Department of the Army
Pamphlet 700–127

Logistics

Integrated Product Support Procedures

Headquarters
Department of the Army
Washington, DC
28 September 2016

UNCLASSIFIED

SUMMARY of CHANGE

DA PAM 700–127

Integrated Product Support Procedures

This mandated revision, dated 28 September 2016-

- o Adds guidance for special tools (para 8-6).

- o Incorporates guidance from Army Directive 2016-12 (para 8-6).

Headquarters
Department of the Army
Washington, DC
28 September 2016

Department of the Army
Pamphlet 700–127

Logistics

Integrated Product Support Procedures

By Order of the Secretary of the Army:

MARK A. MILLEY
General, United States Army
Chief of Staff

Official:

GERALD B. O'KEEFE
Administrative Assistant to the Secretary of the Army

History. This publication is a mandated revision. The portions affected by this mandated revision are listed in the summary of the change.

Summary. This pamphlet prescribes procedures for the policy set forth in AR 700–127 relating to the Army's implementation of performance-based life cycle product support, including performance-based logistics, through the Army's Integrated Product Support Program.

Applicability. This pamphlet applies to the Active Army, the Army National Guard/Army National Guard of the United States, and the U.S. Army Reserve, unless otherwise stated. It also applies to all personnel involved in acquisition of new, product improved, or displaced materiel and software developed, acquired, or used by the Army.

Proponent and exception authority. The proponent and exception authority for this pamphlet is the Assistant Secretary of the Army (Acquisition, Logistics and Technology). The proponent has the authority to approve exceptions and waivers to this pamphlet that are consistent with controlling law and regulations. The proponent may delegate this approval authority, in writing, to a division chief within the proponent agency, its direct reporting unit or field operating agency, in the grade of colonel or the civilian equivalent. Activities may request a waiver to this pamphlet by providing justification that includes a full analysis of the expected benefits and must include formal review by the activity's senior legal officer. All waiver requests will be endorsed by the commander or senior leader of the requesting activity and forwarded through their higher headquarters to the policy proponent. Refer to AR 25–30 for specific guidance.

Suggested improvements. Users are invited to send comments and suggested improvements on DA Form 2028 (Recommended Changes to Publications and Blank Forms) directly to the Assistant Secretary of the Army (Acquisition, Logistics and Technology) (SAAL–ZL), 103 Army Pentagon, Washington, DC 20310-0103.

Distribution. This publication is available in electronic media only and is intended for command levels C, D, and E for the Active Army, the Army National Guard/Army National Guard of the United States, and the U.S. Army Reserve.

Contents (Listed by paragraph and page number)

*This publication supersedes DA Pam 700-127, dated 8 October 2014.

Contents—Continued

Contents—Continued

Contents—Continued

Contents—Continued

Contents—Continued

Table List

Contents—Continued

Figure List

Glossary

Chapter 1
General

1–1. Purpose

This pamphlet supports the Army's implementation of performance-based life cycle product support, including performance-based logistics, and provides implementing guidance for planning, developing, acquiring and sustaining well-defined performance-based product support strategies (PBPSS) that meet the Soldier's requirements for Army materiel and software throughout its life cycle. Army Regulation (AR) 700–127 provides policies and requirements for integrated product support (IPS). This pamphlet should be used in conjunction with AR 700–127 to ensure consistent application of Army policy when developing and implementing a PBPSS for materiel and software. This pamphlet guides implementation of PBPSS requirements; describes the process that the materiel developer (MATDEV) will use to develop and integrate a PBPSS consistent with the system engineering process; identifies the framework (12 IPS elements) used to develop the PBPSS; describes the product support manager's (PSM) role and relationships with stakeholders in developing and executing the PBPSS; defines metrics to measure the product support system performance; and stresses the importance of ensuring that contract requirements are accurately identified and included in solicitations and contracts.

1–2. References

Required and related publications and prescribed and referenced forms are listed in appendix a.

1–3. Explanation of abbreviations and terms

Abbreviations and special terms used in this pamphlet are explained in the glossary.

