Military Handbook
Software Support Environment Acquisition

Implementation Guide
for DOD-STD-1467 (AR)
"Software Support Environment"

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AREA MCCR

DEPARTMENT OF DEFENSE
WASHINGTON, DC 20301

Software Support Environment Acquisition

Implementation Guide for DOD-STD-1467(AR)
"Software Support Environment"

1. This standardization document was developed by the Department of Defense in accordance with established procedures.

2. This Handbook provides fundamentals regarding the use of DOD-STD-1467(AR) as one means of ensuring software supportability on contracted software development efforts. It helps both contractor and Government acquisition managers, and life cycle software support activities in determining and accomplishing the efforts that must precede transition to, and acceptance of, software support by the Government's designated life cycle software support activity.

3. This Handbook is not intended to be referenced in any purchase specification except for informational purposes, nor is it intended to supersede any specification requirements of DOD-STD-1467(AR).

4. Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to:

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by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

FOREWORD

In the past decade, the number of automated systems in the Government has dramatically increased. Although some commonality has been achieved, the diversity of system requirements has resulted in the need to provide life cycle support for a large number of unique computer systems and computer software. Several automated systems are usually assigned to a single software support activity to gain the economies of centralization. The resulting software support requirements demand a large support environment in order to both support all common functional requirements and support all of the unique requirements of each system. Department of Defense policies for standardization of computer resource acquisition and programming languages further increase the potential economic benefits of common life cycle software support activities and standardized elements of the software support environments. Since automated systems for the Government are being developed by many different contractors, pressures for standardization and the economies of standardized contract approaches is magnified.

For the acquisition manager, the use of contracting standards is the most effective way to solve many of the software supportability and life cycle software support standardization problems. The need to provide a common vehicle for addressing issues of software supportability in contracted software development efforts was met with the development of DOD-STD-1467 (AR), "Software Support Environment". This Standard does NOT specify any one standard software support environment for use by Army contractors. Rather, this Standard, which is applicable to all Army contracted software developments, implements a contract process that will ensure the existence of a complete life cycle software support capability for contractually deliverable software upon its entry into the Army's operational inventory.

This Handbook contains an explanation of the scope and intent of DOD-STD-1467, and it provides the information needed to implement this Standard. This Handbook also provides an insight for managers into the intent and meaning of the Standard's requirements. This Handbook is intended for use by Army Life Cycle Software Engineering (LCSE) Centers, Materiel Managers (e.g., Project/Product Officers, Weapon System Matrix Managers), Data Management Officers, Procuring Contracting Officers and legal personnel who are responsible for procuring and ensuring life cycle software supportability.

For personnel not familiar with the requirements and processes involved in software acquisition and support, this Handbook will also serve as an introduction to DOD-STD-1467 and an explanation of its significance.

This Handbook is also provided as information for contractors who will be involved in software development and delivery, as an aid in understanding the requirements of DOD-STD-1467 and the Army's requirements for life cycle software supportability. This Handbook will provide all parties, both Government and contractor, who are responsible for ensuring software supportability, a common basis for interpretation of the Standard.

DOD-STD-1467 has been structured to implement the minimum contract requirements essential for ensuring software support. Therefore, tailoring of the Standard should not be necessary when used as a contractual source document. The proper development of contract requirements will require careful consideration to the application of the Standard within the particulars of the system and software to be developed, and the characteristics of the LCSE Center's software support environments and plans.

Although DOD-STD-1467 was intended for use by the Army to specify requirements for software supportability, the Standard is available for use by other agencies of the Department of Defense, and for software support efforts conducted within the Government.

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1. SCOPE

1.1 Purpose. MIL-HDBK-782(AR) (referred to hereafter as the Handbook) provides a common interpretation of the requirements and uses of DOD-STD-1467 (referred to hereafter as the Standard), and the information needed to use it effectively.

a. This Handbook provides the necessary explanation and background data that will enable entry level or newly assigned personnel (both Government and contractor) to understand the fundamental principles of the Standard and understand the significance of its requirements.

b. For experienced personnel (both Government and contractor), this Handbook provides a ready reference and a common base for interpretation of the detailed requirements of the Standard. The Handbook also presents the arguments and supporting rationale needed to understand the intent of these requirements.

1.1.1 Philosophy. This Handbook is intended to assist and support the Army Life Cycle Software Engineering (LCSE) Centers in developing, publicizing and leveraging software support requirements into contracted software development efforts. The Handbook and its guidance are also intended to assist in the evaluation of a software development contractor's compliance with the contract requirements. The information in this Handbook is not expected to replace the requirement for sound management judgment and practices on the part of the acquisition managers and LCSE Center personnel. Adequate management attention and action, based on the information provided herein, is a necessary prerequisite for successful use of the Standard. The LCSE Centers must develop supplemental guidance and information, tailored to their particular LCSE environment, to integrate the requirements of the Standard into their day-to-day business, management, and engineering practices.

1.1.2 Application. This Handbook is intended for use by any activity invoking the Standard, either on a contract, on another Government agency, or within their organization. Anyone tasked with developing the software support portions of contracted efforts should be familiar with its contents. The Handbook is not intended to portray a cookbook approach to ensuring software support. It is, instead, intended to assist Government personnel who must deal on a daily basis with the many aspects and variables of life cycle software supportability.

1.2 Organization of the Handbook. This Handbook initially discusses the Standard's relationship to the Army Life Cycle Software Support (LCSS) planning and LCSE Center missions and functions. It then discusses the concepts and efforts required both to implement contractually the Standard and to monitor its use. Appendix A of this Handbook explains the purpose of each paragraph of the Standard (why it is necessary) and provides a brief description of the types of work and information to be expected. A list of acronyms is contained in Appendix D.

1.2.1 Section 4. This section establishes the basis for use of the Standard to ensure supportability. This section presents the information at a tutorial level, with the objective of presenting the concepts that support the use of the Standard. Major topics include: the supportability problem, the need to standardize support environments, and the approach adopted by the Army for implementing software support. The LCSE Center role in the Army implementation concept and software support planning are described, and the software support environment elements are defined.

1.2.2 Section 5. This section describes the steps necessary to contractually implement and apply the Standard. This section presents the information as steps in a normal sequence of contract preparation, source selection, and contract performance monitoring.

1.2.3 Appendix A. This appendix is organized to provide a paragraph by paragraph discussion of the Standard's contents, along with supporting rationale where appropriate. This information is intended to provide a reference point for common interpretation of the specific paragraphs and requirements in the Standard.

1.2.4 Appendix B. This appendix contains selected topics that require specialized treatment for individual applications that are beyond the coverage of the Standard. Subjects include: improving the software support environment(s), integration of support requirements for software from multiple contract sources, providing for changes to the environments during the contract period, and ensuring requirements traceability.

1.2.5 Appendix C. This appendix contains both examples of ways that the LCSE Centers may choose to define the Life Cycle Software Support Environment (LCSSE), and also the alternatives available for designating some (or all) of that LCSSE for use by the software development contractors.

1.3 How to use this Handbook. Some sections and appendixes are important for understanding the support aspects of the Standard, others for contractually applying the Standard.

1.3.1 Understanding the Standard. Newly assigned or entry level personnel should first study Sections 1 through Section 4, then Appendix A, and finally Section 5. These personnel should have access to experienced users. Any software support situations that are not addressed by the normal policy and contracts methods described in the Handbook should be referred to experienced LCSE Center personnel.

1.3.2 Applying the Standard. The Handbook should be used as a reference for developing specific contract requirements and for resolving differences in interpretation of contract requirements. Section 5, and Appendixes C and A are the primary sources of this supporting information. Users should address Appendix B whenever the forecasted software development situations differ from those normally encountered.

1.3.3 Use by contractors and software developers. The Handbook should be used to help understand the Army's LCSS approach and the Army's requirements for life cycle software support. It should be used as a basis for planning and developing contract approaches that will satisfy the Army's life cycle software support requirements, and for effectively documenting this approach in proposals. It should also be used as a common reference point for discussing and resolving any contract issues regarding software supportability.

1.4 Cost of applying the Standard. The use of the Standard may result in initial increased start-up costs. However, the total software development cost should be reduced, and the long term life cycle software support costs will be reduced, since more reliable, supportable software (and the necessary items for software support) will be developed and delivered. The existing Army policies already require the work tasks associated with the efforts that are described in the Standard. Historically, the costs associated with software support may have been deferred or not identified in the original contracts for software development. The use of the Standard will help correct this situation by requiring specific software supportability efforts and by forcing the identification of costs associated with software supportability.

1.4.1 Contractor work/task relationships. The work tasks required of the contractor by the Standard are those that should be required in any case to properly plan for, and implement, the capability to ensure software supportability. For example:

a. The Developmental Software Support Environment Plan (DSSE Plan) and the Software Support Transition Plan (SSTP) are two new documents that support implementation of the Standard. They serve as management tools that enable both the contractor and the contracting activity to more effectively plan for, develop, and deliver the software. This information is required in any case as part of the software development and transition planning.

b. The support information contained in the Life Cycle Software Support Environment Users Guide (LCSSE Users Guide), a document that is developed as a result of implementation of the Standard, is necessary to perform life cycle software support, regardless of the Data Item Description used. The LCSSE Users Guide is an efficient way of obtaining this information.

c. Support software from previously developed sources may be more cost effective than newly developed software. The Standard provides the mechanism for managing and delivering these items.

1.4.2 Costs of not applying the Standard. Acquisition agencies and managers that do not apply the Standard in software developments may obscure the issues of supportability. Failure to properly address the requirements for software support may force other Army organizations to address, separately, the issues of supportability. The dangers of following this approach far outweigh any apparent near-term cost avoidance or schedule benefits. Some of the more common risks of not using the Standard include:

a. Failure to specify all necessary data rights and licenses.

b. Failure to specify delivery of all necessary support items.

c. Degraded operational capability due to delayed or inadequate software supportability.

d. Delays in assuming Government software support.

e. Certification of marginal supportability by the LCSE Center.

NOTE: A satisfactory software development program is a necessary, **BUT NOT SUFFICIENT**, condition for software supportability. The LCSE Center must have in place the necessary capabilities to assume software support from the software developer.

2. REFERENCED DOCUMENTS

2.1 Government documents.

2.1.1 Specifications, standards, and handbooks. Unless otherwise specified, the following specifications, standards, and handbooks of the issue listed in that issue of the Department of Defense Index of Specifications and Standards (DODISS) specified in the solicitation form a part of this Handbook to the extent specified herein.

STANDARDS

DOD-STD-1467 -- Software Support Environment.

DOD-STD-2167 -- Defense System Software Development.

HANDBOOKS

None.

2.1.2 Other Government documents, drawings, and publications. The following other Government documents, drawings, and publications form part of this Handbook to the extent specified herein.

DARCOM-R 70-16 -- Management of Computer Resources in Battlefield Automated Systems.

Headquarters Department of the Army Life Cycle Software Support (LCSS) Implementation Plan.

(Copies of listed military standards, specifications, and handbooks required by contractors in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting officer.)

2.2 Other publications. None.

3. DEFINITIONS

3.1 Introduction. The definitions provided in DOD-STD-1467 are applicable for use with this Handbook. A discussion of selected terms defined in DOD-STD-1467 is contained in Appendix A of this Handbook.

3.2 Added definitions. The following terms are not contained in any widely distributed policies or standards and are defined here for the purposes of this Handbook.

3.2.1 Handbook. The term "Handbook" (capitalization intended) refers to this document, MIL-HDBK-782(AR). This simplification is used to improve readability.

3.2.2 Standard. The term "Standard" (capitalization intended) refers to DOD-STD-1467. This simplification is used to improve readability.

3.2.3 Life Cycle Software Support (LCSS). The sum of all activities required to ensure that, during the system's life cycle, the implemented and fielded software continues to support its original operational mission, including modification and product improvement efforts. (Source: Department of the Army Life Cycle Software Support (LCSS) Implementation Plan).

3.2.4 Life Cycle Software Engineering (LCSE) Center. The Army's designated life cycle software support activity that is referred to in DOD-STD-1467.

4. GENERAL INFORMATION

NOTE: This Section provides the initial basis for understanding and applying the Standard. Therefore, the subjects are addressed at a tutorial level. For an explanation of the detailed requirements of the individual paragraphs of the Standard, see Appendix A.

4.1 The software support background. Over the past decade, the number of automated systems acquired and deployed by the Department of Defense has dramatically increased. Although some commonality among systems has been achieved, the diversity of operational and support requirements has resulted in the entry of a large number of unique automated systems into the government inventory. Each automated system has its own set of life cycle software support requirements. The complexity of these systems requires the assigned software support activity to provide a full range of engineering services, including the efforts necessary to integrate the operational software with the other elements of the operational system. Most acquisition managers, when contracting for systems that include the development of software, are often unfamiliar with the special requirements for life cycle software support and have historically not included these requirements in their plans and budgets. These managers may also be unsure as to what is needed to perform the software support functions during the operations and maintenance phases of the system's life. This situation generally exists, in varying degrees, throughout the Government.

4.1.1 The software support need. Specialized facilities, skills, computer equipment and software are required to provide the full range of engineering support services required for the software elements of automated systems. The scarcity of the computer related skills and the cost of specialized facilities have greatly increased the cost of providing the necessary software support. In the Army, several automated systems are usually assigned to a single Life Cycle Software Engineering (LCSE) Center to gain the economies of centralization. The resulting software support environment at the LCSE Center must have common functional capabilities to support all of its assigned systems, but must also have capabilities to support system unique requirements based on the size, sophistication, and implementation methodology of the software to be supported.

4.1.2 The software support contract problem. Because of the many automated systems, and the necessary associated support resources, the ability to use common tools across systems and avoid procurement or delivery of unnecessary added resources provides definite economic advantages, to both the contractor and the contracting activity. The LCSE Center must be able to identify its software support requirements for each system to be developed or acquired and to relate these requirements to the existing LCSE Center software support environment. The LCSE Center requires contract methods of tasking a contractor both to be compatible with the LCSE Center environment, and to ensure the supportability of the software after it is developed and delivered. This need reinforces the use and growth of standard software development approaches and the use of standard software support environments by contractors. As each item of contracted software is delivered, the standardized portion of the LCSE Center environment is expected to grow. The implementation of the Ada[R] programming language coupled with the development of Ada Programming Support Environments (APSE) increases the economic pressures for standardization of the LCSE Center software support environment.

4.1.3 The software support contract solution. The use of DOD-STD-1467 provides common requirements for all contracts that contain software development or support, and it provides a vehicle to ensure supportability of the delivered software in a designated software support environment. The Standard provides a tool for acquisition managers to use in writing their contracts to make sure that this important area receives proper contractual coverage. The Standard, and its associated set of four support software Data Item Descriptions, were developed specifically to address the Army's requirements for life cycle software supportability. The contractual application of this Standard ensures that all issues of software supportability are properly addressed in contracted software development and support efforts, and that there will exist a life cycle software support capability for the contractually deliverable software upon its entry into the operational inventory. The Standard does NOT require the use of any standard software support environment. It is designed to recognize the needs and constraints of existing software support organizations and, at the same time, allow the software contractor the flexibility to develop software and manage the contract in accordance with the contractor's best judgment and practice.

[R]Ada is a registered trademark of the U.S. Department of Defense

4.2 Software support in the systems acquisition process. The framework for software support in the Department of Defense is defined in a set of Office of the Secretary of Defense (OSD) and Service policies for acquisition management of Mission Critical Computer Resources (MCCR). In the Army, systems which incorporate MCCR are referred to as Battlefield Automated Systems and Automated Trainers (BAS/AT). The Army policies regarding life cycle software supportability are summarized in DARCOM-R 70-16 as follows:

"1-4.i. Software quality and support will be addressed as a major consideration during all phases of the system life cycle."

"1-4.l. Computer resources, . . . required for development and support of operational systems, will be specified as deliverable in all solicitation documents . . . "

"1-4.o. Organic computer equipment maintenance and computer program development and maintenance capabilities will be established where economical or to satisfy system requirements. Common or existing capabilities will be used wherever practicable."

