFAS	ARRADCOM (DOVER SITE)	ARRCOM	PICATINNY ARSENAL	ARRADCOM
AH/GSG-10(U) TACTICAL FIRE DIRECTION SYSTEM (TACFIRE)	1	USAFAS	CORADCOM (FT. MONMOUTH)	CERCOM	FT. SILL	CORADCOM
AN/GYK-29 BATTERY COMPUTER SYSTEM (BCS)	2A	USAFAS	CORADCOM (FT. MONMOUTH)	CERCOM	FT. SILL	CORADCOM
AN/PSG-2 DIGITAL MESSAGE DEVICE (DMD)	3	USAFAS	CORADCOM (FT. MONMOUTH)	CERCOM	FT. SILL	CORADCOM
LASER RANGE FINDER	3	USAFAS	ERADCOM (FT. MONMOUTH)	CERCOM	FT. MONMOUTH	ERADCOM
AN/TNS-10 SOUND RANGE SET	3	USAFAS	ERADCOM (FT. MONMOUTH)	CERCOM	FT. MONMOUTH	ERADCOM

Figure C-5. Fire Support BFA Systems (continued on next page)

SYSTEM	CATE- GORY	PROONENT	DEVELOPMENT COMMAND	READINESS COMMAND	PDSS CENTER	
					LOCATION	MANAGED BY
AN/TPQ-36 FIREFINDER (MOKTAR)	3	USAFAS	ERADCOM (FT. MONMOUTH)	CERCOM	FT. MONMOUTH	ERADCOM
AN/TPQ-37 FIREFINDER (ARTILLERY)	3	USAFAS	ERADCOM (FT. MONMOUTH)	CERCOM	FT. MONMOUTH	ERADCOM
USTAR BATTLEFIELD SURVEILLANCE TARGET ACQUISITION RADAR	3	USAFAS	ERADCOM (FT. MONMOUTH)	CERCOM	FT. MONMOUTH	ERADCOM
FAMAS FIELD ARTILLERY METERO- LOGICAL ACQUISITION SYSTEM	3	USAFAS	ERADCOM (FT. MONMOUTH)	CERCOM	FT. MONMOUTH	ERADCOM
PERSHING II TACTICAL MISSILE SYSTEM	2B	USAFAS	MICOM (REDSTONE)	MICOM	REDSTONE ARSENAL	MICOM
LANCE SHORT-RANGE TACTICAL MISSILE SYSTEM	3	USAFAS	MICOM (REDSTONE)	MICOM	REDSTONE ARSENAL	MICOM
PERSHING PIA TACTICAL MISSILE SYSTEM	3	USAFAS	MICOM (REDSTONE)	MICOM	REDSTONE ARSENAL	MICOM
MLRS MULTIPLE LAUNCH SYSTEM	3	USAFAS	MICOM (REDSTONE)	MICOM	REDSTONE ARSENAL	MICOM

Figure C-5. (continued)

SYSTEM	CATE- GORY	PROPONENT	DEVELOPMENT COMMAND	READINESS COMMAND	PDSS CENTER	
					LOCATION	MANAGED BY
RPV REMOTELY PILOTED VEHICLE	3	USAFAS	AVRADCOM (FT. MONMOUTH)	CERCOM	FT. MONMOUTH	AVRADCOM
PADS POSITIONING AZIMUTH DIRECTION SYSTEM	3	USAFAS	ENGINEER TOPOLOGICAL LABS (DARCOM)	TSARCOM	*	*

* Systems for which a DARCOM PDSS Center is not required or for which the need has not been determined.

Figure C-5. (concluded)

SYSTEM	CATEGORY	PROONENT	DEVELOPMENT COMMAND	READINESS COMMAND	PDSS CENTER MANAGED BY	
					LOCATION	
MEDLOG MEDICAL LOGISTICS SYSTEM	*	SURGEON GENERAL	ACADEMY OF HEALTH SCIENCES	CSC	FT. BELVOIR	CSC
MEDBLOOD BLOOD MANAGEMENT SYSTEM	*	SURGEON GENERAL	ACADEMY OF HEALTH SCIENCES	CSC	FT. BELVOIR	CSC
MEDREG MEDICAL REGULATING	*	SURGEON GENERAL	ACADEMY OF HEALTH SCIENCES	CSC	FT. BELVOIR	CSC
PAR PATIENT ACCOUNTING REPORTING	*	SURGEON GENERAL	CSC (FT. BELVOIR)	CSC	FT. BELVOIR	CSC
SIDPERS STANDARD INSTALLATION DIVISION PERSONNEL SYSTEM	*	MILPERCEN	CSC (FT. BELVOIR)	CSC	FT. BELVOIR	CSC
CIUS CORPS INTERIM UPGRADE SYSTEM (HARDWARE ONLY)	*	N/A	CSC (FT. BELVOIR)	CERCOM	FT. BELVOIR	CSC
XM-19-XM-2 BIOLOGICAL DETECTOR	3	USAOCCS	ARRADCOM (DOVER SITE)	ARRCOM	PICATINNY ARSENAL	ARRADCOM
CSS CONTROL SYSTEM	1	LOGCEN	CSC	CSC/CERCOM	FT. LEE	CSC
SIDPERS FUTURE	*	SSC	CSC	CSC	FT. BELVOIR	CSC