Chapter 2
Framework

2–1. Integrated product support

a. IPS is an integrated and iterative process for assuring supportability of a materiel and software. Supportability is that characteristic of a support system design that provides for sustained materiel performance at a required readiness level. IPS is the process used by the Army to develop and implement product support, including all the mandatory acquisition logistics and supportability procedures as defined by Department of Defense directive (DODD) 5000.01, Department of Defense instruction (DODI) 5000.02, and AR 70–1. These cover all elements of planning, developing, acquiring, and sustaining Army materiel and software throughout its life cycle. The IPS process is governed by AR 700–127.

b. All analyses and actions related to the supportability of Army materiel are considered part of the IPS process. The IPS process is used to satisfy the capability developer's (CAPDEV's) supportability requirements, to affect the design of Army materiel, to optimize and simplify equipment operation and maintenance, and to integrate supportability requirements in a way that minimizes operations and support (O&S) cost and logistics burden on the Army. For maximum effectiveness, the IPS process must be applied from program inception as part of the engineering process and the IPS requirements must be accurately included in solicitations and contracts. The IPS process ensures the readiness and supportability of Army materiel and software from cradle to grave while considering environmental, safety, and occupational health (ESOH) responsibilities during development, production, deployment, sustainment, and disposal of Army materiel.

2–2. Integrated product support elements

a. The IPS process facilitates development and integration of all of the product support elements to acquire, test, field, and support Army materiel. From the earliest stages of the materiel and software development, the acquisition strategy (AS) and Life Cycle Sustainment Plan (LCSP) will ensure that the requirements for each of the 12 IPS elements are properly planned, resourced, and implemented. These integrated actions will enable the materiel to achieve the operational readiness levels required by the Soldier at the time of fielding and throughout its life cycle. The 12 IPS elements are listed in table 2–1.

Table 2–1
Integrated Product Support Elements

Element	Objectives	Description
Product Support Management	Plan and manage cost and performance across the product support value chain, from design through disposal.	Plan, manage, and fund materiel product support across all IPS Elements.
Design Interface	Participate in the system engineering process through membership in the System Engineering Integrated Process Team (IPT) to impact the design from its inception throughout the life cycle. Incorporate product support analysis (PSA) activities in the System Engineering Plan (SEP) to ensure the PSA results are visible to program and engineering management. This will facilitate supportability to maximize the availability, effectiveness and capability of the materiel at the lowest life cycle cost (LCC).	Design interface is the integration of the quantitative design characteristics of system engineering (for example reliability, maintainability) with the functional logistics elements (that is integrated product support elements). Design interface reflects the driving relationship of materiel design parameters to product support resource requirement. These design parameters are expressed in operational terms rather than as inherent values and specifically relate to materiel requirements. Thus, product support requirements are derived to ensure the materiel meets its availability goals, and the design and support costs of the materiel are effectively balanced.
Sustaining Engineering	Support in-service materiel in their operational environments.	Involves the identification, review, assessment, and resolution of deficiencies throughout a materiel's life cycle. Sustaining engineering returns a materiel to its baseline configuration and capability, as well as identifies opportunities for performance and capability enhancements. It includes the measurement, identification and verification of materiel technical and supportability deficiencies, performance of associated root cause analysis, the evaluation of the potential for deficiency correction, and the development of a range of corrective action options. Typically business case analysis and life cycle economic analysis are performed to determine the relative costs and risks associated with the implementation or various corrective action options. Sustainment engineering also includes the implementation of selected corrective actions to include configuration or maintenance processes and the monitoring of key sustainment health metrics.
Supply support	Identify, plan, resource, and implement management actions to acquire repair parts, spares, and all classes of supply to ensure that the best equipment and capability is available to support the Soldier or maintainer, when it is needed, at the lowest possible LCC.	Consists of all management actions, procedures, and techniques necessary to determine requirements to acquire, catalog, receive, store, transfer, issue and dispose of spares, repair parts, and supplies. This means having the right spares, repair parts, and all classes of supply available, in the right quantities, at the right place, at the right time, and at the right price. This process includes provisioning or initial support, as well as acquiring, distributing, and replenishing inventories.
Maintenance planning and management	Identify, plan, resource, and implement maintenance concepts and requirements to ensure the best possible equipment and capability is available when the Soldier needs it at the lowest possible LCC.	Establishes maintenance concepts and requirements for the life of the materiel for both hardware and software.
Packaging, handling, storage, and transportation	Identify, plan, resource, and acquire packaging, preservation, handling, storage and transportation (PHS&T) requirements to maximize availability and usability of the materiel to include support items whenever they are needed for training or mission.	The combination of resources, processes, procedures, design considerations, and methods to ensure that all materiel, equipment, and support items are preserved, packaged, handled, and transported properly. This includes environmental considerations, equipment preservation for short and long term storage, and transportability. Some items require special environmentally controlled, shock isolated containers for transport to and from repair and storage facilities via all modes of transportation (land, rail, air, and sea).