"2-4.i.(2).(l). Planning for post deployment software support will be initiated prior to Milestone II. Support software as deliverables will be specified prior to entering the Full-Scale Engineering Development Phase . . . "

4.2.1 Software supportability policy. Prior to Materiel Release, a statement of software supportability must be prepared by the designated LCSE Center. The statement must evaluate system life cycle software supportability based on the definitized requirements for life cycle software support and the degree to which these requirements have been satisfied. Evaluation criteria include: operational software to be supported, personnel experience, host and target computer environments, documentation, facilities, training, independent assessment and test results, and an overall management evaluation.

4.2.2 The Department of the Army LCSS Implementation Plan. Army policies for life cycle software support are further described in the Army LCSS Implementation Plan, which also provides policy for Army-wide management of the LCSE Centers. This plan addresses how the LCSE Centers are to interface with the overall software development process. This plan establishes the concept and the methodology for the technical and operational execution of an LCSE Center, and it also assigns major functions and responsibilities to the Army's materiel developers.

4.2.3 Life cycle software support planning. The Army life cycle software support concept is based on the assignment of software support responsibility, generally by Battlefield Functional Areas and commodities, to the LCSE Centers.

a. The LCSE Center management concept requires the LCSE Center to maintain a close and continuous interface with the developing and operating commands, to prioritize requirements, and to allocate resources for software support among the affected systems. The LCSE Center is required to participate in the development of Computer Resource Management Plans (CRMPs), to coordinate the contents of those plans, and to certify the supportability of all software that is to transition to the LCSE Center for support.

b. Because Army project managers generally may not be familiar with the requirements for software supportability, the LCSE Center is expected to play a major role in determining the computer resource related contract requirements. The LCSE Center must assist the project managers by developing the proper inputs to contracts, by evaluating the adequacy and affordability of proposed software development or support approaches, and by justifying the costs incurred in ensuring software supportability.

4.2.4 The LCSE Center life cycle software support role. The Army's LCSE Centers are the key element in maintaining the operational capability of computer resources in Army BAS/AT. The LCSE Centers provide centralized life cycle management and support for the computer resource elements (equipment and software) of each assigned BAS/AT. Each LCSE Center's missions and functions require it to perform a dual acquisition and support role:

a. The LCSE Centers provide support to the Army program or project managers in the acquisition of the computer resource elements of the BAS/AT. This support includes the development of Computer Resource Management Plans (CRMPs), development and approval of software acquisition strategies and contract requirements, independent evaluation of software contractor performance, and certification of software supportability.

b. The LCSE Centers are the Army's designated activities for ensuring that implemented and fielded software for the BAS/AT continues to support its original operational mission, that all identified deficiencies are corrected, and that approved product improvement efforts are implemented.

4.2.5 The LCSE Center support requirements. The LCSE Center is the major element of the Army's computer resources procurement and acquisition team, whose efforts are necessary to successfully complete the system's software development and to ensure the necessary life cycle software support. The range of expected capabilities and duties of the LCSE Centers include:

a. Development of added guidance for implementation and monitoring of Military Specification and Standards.

b. Interpretation of Office of the Secretary of Defense (OSD) and Army policies for computer resource acquisition, and supporting their application.

c. Assessment of the feasibility of using and supporting Ada; the development of Computer Resource Management Plans and assessment of their compliance with DARCOM-R 70-16.

d. Assistance in the development of procurement packages and in source evaluation, and determining supportability of a project's software in accordance with DOD-STD-1467.

e. A full range of problem analysis, design, implementation and test capabilities for changes or improvements to software that has been accepted into the inventory.

4.3 The software support concept. The large number of BAS/AT systems to be supported by each LCSE Center will demand an extremely large software support base. This support situation is complicated by the fact that these systems are being developed by many contractors, each with differing approaches and software development environments. Each BAS/AT also has unique life cycle software support requirements. The software support concept is based on using a host computer system, with extensive support software, to develop and support the operational (and support) software for all BAS/AT. The host computer system provides for storage of software both in a source form and in a form that has been compiled for a particular target computer system. The host computer system also provides the structure for implementing both development and management methodologies, together with their supporting set of tools. The software support tools usually include tools for software development, testing, support, maintenance, modification, configuration management, and resource management (work breakdown, cost reporting and schedule status). The typical software support structure, with representative elements of a host computer system and a target computer system, is shown in Figure 1.

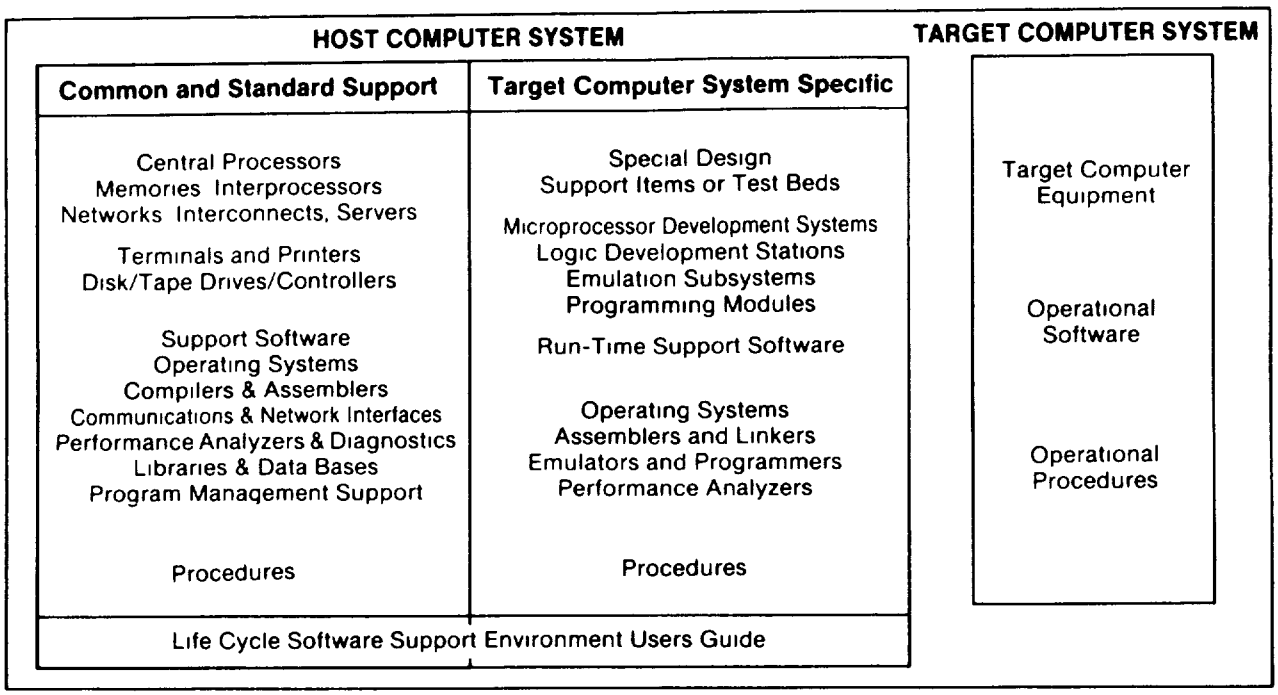

FIGURE 1 Typical Software Support Structure

4.3.1 Target computer system. The Target computer system consists of equipment, software and procedures which are physically part of a fielded BAS/AT system.

4.3.2 Host computer system. The host computer system consists of computer equipment, support software, and procedures used to develop and support the software of the target computer system.

4.3.2.1 Standard components. This portion of the host computer system includes standard equipment, resident operating systems, standard support tools, and standard operating procedures for these items. This portion implements the operator interfacing and programming features, and the methods required for access, generation, and change of the software. The central library, its data base management system, the data files, and the methods for management and use of the files are also included.

4.3.2.2 Target computer system unique components. This portion of the host computer system includes special items of support equipment, software and procedures that are necessary to support a particular target computer system. This includes all items that will be used to represent, simulate, emulate, or provide test beds for items of the target computer system. Actual items of the target computer system that are necessary to test the implementation of new functions or other software changes may also be included.

4.3.3 Software components. The software support environment will generally consist of a complex mix of software and documentation from many, varied sources. The software support environment must define its software structure from two viewpoints: The source of the software and its ultimate use in the environment.

a. Each item of support software must be defined and managed as being commercially available, privately developed, Government furnished, or contractually developed.

b. Each item of support software is further defined by whether it is part of the host or target computer system (or both).

c. The management requirements, rights restrictions, and controls for each item of software must be defined depending on its source and use.

4.3.4 Support support environment functions. The software support environment should be organized to perform these functions:

a. **Performance evaluation** of the target computer system and its software, both in the host and target environments.

b. **System and software generation,** including development of new software versions suitable for release to fielded units.

c. **Development and testing of changes,** including simulation, emulation, validation and verification capabilities.

d. **Training** for both the environment operators and selected operational users for the target computer systems.

e. **Integration** of the software with the target computer systems and the fielded systems.

f. **Configuration management** support of all equipment, software and documentation in the environment.

g. **Verification, materiel release and distribution** (either to the National Maintenance Point or to the fielded units), including the preparation, update, and distribution of software implemented as firmware components of the fielded units.

4.4 The DOD-STD-1467 software support environment concept. Software development and support activities are based on the concept of using two software support environments that will support the development, maintenance and modification of both operational and support software (See Figure 2 below). The Standard is specifically based on defining the software support environment of the software development contractor (the DSSE), defining the software support environment of the LCSE Center (the LCSSE), determining differences between the two environments, and establishing their compatibility.

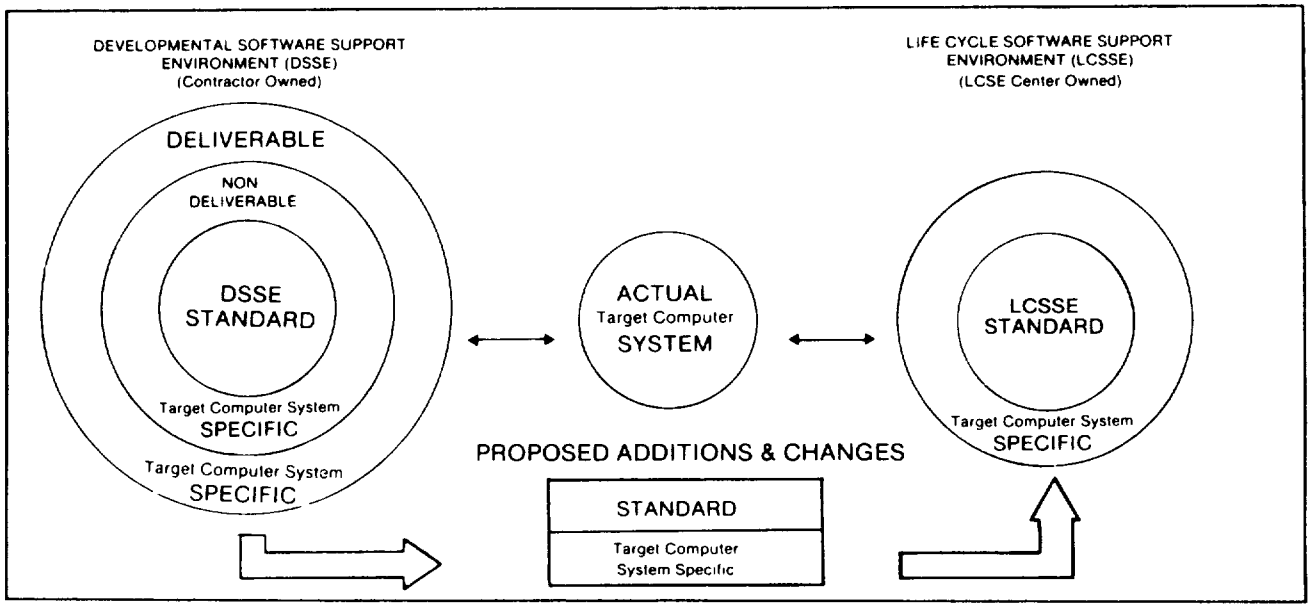

FIGURE 2 DOD-STD-1467 Software Support Concept

a. This approach allows the LCSE Center to identify, prior to selection of the software development contractor, its particular requirements and to require the software development contractor to be compatible with the existing LCSSE at the LCSE Center. The contracting activity would normally identify in the Request for Proposal (RFP) the LCSE Center and any of its items that are designated by the contracting activity for use by the contractor.

b. Subject to the constraints imposed by the contracting activity, the contractor may propose to use the existing resources of the LCSE Center, to use the contractor's own resources (either existing or to be developed), or to select from a wide range of options in between. The contractor would then identify the selected approach in the proposal for the contracted software effort. The contractor's approach is considered during source selection and is subject, after contract award, to approval by the contracting activity prior to implementation.

4.4.1 Developmental Software Support Environment (DSSE). The DSSE is normally managed by the contractor and is used to develop and control the contractually deliverable software. The DSSE is required to employ a host/target computer system approach, with a set of defined user/system interfaces, a set of software support tools, and a central library for storage of all information associated with the development and support of the contractually deliverable software. The configuration, the capabilities and functions, and the controls used to manage the DSSE are described in the contractor's DSSE Plan. This Plan also defines the differences between the DSSE and the designated LCSSE, and the approach to be used by the contractor to ensure that the LCSE Center will have the capability to support the contractually deliverable software.

4.4.2 Life Cycle Software Support Environment (LCSSE). The LCSSE is that portion of the software support environment managed by the LCSE Center that is to be utilized for the ultimate support of the contractually deliverable software. The LCSE Center's operating environment will normally consist of a centralized host computer system environment, subsets of which are coupled with target computer system peculiar items to define the LCSSE for a particular contracted effort. Elements of the LCSSE may be designated for contractor use or delivered to the contractor for use in the DSSE.

4.4.3 Additions to the LCSSE. In order for the LCSE Center to properly provide life cycle software support, it may be necessary for the contractor to identify and implement additions to the LCSSE, or changes (improvements or up-grades) to the existing items. The contractor is required to identify all differences between the DSSE and the LCSSE. The contractor may propose (in the DSSE Plan) additions or changes to the LCSSE, as an integral part of the Standard's requirements for establishing the compatibility of the two environments, and ensuring the life cycle supportability of the contractually deliverable software. The contracting activity reviews and approves the differences (and any proposed additions or changes), as part of their review and approval of the DSSE Plan. Implementing improvements to the software support environments is a special subject in Appendix B, paragraph 22.1, of this Handbook.

4.5 Application of DOD-STD-1467 with other Military Standards. DOD-STD-1467 is only one of the Military Standards recently developed or planned for the near future, that address software development and support. It is designed to be compatible with the concepts and requirements of these documents. However, it is the only document that is specifically designed to implement the Army's concept of life cycle software supportability, as defined in the Army LCSS Implementation Plan.

4.5.1 Compatibility. The Standard can be applied independent of the type of software development or software quality approach selected, and it should be used to complement the support aspects of those approaches. For example, this Standard can be used in conjunction with DOD-STD-2167. When these two standards are implemented in contracts together, this Standard can be used to ensure that the Army's life cycle software support requirements (partially addressed in DOD-STD-2167) are adequately and completely implemented.

a. DOD-STD-2167 addresses the definition of software engineering and test environments, but it does not establish a complete set of minimum capabilities or management requirements for items contained in these environments. DOD-STD-1467 defines and provides minimum requirements for the management of all items of support software and documentation that are to be used by the contractor for the development or delivery of the contractually deliverable software.

b. DOD-STD-1467 implements the added work tasks and the formal mechanism, in addition to those contained in DOD-STD-2167, that will ensure that the contractor recommended efforts will be sufficient to ensure the development and/or delivery of the necessary software support capability.

4.5.2 Added benefits. DOD-STD-1467 provides the needed emphasis on the Army's life cycle software supportability and software support transition requirements. It defines and provides the added mechanism to ensure that the necessary capability (equipment, software, procedures) will be procured and delivered as part of the development effort. It also defines and establishes minimum requirements for the management of all items of support software that are to be used by the contractor for the development or delivery of the contractually deliverable software. The integrated application of contracted software development and software quality requirements with the Standard's requirements ensures the proper balance of acquisition and support emphasis and is expected to have a significant beneficial impact on the ability of the Army to successfully acquire and provide life cycle software support the software elements of its BAS/AT.