*Not categorized but treated as Category 2 for PDSS planning.

Figure C-6. Combat Service Support BFA Systems (continued on next page)

SYSTEM	CATE- GORY	PROONENT	DEVELOPMENT COMMAND	READINESS COMMAND	PDSS CENTER	
					LOCATION	MANAGED BY
PWIS PRISONERS OF WAR INFORMATION SYSTEM	*	DCSPER	CSC	CSC	FT. BELVOIR	CSC
VFDMIS VERTICAL FORCE DEVELOPMENT MANAGEMENT INFORMATION SYSTEM	*	ODCSOPS	CSC	CSC	FT. BELVOIR	CSC
TAPER THEATER ARMY PERSONNEL ROLLUP AND TAPER WARTIME	*	USAREUR	CSC	CSC	FT. BELVOIR	CSC
VTAADS VERTICAL THE ARMY AUTHORIZATION DOCUMENT SYSTEM	*	ODCSOPS	CSC	CSC	FT. BELVOIR	CSC
XM-21 CHEMICAL AGENT ALARM REMOTE SENSING	3	USAOCCS	ARRADCOM (DOVER SITE)	ARRCOM	PICATINNY ARSENAL	ARRADCOM
DSU/GSU DIRECT SUPPORT UNIT/GENERAL SUPPORT UNIT	*	LOGCEN/ DCSLOG	CSC (FT. BELVOIR)	CERCOM/CSC	FT. BELVOIR	CSC
MOBILE 360/40 (HARDWARE ONLY)	*	N/A	CSC (FT. BELVOIR)	CERCOM	FT. BELVOIR	CSC

* Not categorized but treated as Category 2 for PDSS planning.

Figure C-6. (continued)

SYSTEM	CATEGORY	PROPOSER	DEVELOPMENT COMMAND	READINESS COMMAND	PDSS CENTER	
					LOCATION	MANAGED BY
CS3 COMBAT SERVICE SUPPORT SYSTEM (HARDWARE ONLY)	*	N/A	CSC (FT. BELVOIR)	CERCOM	FT. BELVOIR	CSC
SAMS STANDARD ARMY MAINTENANCE SYSTEM	*	LOGCEN/ DCSLOG	CSC/LOGCEN (FT. LEE)	CERCOM/CSC	FT. LEE	CSC
DLOGS DIVISION LOGISTICS SYSTEM	*	LOGCEN/ DCSLOG	LOGCEN/CSC (FT. LEE)	CSC	FT. LEE	CSC
DS4 DIRECT SUPPORT STANDARD SUPPLY SYSTEM	*	LOGCEN/ DCSLOG	LOGCEN/CSC (FT. LEE)	CSC	FT. LEE	CSC
MRM MAINTENANCE REPORTING AND MANAGEMENT	*	LOGCEN/ DCSLOG	LOGCEN/CSC (FT. LEE)	CSC	FT. LEE	CSC
SAAS-3 STANDARD ARMY AMMUNITION SYSTEM	*	LOGCEN/ DCSLOG	LOGCEN/CSC (FT. LEE)	CERCOM/CSC	FT. LEE	CSC
SAILS ABX STANDARD ARMY INTER- MEDIATE LEVEL SUPPLY	*	LOGCEN/ DCSLOG	LOGCEN/CSC (FT. LEE)	CERCOM/CSC	FT. LEE	CSC
DAS-3 (HARDWARE)	*	LOGCEN/ DCSLOG	CSC (FT. BELVOIR)	CERCOM	FT. LEE	CSC

* Not categorized but treated as Category 2 for PDSS planning.