Table 2–1
Integrated Product Support Elements—Continued

Technical data	Identify, plan, resource and implement management actions to develop and acquire information to: a) Operate, install, maintain, and train on the equipment to maximize its effectiveness and availability; b) Effectively catalog and acquire spare and repair parts, support equipment, and all classes of supply; c) Define the configuration baseline of the materiel (hardware and software) to effectively support the Soldier with the best capability at the lowest possible LCC.	Represents recorded information of scientific or technical nature, regardless of form or character (such as equipment technical manuals (TM), engineering drawings and provisioning technical documentation (PTD), engineering data, specifications, standards and data item descriptions (DID). TMs, including interactive electronic technical manuals (IETMs) and engineering drawings are the most expensive and probably the most important data acquisitions made in support of a materiel. TMs and IETMs provide the instructions for operation and maintenance of a materiel. IETMs also provide integrated training and diagnostic fault isolation procedures. Address data rights and data delivery as well as use of any proprietary data as part of this element. Establish a data management system that allows every activity involved with the program to cost-effectively create, store, access, manipulate, and exchange digital data. This includes, at a minimum, the data management needs of the system engineering process, modeling and simulation activities, test and evaluation strategy, support, and other periodic reporting requirements.
Support equipment	Identify, plan, resource, and implement management actions to acquire the support equipment (mobile or fixed) required to sustain the operation and maintenance of the materiel, and to ensure that the materiel is available to the Soldier when it is needed at the lowest LCC.	Consists of all equipment (mobile or fixed) required to support the operation and maintenance of a materiel. This includes but is not limited to ground handling and maintenance equipment, trucks, air conditioners, generators, tools, metrology and calibration equipment, and manual and automatic test equipment. MATDEVs are expected to decrease the proliferation of support equipment into the inventory by minimizing the development of new support equipment and giving more attention to the use of existing government or commercial equipment.
Training and training support	Plan, resource, and implement a cohesive integrated strategy to train military and civilian personnel to maximize the effectiveness of the doctrine, manpower and personnel, to enable them to fight, operate, and maintain the equipment throughout the life cycle.	Consists of the policy, processes, procedures, techniques, training aids, devices, simulators, and simulations, as well as planning and provisioning for the training base including the equipment used to train civilian and military personnel to acquire, operate, maintain, and support materiel. This includes New Equipment Training (NET), institutional training, sustainment training and displaced equipment training for the individual, crew, unit, collective, and maintenance through initial, formal, informal, on the job training, and sustainment proficiency training. Significant efforts are focused on NET, which in conjunction with the overall training strategy, will be validated during materiel evaluation and test at the individual, crew, and unit level.
Manpower and personnel	Identify, plan, resource and acquire personnel (civilian and military) with the grades and skills required to operate and maintain equipment, to complete missions, to effectively fight or support the fight, to win our nation's wars; to effectively support the Soldier, and to ensure the best capability is available for the Soldier when needed.	Involves the identification and acquisition of personnel (military and civilian) with the skills and grades required to operate, maintain, and support materiel over its life cycle. Early identification of personnel requirements is essential. If the needed manpower is an additive requirement to the existing manpower levels of an organization then a formalized process of identification and justification must be made to higher the authority.
Facilities and infrastructure	Identify, plan, resource, and acquire facilities to enable training, maintenance and storage to maximize effectiveness of materiel operation and the product support system at the lowest LCC. Identify and prepare plans for the acquisition of facilities to enable responsive support for the Soldier.	Involves a variety of planning activities, all of which are directed toward ensuring that all required permanent or semi-permanent operating and support facilities (for instance, training, field and depot maintenance, storage, operational, and testing) are available concurrently with materiel fielding.
Computer resources	Identify, plan, resource, and acquire hardware, software, documentation, and manpower and personnel necessary for planning and management of mission critical computer hardware and software materiel.	Includes actions to identify, plan, resource and acquire hardware, software, documentation, and manpower and personnel necessary for planning and management of mission critical computer hardware and software materiel.

b. All IPS elements must be developed as an integral part of the system engineering effort and with consideration of the impacts to each element across other IPS elements. Tradeoffs may be required between elements in order to acquire a materiel that is affordable (and considers achieving the lowest LCC), operable, supportable, sustainable, transportable, safe, and environmentally sound within the resources available. An IPS checklist is provided in Department of the Army pamphlet (DA Pam) 700–28.