4.6 Rights to support software. Inadequate provisions to protect the Government's rights to technical data and computer software necessary for operation and support of its acquisitions have historically been responsible for decreased operational and support capabilities. In some cases, considerable additional expense was necessary to procure or develop the information required by the Government to sustain the operation and support of its fielded systems.

a. As a general rule, the contract must guarantee the Government unlimited rights to all technical data and software specified in the Contract Data Requirements List (CDRL) or the Delivery Schedule. However, the acceptance of computer software with restricted rights may be necessary for the Government to obtain use and rights to use contractor-owned or state-of-the-art software that will improve the operation and efficiency of the LCSE Centers. To maintain the currency of the LCSE Center, it may be in the best interests of the contracting activity to accept limits and restrictions in order to encourage the use by contractors and accessibility by the LCSE Center to these improved items. This approach also supports the APSE concept of selective growth by providing for identification and adoption of new tools and permits the contractor freedom (within certain limits) to determine and incorporate new tools in his DSSE.

b. The RFP should require identification, in proposals, of any intended use of proprietary products. This requirement will force both parties to address proprietary products during negotiations and in the resulting contract, not after the fact. The RFP should be structured to protect the rights of both parties and encourage the contractors to propose the use of state-of-the-art proprietary tools, where such use is deemed to be in the best interests of the Government. The LCSE Center must be prepared to evaluate any alternatives proposed by the contractor, to challenge limited rights and explore alternatives during negotiation. The LCSE Center should not let proprietary limitations preclude productivity improvements, but should be careful to ensure adequate Government access and use of proprietary products necessary for life cycle software support. The Standard is designed to enable the definition and negotiated use of these items in the contractor's DSSE, and the controlled identification and delivery of limited rights products (software tools and techniques) that will increase the productivity and effectiveness of the LCSE Center.

5. SPECIFIC INFORMATION

NOTE: The items in this section describe the steps necessary to contractually implement and manage the application of the Standard.

5.1 Implementing the Standard. The Standard is based on the philosophy of identifying and specifying the absolute minimum work tasks that would be required for all software development contracts. Therefore, the contracting activity should ensure that the requirements of the Standard are not tailored downward. Additional requirements that are unique to a particular acquisition should be added to the statement of work. The work tasks in the Standard are designed to support a common 5-step approach that that can be used to ensure the acquisition of supportable software:

-- **STEP 1: Establish an approved DSSE Plan.**

-- **STEP 2: Implement the DSSE Plan exactly.**

-- **STEP 3: Transition the deliverable software.**

-- **STEP 4: Demonstrate supportability.**

-- **STEP 5: Operate the LCSSE.**

5.1.1 STEP 1: Establish an approved DSSE Plan. In this step, the contractor completely identifies the proposed DSSE in the DSSE Plan, the contracting activity approves the Plan, and the DSSE is defined for the software development effort.

a. The ideal DSSE Plan will promote a thorough identification of all elements in the DSSE including: 1) the support software to be used, 2) the DSSE capabilities and operation, and 3) all functional and physical differences between the DSSE and LCSSE.

b. To ensure that life cycle software support requirements are included in the DSSE Plan, the RFP should require that the proposal for the contracted software development includes a preliminary version of the DSSE Plan or essential elements from the DSSE Plan. This will allow the contracting activity to: 1) evaluate each offeror's approach, 2) determine which specific items of support software are required, 3) negotiate with each offeror for delivery of these items, 4) ensure that all government data rights issues are addressed, and 5) ensure that these items are included in the contract. In this manner, the true costs of providing the necessary support resources can be determined and established early in the contract period.

5.1.2 STEP 2: Implement the DSSE Plan exactly. The contracting activity and the LCSE Center should ensure that the approved DSSE Plan is implemented exactly throughout the entire contract period.

a. The contracting activity should require that all changes to the DSSE Plan to have **PRIOR** contracting activity approval. Through contractually approving the DSSE Plan and requiring prior contracting activity approval of any changes, the contracting activity and the LCSE Center are kept abreast of any changes to the DSSE and can plan accordingly to ensure compatibility with the LCSSE.

b. The contracting activity should notify the contractor of any programmed changes to the LCSSE, so that both the contractor and the contracting activity can evaluate the effects of these changes on the contractor's requirement to transition software support and to ensure compatibility with the LCSSE. Any changes must, of course, be ultimately reflected in the DSSE Plan.

5.1.3 STEP 3: Transition the deliverable software. The LCSE Center and the contracting activity should ensure that the requirements for transition of all contractually deliverable software are adequately defined in the DSSE Plan. Complex or prolonged transition efforts may require the development of a contracting activity approved Software Support Transition Plan. Either method will provide the basis to ensure that the support software meets the needs of the LCSSE and that the operational software and its related items work correctly for the support function.

a. Describing the transition will bring focus to the planning requirements of the transition effort, such as: 1) determining the objectives of the transition and the related computer resource requirements, 2) defining the methods, events and activities that will lead to final acceptance, 3) developing the detailed transition schedules and system milestones, 4) establishing lead-times for phasing in the transition without support degradation, and 5) identifying the roles and responsibilities for both the contractor and the contracting activity.

b. Both the DSSE Plan and the Software Support Transition Plan must identify the methods planned to: 1) ensure supportability of the operational software, 2) demonstrate a verifiable compatibility of the two environments, 3) ensure validation of all LCSSE functions, and 4) ensure that identical results are produced by DSSE and LCSSE operations on the operational software.

5.1.4 STEP 4: Demonstrate supportability. Final acceptance of the software development effort is predicated on the establishment in the LCSSE of a satisfactory software support capability for the contractually deliverable software.

a. The contractor is required to demonstrate and warrant: 1) that the DSSE is completely compatible with the LCSSE, 2) that all contractually deliverable software is capable of being supported in the LCSSE, using only the contracting activity designated and contractually deliverable software, 3) that all operations or functions performed in the DSSE (that are identified for inclusion in the LCSSE) can be performed in the LCSSE, and 4) that the contractually deliverable software will produce identical results when operated in the target computer systems, whether generated in the DSSE or the LCSSE.

b. The methods to be used for the demonstration and warrant effort are selected and developed by the contractor and proposed in the DSSE Plan. The methods proposed may vary from a complete operational training and demonstration period to a simple warranty for a fixed period of time after acceptance. No rules have yet been established or developed to use as guidelines for determining the acceptability of the proposed approach. Each contracting activity and contractor must negotiate the exact rules, requirements, and procedures, based primarily on the amount and complexity of the proposed additions to the LCSSE.

5.1.5 STEP 5: Operate the LCSSE. The contractor must ensure that the procedures for operation of the LCSSE completely describe the methods necessary to support the contractually deliverable (both operational and support) software. The Standard provides for both a description of these procedures and assistance in resolving any problems encountered in the operation of the LCSSE by the LCSE Center.

a. The contractor developed LCSSE Users Guide describes the required environment for a particular target computer system, and it contains the details of additions made to existing LCSSE. This Guide should be a complete reference and procedures manual describing the rules and conventions for operation. It describes the configuration of the LCSSE, including any additions made as a result of the contract, and it addresses all LCSSE functions.

b. The Standard has provisions for obtaining assistance from the contractor for resolution of any problems encountered during the transfer of support responsibility and for a specified period of time subsequent to the transfer. The period of performance for this assistance after transfer must be specified by the contracting activity.

5.2 Contractual implementation. Successful contracting for software supportability requires that the LCSE Center perform certain preliminary planning actions and develop the necessary support oriented inputs to the procurement process. These prerequisites to contract award are designed both to ensure mutual understanding of the contract environment and requirements, and to force the necessary contracting activity support decisions.

5.2.1 Definition of the support environment. Implementation of the Standard requires precise definition of the environment in which the contractor is required to operate and with which the contractor is required to be compatible. This environment must be defined in terms of all of its elements: equipment, facilities, support software, documentation, and programmed additions or changes. There is a five-step process necessary to prepare the LCSE Center's inputs to any software development procurement package:

-- **STEP 1: Identify the designated LCSE Center and LCSSE.**

-- **STEP 2: Identify the portion of the LCSSE that applies.**

-- **STEP 3: Identify the designated resources and their sources.**

-- **STEP 4: Identify any use restrictions or requirements.**

-- **STEP 5: Identify any programmed additions or changes.**

5.2.1.1 STEP 1: Identify the designated LCSE Center and LCSSE. This action requires Army concurrence on the assignment of software support to a particular LCSE Center, and the definition of the LCSSE that exists in that LCSE Center. Adequate definition of the environment implies identification and control of the LCSSE in accordance with formal configuration management techniques. The ability of the contractor to estimate resources and the cost-effectiveness of the software support related efforts is directly proportional to the quality of the LCSE Center's definition and control of the LCSSE. The LCSE Center must develop an exact, detailed description of the LCSSE, from a functional requirements, capability, and configuration management viewpoint. This description should be tailored to fit each specific system or contract requirement.

5.2.1.2 STEP 2: Identify the portion of the LCSSE that applies. Each LCSE Center will normally have an extensive support capability for the many systems it is programmed to support. Only the minimum portion of the capability necessary to support a particular target computer system or software acquisition should be defined as the LCSSE for a particular effort. The selection of a minimum set requires a decision by the LCSE Center that balances two competing considerations:

a. Including many support items in the designated LCSSE will increase the items that the contractor must consider in planning how to ensure compatibility. The more items that must be considered, the more complicated (and expensive) will be the implementation and warrant process.

b. Including only a few items in the designated LCSSE may force the contractor to propose many additions to the LCSSE. The addition of these may possibly duplicate similar existing capabilities that were not included in the LCSSE definition.

5.2.1.3 STEP 3: Identify all designated resources and their sources. Designation of resources requires a further two-step decision by the LCSE Center: what to designate and what to supply.

a. The LCSE Center should decide whether the designation of resources will benefit the LCSE Center without unduly restricting the competition, or unduly constraining the ability of the contractor to perform the software development.

b. Once the decision has been made to designate certain resources for use by the contractor, the LCSE Center should determine whether to provide these resources, or to require the contractor to obtain them. These decisions must be implementable and enforceable. Delivery of unusable resources by the LCSE Center will detract from the effectiveness of the effort; requiring the contractor to obtain resources that will involve costly or restricted licenses will detract from the funding applied to the software development.

5.2.1.4 STEP 4: Identify any use restrictions or requirements. Both the rights of the Government and the rights of suppliers or vendors must be considered. Since the LCSE Center is responsible for a complex mix of software from many sources, with many different licensing or proprietary restrictions, the contracting activity must ensure that any contract requirements protect the rights of the Government, the proposed contractors, and the original suppliers of the items that are included in the LCSSE. The contract must also require the contractor to implement actions necessary to protect the rights of the Government and any third party vendors or suppliers.

5.2.1.5 STEP 5: Identify any programmed additions or changes. For software developments that are expected to occur over prolonged periods of time, changes must be expected (and programmed for) in both the DSSE and the LCSSE. The LCSE Center should identify programmed or forecasted changes to the LCSSE in the procurement package. The contracting activity should include in the statement of work provisions to review and negotiate contract changes that may result from changes to the LCSSE. The interface between the contractor's and the LCSE Center's configuration management systems will directly affect the effectiveness and cost of the software support transition.

5.2.2 Contract package development. The RFP is the starting point of a series of critical requirements definition efforts and information exchanges between offerors and the contracting activity. Parts I, II, and III (Sections A through J) of the RFP will eventually become the contract between the winning offeror and the contracting activity. Even the best prior planning is wasted if the necessary software support related information is not included in the RFP and factored into the source evaluation process. The software support related inputs must be compatible with the overall system or support concepts. The contracting activity, with the assistance of the LCSE Center, should ensure that the required items are developed and integrated into the RFP.

5.2.2.1 Statement of Work (SOW) requirements. Specific work tasks must be developed and included in the SOW to address the following items:

a. **Implement the results of paragraph 5.2.1 and subparagraphs, above.** The description of the existing LCSSE, any requirements for the use of designated items in the DSSE, conditions under which the LCSSE will be made available to the contractor, and methods of identifying changes to both the DSSE and LCSSE must be incorporated into the introductory portion of the SOW.

b. **Invoke the requirements of DOD-STD-1467.** The contractor must be tasked with compliance with the Standard, and any added requirements that have evolved from the LCSE Center's support planning efforts. The contractor must be tasked to verify and warrant the supportability in the LCSSE of all software developed or delivered under the contract, as required by DOD-STD-1467. The contractor must also be tasked to implement, use, and maintain the DSSE in accordance with the approved DSSE Plan. The contractor must also be tasked to plan and implement the efforts necessary to install the necessary software support capability for the deliverable software in the LCSSE.

c. **Enforce the approved contractor plans.** The contractor must be tasked to implement, execute and maintain the SDP and DSSE Plans, as approved by the contracting activity, and apply these plans to all software developed or used in the performance of the contract. The contractor should be tasked with ensuring compliance with the approved plans and with processing all proposed changes to the plans for contracting activity approval prior to implementation.

d. **Identify the methods and forms of delivery for support related items.** The contractor must be told how, and in what forms, to deliver any support related computer equipment, software, or documentation for use in the LCSSE.

5.2.2.2 Delivery requirements. Specific inputs to both the Delivery Schedule and the CDRL must be developed and included for the following items:

a. **Delivery of support equipment and software.** Separate Contract Line Items (CLINs) for each major item (usually at the Configuration Item level) should be identified and listed in the RFP, Section B, "Supplies or Services and Prices/Costs".

b. **Delivery of support documentation and procedures.** Separate line items in the CDRL must be developed and included to require delivery of the DSSE Plan, the Software Support Transition Plan, and the LCSSE Users Guide. If documentation for previously developed items is to be acceptable, the data item for Documentation of Commercially Available and Privately Developed Software must also be included in the CDRL.

5.2.2.3 Source evaluation requirements. Software support related items must be factored into the source selection process. Inputs should be developed and included for the following items:

a. **Incorporation of a draft DSSE Plan.** The RFP, Section L, "Instructions, Conditions, and Notices to Offerors" must include a section in which each offeror is to provide a preliminary DSSE plan.

b. **Separate evaluation factors for supportability considerations.** The RFP, Section M, "Evaluation Factors for Award", must separately identify a factor and the weighting of that factor. The scoring should be based on an evaluation of the proposed DSSE Plan.

c. **Separate evaluation criteria for supportability approaches.** The source evaluation criteria and instructions to the source evaluation team should emphasize the weighting given to the offeror's proposed support approach, and the importance of this approach in determining the eventual successful offeror.

5.2.3 Source evaluation and selection. The five-step process that is described in paragraph 5.1 above provides the ground rules for use in evaluating and determining the suitability of the offerors' proposed support approaches. While this effort establishes the basis, it is not the complete solution to the problem of ensuring supportability.

a. Since most contracts are awarded based on a multiplicity of evaluation criteria (including lowest cost), there is no infallible way to ensure that the offeror with the best support approach will be the successful bidder. However, there is an additional six-step process that can be used to improve the probability that successful contractor(s) will have an acceptable software support approach.

b. This six-step approach requires the offerors' proposals to include a draft DSSE Plan (or equivalent) in the offerors' proposals, and the evaluation criteria to include sufficient detail and weighting of the elements of the DSSE Plan.

-- **STEP 1: Match the evaluation criteria to the DSSE Plan outline.**

-- **STEP 2: Compare each offeror's DSSE Plan, item by item.**

-- **STEP 3: Identify and evaluate the proposed use of proprietary products.**

-- **STEP 4: Identify hidden costs; assess true costs.**

-- **STEP 5: Identify deficiencies and restrictions.**

-- **STEP 6: Resolve all items prior to contract award.**

5.2.3.1 STEP 1: Match the evaluation criteria to the DSSE Plan outline. The contracting activity should base both the technical and management evaluation criteria on the contractor's Software Development Plan (SDP) and the DSSE Plan. In this way, both the contractor's technical development capabilities (the quality of the delivered software) and management capabilities (the supportability of the delivered software) will be included in the decision process.

a. If the relative size of the software development is small compared to the total system, the consideration of the software development and support may be lost in the overall weighting and evaluation. The source selection criteria must be weighted to base decisions on the impact of the software on the system capability, not just on the relative size of the individual system efforts. Since the impact of the software on the operational capability of the system may be much greater than that reflected by its size or cost, the evaluation factors should be weighted accordingly.

b. The LCSE Center should be tasked by the contracting activity to be responsible for developing the portion of the evaluation plan and criteria that addresses both the software development and the software support. In this manner, the LCSE Center can work with the Program Manager and the Source Selection Authority to develop evaluation criteria that balance system requirements with software development (performance) and software support.