Figure C-6. (continued)

SYSTEM	CATE- GORY	PROONENT	DEVELOPMENT COMMAND	READINESS COMMAND	PDSS CENTER	
					LOCATION	MANAGED BY
AN/MSQ-67 COMMUNICATIONS CENTER	2A	USAICS	USACC	CERCOM	FT. MONMOUTH	CORADCOM
ASAS ALL SOURCE ANALYSIS SYSTEM	1	USAICS	ERADCOM	CERCOM	FT. HAUCHUCA	ERADCOM
AN/TSQ-114 TRAILBLAZER	2A	USAICS	ERADCOM (FT. MONMOUTH)	CERCOM	FT. MONMOUTH	ERADCOM
AN/ALQ-151 QUICKFIX	2B	USAICS	ERADCOM (FT. MONMOUTH)	CERCOM	FT. MONMOUTH	ERADCOM
AN/TSQ-105 GUARDRAIL V	2B	USAICS	ERADCOM (FT. MONMOUTH)	CERCOM	FT. MONMOUTH	ERADCOM
AN/ALG-133 QUICKLOOK II	2B	USAICS	ERADCOM (FT. MONMOUTH)	CERCOM	FT. MONMOUTH	ERADCOM
SOTAS STAND-OFF TARGET ACQUISITION SYSTEM	2B	USAICS	ERADCOM (FT. MONMOUTH)	CERCOM	FT. MONMOUTH	ERADCOM
TCAC TECHNICAL CONTROL AND ANALYSIS CENTER	2B	USAICS	ERADCOM (FT. MONMOUTH)	CERCOM	FT. MONMOUTH	ERADCOM

Figure C-7. Intelligence and Electronic Warfare BFA Systems (continued
on the next page)

SYSTEM	CATEGORY	PRCPONENT	DEVELOPMENT COMMAND	READINESS COMMAND	PDSS-CENTER	
					LOCATION	MANAGED BY
AN/MLQ-33 CLOSE AIR SUPPORT ELECTRONIC COUNTERMEASURE (CAS ECM)	3	USAICS/ USAADS	ERADCOM (FT. MONMOUTH)	CERCOM	FT. MONMOUTH	ERADCOM
AN/MLQ-34 TACTICAL JAMMER (TACJAM)	3	USAICS	ERADCOM (FT. MONMOUTH)	CERCOM	FT. MONMOUTH	ERADCOM
U/E ECM UNATTENDED/EXPENDABLE ELECTRONIC COUNTERMEASURE	3	USAICS	ERADCOM (FT. MONMOUTH)	CERCOM	FT. MONMOUTH	ERADCOM
AGTELIS AUTOMATIC GROUND-TRANSPOR- TABLE EMITTER LOCATION/ IDENTIFICATION SYSTEM	3	USAICS	ERADCOM (FT. MONMOUTH)	CERCOM	FT. MONMOUTH	ERADCOM
AN/ALR-46 AIRBORNE RADAR WARNING RECEIVER	3	USAADS	ERADCOM (FT. MONMOUTH)	CERCOM	FT. MONMOUTH	ERADCOM
AN/MSQ-103 TEAMPACK	3	USAICS	ERADCOM (FT. MONMOUTH)	CERCOM	FT. MONMOUTH	ERADCOM
MAGIIC MOBILE AIR-GROUND IMAGE INTERPRETATION CENTER	3	USAICS	ERADCOM (FT. MONMOUTH)	CERCOM	FT. MONMOUTH	ERADCOM

Figure C-7. (continued)

SYSTEM	CATE- GORY	PROPOSER	DEVELOPMENT COMMAND	READINESS COMMAND	PDSS CENTER	
					LOCATION	MANAGED BY
MDPG-OL-192 METEOROLOGICAL DATA PROCESSING GROUP	3	USAICS	ERADCOM (FT. MONMOUTH)	CERCOM	FT. MONMOUTH	ERADCOM
REMBASS REMOTELY MONITORED BATTLEFIELD SENSOR SYSTEM	3	USAICS	ERADCOM (FT. MONMOUTH)	CERCOM	FT. MONMOUTH	ERADCOM
SLAR SIDE-LOOKING AIRBORNE RADAR	3	USAICS	ERADCOM (FT. MONMOUTH)	CERCOM	FT. MONMOUTH	ERADCOM
FENC FREQUENCY EXTENSION NON-COMMUNICATIONS	3	INSCOM	ERADCOM (FT. MONMOUTH)	TBD	*	*

* Systems for which a DARCOM PDSS Center is not required or for which the need has not been determined.