2–3. Integrated product support process

a. The IPS process is the means by which supportability considerations are integrated into the system engineering process. The purpose is to influence a materiel design and software that achieves operational mission requirements, is reliable, and is supportable. The IPS process is iterative, meaning it is continuously applied and refined throughout a materiel's life cycle to ensure that the materiel design and software continues to meet its intended mission and remains supportable. High levels of readiness and low O&S cost are expected results of a product support strategy that influences the materiel design and software at the earliest opportunity in a program's life cycle. It is vital that the CAPDEV includes a PSM from the appropriate program executive officer (PEO) community early in the requirements development process at the materiel development decision (MDD), and up to program initiation, to ensure that the MATDEV can develop a reliable materiel that can be effectively supported at the lowest LCC.

b. The IPS process includes all elements of planning, developing, acquiring, sustaining, and disposing of Army materiel throughout its life cycle, and supportability analyses and actions related to Army materiel and software.

c. The IPS process is used to—

(1) Develop and implement PBPSS.

(2) Document the PBPSS and supportability requirements in the LCSP.

(3) Influence the design of Army materiel.

(4) Optimize and simplify equipment operation and maintenance.

(5) Minimize O&S cost and logistics burden on the Army.

d. The IPS process is a deliberate, unified, iterative methodology used to develop materiel, software, and a product support strategy that—

(1) Optimizes functional support elements for a materiel.

(2) Leverages existing investments in manpower, materiel, equipment, training, facilities, and other resources.

(3) Uses the system engineering process using supportability attributes to achieve goals and to—

(a) Synchronize the design with supportability requirements.

(b) Influence materiel design and software considerations early in the life cycle to enable achievement of the best support alternative.

(c) Develop an IPS strategy that is performance-based.

(d) Ensure standardization and interoperability (S&I) of materiel and software within the Army, the Department of Defense (DOD), and their allies.

(e) Identify the optimum support required for the materiel design and software.

(f) Resource and acquire the planned support.

(g) Improve product support, readiness, and reduce O&S cost throughout the materiel life cycle.

e. Place emphasis on increasing reliability and reducing the logistics footprint, apply the system engineering process and provide for effective product support using PBPSSs. Figure 2–1 illustrates the IPS process inputs, supportability planning, analysis and tradeoffs to achieve a supportable design.