5.2.3.2 STEP 2: Compare each Offeror's DSSE Plan, item by item. Through the use of the DSSE Plan, each Offeror's approach can be compared on an item by item basis. The source evaluation team should compare the proposed approaches, isolate the similarities of each approach, and concentrate on differences. The source evaluation team should evaluate the real impact of these differences on the projected supportability and cost. The source evaluation team should consider the real impact on effectiveness of software development, remembering that a more expensive environment may be both more productive and result in the transition of better capabilities to the LCSSE.

5.2.3.3 STEP 3: Identify and evaluate the proposed use of proprietary products. Generally, the better (or more powerful) a tool is, the greater will be the protection applied by the developer of that tool. This means that if the LCSE Center expects to obtain access to more productive tools, some limitations or licenses must be tolerated. If the instructions for proposal are developed properly, contractors should propose the use of modern, proprietary tools and propose to deliver them to the LCSE Center with certain restrictions. Benefits to the LCSE Center must be clearly discernable; the contracting activity should clarify and evaluate any restrictions prior to commitment to use.

5.2.3.4 STEP 4: Identify hidden costs; assess true costs. The source evaluation team should look for potential requirements or costs that are not included in the proposals. Examples include the proposed delivery of: privately developed, untried support tools; licenses that may require costly follow-on contracted support agreements; tools with privacy or security restrictions that will require supplementing the facilities or personnel of the LCSE Center; functionally obsolete tools that will require unique support by the LCSE Center; or tools with unproven availabilities that are being developed for use on other contracted efforts. The source evaluation team should evaluate the long-term cost to the LCSE Center of the proposed additions.

5.2.3.5 STEP 5: Identify deficiencies and restrictions. The source evaluation team should request clarification on all questionable items, and coordinate these items with other members of the source evaluation team (including the cost evaluation team) to ensure that the effects of any changes or clarifications in the software area are included in the overall evaluation.

5.2.3.6 STEP 6: Resolve all items prior to contract award. All areas of concern should be resolved, either through revisions to the offerors' proposals, or during final negotiations. The contracting activity should ensure that the negotiating team is provided with any items that must be included in the contract negotiations, together with an assessment of the impact of not resolving them. The LCSE Center should be used by the negotiating team to resolve the technical issues that arise during negotiations. Any items that are not resolved will most likely require costly follow-on management and procurement actions on the part of (or on the behalf of) the LCSE Center.

5.2.4 Contract supervision and monitoring. The Standard provides, via the DSSE Plan and the Software Support Transition Plan, the means to monitor the contractor's performance throughout the contract and to enforce the Standard's requirements for software supportability. The approach depends on eliminating objectionable elements of the DSSE Plan during negotiations, finalizing the DSSE Plan immediately after contract award, and periodically reviewing the contractor's conformance with the approved DSSE Plan.

a. For cost type or level-of-effort contracts, the contracting activity should monitor closely the contractor's expenditure of resources on the implementation and use of the DSSE, especially the development or management of the tools destined for delivery to the LCSE Center.

b. The contracting activity should ensure that all necessary resources (e.g., equipment, software, documentation, test bed requirements) are identified at the start of the contract, and maintained throughout the life of the contract, to properly support the transition and delivery. The contracting activity and the LCSE Center should pay attention to changes in the system's progress or development requirements that may erode the contractor's resource base that was identified for supportability.

5.2.4.1 Enforcement of plans. The SDP and the DSSE Plan aid the contractor to adequately prepare for the contract effort, they provide some tangible evidence of the contractor's existing capabilities, and they provide the management vehicle for the contracting activity to influence the contractor's management of the software development and support planning. These plans cover the entire contracted effort and must be required and approved before significant resources have been committed. Any changes in planning, resource allocation, or status, must be reported sufficiently in advance to permit proper decision making. The contracting activity should require prior approval of any changes by the contracting activity to permit the contracting activity the time to evaluate, coordinate, and approve these changes. The contracting activity should ensure that the contract requires the contractor to provide the plans for contracting activity approval and to process any changes for contracting activity approval prior to implementation.

5.2.4.2 Contractor's development planning. For large software development contracts some form of pre-award survey or contractor capability evaluation should be accomplished. For smaller procurements, some insight into the maturity and soundness of the contractor's development planning and capability can be obtained from a critical review of the SDP and the DSSE Plan. In addition to the size and organization of the projected support resources, the source evaluation team should pay careful attention to:

a. The amount of resources dedicated to the project and those that are to be shared within the contractor's organization.

b. The amount of resources in place and those that are to be procured (including schedules for delivery).

c. The operational control of the contractor's program manager over the support resources.

d. The amount of resources to be supplied by the contractor and those that the contractor expects from the contracting activity.

e. The amount and type of privately developed software.

5.2.4.3 Contractor's transition planning. The Standard provides the basis for two sources of support transition planning:

a. The DSSE Plan requires the contractor to propose transition planning prior to contract award.

b. The Software Support Transition Plan requires the expansion of this planning for complex transition efforts.

The contractor's support planning should identify the resources and milestones projected to ensure a complete life cycle software support capability when the contractually deliverable software is ready for Materiel Release. The contractor's recognition of the resources and lead times required to ensure this transition is a good indicator of the scope of problems to be expected. If the contractor expects to develop or procure a significant number of support tools, the needed dates versus available dates should be closely scrutinized and monitored. Significant changes in the planned availability of needed support tools can indicate problems, not only with support, but also with the progress of the software development program.

5.2.4.4 Software support status monitoring and reporting. From a software support standpoint, the features to be monitored and reported revolve around the software support transition planning, as discussed above. This planning will identify the necessary support milestones lead-time away from the required supportability dates, including the phased availability of tools to be developed or delivered to the LCSE Center. Tracking of these milestones against the software development milestones should provide a reliable indicator of how well the support planning is proceeding compared to the overall pace of the contract. Significant delays in transition milestones, or a significant shift in assigned resources away from transition planning can be early warning indicators that the contract effort is attempting to rescue development efforts by sacrificing support requirements.

Custodian:
Army - AR

Reviewing Activities:
Army - AV, CR

Preparing Activity:
Army - AR

(Project MCCR 024)

APPENDIX A
DOD-STD-1467(AR) CONTENTS

10. SCOPE

10.1 Approach. This appendix contains a paragraph-by-paragraph interpretation of the Standard along with supporting rationale where appropriate. Army Program Managers and LCSE Center personnel must recognize that, while the Standard itself is new, the concepts and requirements embodied within have been evolving for more than a decade. The Standard's requirements represent the composite lessons learned throughout the Army's support community with regard to ensuring supportability of contracted software developments. Decisions to deviate from the requirements of the Standard should be thoroughly evaluated and justified.

10.2 Application. This Appendix is intended to be used as a reference document to supplement the guidance provided in the Handbook. It is intended to be used to avoid the possibility of misinterpretation of the detailed requirements of the Standard and as a reference point for interpretation of specific paragraphs and points contained in the Standard.

11. GENERAL REQUIREMENTS

Section 12 of this appendix contains a paragraph-by-paragraph reference to Sections 1 through 6 of the Standard. To simplify references, the paragraph numbering used in Section 12 corresponds to the paragraph numbers of the Standard. Section 12 also contains a discussion of each of the four Data Item Descriptions referenced in Section 6 of the Standard.

12. SPECIAL TOPICS

NOTE: The **FOREWORD** of the Standard provides a concise summary of the underlying philosophy of, and the reasons for, the Standard.

1. SCOPE

This section defines, for both contractors and contracting activities, the Government's intent as to what contractual items and efforts are to be included under the umbrella of the Standard.

1.1 Purpose. This paragraph is a lead-in to the Standard and contains a short statement of its major objectives. Key words that are the foundation for the the Standard are: "**compatibility**", "**software support capability**", and "**deliverable software**".

1.2 Application. This paragraph states the intent to prevent the exclusion (intentional or otherwise) of any resources that may be necessary for life cycle software support.

1.3 Contractual intent. This paragraph contains two fundamental concepts that are the foundation of the Standard:

a. The Standard contains the **MINIMUM ESSENTIAL COVERAGE** required for all contracted software developments; it must be **AUGMENTED** (not tailored) for specific contracts.

b. The contractor is responsible for ensuring compliance, whether the contract items are directly developed or supplied by subcontractors or vendors. This "**flow-down**" is necessary since software support tools will typically be obtained from commercial vendors or third party suppliers, and the use of these items will typically be limited by proprietary rights or copyright protection.

2. REFERENCED DOCUMENTS

2.1 Issues of documents. The Standard was designed to permit application to contracted software efforts, independent of the development or acquisition methods implemented on the contract. It does not make reference to any other documents, and it does not require the implementation of other documents for its use. Complete coverage of the software development effort will, of course, require the contractual application of other software related specifications and standards.

3. DEFINITIONS

3.1 Introduction. This section contains terms specifically defined for use in the Standard. Some definitions are for newly coined terms; some are an elaboration of terms commonly used or defined elsewhere. The specific definitions are necessary, since these terms are basic to the structure and meaning of the Standard.

3.2 Specific terms. Section 3 of the Standard lists the terms in alphabetical order. The discussion that follows addresses only selected terms based on their structure and relationships. The numbers in parentheses correspond to the applicable DOD-STD-1467 paragraph.

a. (3.7) Software support environment. This capstone definition provides the basis for determining what a minimum environment should contain, how it would be organized, and what services it would be expected to provide.

NOTE: The software support environment for a particular target computer system does not necessarily include all items that are contained in a particular computer facility, but **only those items identified to support that effort.** For example, a contractor may have extensive computer facilities that support the total business base of the company. The existence of these facilities, alone, will not guarantee that they will be applied to any particular contract.

b. (3.7.1) DSSE (Developmental Software Support Environment). The DSSE is a special kind of software support environment, managed and operated by the software development contractor. The definition contains two key conditions for the resources: 1) identified by the contractor to support the contract, and 2) approved by the contracting activity for use in the DSSE. The implication of this definition, which is also supported by the requirements in the Standard, is that the contractor must not use any resources to support the software development contract that have not been previously approved for use by the contracting activity.

c. (3.7.2) LCSSE (Life Cycle Software Support Environment). The LCSSE is a companion environment to the DSSE, but managed and operated by a government (or government designated) agency. In the Army, the LCSSE will be managed by the LCSE Center that has been assigned the responsibility to support the software to be delivered by the contractor. The definition of the LCSSE is important, since the contractor is tasked by the Standard to ensure the existence of a complete life cycle software support capability in the contracting activity designated LCSSE.

3.2 Specific terms (continued).

d. (3.10) Target computer system. The host-target concept is basic to the life cycle software support approach adopted by the Army and is a basic implementation requirement for the DSSE. The target computer system is generally the "fielded" portion of the computer resources and may include intermediate level support systems that accompany the operational system into the battlefield. The software elements of the target computer systems are generally implemented as a bit pattern on a magnetic reel or disc, or as a specific code pattern fabricated into a micro-electronic device, such as a Read Only Memory (ROM).

e. (3.5) Host computer system. The host computer system generally supports itself, that is, it is used for life cycle support of all related software (including support software) and may include some or all of a particular target computer system. The host computer systems in the LCSSE and the DSSE will generally support many target computer systems. A single host computer system (or its portions) could also be included as part of many different software support environments, depending on the nature of the contractor's business and operations.

f. (3.8) Software. This definition is the generally accepted definition of software. It is included here as a lead-in for the separate handling of operational and support software. The two subparagraph definitions separate the software into these discrete categories, which are based on the software's use and residency. This equal but separate treatment is included to ensure that the requirements for support software are not obscured by the treatment of the operational software and that items essential for software support are not excluded.

g. (3.6) Previously developed. This term is included in the Standard to differentiate between tools that are available for use at the time of contract award and tools that are still under development, or proposed for development. The objective of this differentiation is to highlight to the contracting activity the potential risks of allowing the contractor to propose (and use) software tools that are are generally untried or unproven in general use.

NOTE: **ANY SUPPORT TOOLS** that are not previously developed, and that the contractor proposes to use, must be identified in the contract, funded, and managed as software that is to be developed. The proposal and use of these tools is subject to the prior approval of the contracting activity.

3.2 Specific terms (continued).

h. (3.9) Software sources. These definitions allocate support software into discrete categories that are used to determine the management requirements for the support software (as described in paragraph 5.2 and subparagraphs of the Standard. The definitions represent the four categories of software that will find their way into the LCSSE. The definition and use of these categories is important since the management requirements of the software for each source are quite different. Every item of operational or support software to be included in the DSSE or the LCSSE must be allocated into (and managed as) one or more of these categories. (See also paragraph 5.2 of this Appendix.)

NOTE: Since the management requirements for each category of software differ, the mixture of categories will complicate both the contractor's and the LCSE Center's management processes. For this reason, the use or delivery of tools that contain a mixture of software from different sources is to be discouraged. If a software tool requires the mixture of software from different sources, the components of that tool should be modular and independent.

i. (3.9.3) Contracting activity designated resources. These terms are NOT identical to Government Furnished Equipment (GFE) or Government Furnished Information (GFI). Both GFE and GFI may be included as a subset of the resources designated by the contracting activity. The essential difference is that the contracting activity may elect to require the use of certain resources, without becoming involved as the supplier. In this case, the contractor will be required to include the designated resources in the DSSE and make the necessary arrangements for their use.

NOTE: Both commercially available or privately developed items may be designated. In the case where the resources are not supplied by the contracting activity, the contractor should be required to arrange for purchase, lease, or use of these items. The LCSE Center must put forth some prior thought and analysis as to how difficult or costly it will be for the contractor to arrange for the use of these designated items, versus how difficult it will be for the LCSE Center to arrange for their use by the contractor.

4. GENERAL REQUIREMENTS

NOTE: The requirements contained in Section 4 of the Standard are, as their name implies, general in nature and applicable across the spectrum of the contractor's and Government's activities. They are supported by the detailed requirements contained in Section 5 of the Standard.

4.1 Software support environment. This paragraph is essentially a summary of the coverage contained in paragraph 5.1 of the Standard, and it is one of the tasking statements that support procurement of the DSSE Plan. It defines the contractor's responsibility to do the following:

a. Define the DSSE in a proposed DSSE Plan.

b. Identify resources needed for life cycle software support.

c. Identify approach to ensure and warrant supportability.

d. Obtain approval of the DSSE Plan before starting the contract effort.

4.2 Contracting activity furnished resources. This paragraph invokes and protects the contracting activity's options to require the contractor to use certain designated resources. Note that the specifics of identification require the contracting activity to identify the LCSSE, whatever items of that LCSSE that are to be used by the contractor, and whatever other items of software (not part of the LCSSE) are to be used by the contractor.

THE CONTRACTING ACTIVITY SHOULD AUGMENT THIS PARAGRAPH IN EACH PARTICULAR CONTRACTED EFFORT BY:

a. IDENTIFYING THE LCSSE.

b. DESIGNATING ANY RESOURCES REQUIRED FOR USE BY THE CONTRACTOR.

c. IDENTIFYING HOW THE CONTRACTOR IS TO ACQUIRE THESE DESIGNATED RESOURCES.

Further discussions of these contracting activity tasks are contained in paragraph 5.2 and subparagraphs of this Handbook.

4.3 Rights in documentation and computer software. The purpose of this paragraph is to encourage the use of state-of-the-art tools, provided that the expected benefits to the contracting activity will support such use. Note that the rights issues are not completely resolved by this paragraph, but are flagged for negotiation and agreement before the contracting activity is committed to a particular contractor's approach. Successful coverage of this area depends on the requirement (in the proposal) for a DSSE Plan and the specific negotiation and contractual coverage of all items subject to any restrictions, including limited rights, trade secret restrictions, or copyrights.