Figure C-7. (concluded)

SYSTEM	CATEGORY	PROPOONENT	DEVELOPMENT COMMAND	READINESS COMMAND	PDSS CENTER MANAGED BY	
					LOCATION	
AN/MSM-105(V)1,2 TEST AND AUTOMATIC REPAIR FACILITY	1	ATE	CORADCOM (FT. MONMOUTH	CERCOM	FT. MONMOUTH	CORADCOM
PLRS/JTIDS HYBRID POSITION LOCATION REPORTING SYSTEM/JOINT TACTICAL INFORMATION DISTRIBUTION SYSTEM	1	USASC	CORADCOM (FT. MONMOUTH	CERCOM	FT. MONMOUTH	CORADCOM
AN/MYQ-Z TRANSPORTABLE AUTOMATIC DIGITAL SWITCH (TADS)	2B	USASC	CORADCOM (FT. MONMOUTH)	CERCOM	FT. MONMOUTH	CORADCOM
AN/TTC-38 AUTOMATIC TELEPHONE CENTRAL OFFICE	2B	USASC	CORADCOM (FT. MONMOUTH)	CERCOM	FT. MONMOUTH	CORADCOM
AN/TTC-39 AUTOMATIC TELEPHONE CENTRAL OFFICE	2B	USASC	CORADCOM (FT. MONMOUTH)	CERCOM	FT. MONMOUTH	CORADCOM
AN/TYC-39 AUTOMATIC MESSAGE SWITCHING CENTER	2B	USASC	CORADCOM (FT. MONMOUTH)	CERCOM	FT. MONMOUTH	CORADCOM
AN/UGC-74A(V)3 COMMUNICATIONS TERMINAL	2B	USASC	CORADCOM (FT. MONMOUTH)	CERCOM	FT. MONMOUTH	CORADCOM

Figure C-8. Communications Systems (continued on next page)

SYSTEM	CATEGORY	PROONENT	DEVELOPMENT COMMAND	READINESS COMMAND	PDSS CENTER	
					LOCATION	MANAGED BY
PLRS POSITION LOCATION REPORTING SYSTEM *	2B	USASC	CORADCOM (FT. MONMOUTH)	CERCOM	FT. MONMOUTH	CORADCOM
AN/USC-28(V) SATELLITE COMMUNICATION SET	3	DCA	CORADCOM/SATCOM (FT. MONMOUTH)	CERCOM	FT. MONMOUTH	CORADCOM
BURST COMMUNICATIONS SYSTEM	3	USAIMA (FT BRAGG)	CORADCOM (FT. MONMOUTH)	CERCOM	FT. MONMOUTH	CORADCOM
DCSS FAULT CONTROL SUBSYSTEM	3	DCA	CORADCOM/SATCOM (FT. MONMOUTH)	CERCOM	FT. MONMOUTH	CORADCOM
AN/TSQ-84(A) COMMUNICATIONS TECHNICAL CONTROL CENTER	3	USASC	CORADCOM (FT. MONMOUTH)	CERCOM	FT. MONMOUTH	CORADCOM
RTACS REAL-TIME ADAPTIVE CONTROL SYSTEM	3	DCA	CORADCOM/SATCOM (FT. MONMOUTH)	CERCOM	FT. MONMOUTH	CORADCOM
SINGGARS SINGLE CHANNEL GROUND AND AIRBORNE RADIO SUBSYSTEM	3	USASC	CORADCOM (FT. MONMOUTH)	CERCOM	FT. MONMOUTH	CORADCOM
TSCVT TACTICAL SATELLITE SINGLE CHANNEL VEHICULAR TERMINAL	3	USASC	CORADCOM/SATCOM (FT. MONMOUTH)	CERCOM	FT. MONMOUTH	CORADCOM

* Also addressed under Command and Control Functional Area.

Figure C-8. (continued)

SYSTEM	CATEGORY	PROponent	DEVELOPMENT COMMAND	READINESS COMMAND	PDSS CENTER	
					LOCATION	MANAGED BY
MSE MOBILE SUBSCRIBER EQUIPMENT	3	DCA	CORADCOM (FT. MONMOUTH)	CERCOM	FT. MONMOUTH	CORADCOM
PCS PILOT CONTROL SYSTEM	3	DCA	CORADCOM/SATCOM (FT. MONMOUTH)	CERCOM	FT. MONMOUTH	CORADCOM
AJ/CON ANTI-JAM CONTROL MODEM	3	USASC	CORADCOM/SATCOM (FT. MONMOUTH)	CERCOM	FT. MONMOUTH	CORADCOM
AN/GSC-40 COMMAND POST TERMINAL	3	USASC	CORADCOM/SATCOM (FT. MONMOUTH)	CERCOM	FT. MONMOUTH	CORADCOM
AN/MSQ-64 FORCE TERMINAL	3	USASC	CORADCOM/SATCOM (FT. MONMOUTH)	CERCOM	FT. MONMOUTH	CORADCOM
AN/MSQ-114 SATELLITE COMMUNICATIONS MONITORING CENTER	3	USACC	CORADCOM (FT. MONMOUTH)	CERCOM	FT. MONMOUTH	CORADCOM
DLDED DIVISION LEVEL DATA ENTRY DEVICE	**	SIGCEN	CSC (FT. BELVOIR)	CERCOM/CSC	FT. BELVOIR	CSC