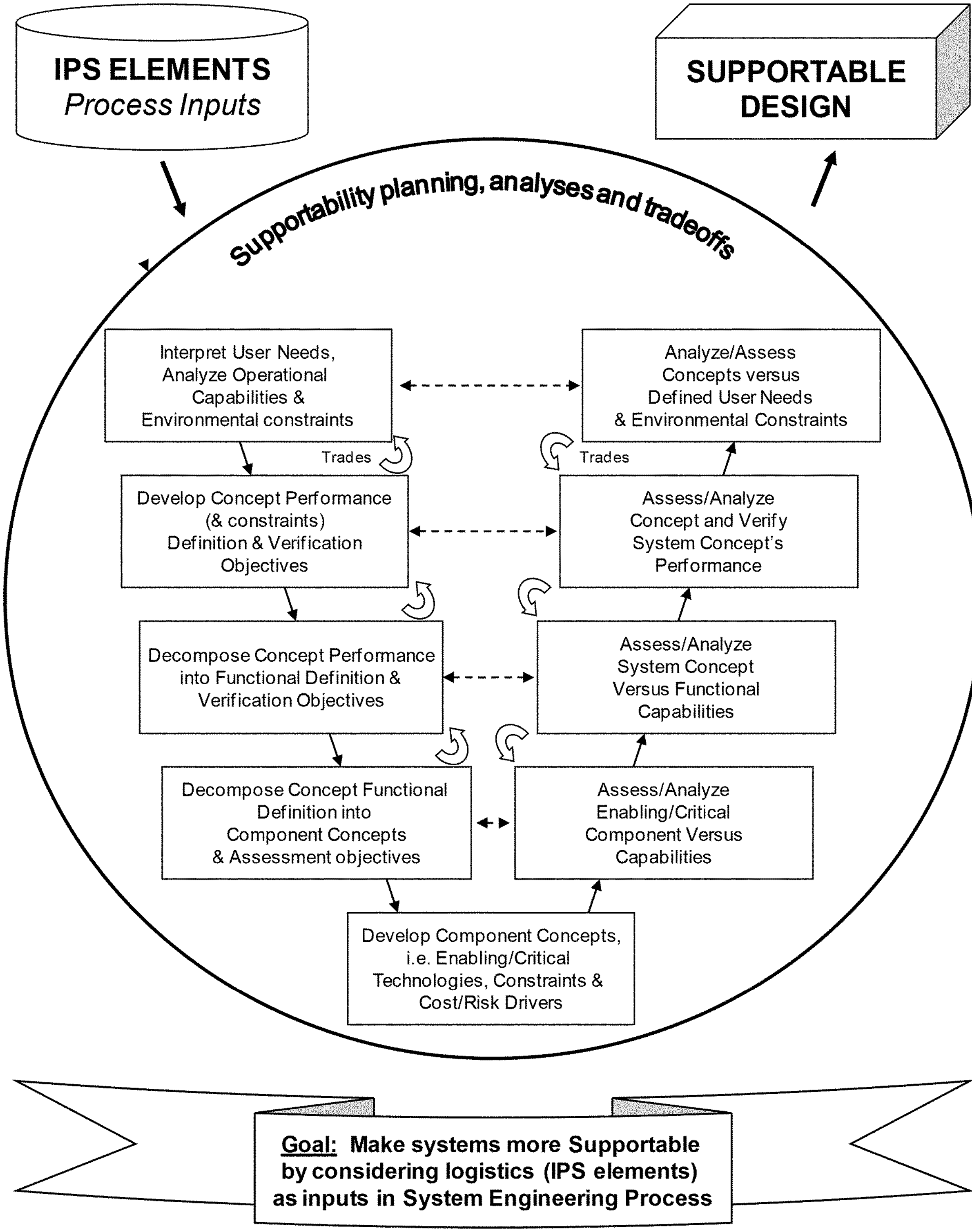


Figure 2–1. Integrated Product Support Process

2–4. Integrated product support process in the acquisition strategy

a. MATDEVS are responsible for synchronizing the LCSP with the AS. This ensures that the product support strategy and the implementation process are consistent with the plan for materiel and software acquisition. It is important that the PSM coordinate the LCSP development with the team developing the AS to ensure synchronization of these documents. All acquisition programs, including highly sensitive classified, cryptologic, and intelligence programs, will use the IPS process as a tool to help develop the AS and LCSP.

b. When developing the AS and LCSP, the number of acquisition phases and decision points may be tailored to meet the specific needs of individual programs, based on objective assessments, acquisition category, risks, the adequacy of proposed risk management plans, and the materiel's urgency determined by the CAPDEV. Tailored acquisition strategies may vary in the way that the IPS related activities are to be conducted, the formality of reviews and documentation, and the need for other supporting activities. Tailoring will give full consideration to all applicable policies and statutes.

2–5. Contracting

a. When contracting for IPS, the requirements must be—

(1) Stated in clear, specific, and objective terms.

(2) Performance based.

(3) Tailored according to the AS.

(4) Included in solicitation documents (to include contract data requirements lists (CDRL) and DIDs)). Each contract solicitation document must require the contractor's proposal to define the approach used to meet the stated IPS requirements.

b. Performance outcome metrics that are relevant and measureable must be included in each solicitation document and contract. These metrics must be limited to the actions each contractor can control. This ensures that the contractor is fully accountable for their required performance under the contract.

c. Contracts should include requirements that—

(1) Encourage that SAE International Standard SAE TA–STD–0017 and Military Handbook (MIL–HDBK)–502 be used for PSA.

(2) Encourage that SAE International Standard SAE GEIA–STD–0007 and SAE International Handbook SAE GEIA–HB–0007 be used for guidance on data definitions and formats for data products and options for logistics product data (LPD) that must be acquired to support program requirements.

(3) Address the IPS program, including the related PSAs, as an element of program management and system engineering, to include a requirement to assess contractor progress during periodic integrated functional reviews.

(4) Require that the work breakdown structure (WBS) is used as the format for itemized cost data for the IPS program contract items. MATDEVs may tailor a WBS for each program using the guidance in MIL–HDBK–881. When multiple contractors are providing IPS program contract items, their specific responsibilities must be clearly delineated in the appropriate contracts.