THE CONTRACTING ACTIVITY SHOULD AUGMENT THIS PARAGRAPH IN EACH PARTICULAR CONTRACTED EFFORT BY:

a. IDENTIFYING IN THE REQUEST FOR PROPOSAL AND THE INSTRUCTIONS FOR PROPOSAL PREPARATION, THE INFORMATION (OR ALTERNATIVES) DESIRED FROM THE BIDDERS (NORMALLY IN THE FORM OF A DRAFT DSSE PLAN).

b. NEGOTIATING THE AGREEMENTS FOR USE OF EACH PARTICULAR ITEM PROPOSED BY THE CONTRACTOR, AND DOCUMENTING THESE AGREEMENTS IN THE RESULTING CONTRACT.

c. ARRANGING FOR DELIVERY TO THE LCSE CENTER OF SELECTED ITEMS BY WAY OF ADDITIONS OR MODIFICATIONS TO THE CONTRACT SCHEDULE AND THE CDRL.

A short discussion of this complex area is contained in paragraph 4.6 of this Handbook.

4.4 Deviations and waivers. The purpose of this paragraph is to reinforce the fact that the Standard addresses ALL resources to be used by the contractor to satisfy the contract requirements. The specific method of processing deviations and waivers is left to the option of the contracting activity. The approval and documentation of any requests should be processed as formal contract changes. The Contract Change Proposal/Task Change Proposal (CCP/TCP) process described in MIL-STD-483 is one method of processing these changes.

5. DETAILED REQUIREMENTS

This section of the Standard contains the detailed work statements that task the contractor, and it is organized into three main paragraphs:

a. **Paragraph 5.1 and subparagraphs:** Establish the contractor's requirements to define both the DSSE and the plans for ensuring software supportability.

b. **Paragraph 5.2 and subparagraphs:** Define the rules to be applied to the support software and documentation that is to be included in the DSSE, based on the source of this software.

c. **Paragraph 5.3 and subparagraphs:** Establish the conditions that the contractor must meet in order to ensure and warrant the required software support capability.

5.1 DSSE (Developmental Software Support Environment). The purpose of this paragraph is to require the contractor to define, design, and implement the DSSE. Any software development contractor must, in any case, have or implement an environment to support the contract requirements for software development. Therefore, the paragraph establishes some up front conditions to be met by this environment, to ensure that the contractor has accomplished the necessary preliminary planning and analysis, and to provide some assurance that the contractor is prepared to properly support the contract. This paragraph is necessary to help ensure that the Government will select contractors that have a sufficient software development and management capability. Key elements:

a. The DSSE must provide a full range of engineering and other services, such as software development, software test, configuration management, project management, documentation control, and release control.

b. The contractor must evaluate alternatives for the DSSE.

c. The DSSE approach must be approved before use on the contract.

d. The Contractor must identify how the DSSE will be shown to be compatible with the LCSSE.

5.1.1 DSSE approach. The purpose of this paragraph is to ensure that the contractor's DSSE approach will be in line with the LCSSE host-target concepts. It also ensures that the contractor is planning to develop the software with a sufficient set of resources (equipment, tools, and procedures).

5.1.2 DSSE identification. The purpose of this paragraph is to require the contractor to identify and justify the selected DSSE approach. It is necessary to ensure that the decisions of the contractor are made in best interests of the contracting activity and the LCSE Center. Key elements:

a. The contractor must justify fully the selected alternative.

b. The DSSE must be reconciled with the operating and support concepts.

c. Changes to the contracting activity approved DSSE must be approved by contracting activity.

THE CONTRACTING ACTIVITY SHOULD AUGMENT THIS PARAGRAPH IN EACH PARTICULAR CONTRACTED EFFORT BY:

a. DESIGNATING THE LCSSE AND ANY RESOURCES (See paragraph 4.2 of this Appendix.)

b. IDENTIFYING AND SUPPLYING THE DOCUMENTS THAT DEFINE THE OPERATIONAL AND SUPPORT REQUIREMENTS.

5.1.3 DSSE contents. The purpose of this paragraph is to establish a minimum functional capability for the DSSE. It helps ensure that the software development is at least as sophisticated as that implemented by the LCSE Center and that the contractor's software development will be properly disciplined and managed. Key elements:

a. The DSSE must have a defined interface between the users of the DSSE and its resources, a set of software support tools, and a central library for the storage of both software and information.

b. The DSSE must have a control language for the interface of users with the library.

c. The DSSE must support the functions of project management, configuration management, documentation, and release control.

5.1.4 DSSE operation. The purpose of this paragraph is to ensure that the contractor has established satisfactory management and control of the DSSE. This paragraph ties software support to the contractually specified requirements for software development and ensures their compatibility. It also helps ensure that the contractor has proposed to provide similar capabilities as those required by the LCSE Center to perform life cycle software support.

5.1.5 Differences between the DSSE and the designated LCSSE. The purpose of this paragraph is to ensure that the contractor sufficiently understands the LCSSE and how it differs from the DSSE. It requires the contractor to identify ALL differences, and to either recommend additions to the LCSSE, or justify why additions are not recommended. It mandates that no contractually deliverable software shall be dependent on any software or procedures that are not deliverable or designated by the contracting activity.

THE CONTRACTING ACTIVITY SHOULD AUGMENT THIS PARAGRAPH IN EACH PARTICULAR CONTRACTED EFFORT BY:

a. NEGOTIATING THE SPECIFICS OF ANY RECOMMENDED ADDITIONS, AND DOCUMENTING THESE ADDITIONS IN THE RESULTING CONTRACT.

b. ARRANGING FOR DELIVERY OF SELECTED ITEMS BY WAY OF ADDITIONS OR MODIFICATIONS TO THE CONTRACT SCHEDULE AND THE CDRL.

A further discussion of this area is contained in paragraph 4.3 of this Handbook.

NOTE: The paragraph requirement is based on the assumption that the DSSE will provide a capability that is greater than the LCSSE, hence the emphasis on identifying additions for possible enhancement of the LCSSE. Instances may be encountered in which the contractor will propose a DSSE that is less capable than the LCSSE. In these cases, it may become necessary for the contracting activity to require enhancement of the DSSE, by designating resources for use in the DSSE. Additionally, as the LCSSE matures, fewer additions should be needed or expected, and the contracting activity should be more selective or restrictive in evaluating proposed additions.

5.1.6 Software source identification. The purpose of this paragraph is to require the contractor to categorize all software intended for use in the DSSE into the four categories used by the Standard. This paragraph is necessary to set the stage for the implementation of the DSSE (paragraph 5.2 of the Standard), and to give the contracting activity prior approval over the final identification of software sources.

NOTE: This paragraph reinforces the requirement that prior approval by the contracting activity is necessary before the contractor has entered into any agreements or procured any licenses for the use of proposed items. The intent is to prevent prior contractor decisions from preempting the options of the contracting activity. For those items designated (but not supplied) by the contracting activity, their approval for use is implied.

[redacted]

of the Standard).

5.2.1 Software furnished by the contracting activity. Software in this category is previously developed, and generally owned by the LCSE Center, or some other government software support agency. It will usually be subject to formal configuration management. In some cases, the support agent may be a contractor acting on behalf of the Government. Key elements:

a. The contracting activity will generally NOT have management responsibility for this software and will NOT have the authority to approve changes to it. Configuration control for these items is usually exercised by command level Configuration Managers, product directorates or other support organizations.

b. Any changes to this software must be processed and approved by the control agent before authorized for use on the contract. For example, if a contractor were permitted to copy the item, give it a new name, and make changes, the necessary compatibility of this item with the government furnished item and with the LCSSE might be lost.

c. Since this software is to be supplied by the contracting activity, the contract must have special provisions to ensure the integrity, protection, and adequacy of the software.

5.2.2 Software that is commercially available. Software in this category is previously developed and generally available from a wide range of suppliers, with differing levels of test and quality assurance and differing levels of availability or restrictions. Key elements:

a. The Government generally cannot influence the capabilities of the software nor its configuration stability. The supplier has no obligations to correct deficiencies, to provide corrections or enhancements, nor ensure compatibility of versions.

b. Since the control of this software by both the contractor and the contracting activity is restricted, the contract must have special provisions to ensure the initial adequacy of the software and the continual coordination with the original supplier to address any deficiencies or changes.

c. The contractor must also be able to integrate this software into the DSSE and ensure its compatibility with the rest of the DSSE and the LCSSE.

5.2.3 Software that is privately developed. Software in this category is previously developed, has historically proven the most difficult to identify or manage, and has been the primary reason for limitations to the ability of government agencies to ensure software supportability. Key elements:

a. This software is not subject to any government or commercial market place pressures that would affect its adequacy or control its configuration.

b. This software may typically be closely held within a company, protected under severe trade secret or copyright laws, and available (if at all) only at significant cost.

c. This type of software may represent a major improvement in software support state of the art, and could provide a significant improvement in the capability of the LCSE Center.

d. Since the incorporation of software in this category into the DSSE may affect the ability, productivity, and cost of providing life cycle software support by the LCSE Center, the contract must have special provisions to accomplish the following: 1) require identification of these items, 2) protect the Government's abilities to perform software support, and 3) still encourage contractors to use (and recommend) the best available software tools.

5.2.4 Software that is to be developed. Software in this category permits the most influence by the contracting activity in the requirements, development, and quality of the software tools. However, development of new support tools can also present a significant risk. Key elements:

a. The development of support software concurrently with operational software is risky from both the standpoint of adequacy and availability. The delayed completion of a software tool, or its failure to perform as expected, can affect both the development and fielding of the operational system and the achievement of life cycle software supportability.

b. The Standard requires software in this category to be developed under the same contract rules, tasks, and requirements that are contractually specified for the operational software.

c. To protect the contracting activity, the Standard also requires the treatment of software from any source, that is not previously developed, to be treated and managed in the category of software that is to be developed. The implication of this treatment is that this software is subject to all of the contract requirements for software development, such as DOD-STD-2167.

NOTES:

1. The following paragraphs discuss the SIX MANAGEMENT RULES for each source category of support software.

2. The paragraph numbers for each of the work tasks have been combined, with an X replacing the unique part of the paragraph number. For example, the software integration requirements for Contracting Activity Furnished software, are contained in paragraph 5.2.1.1 of the Standard.

3. Each source of software includes, in parentheses, the exact DOD-STD-1467 paragraph reference. For example, the title "Contracting Activity Furnished", under paragraph 5.2.X.1 includes (5.2.1.1), which is the paragraph that refers to software integration requirements for contracting activity furnished software.

5.2.X.1 Software integration requirements. These paragraphs cover requirements for integration of the software from each source into the DSSE and for ensuring compatibility of this software (if selected for integration) with the LCSSE. The primary purpose of the integration requirement is to ensure that software from different sources can operate as a complementary set of software tools in the LCSSE.

a. The mixture of software from different sources can greatly complicate operation and configuration management, especially where configuration control authority resides outside the Army Program Office or the LCSE Center.

b. Increased modularity or independence of the software tools will improve the LCSE Center's ability to selectively upgrade the LCSSE and to allocate common resources among separate LCSSEs within the LCSE Center.

(5.2.1.1) **Contracting Activity Furnished:** The issues addressed in this paragraph relate to the integrity and independence of this type of software.

a. The purpose of this paragraph is to avoid ending up with a non-standard version of government furnished software, that may be embedded in (and dependent on) the contractor's software.

b. This paragraph is necessary to avoid building a unique shell around the government furnished software, which will restrict the flexibility of the Government in the support of that government furnished software.

(5.2.2.1) **Commercially Available:** The issues addressed in this paragraph relate to adequacy, currency, and independence of this type of software:

a. Since commercially available software can come from almost unlimited sources that are not subject to government controls, quality evaluation (as opposed to product control) must be implemented. For many of these products, the software development contractor and the contracting activity cannot control the configuration of the product.

b. The primary purpose of this paragraph is to require the contractor to supply evidence of the adequacy of the software and its documentation. The contractor is also required to ensure that future changes from the supplier of the software can be readily incorporated in the DSSE (if desired by the contracting activity).

5.2.X.1 Software integration requirements (continued).

(5.2.3.1) **Privately Developed:** The issues addressed in this paragraph are the adequacy of this type of software and its general availability.

a. Since privately developed software is not widely marketed or available, the price, quality and configuration control can vary widely, based on its projected benefits.

b. The products may represent a significant competitive edge for the supplier, who may be reluctant to release any information or permit even restricted use by the Government.

c. The purpose of this paragraph is to avoid an historically troublesome situation in which powerful tools were used to develop the software, but not delivered, since these tools were not "needed" for the LCSSE. The contractor must assess, in effect, what's gained if the tool is used, and what's lost if it isn't.

(5.2.4.1) **To Be Developed:** The purpose of this paragraph is to ensure that the software tools are developed so that they will operate in the LCSSE. The contracting activity is funding the development of these tools for use by the contractor; this paragraph is necessary to ensure that the support software developed by the contractor is suitable for LCSE use without further LCSE Center or contracted efforts.

5.2.X.2 Software documentation requirements. These paragraphs cover requirements for development, procurement, and maintenance of the documentation for each source. The paragraphs are necessary to accommodate the differences in sources, quality, and control (of both the Government and software development contractor) over the documentation.

(5.2.1.2) **Contracting Activity Furnished:** This paragraph has two purposes: First, to restrict the contractor from making any changes to the documentation furnished by the contracting activity, and secondly, to require the documentation of actions that were needed to get the contracting activity furnished items to work in the DSSE.

THE CONTRACTING ACTIVITY SHOULD AUGMENT THIS PARAGRAPH IN EACH PARTICULAR CONTRACTED EFFORT BY:

SPECIFYING THE DOCUMENTATION REQUIREMENTS FOR ANY CHANGES OR ADDITIONS. NORMALLY THESE REQUIREMENTS WILL BE THE SAME AS THE DOCUMENTATION USED TO DEFINE THE CONTRACTING ACTIVITY FURNISHED SOFTWARE.

5.2.X.2 Software documentation requirements (continued).

(5.2.2.2) **Commercially Available:** The purpose of this paragraph is to permit an alternative for procuring existing documentation, provided that it is considered adequate. The paragraph is necessary to avoid the costly repackaging of documentation (if only for the purposes of meeting a DID requirement), yet to protect the LCSE Center's needs.

THE CONTRACTING ACTIVITY SHOULD AUGMENT THIS PARAGRAPH IN EACH PARTICULAR CONTRACTED EFFORT BY:

a. NEGOTIATING THE KIND OF DOCUMENTS TO BE PROVIDED FOR SOFTWARE IN THIS CATEGORY.

b. ESTABLISHING A MILESTONE OR REVIEW SCHEDULE FOR SUBMITTAL OF THIS DOCUMENTATION FOR REVIEW AND APPROVAL BY THE CONTRACTING ACTIVITY.

(5.2.3.2) **Privately Developed:** This paragraph is identical to that for commercially available software.

(5.2.4.2) **To Be Developed:** The purpose of this paragraph is to ensure that developed support software is documented the same as the developed operational software.

5.2.X.3 Software quality assessment requirements. These paragraphs cover requirements for applying the contractor's software quality program to the integration and use of the support software. These paragraphs are necessary to prevent the exclusion of the support tools from the contractor's program. All the paragraphs are similar, with one exception. For contracting activity furnished software, the contractor can only be held responsible for integration of this software, not for its performance or quality.

5.2.X.4 Software configuration management requirements. These paragraphs cover the contractor's authority and flexibility in identifying and correcting the problems encountered in the integration and use of the support software, as well as implementing any changes to the software. The purpose of these paragraphs is to require the contractor to report any problems and require any changes to be processed as a separate contractual action (except for software that is to be developed). The paragraphs for each source of software are similar, except for the coverage of software that is to be developed.

5.2.X.5 Software changes. These paragraphs define the limits on the contractor's internal authority to implement changes to the support software. In general, except for software that is to be developed, the contractor is not permitted to implement any changes to the software without prior contracting activity approval.

NOTE: A distinction is made here between those changes processed and implemented internally by the contractor (software changes) and those that are processed by formal Engineering Change Proposal (ECP) and contract change actions.