** Not categorized but treated as Category 2 for PDSS planning.

Figure C-8. (continued)

SYSTEM	CATE- GORY	PROONENT	DEVELOPMENT COMMAND	READINESS COMMAND	PDSS CENTER	
					LOCATION	MANAGED BY
AN/TSQ-111(V) COMMUNICATIONS NODAL CONTROL ELEMENT	2B	USASC	ESD AFSC	TBD	*	*
JTIDS JOINT TACTICAL INFORMATION DISTRIBUTION SYSTEM	2B	USASC	ESD AFSC	TBD	*	*
GPS GLOBAL POSITIONING SYSTEM	3	USASC	SAMSO/AFSC	AIR FORCE	*	*

* Systems for which a DARCOM PDSS Center is not required or for which the need has not been determined.

Figure C-8. (concluded)

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APPENDIX D

SUMMARY OF QUESTIONNAIRE RESPONSES

D-1. GENERAL.

a. This appendix contains a summary of the responses received to date to the questionnaire that was prepared and administered during Phase I of the study. These questionnaires were distributed to selected personnel at TRADOC Doctrinal Centers during visits by Study Team members.

b. The purpose of the questionnaire was to obtain more detailed data pertaining to individual Category 1 and 2 and CSC-developed systems addressed during the study, than could conveniently be obtained during interviews and discussions. The questionnaire included an explanation of its purpose, administrative instructions, and 32 questions. The questions focused principally on actions related to the Combat Developer's role in post-deployment software support.

c. At the time this report was prepared, 39 completed questionnaires had been returned to the Study Team. These address 30 of the 41 systems on which a questionnaire was requested. Thirteen of these 30 systems are at or beyond Initial Operational Capability (IOC). The other 17 are in various phases of development. All questionnaire respondents were either members of a TSM Office, a US Army Test Board, or a Combat Development staff element with assigned responsibilities associated with system development and life cycle management.

d. The questionnaires received have been analyzed for information that would contribute to the development of insights into the role of the Combat Developer in planning for and providing PDSS for BAS. Results derived are summarized below.

D-2. QUESTIONNAIRE RESPONSES.

a. The completed questionnaires indicate that virtually all of the respondents recognize that they have certain responsibilities associated with PDSS. Responsibilities described in the responses generally center on three areas, (1) acting as User representative, (2) performing system testing, and (3) defining functional requirements of the system with which they are concerned. The percent of their duty time that respondents indicate is devoted to PDSS varies from zero to 100 percent with most indicating about one to three percent.

b. Most responses state that system software requirements were developed by the Combat Developer and included in the system requirements or specification document. However, several responses indicate that these requirements

were not developed to the degree of detail desired by either the Combat Developer or Materiel Developer. Results of other Phase I research conducted by the Study Team supports the view expressed in these responses.

c. Eighteen of the 39 responses indicate that fairly specific procedures have been developed for addressing User-identified system software problems. Considering that 17 of the 30 systems addressed by the completed questionnaires have not reached IOC, this distribution of responses might be expected. However, of the 11 affirmative responses, only four indicate that the Combat Developer has a prominent role in the process of addressing User-reported software problems. These problems appear to be handled primarily between the User and Materiel Developer or Contractor.

d. Only four responses indicate that software support requirements and response times in a crisis/combat environment have been addressed specifically. Even though some of the systems addressed by the questionnaires are in early development, this low number of affirmative responses suggests that further attention needs to be focused on crisis/wartime software support requirements and procedures.

e. Only three responses indicate knowledge of the preparation of a Computer Resources Management Plan (CRMP) or Combat Developer participation on a Computer Resources Working Group (CRWG) for the system being addressed. This reflects limited participation by the Combat Developer in PDSS planning that should be initiated early in the system development cycle.

f. With respect to system configuration management, 15 responses state that a system Configuration Control Board (CCB) has been formed for the system addressed. These 15 responses plus five others identified the Combat Development element responsible for participation in system configuration control functions. Other responses indicate no knowledge of the existence of a CCB for their system.

D-3. ADDITIONAL RESPONSES. Additional responses to the questionnaire are anticipated. As these are received, they will be analyzed and results incorporated into the data base to support accomplishment of Phase II.