(5) Provide opportunity for public-private partnerships (PPP), where appropriate.

Chapter 3
Integrated Product Support and the Defense Acquisition Framework

Section I
Integrated product support development in the Joint Capabilities Integration and Development Process

3–1. Objectives and goals

IPS implementation begins in the Joint Capabilities Integration and Development System (JCIDS) process with the exploration of capabilities. Every materiel is acquired to provide a particular set of capabilities in a specific concept of operations and sustained at an optimal level of readiness. The objectives and goals of the JCIDS process are to identify effective solutions to fill capability gaps.

3–2. Soldier needs, technology opportunities, and resources (pre-acquisition)

Understanding Soldier needs in terms of performance is an essential initial step in developing a meaningful PBPSS.

CAPDEVs and PSMs must be able to understand and forecast materiel requirements to meet necessary sustainment activities and outcomes.

a. The JCIDS analysis process defines capability gaps, capability needs, and approaches to provide those capabilities within a specified functional or operational area. The analyses initiates the development of integrated, joint capabilities from a common understanding of existing joint force operations and doctrine, organization, training, materiel, leadership and education, personnel, facilities, and policy (DOTMLPF–P) capabilities and deficiencies. The DOTMILPF–P includes analysis of the entire life cycle, including the sustainment; ESOH; The human systems integration (HSI) domains. The JCIDS analyses are led by the requirements sponsor and linked into each life cycle phase and milestone (MS).

b. The JCIDS analysis (Chairman of the Joint Chiefs of Staff 3170.01, and the JCIDS Manual require that key considerations for sustainment be addressed early in the analysis. The considerations includes the following:

(1) A key performance parameter (KPP) for sustainment which treats logistics supportability as a performance capability inherent to the materiel design and development for all Joint Requirements Oversight Council (JROC) Interest programs involving materiel solutions.

(2) The sustainment KPP has three elements—

(a) Availability KPP with two components: materiel availability and operational availability.

(b) A mandatory supporting key system attribute (KSA) of materiel reliability.

(c) A mandatory supporting KSA of O&S cost.

(3) Logistics supportability as an inherent element of operational effectiveness.

c. The JCIDS analyses provide the information necessary for the development of the initial capabilities document (ICD). The lessons learned, cost drivers of current materiel, and/or constraints impacting the supportability related design requirements of the planned materiel and support system should be documented in the ICD. In addition, the sustainment metrics and supportability drivers should be included in the ICD because they guide the acquisition community in: refining the concept selected, identifying potential constraints on O&S resource requirements, establish- ing materiel maintenance and support profiles, developing use case scenarios, identifying reliability and maintenance rates, identifying support environment and support location requirements, determining maintenance effectiveness needs, and duration of support.

d. When the ICD demonstrates the need for a materiel solution, the cognizant milestone decision authority (MDA) working with appropriate stakeholders, determines whether there is sufficient information to proceed with a MDD. A MDD review is the formal entry point into the acquisition process and is mandatory for all programs.

Section II
Materiel Solutions and Analysis Phase

3–3. Objectives and goals

The purpose of the materiel solutions and analysis (MSA) Phase is to assess potential materiel solutions and develop the AS. Soldier capabilities are examined against technologies, both mature and immature, to determine feasibility and alternatives to meet Soldier needs. An analysis of alternatives (AoA) must be developed to identify and evaluate affordable product support alternatives and their ability to meet operational requirements and the associated risks. In describing the desired performance to meet mission requirements, sustainment metrics should be defined in addition to traditional performance design criteria (for example, speed, lethality). The MSA Phase ends when the AoA has been completed, materiel solution options for the capability need identified in the approved ICD have been recommended by the lead DOD component, and phase-specific entrance criteria for the initial review MS have been satisfied. The PSM and stakeholders responsible for planning the PBPSS engage with the CAPDEV as early as possible. This ensures that the materiel solution analyses and trade-off decisions consider each of the IPS elements. A list of IPS objectives and goals along with key tasks and documentation to fulfill them is in table 3–1.