(5.2.1.5) **Contracting Activity Furnished:** NO INTERNAL CHANGES. All changes must be processed and implemented by ECP and contractual changes, with concurrence of the LCSE Center.

(5.2.2.5) **Commercially Available:** NO INTERNAL CHANGES without prior approval by the contracting activity and concurrence of the LCSE Center. The purpose of this paragraph is to require the software development contractor to coordinate all problems and changes with the vendor or supplier. It is necessary to ensure that this software continues to comply with the vendor's or supplier's requirements, or require the contractor to provide sufficient documentation and rights to permit support of this software by the LCSE Center.

(5.2.3.5) **Privately Developed:** NO INTERNAL CHANGES without prior approval by the contracting activity and concurrence of the LCSE Center. The purpose of this paragraph is the same as that for commercially available software. Since privately developed software is not widely marketed, this paragraph additionally requires a more thorough evaluation of the impact of any proposed changes. This paragraph is necessary to ensure the continued protection of the rights and needs of the LCSE Center.

(5.2.4.5) **To Be Developed:** The purpose of this paragraph is to include the support software in the contractor's software development program. It is necessary to avoid any misunderstanding of the scope of the contractor's software development requirements. All internal changes to the support software are controlled in the same manner as are the internal changes to the operational software.

5.2.X.6 Software acceptance requirements. The purpose of these paragraphs is to ensure the resolution of any particularly pointed issues (that may not be covered elsewhere in the contract) prior to completion of the contract effort. All paragraphs predicate the acceptance of the software effort on compatibility with the LCSSE.

(5.2.1.6) **Contracting Activity Furnished:** The purpose of this paragraph is to permit a final review or audit of the software and its documentation.

(5.2..2.6) **Commercially Available:** The purpose of this paragraph is to ensure the satisfactory resolution of any rights issues. These issues should have been resolved up front; this paragraph is necessary as a final check and protection point.

(5.2.3.6) **Privately Developed:** This paragraph is identical to that for commercially available software.

(5.2.4.6) **To Be Developed:** This paragraph has no requirements other than compatibility. This paragraph infers that the software acceptance requirements of the contract are sufficient, when supplemented by the requirement for compatibility with the LCSSE.

5.3 Establishment of software supportability within the designated life cycle software support activity. The purpose of this paragraph is to establish the conditions necessary for acceptance of the contracted effort. It is the PRIMARY purpose of the Standard and the culmination of all the preparatory efforts that were tasked in paragraphs 5.1, 5.2 and their subparagraphs of DOD-STD-1467.

NOTE: Although the emphasis of the Standard coverage is on the software and the supportability of that software, this capability will depend on ALL of the resources necessary to perform those services, such as **FACILITIES, EQUIPMENT, AND DOCUMENTATION**. Any additions to the LCSSE proposed by the contractor must also address these items. Key elements:

a. A satisfactory software support capability must be established in the LCSSE prior to acceptance.

b. New (added) software (operational and support) and other resources must be compatible with the existing resources.

c. New, plus existing software, must provide the necessary support capability.

d. The new capability must be warranted by the contractor.

5.3.1 Identification of additions to the designated LCSSE. The purpose of this paragraph is to task the identification of all additions recommended by the contractor and provide a tasking statement for portions of the LCSSE Users Guide. It is necessary to ensure that the LCSE Center is provided with adequate information on the extent of the delta to the existing LCSSE.

5.3.2 Description of the designated LCSSE operation. The purpose of this paragraph is to provide the basic tasking statement for the remaining portions of the LCSSE Users Guide. It is necessary to ensure that the LCSE Center is provided sufficient information to permit operation of the LCSSE, as augmented by the contract effort. This paragraph contains the following major requirements:

a. The contractor must describe how to operate the LCSSE, as augmented by the new capabilities.

b. Operating procedures for the LCSSE must be provided.

c. Software interfacing instructions must be provided.

5.3.3 Implementation of additions to the designated LCSSE. The purpose of this paragraph is to ensure the proper transfer and implementation of all additions to the LCSSE. It also provides the tasking statement that supports the ordering of the Software Support Transition Plan. This paragraph is necessary to ensure that the contractor properly plans for the transition of the support, and that the contractor will provide necessary support to the LCSE Center subsequent to transfer. Key elements:

a. The contractor must plan for transfer of all deliverable software to the LCSSE.

b. Installation support must be made available.

THE CONTRACTING ACTIVITY SHOULD AUGMENT THIS PARAGRAPH IN EACH PARTICULAR CONTRACTED EFFORT BY:

DEFINING THE SCOPE OF SUPPORT DESIRED FROM THE CONTRACTOR AND THE PERIOD OF TIME THAT THIS SERVICE IS TO BE PROVIDED.

NOTE: If the Software Support Transition Plan is not to be a deliverable, the requirements of this paragraph are included in the DSSE Plan. In this case, the contracting activity should ensure adequate and complete coverage of these events, prior to approval of the DSSE Plan.

5.3.4 Supportability and compatibility requirements. The purpose of this paragraph is to require the contractor to implement the plans (DSSE Plan and Software Support Transition Plan) as approved by the contracting activity. It also details the conditions necessary to satisfy the supportability and compatibility requirements of the Standard. It is necessary to provide minimum conditions for accomplishing all of the requirements of the Standard. Key elements:

a. The contractor must propose how he will ensure and warrant satisfaction of this requirement.

b. The contracting activity must approve the approach.

c. All deliverable software must be maintainable using only those items contractually deliverable or identified by the contracting activity.

d. All operations and functions that were available in the DSSE must be available in the LCSSE.

e. Software generated by the DSSE and the LCSSE must produce identical results during operation.

6. MISCELLANEOUS

Contract data requirements. This section of the Standard is contractually non-mandatory. It is included to indicate the Data Item Descriptions (DIDs) that come under the cognizance of the Standard. Each of the four DIDS that can be used to support implementation of the Standard are described in the following paragraphs. Of the four DIDs, the DSSE Plan and the LCSSE Users Guide are the minimum documentation requirement and should be required to be delivered for any contracted software development or support effort.

6.1 Developmental Software Support Environment Plan (DI-E-7140). This is the primary document on which the application of the Standard, and the measure of compliance with the Standard, is based. It is structured to permit the contractor the flexibility to determine and recommend the best way for the LCSE Center to achieve the capability to perform software support. It is intended to be a companion document to the contractor's Software Development Plan.

6.1.1 Purpose. The DSSE Plan establishes a contractually approved agreement on the contractor's performance requirements and defines the contractor's approach for complying with the Standard. The DSSE Plan covers the entire range of contract performance, from definition and implementation of the DSSE, through software support transfer, to implementation and operation in the LCSSE.

6.1.2 Contractual application. The information in the DSSE Plan (in the form of a draft plan) is usually required as part of the contractor's proposal. Once the content of the DSSE Plan has been negotiated with (and approved by) the contracting activity, the contractor is then required (by the Standard) to implement the plan as approved. The Standard provides the requirements, the DSSE Plan documents how the contractor will satisfy those requirements.

6.1.3 Monitoring implementation. The ability to monitor the contractor's compliance with the Standard is directly proportional to the quality of the DSSE Plan. The contractor's software quality evaluation program is required to be applied to the support software, and this program should also be used to evaluate the adequacy of the DSSE Plan implementation.

6.2 Software Support Transition Plan (DI-E-7142). This is an optional document, whose requirement is based on the complexity and length of the projected software support transition effort. The basic requirements for software support transfer are contained in the DSSE Plan, which are usually defined as part of the contract negotiation process. The Software Support Transition Plan (SSTP) is generally ordered later in the software development, when the details of the scheduling and the software transfer have matured.

6.2.1 Purpose. The purpose of the SSTP is to spell out in excruciating detail the who, what, when, and how of the transfer of support software and responsibility from the contractor to the LCSE Center. It is especially valuable whenever the transfer period is prolonged, or when many contractors and government agencies will be involved.

6.2.2 Contractual application. The SSTP is invoked in a manner similar to that for the DSSE Plan and the Software Development Plan. Since the SSTP documents how the Standard's and the DSSE Plan's requirements will be met, the SSTP becomes the contract agreement for the transfer tasks of paragraph 5.3 of the Standard.

6.2.3 Monitoring implementation. Since the SSTP is heavily resource and milestone oriented, the progress must be periodically monitored and reconciled. The transfer tasks should be made an integral part of integration or system test, and the software test team (or system test team) should be tasked with monitoring the implementation of the SSTP.

6.3 Life Cycle Software Support Environment Users Guide (DI-E-7143). This document is directed at the needs of the LCSE Center and should be required on all contracts. It documents that portion of the total equipment, software, and documentation of the LCSE Center that is to be considered the LCSSE, and it details the operating procedures necessary to operate the LCSSE. Existing manuals or other similar types of documentation that explain or describe portions of the LCSSE should only be referenced, not directly incorporated. The LCSSE Users Guide should contain only that information necessary for operation of the LCSSE that is not available from other sources.

6.3.1 Purpose. The purpose of the LCSSE Users Guide is to describe the resources necessary and the procedures to be used to fully support the target computer systems and associated software by the LCSE Center after Materiel Release. Usually, a separate LCSSE Users Guide is procured for each target computer system, or set of closely related target computer systems.

6.3.2 Contractual application. The LCSSE Users Guide is intended to be used as the basis for the operation of the LCSSE, and should form the basis for the contractor's demonstration of software supportability. The contracting activity should consider an added contract requirement that will task the contractor to support the extended application of the LCSSE Users Guide. This added task should permit the contracting activity to validate and verify the accuracy and completeness of the LCSSE Users Guide under actual operating conditions at the LCSE Center.

6.3.3 Monitoring implementation. The LCSSE Users Guide should be initially validated and verified by the LCSE Center or the contracting activity during the period of software support transfer. If a follow-on period of support is contractually required of the contractor, the evaluation and revision of the LCSSE Users Guide should be included as an ongoing task on the part of the contractor.

6.4 Documentation of Commercially Available or Privately Developed Software (DI-E-7141). This DID provides an optional method of delivery of existing documentation for previously developed software that has been recommended and approved for incorporation and use in the LCSSE.

6.4.1 Purpose. The purpose of this DID is to permit the delivery and use by the LCSE Center, of existing documentation, provided it meets the minimum requirements of the LCSE Center. It provides a channel to avoid the costly re-development and formatting of already existent documentation solely for the purposes of meeting other software related DID requirements. This DID also permits the ordering of Non-developmental Item (NDI) software in efforts where software development is not required.

6.4.2 Contractual application. The contracting activity must review the documents proposed for delivery under this DID and provide contract direction which identifies which documents are acceptable. The default mode in this case, is to require the complete set of software documentation that is specified by the contract's software development requirements.

6.4.3 Monitoring implementation. Wherever previously developed (privately developed or commercially available) software is proposed in support of the Standard, or the software development efforts, this DID should be incorporated in the procurement package. The requirement in the Standard for prior approval by the contacting activity for use of this mode of delivery requires the LCSE Center to review and approve all documentation proposed by the contractor for delivery by this method.

APPENDIX B
SPECIAL TOPICS

20. SCOPE

20.1 Approach. This appendix discusses selected topics of general interest for situations that are expected to be encountered in the process of applying DOD-STD-1467.

a. Some of these topics are beyond the scope of the normal Standard coverage.

b. Other topics are an amplification of the Standard's requirements.

All of these topics will require some added consideration, thought and planning on the part of the LCSE Centers, and some may require specialized treatment in the contracted efforts.

20.2 Application. This appendix is to be used as a reference to help ensure that unique system situations and system requirements have been considered in the LCSE Center's initial planning and in the contracts that implement the Standard. The information provided here should be used to develop an added insight into the specific problems associated with unique work task coverage in procurement packages.

21. GENERAL REQUIREMENTS

Section 22 of this appendix contains a topical treatment of selected special subjects.

21.1 Special subjects. The following topics are discussed:

(22.1) Improving the software support environment(s).

(22.2) Integration of support requirements for software that is to be developed or delivered by multiple sources.

(22.3) Providing for changes that must be incorporated in both the DSSE and the LCSSE during the contract period.

(22.4) Providing for and ensuring requirements traceability.

21.2 Coverage of each item. Each subject is first described, then its relevance or importance to the LCSE Center is explained, and finally, proposed courses of action are identified to ensure that the subject is properly covered in procurement packages and support planning:

a. **Description:** A general discussion of each item, why it is a potentially troublesome area, and why added coverage (beyond the Standard) may be desirable.

b. **Relevance to the LCSE Center:** A general discussion of how this item affects the mission of the LCSE Center and why the item is important to the LCSE Center.

c. **Proposed Courses of Action:** A discussion of possible actions and effort required by the LCSE Center, including alternatives, where applicable.

22. SPECIAL SUBJECTS

22.1 Improving the software support environment(s).

22.1.1 Description. The Army LCSE Centers are competing with other Army acquisition and support organizations to identify and justify the resources needed to support their mission. A chronic issue is the need to identify and justify ADDED resources that will MODERNIZE or IMPROVE the support mission and functions.

a. In the business of identifying and acquiring improvements to the LCSSEs, the LCSE Center is essentially an Organization and Maintenance funded organization that is competing for Research and Development funds.

b. The LCSE Center must compete, with both the Army program offices in identifying funding requirements, and with the DoD contractors in using funds, for software development and support related efforts and items.

22.1.2 Relevance to the LCSE Center. The LCSE Center must always consider the balance of its resources and options against the need for standardization (and its relative benefits) and the application and use of more powerful, system specific, unique tools (and their relative benefits). This balance is complicated by many factors: a) the need to minimize contract requirements and costs, b) the desire to maintain the status quo, c) the length of acquisition time, d) the prior approvals required, and e) limitations on resources. These factors are discussed in the following paragraphs.

21.1.2.1. The need to minimize contract requirements and costs. DOD-STD-1467 requires contractors to be compatible with, and ensure software supportability within, the designated LCSSE. Even if the LCSE Center chooses not to designate any LCSSE resources for required use by the contractor, the contractor may still choose to obtain and use the resources that are identical to those in the LCSSE, as the simplest management approach. If the contractor chooses to use its existing equipment and software to support development, the contractor may still not be required to deliver any of these items, expecting to only show that the delivered software can be supported using the existing resources of the LCSE Center.

CONCLUSION: Regardless of the alternative approach chosen by the contractor, there are no real incentives to propose the DELIVERY to the LCSE Center of new tools and techniques.

21.1.2.2 The desire to maintain the status quo. The LCSE Centers will generally lean toward use of proven tools and techniques, especially those that are currently in use within the LCSSE, or those in which the LCSE Center has a large investment. A fair amount of dissatisfaction with the existing tool or technique, and a perceived large benefit for adoption of a new tool or technique, will be required to tip the balance in favor of the new tool or technique versus the old tool or technique.

CONCLUSION: For the successful introduction of new tools, contract and management incentives are needed on the part of BOTH the contractor AND the LCSE Center.

22.1.2.3 The length of acquisition time. Because of the length of time from identification of a new tool or technique to its delivery or insertion in the inventory, and the length of the system acquisition cycle, most LCSSEs will not reflect the current state of the art in software development or support. Each LCSE Center will have a fairly large investment in the existing resources, with no expedient way of replacing outmoded tools or techniques.

CONCLUSION: Both a method of accelerating acquisition and a continuing refreshment process are needed.

22.1.2.4 The prior approvals required. New tools or techniques must be approved by the contracting activity before they can be used by the contractor. The proposal to use new items, or items under development, may add significant development risks to the proposed approach. New tools may be subject to rights restrictions (or other forms of protection); they also can drive up the contractor's development costs. Both items can potentially jeopardize the contractor's chances of winning the competition.

CONCLUSION: Source selection and contract award incentives to propose new tools or techniques are needed.

22.1.2.5 Limitations on resources. The LCSE Centers do not have the resources (manning or funding) to review or evaluate proposed additions to the LCSSE. The personnel shortage is especially acute during the source evaluation, when the contractor's proposed additions to the LCSSE must be evaluated and approved prior to contract award. As the LCSE Center becomes more familiar with the winning contractor's effort, it will be in a better position to evaluate tools and techniques for addition to the LCSSE.

CONCLUSION: A CONTINUING contract and review mechanism is needed.

22.1.3 Proposed courses of action. Four specific areas must be developed and implemented to provide the means for the LCSE Center to evaluate and acquire the tools and techniques necessary for a modern, productive, cost-effective LCSSE: a) proposal and contract incentives, b) work tasks for statements of work, c) contract and funding mechanisms, and d) acquisition and management techniques.

22.1.3.1 Proposal and contract incentives. Contract clauses are needed that will encourage the offerors to propose for delivery to the LCSE Center, modern environments, with state of the art tools. These items must be insulated and separate from the other proposal criteria and contract costs, and attached to profit/fee breaks for the use and delivery of modern tools and techniques.
Some suggestions:

Section H: Special Limited Rights Protection, tailored to protect third party suppliers (i.e., provide rights directly to the contracting activity).

Section L: Proposal Preparation Instructions that contain a separate section or part of proposal devoted to the contractor's recommendations for new tools, including benefits and risks of using.

Section M: Proposal Evaluation Criteria with a separate weighted evaluation criteria that addresses the worth of the proposed new tools.

22.1.3.2 Contract tasking and methods. The contractor should be tasked to accomplish the continuing evaluation of potential new tools and to propose these tools for delivery to the LCSE Center. This work should include SOW tasking to evaluate tools throughout the contract period, and separate contract changes and funding to acquire and install new tools and techniques. The application of these items must be government regulated to ensure that all contractor expenditures of funds for these tasks are directed only toward tools that will benefit the LCSE Center. Some suggestions:

Section B: Separate Contract Line Item Numbers (CLIN) for each CSCI (Each tool recommended to be added should be separately priced.)

Section C: Statement of Work tasks that require review, evaluation, and proposal, during contract performance, of new tools for use by the LCSE Center.

The SOW should include a special clause that will task the contractor to evaluate support tools or techniques, or other potential improvements to both the DSSE and LCSSE.

Each evaluation under this effort should be subject to prior approval and control of the contracting activity.

The LCSE Center should also be in the position of being able to task the contractor (through the contracting activity) to evaluate selected tools or techniques that are of interest to the LCSE Center.

The contractor should also be tasked to provide an estimate of the cost of providing these tools, so that the LCSE Center has a contract vehicle to obtain those that are of benefit.

22.1.3.3 Procurement and funding mechanisms. These items are needed for justifying, defining, and acquiring new tools or techniques. These items include the development of added policies, procurement package guidance, and special contract line items or contract clauses. Some suggestions:

Section B: (See recommendation in paragraph 22.1.3.2 above)

CDRL: Use DID DI-E-7141, as applicable, to identify and deliver the added documentation requirements for the proposed tools or techniques. The use of this DID can cut the cost of documentation needed by the LCSE Center.

Policy: AR 70-1, and DARCOM-R 70-16 should be revised to emphasize the use of development funds for procurement, during development, of tools that are recommended by the contractor and approved by the LCSE Center.

22.1.3.4 Acquisition and management techniques. These items are needed to accelerate the delivery and use of new tools. These items include instructions in both planning documents and SOW clauses that permit advanced access by the LCSE Center to the development contractor's DSSE, and a review and procurement cycle for added support tools, as part of the systems contract (or as separate contract). Some suggestions:

CRMP and CRWG: The LCSE Center should insure that the CRMP includes the responsibility, on the part of the Project/Program Manager, to incorporate budgeting and funding estimates for potential additions to both the DSSE and LCSSE, as the contract progresses.

SOW: The contracting activity should supplement DOD-STD-1467, paragraph 5.3.3, to permit access, during development, to the DSSE by the LCSE Center personnel for the purposes of becoming familiar with the items in the DSSE and evaluating such items for potential addition to the LCSSE.

22.2 Integration of support requirements for software that is to be developed or delivered by multiple sources.

22.2.1 Description. This subject covers those situations in which either (or both) the operational or support software for a particular system will be developed and delivered by more than one (contractor or government) source:

a. The prime contractor may subcontract (part or all of) the software development to one or more subcontractors.

b. The Army may contract for the software development from one or more associate contractors and perform (or contract for) the system level integration.

c. The Army may contract for some of the software development or procure support software from another contractor and deliver it as Government Furnished Information (GFI) for integration into the prime contractor's DSSE or into the delivered software.

d. The Army may develop (internally) some of the software and deliver it to the prime contractor for integration.

22.2.2 Relevance to the LCSE Center. In the situations above, the software could be developed on more than one DSSE, each with a different set of tools. Duplicate capabilities may be recommended (or required) for addition to the LCSE Center, resulting in many tools that will perform the same (or similar) functions for a single system.

a. It is possible that a prime contractor, subcontractors, and associate contractors could comply with the requirements of the Standard and yet yield a life cycle software support posture that is not in the best interests of the LCSE Center or the contracting activity.

b. The missing elements in these situations are the requirements to avoid the unnecessary duplication of tools (or capabilities), to use compatible tools, or to standardize tools within the DSSEs that are proposed. For these special situations, a combination of prior planning and added contract work tasking is required on the part of the LCSE Center, depending on the particulars of each situation.

22.2.3 Proposed courses of action. All of the above situations can be controlled to some extent through prior LCSE Center planning and the development of an acceptable acquisition strategy. Complete coverage of these items will require added contract tasking, and the SOW must contain work tasks that can be adapted to the specifics of the system (contracted effort) and the contracting approach that will be selected. As the acquisition process evolves, and the contracting strategies are further defined, the program decisions must be reflected in the SOW. This information is essential for a complete understanding between the Government and the contractor as to each organization's responsibilities for ensuring a life cycle software support capability.

22.2.3.1 Prime contractor to subcontractor relationships. In those situations where extensive subcontracting of the software development is expected or proposed, added contract coverage may be required.

a. The LCSE Center can designate the use of certain equipment and software tools, reducing the dangers of uncontrolled proliferation. The Standard, through its flow-down provision, requires the prime contractor to impose these requirements on any subcontractors, in effect requiring any subcontractors to use the designated resources. The Standard also requires the prime contractor to obtain prior approval to use any items in addition to those designated. The prime contractor must also require all subcontractors to seek similar approvals. The prime contractor's DSSE Plan must identify how these requirements will be imposed and enforced.

b. A work task or other special contract provision that permits contracting activity and LCSE Center visibility into subcontractor efforts should also be included. This provision could define the contract mechanism to be used for identifying the subcontractor's DSSEs (e.g., delivery or review of the subcontractors' DSSE Plans) and the mechanism to be used for processing requests for changes to these DSSEs. This special provision could also require the prime contractor to notify the contracting activity or the LCSE Center of any important meeting with subcontractors that involves issues of software support, and it should reserve the right of the contracting activity or the LCSE Center to participate in these meetings.

c. The statement of work for the software development should require the prime contractor to: 1) implement and enforce a program for the standardization of resources (equipment and software), 2) flow-down these standardization requirements to subcontractors, and 3) consolidate the requirements for additions, reconfigurations, or revisions to the LCSSE.

22.2.3.1 Prime contractor to subcontractor relationships (continued).

d. The prime contractor's and subcontractor's DSSE Plans should also be evaluated to: 1) critically review all software (especially subcontractor) that is not recommended for delivery, 2) approve the rationale for non-delivery, 3) study all recommended additions and alternatives, and 4) scrutinize the proposed certification approach for evidence of consolidation and integration of efforts.

e. By using these techniques and contract provisions, the LCSE Center can constantly evaluate all items used, or proposed for use, by all contract parties. The LCSE Center will be in a position to prevent or avoid the uncontrolled use or proliferation of support resources by the prime contractor and subcontractors.

22.2.3.2 Government organization and associate contractor relationships. Controls over the requirements and relationships of associate contractors, or government sources, are more difficult to impose. It is possible, in these cases, that only the LCSE Center can be ultimately responsible for the integration and control of proliferation.

a. If two or more contractors are to participate in the system development or contract, each of the RFPs and SOWs must define the responsibilities of the individual contractors to coordinate the definition of their DSSEs and the mechanisms used to resolve any differences among them. Areas of particular concern that must be addressed include the assignment of ultimate responsibility for the interface between the products of the individual contractors, each of the responsibilities of the contractors to exchange information with each other, and the review mechanism to be used to minimize any differences and eliminate unnecessary duplication of resources.

b. In the event that the Army employs an integrating contractor or an independent validation and verification contractor, the RFP and the SOW must include clauses which define the rights and limits of all parties for access to information, and the authorities and requirements of all contractors for the release, exchange and use of information.

c. If the Army is to deliver any items for use in either the contractor's DSSE or the LCSSE, these items must be identified as contracting activity designated. The RFP and SOW must identify these items and the responsibilities of the contracting activity for delivery, maintenance, configuration control. The RFP and the SOW must also specify the contractor's requirements for integration or use of these items in the DSSE.

22.3 Providing for changes that must be incorporated in both the DSSE and the LCSSE during the contract period.

22.3.1 Description. The Army's LCSE Centers are experiencing a period of prolonged growth. The pace of computer technology is continually producing new and better products. Most of the system development efforts require two to four years. In only the most exceptional cases will a DSSE or and LCSSE remain stable throughout the contract period. Even a major software development contractor, with a mature DSSE, will be evolving the capabilities of the DSSE with new and better tools and techniques. The LCSE Center will also be expanding and improving its LCSSE as new systems are fielded and its responsibility grows.

22.3.2 Relevance to the LCSE Center. The DOD-STD-1467 process is based on the ability to properly define the configuration of both the DSSE and the LCSSE, as the basis for ensuring compatibility of the two environments.

a. Once the contractor has defined the DSSE, all changes require prior contracting activity approval. This requirement is imposed to permit the LCSE Center the opportunity to evaluate the proposed change for its impact on the LCSSE and the LCSE Center's ability to perform software support.

b. Once the LCSE Center has provided the contracting activity with a description of the LCSSE, it becomes part of the procurement package and eventually becomes part of the negotiated contract agreement. The contractor is required to use this description as the basis for ensuring and warranting the support capability. The LCSE Center is not prohibited from changing the configuration of the LCSSE, but the contractor is under no obligation to consider these changes, and the LCSE Center must be able to recreate the original contract configuration of the LCSSE for use by the contractor.

c. A simple (but not workable) approach would be to freeze the configurations of both the DSSE and LCSSE for the life of the contract. This approach does not allow for vendor driven changes in equipment and software, and it does not recognize the need to exploit improvements in computer technology.

d. The contracting activity, to ensure that the Government can meet its contractual obligations, and to encourage the productive evolution of both contractor and government software support environments, must put in place the contract mechanisms that will permit formalized changes to both the DSSE and the LCSSE.

22.3.3 Proposed courses of action. The solution is (again) a mixture of prior planning, proper contract coverage, and periodic management actions.

a. The LCSE Center can simplify its management problems by carefully evaluating the status of its LCSE Center facilities, its plans for expansion and utilization of the LCSE Center resources, and the suitability/availability of its resources for each potential system. In this manner it can identify the proper mix of existing resources to be applied for each LCSSE, and allow for the eventual use of those resources. Each LCSE Center will not have just one, but many LCSSEs, each with a planned overlap of common resources. If the LCSE Center identifies ALL of its resources as part of a certain LCSSE, then the contractor can properly assume that ALL of these resources will be available for software support at the time of software support transition. Such an action can lead to a shortage of the LCSE Center's capacity and its ability to change and grow. It will benefit the LCSE Center to identify with each LCSSE, only the absolute, known resources that will be applied to each system.

b. Each contract should contain a standard work clause that will permit the formal identification and contract processing of changes to the DSSE and the LCSSE. Although neither environment is formally baselined (in a strict configuration management sense), any changes need to be controlled and mutually agreed upon prior to their implementation. Therefore, the management mechanism (as opposed to the engineering change mechanism), through management of the contractor's DSSE Plan, provides the necessary process.

c. Throughout the contract performance, the LCSE Center personnel should periodically review and assess both the DSSE and the LCSSE for the following items:

-- Has the LCSE Center workload changed sufficiently to merit a re-assessment or re-definition of the LCSSE?

-- Are there any developments in the state of the art that should be addressed by either the contractor or the LCSE Center for potential additions to either the DSSE or the LCSSE?

-- Are there any changes to the DSSE or the LCSSE that must be addressed by contract action; have these actions been initiated?

22.4 Providing for and ensuring requirements traceability.

22.4.1 Description. A complete and accurate description of the system elements, coupled with the ability to trace the allocation of requirements and their dependencies is essential for software support. The requirements for the target computer systems and the computer software are initially derived from system requirements through the application of system engineering disciplines such as functional analysis, requirements allocation, trade studies and system synthesis. It is the application of this systematic system engineering process that enables the fielded system to meet its mission requirements in the most cost-effective manner.

a. The primary purpose of the system engineering process is the quantification of system requirements from mission objectives and the allocation of these requirements to lower levels in the system design. As the total set of requirements is defined, they must be allocated to successively detailed levels in the system's design hierarchy. This process must be fully documented and traceable; traceability must be implemented early. MIL-STD-499A is generally used to task the system development contractor with the planning and implementation of systems engineering, through a System Engineering Management Plan (SEMP).

b. The system engineering process is achieved initially through concept studies and analyses, generally resulting in one or more functional specifications (e.g., MIL-STD-490, Type A or B1). These requirements are then successively expanded and refined in the form of engineering data such as Functional Flow Diagrams, Structured Analyses, Requirements Allocation Sheets, and Trade Studies. The results of these efforts are generally documented in the form of a set of more detailed specifications (e.g., MIL-STD-490, Type B). The resulting set of specifications and engineering data document the system architecture and requirements structure from which the system can be developed and tested.

c. The software development process defined by DOD-STD-2167 is predicated upon the PRIOR accomplishment of most of the system engineering activities. DOD-STD-2167 concentrates on the refinement and allocation of the system's software requirements into Software Requirements Specifications (SRS). Although DOD-STD-2167 addresses the continued refinement of the system architecture and requirements allocation, it does not directly address the allocation of requirements to the target computer systems, nor their integration into the system design.

22.4.2 Relevance to the LCSE Center. During the operation and maintenance phases of a BAS/AT, the software modification and change process has been described as essentially a repeat of the general software development cycle that is defined in DOD-STD-2167. The development cycle's activities and decision points may be somewhat similar, but there exists a difference that is a primary concern of the LCSE Center: The architecture of a system under development is evolving; the architecture of a fielded system has been defined. The LCSE Center is concerned with changes to a described and fielded system, and with integrating those changes in the existing system such that the system continues to meet its mission requirements in the most cost-effective manner.

a. For the LCSE Center to analyze the impact of software changes on the fielded system and to ensure the proper integration of the computer resources related elements, the LCSE Center must have a detailed and exact knowledge of the system description. This capability requires a complete and accurate history of the products of the system engineering process and the ability to trace the allocation of requirements to each of its configuration items, both equipment and software.

b. The LCSE Center needs access to the history and documentation of the front-end system engineering process. Not only does it need access to the set of functional specifications, but it needs access to the supporting set of engineering data that produced the current system configuration. The LCSE Center must be able to fully and completely evaluate the impact of a proposed computer resources change on all of the system elements. To do this, it must be able to completely and accurately trace the allocation of requirements and the impact of a change in one requirement on the other elements of the system.

22.4.3 Proposed courses of action. While the implementation of DOD-STD-1467 will provide the basis for supportability, neither this Standard, nor DOD-STD-2167 will provide the basis for the complete requirements traceability that is needed by the LCSE Center. The scope of this effort is beyond the scope of either standard. The LCSE Center must ensure that either the implementation of MIL-STD-499A or special work tasks and data items at the system level be included in all contracted efforts. These items are necessary to ensure the capability of the LCSE Center to know the requirements allocation of its fielded systems and to evaluate the impact of proposed changes on that allocation. Additional information is provided in the Army Field Manual 770-78, "System Engineering".