Table 3–1
Integrated product support in the materiel solutions and analysis phase

Objectives and goals	Tasks and documents
Define and evaluate alternative concepts. Assess and compare concepts. Identify the most promising concepts. Quantify the broad objectives for cost, schedule, performance, and supportability. Identify software requirements. Define tradeoffs. Establish an overall AS, and test and evaluation (T&E) strategy. Describe a functional baseline.	Conduct concept studies in accordance with ICD. Initiate the following documents: Affordability assessment. AoA (including market investigation (MI) results and AS. Reliability, Availability, and Maintainability (RAM)-Cost Rationale (RAM–C) Report). Draft capability development document (CDD). Test and Evaluation Master Plan (TEMP). SEP. Intellectual Property Strategy. LCSP. Programmatic Environment, Safety, and Occupational Health Evalu- ation (PESHE). Core logistics determination of applicability. Core Logistics Analysis (CLA). Core Depot Assessment (CDA). PBPSS (to include applicable Analysis of Product Support Alterna- tives (APSA)). Transportability Report (TR). Independent Logistics Assessment (ILA) Report. Corrosion Prevention and Control (CPC) Plan. Item Unique Identification (IUID) Plan. System Demilitarization (DEMIL) and Disposal Plan. Exit Criteria.

3–4. Integrated product support management

The CAPDEV—

a. Uses the AoA to develop the AS and address the Army areas of DOTMILPF–P. All organizations that have a significant interest in a materiel capability or having critical support capabilities are to be invited to participate in the CAPDEV Product Support Management IPT (PSMIPT).

b. Establishes an initial logistics framework of parameters, constraints, and data requirements. The CAPDEV establishes product support items for inclusion in early requests for proposal (RFP) to industry and may establish desired parameters or goals such as fuel efficiency, reliability, availability, or operations cost (or total cost), technical data requirements, and other requirements. The goals of these requirements in the RFP are to support Soldier requirements and Army goals, enable further decision, and begin the effort to control costs, reduce logistics footprint, and enable the IPS process.

c. The CAPDEV evaluates IPS issues, supportability deficiencies, and opportunities for improvements and efficiencies using the capabilities determination process. Prior to program initiation, the CAPDEV—

(1) Initiates Manpower and Personnel Integration (MANPRINT), logistics improvement, and doctrine studies.

(2) Identifies issues, constraints, and requirements concerning supportability, MANPRINT, environment, and training.

(3) Ensures IPS planning lends specific weight to mission and logistics reliability.

(4) Initiates APSA development prior to MS A and is further refines for submission to the PEO and Life Cycle Management Command (LCMC) prior to MS B.

d. Notifies the following program participants when the ICD is approved and the MSA Phase begins—

(1) The appropriate PEO.

(2) The materiel proponent.

(3) The U.S. Army Combined Arms Support Command.

(4) The U.S. Army Training Support Center (ATSC).

(5) The U.S. Army Nuclear and Chemical Agency.

(6) Army Test and Evaluation Command (ATEC).

(7) Deputy Assistant Secretary of the Army (Acquisition Policy and Logistics) (DASA (APL)), SAAL–ZL for anticipated Acquisition Category (ACAT) I and select II programs.

e. Leads MANPRINT activities and identifies the tasks, analyses, tradeoffs, and decisions that address MANPRINT issues during the materiel development and acquisition process.

f. The PEO—

(1) Designates an individual to serve as a PEO PSM that provides IPS support and expertise to the CAPDEV.

(2) Notifies the CAPDEV and ATEC of the PEO PSM assignment.

3–5. Materiel development procedures

During the MSA Phase the MATDEV and CAPDEV are involved in numerous activities to identify supportability deficiencies and to find opportunities to improve Army materiel and its support. The following are examples of these activities—

a. Examine IPS implications in technology base assessments and experimentation.

b. Ensure IPS concepts, issues and alternatives are fully considered in the AoA.

c. Assist in formulating supportability-related objectives, thresholds and KPPs with special consideration to mission reliability, logistics reliability, and fuel efficiency as they impact on performance, total cost and logistics footprint.

d. Utilize knowledge bases to identify performance, maintenance, and cost information, materiel assessments, engineering changes, incidents reports, simulations, and field-experience data to identify materiel, manpower, personnel and training, and logistics constraints and improvement opportunities.

Section III
Technology Maturation and Risk Reduction Phase

3–6. Objectives and goals

a. The purpose of the Technology Maturation and Risk Reduction (TMRR) Phase is to reduce technology risk, determine and mature the appropriate set of technologies to be integrated into a materiel, demonstrate critical technology elements on prototypes, and to develop an approved CDD.

(1) Technology development is an iterative process designed to assess the viability of technologies while simultaneously refining Soldier requirements.