APPENDIX C
EXAMPLES OF LCSSE DEFINITION

30. SCOPE

30.1 Approach. This appendix discusses some of the possible ways that the LCSE Center may choose to define the LCSSE for a particular software development effort and the alternatives available for designating the use of some (or all) of that LCSSE by the software development contractor(s).

a. Paragraph 5.2 of this Handbook discusses the actions necessary to contractually implement the Standard. One of the prerequisites for implementation is the definition of the LCSSE with which the contractor is required to be compatible. Paragraph 5.2.1 of this Handbook emphasizes the exact and identical definition of portions of the LCSE Center facility and the careful identification of the portions of the LCSE Center that will comprise the particular LCSSE.

b. This appendix concentrates on the actual definition of the LCSSE from the standpoint of the LCSE Center and its existing LCSSE. It defines the factors that affect the decisions of the LCSE Center in adopting an LCSSE approach, some situations that the LCSE Center may be expected to encounter, and the alternative approaches that are available.

c. The use of the Ada programming language and the development of supporting Ada Programming Support Environments (APSE) is expected to grow. Versions of the APSE concept are expected to eventually form the major basis to the LCSE Center's facility, and hence, the basis for most of its LCSSEs. The final section of this appendix discusses the APSE concept, from the standpoint of how it fits into the supportability process defined by DOD-STD-1467.

30.2 Application. This appendix is to be used to help select the approach desired by the LCSE Center from those that are generally available, depending on the status of the LCSSE and the size of the expected software development. This appendix is to be used as an aid in developing the initial inputs to system planning documents (such as the Computer Resource Management Plan), and in developing the LCSSE description and requirements for procurement packages.

31. GENERAL REQUIREMENTS

This section discusses the general categories of software support approaches and the factors that will affect the decisions of the LCSE Center with regard to selecting a particular approach. Section 32 of this appendix contains a detailed discussion of the various possible approaches that can be selected by the LCSE Center, and concludes with a comparison of the APSE to the DOD-STD-1467 requirements.

31.1 Factors that affect the LCSSE approach selected. In all software development situations, an LCSE Center will be identified according to the Department of Army LCSS Implementation Plan. The responsible LCSE Center must determine its software support approach for that effort and decide how to identify the LCSSE that will be required for software support. For contracted software development efforts, the LCSE Center must additionally decide what items in the LCSSE to designate for use by the contractor(s).

a. The size of the software development effort will affect the decisions of the LCSE Center as to how best to provide support, but size is only one factor. Using only the size of the projected software development may be misleading. For example, a large LCSE Center may be able to incorporate a large effort without adding resources for the LCSSE. On the other hand, a relatively small, heavily loaded LCSE Center may be forced to require a complete acquisition of additional support facilities in order to support a relatively small addition to its support responsibilities.

b. The selected SOW approach will be affected by which (and how much) of the existing LCSE Center resources can be made available for use by the contractor to support the software development and delivery. In general, the approach to be selected and incorporated into the RFP and the SOW will be determined by the following: 1) the size of the software development effort, 2) the existing ability of the LCSE Center to support the added workload, 3) the ability of the LCSE Center to provide support or resources to the contractor, and 4) the programmed demand on the existing LCSE Center resources.

NOTE: The LCSE Center should identify any restrictions on the use of the resources for performing software support. For example, if a large central processor is merely identified as part of the LCSSE, the contractor may assume that this machine (and all of its processing capacity) will be dedicated, and may not recommend the addition of processing capacity. If this is not the case, the LCSE Center may find itself without sufficient processing capacity within the LCSE Center facility to support the system without off-loading other facility systems.

31.2 Categories of approaches that can be selected. Four categories of the alternatives available to the LCSE Center are described in paragraphs 32.1 through 32.4 of this appendix:

(32.1) **The LCSE Center does not designate any resources.** In this case the LCSE Center identifies all existing LCSSE resources, but does not provide delivery of (or access to) any of these resources, and permits the contractor the complete flexibility for selection and use of items in the DSSE.

(32.2) **The LCSE Center designates specific resources.** In this case the LCSE Center identifies LCSSE resources that the contractor will be required to use, identifies which are to be GFI, and identifies which are to be acquired by the contractor.

(32.3) **The LCSE Center requires a new LCSSE.** In this case, the acquisition of a completely new LCSSE is required for support of the software, which in turn may require an addition or major modification to the existing LCSE Center facilities.

(32.4) **The LCSE Center requires the use of an Army APSE.** In this case the LCSE Center designates exactly what can be used by the contractor in terms of the APSE specifications, technical documentation and software.

31.3 Coverage of each item. Each of the alternatives listed above is discussed in terms of:

a. **Description:** A general discussion of each approach, its major aspects, and some of the problems or benefits that may be expected.

b. **Relevance to the LCSE Center:** A general discussion of what the LCSE Center must address. For example, access to the LCSSE by the contractor and subcontractors, managing work load schedules and resource conflicts, the quality and acceptability of the software and documentation to be provided to the contractor.

c. **Proposed courses of action:** For example, what requirements in the Standard need to be addressed, which requirements support the rights and obligations of the contracting activity, and which requirements support the rights and obligations of the contractor.

32. SPECIAL SUBJECTS

32.1 ALTERNATIVE 1: The LCSE Center does not designate any resources.

32.1.1 Description. In this situation the LCSE Center would plan on identifying all existing LCSSE resources, but would not plan on providing for the delivery of (or access to) any of these resources on the part of the contractor. The LCSE Center would, in effect, be permitting the contractor the complete flexibility for selection and use of items in the DSSE, but the contractor would be required to have in place, procure, or otherwise obtain all of these resources. (This is the most common approach that is expected to be adopted in the near term. As the LCSE Center's facility matures, and its capability grows, more and more resources may be designated for use by the contractor.)

32.1.2 Relevance to the LCSE Center. This approach involves the least amount of risk on the part of the LCSE Center insofar as the responsibility for providing resources and insofar as assuming the risks that the designated resources are adequate for their task. This approach also could be less costly during development, since the contractor is allowed to determine the "best" approach for the software development effort and the DSSE. This approach is more difficult with respect to evaluating the contractor's plans for ensuring supportability and for monitoring and accepting the results of his software support transition efforts. Points for comparison with other alternatives:

a. **Access to the LCSSE by the contractor and subcontractors.** This alternative is less difficult, since access is necessary only for planning and implementing the software support transition effort.

b. **Managing LCSSE work load schedules and resource conflicts.** This alternative is less difficult, except for the period during the actual software support transition.

c. **Overseeing the contractor's software development.** This alternative is more difficult, due to potential difference between the DSSE and the LCSSE (machines, tools, procedures).

d. **Reviewing and accepting additions to the LCSSE.** This alternative is more difficult, especially in monitoring and controlling the quality and acceptability of the software and documentation to be delivered by the contractor.

32.1.3 Proposed courses of action. If the LCSE Center selects this approach, they must incorporate in the contract, the schedule and the availability of the LCSSE for access by the contractor, at least during the software support transition period. The LCSE Center should also consider the following additional restrictions for incorporation into the contract:

a. The LCSE Center can identify the LCSSE resources, can make some or all of them available on a non-interference basis, and can provide some or all of the existing LCSE resources for information purposes only.

b. The LCSE Center can establish some limits on the contractor's flexibility insofar as recommending additions to the LCSSE. For example, the LCSE Center can require the contractor to minimize the need for additions to the LCSSE and provide specific justification for recommended additions to the equipment.

32.2 ALTERNATIVE 2: The LCSE Center designates specific resources.

32.2.1 Description. In this situation the LCSE Center would plan on identifying all existing LCSSE resources, including which of these resources the contractor would be required to include and use in the DSSE. The LCSE Center would additionally identify how the contractor was to acquire these designated resources (either as GFI or through other methods). The LCSE Center, in effect, would be restricting the approach of the contractor and assuming some of the risks of delivering items for the DSSE and for ensuring a software support capability.

32.2.2 Relevance to the LCSE Center. This approach encompasses a broad range of risks and restrictions on the part of the LCSE Center, depending on the scope and amount of resources that are to be designated, and whether these resources are to used within the LCSSE or installed in the DSSE. This approach could be more costly during development, since the contractor may be required to procure certain tools or techniques that are not currently in the existing DSSE. This approach could be less difficult with respect to evaluating the compatibility of the DSSE and the LCSSE.

32.2.2 Relevance to the LCSE Center. (continued). Points for comparison with other alternatives:

a. **Familiarity of the contractor with the designated resources.** This alternative can be more difficult and costly, depending on the similarity of the LCSSE to the contractor's existing DSSE.

b. **Identification and use of new tools or techniques.** This alternative is more difficult, since the contractor is restricted to the use of tools and techniques that are compatible with the designated resources.

c. **Cost of software development.** This alternative can increase costs, if the contractor is not familiar with the designated resources and must integrate them into the DSSE.

d. **Cost of software support.** This alternative can be less costly, if the designated resources are already in use at the LCSE Center.

32.2.3 Proposed courses of action. If the LCSE Center selects this approach they must (in addition to those items identified in 32.1.3 above) incorporate into the contract the identification of the designated resources and how these resources are to be acquired. The LCSE Center must also identify the obligations of the contracting activity with respect to the availability of the designated resources and the risks assumed by the contracting activity for the contractor's use of these designated resources. The LCSE Center should also consider the following restrictions for incorporation into the contract:

a. The LCSE Center could make the resources available to the contractor at the LCSE Center's facility and require all software to be developed in this LCSSE. For example, the LCSE Center could identify a portion of their facility that contains a large central processor, its operating system and support tools, the APSE, and other tools. The LCSE Center would still permit the contractor to install and use other tools and techniques and would only restrict access times and schedules for the contractor's use.

b. The LCSE Center could provide most or all of the software, with appropriate licenses, but require the contractor to develop the software in a DSSE that is separate from the LCSSE. The contractor would still be permitted to use other tools and techniques.

32.3 ALTERNATIVE 3: The LCSE Center requires a new LCSSE.

32.3.1 Description. In this situation, the LCSE Center would plan on a complete addition, or major modifications to existing facilities, to support the new system. The contracting activity would, in effect, procure the LCSSE as a support element of the systems acquisition, or as a separate procurement action. If the system contractor is to deliver the LCSSE, the DOD-STD-1467 process will still apply; the contractor's responsibilities for software support transition and ensuring software support capability are required regardless of the scope of the resources delivered (in this case, all) or the resources in the existing LCSSE (in this case, zero).

NOTE: The parallel, but separate, procurement of an LCSSE presents an extremely challenging management and contract situation. Because of the problems associated with trying to task one contractor to be compatible with another's (yet to be defined) product, the economic and support benefits must be compelling.

32.3.2 Relevance to the LCSE Center. This approach is less difficult for the LCSE Center in the initial planning stages, since the contractor should be required to specify, design, and deliver a LCSSE that will provide the required software support capability. The LCSE Center will be required to evaluate the contractor's approach and oversee the delivery of the LCSSE. The installation of the LCSSE and the actual software support transition will be more complicated and will require the application of more LCSE personnel. Points for comparison with other alternatives:

a. **The quality and acceptability of the LCSSE.** This alternative is more difficult to determine, since a complete addition of equipment, software and documentation will be involved.

b. **Incentives for new tools and techniques.** The incentives for this alternative are greater, since the contractor is not bound by designated resources, nor by compatibility constraints.

c. **Assumption of support by the LCSE Center.** This alternative will be more difficult, since most equipment and software may be new. Training and support of the new LCSSE will put an added drain on the LCSE Center resources during the initial transition and support period.

32.3.3 Proposed courses of action. If the LCSE Center chooses this approach, they must develop a complete procurement package or incorporate in the system contract the added work tasks to specify, design and deliver the LCSSE. Separate procurement of the LCSSE is not advised, and the effort should be identified as an integral element of the systems acquisition, subject to the same engineering and management disciplines. The LCSE Center should also consider the following additional contract provisions:

a. The LCSE Center could include requirements in the system specification, or develop a separate system segment specification for the LCSSE (MIL-STD-490, Type A) and require the contractor to implement according to that specification.

b. The LCSE Center could require the contractor to specify, design, develop and deliver the LCSSE. In this case, the contract should contain the necessary system engineering and analysis work tasks to derive the requirements, subject to contracting activity approval, along with the remaining system elements.

c. The LCSE Center could require the contractor to develop and use a new DSSE, with plans to transition this DSSE to the LCSE Center as part of the system integration and fielding effort. In this case, the system schedule and planning must ensure the phased transition of the DSSE without degrading the operation of the system (as required by DOD-STD-1467).

32.4 ALTERNATIVE 4: The LCSE Center requires the use of an Army APSE.

32.4.1 Description. This is a special case, wherein the LCSE Center designates exactly what the contractor can use for the DSSE. The LCSE Center could either require the contractor to use the existing LCSSE, could GFI the LCSSE for the contractor's use, require the contractor to acquire an identical capability, or any of a broad range of mixtures of these alternatives. This case is discussed, since it is an integral part of the planned Army future software support posture.

32.4.2 Relevance to the LCSE Center. This approach provides a moderate amount of risk on the part of the LCSE Center insofar as the responsibility for providing resources and assuming the risks that these resources are complete and adequate for their task. This approach also places the maximum constraints on the contractor's approach, by restricting the development options. This approach is also easier to manage and monitor on the part of the LCSE Center, since all of the tools and techniques are known and operated by the LCSE Center personnel. Points for comparison with other alternatives:

a. **Familiarity of LCSE Center personnel with the DSSE and LCSSE.** This alternative is less demanding to manage, since all tools and techniques are known, and additions will be minimal.

b. **Incentives to propose new tools and techniques.** This alternative has less incentive and is more difficult, since new tools and techniques must be compatible with the APSE set.

c. **Demonstrating compatibility and ensuring supportability.** This alternative is less difficult, since both DSSE and LCSSE will be (essentially) identical.

32.4.3 Proposed courses of action. If the LCSE Center selects this approach, they must incorporate into the contract, the exact description of the APSE, the methods by which its elements are to be acquired by the contractor, any licenses or restrictions on the use of these items, the schedule for any GFI, and the obligations on the part of the Government for suitability of any GFI. The LCSE Center should also consider the following additional restrictions for incorporation into the contract:

a. For elements that are to be acquired by the contractor, a requirement that the contractor ensure the continued match-up of configurations and release levels between the DSSE and LCSSE.

b. A requirement on the part of the contractor to evaluate the GFI for suitability and to report any deficiencies, together with an evaluation of their impact and the cost (if applicable) of correcting these deficiencies.

32.4.4 Relationship of an APSE to DOD-STD-1467 requirements. The process defined by DOD-STD-1467 is compatible with, and supports, the Ada software engineering concepts and the Ada Programming Support Environment approach in the following manner:

a. An APSE may be considered either as an LCSSE, a DSSE, or a major portion of both these environments. The APSE may be designated by the contracting activity to be (or be included in) the contractor's DSSE.

b. The Standard supports the APSE concept of selective growth by providing a vehicle for identifying and adopting new tools and techniques.

c. The Standard still permits the contractor the freedom to incorporate improvements into the DSSE provided that the DSSE will still be compatible with the LCSSE, and that supportability of the software in the LCSSE (as augmented by the contractor) can be verified and warranted.

APPENDIX D
LIST OF ACRONYMS

APSE	Ada Programming Support Environment
AR	Army Regulation
BAS/AT	Battlefield Automated Systems/Automated Trainers
CCP	Contract Change Proposal
CDRL	Contract Data Requirements List
CLIN	Contract Line Item Number
CRMP	Computer Resources Management Plan
CSCI	Computer Software Configuration Item
DARCOM	US Army Materiel Development & Readiness Command (Previous Name for the US Army Materiel Command)
DID	Data Item Description
DODISS	Department of Defense Index of Specifications and Standards
DSSE	Developmental Software Support Environment
GFE	Government Furnished Equipment
GFI	Government Furnished Information
LCSE	Life Cycle Software Engineering
LCSS	Life Cycle Software Support
LCSSE	Life Cycle Software Support Environment
MCCR	Mission Critical Computer Resources
RFP	Request for Proposal
ROM	Read-Only Memory
SDP	Software Development Plan
SEMP	System Engineering Management Plan
SOW	Statement of Work
SSTP	Software Support Transition Plan
SRS	Software Requirements Specification
TCP	Task Change Proposal

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a. Paragraph Number and Wording

b. Recommended Wording

c. Reason/Rationale for Recommendation

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