(2) The AS and associated funding provides for two or more competing teams producing prototypes of the materiel and/or key materiel elements prior to, or through, MS B.

(3) Prototype materiel or appropriate component-level prototyping is employed to reduce technical risk, validate designs and cost estimates, evaluate manufacturing processes, and refine requirements.

b. The major IPS objectives during the TMRR Phase are to—

(1) Ensure that the supportability design features achieve the Sustainment KPP and KSAs and they are incorporated in the overall design specifications.

(2) Refine the supportability objectives in both range and depth.

(3) Identify any constraints that will limit the materiel or its supply chain to achieve the operational readiness or mission effectiveness.

c. A list of IPS objectives and goals along with key tasks and documentation to fulfill them is in table 3–2.

Table 3–2
Integrated Product Support in the Technology Maturation and Risk Reduction Phase

Objectives and goals	Tasks and documents
Define and evaluate alternative technologies. Refine Soldier requirements. Assess technology maturity. Conduct tradeoff analyses for cost, schedule, performance, and supportability. Refine software requirements. Refine the AS, and T&E strategy. Establish a functional baseline. Obtain program initiation approval. Assess environmental risks.	Conduct technology risk reduction studies. Identify Exit Criteria. Initiate the following documents: Materiel Performance Specification. CDD. Technology Readiness Assessment. PESHE as part of the AS. Preliminary Design Review results. Depot Source of Repair (DSOR) Analysis. Life Cycle Cost Estimate and Manpower Estimate. Preliminary Maintenance Plans. Acquisition Program Baseline (APB). Affordability Assessment. Computer Resources Life Cycle Management Plan (CRLCMP). ILA Report. Replaced System Sustainment Plan (RSSP). MANPRINT Assessment (occurs at Milestone Decision Review (MDR)). System MANPRINT Management Plan. System Training Plan (STRAP). Update the following documents— AoA. AS. Intellectual Property Strategy. SEP. RAM–C Report. LCSP. APSA. TEMP. CPC Plan. IUID Plan. System DEMIL and Disposal Plan.

3–7. Integrated product support management

a. IPS issues, supportability deficiencies, and opportunities for improvements and efficiencies are evaluated by the CAPDEV using the capabilities determination process. Prior to program initiation, the CAPDEV accomplishes the following:

(1) Continue MANPRINT and logistics improvement and doctrine studies.

(2) Continue to identify the issues, constraints, requirements for logistics, MANPRINT, environment, and training to provide input into ongoing RFP processes that will support the gathering of useful information during MI and beyond.

(3) Utilize results from experience with similar materiel, advanced technology demonstrations and experiments to demonstrate the maturity and military utility of technologies and recommend best-value solutions.

(4) Use the guidance provided in MIL–HDBK–502 to identify the desired materiel support concept.

b. The CAPDEV, in coordination with the PEO's PSM, prepares the LCSP during the initial phase of drafting the CDD. The LCSP ensures that only support analyses tailored to the program needs are accomplished for development of IPS element requirements and constraints and to identify the supportability design requirements. This information must be consistent with the IPS information contained in the ICD.

c. The U.S. Army Training and Doctrine Command (TRADOC) proponent provides the trainer/training developer (T/TD) requirements analyses for CDD development. The PEO PSM performs materiel concept studies. All input contributes to the AoA used by the MDA to support ACAT I and II program decisions. Each analysis identifies logistics support requirements to be considered in the program.

d. The CAPDEV ensures actions are initiated by the appropriate CAPDEV activity to develop, coordinate, and distribute the STRAP. Through a coordinated effort, the CAPDEV and PEO PSM ensure that the schedules and milestones outlined in the STRAP for the training materiel are integrated into other IPS plans and requirements. This includes scheduling the availability of the hardware and other resources to satisfy the requirements of the STRAP.

e. The CAPDEV, in coordination with the T&E Working IPT (WIPT) and the PEO PSM develops IPS test objectives, issues, and criteria for inclusion in the TEMP and ensures adequate scope and resources. Supportability is a critical factor of performance in evaluating test objectives, issues, and criteria, as well as in source selection evaluation. The CAPDEV ensures a complete set of IPS issues and criteria are included in the TEMP. The CAPDEV and the PEO

PSM define the required components of the product support package to ensure availability for tests scheduled in the TEMP. The TEMP is reviewed to ensure the test concepts and planning information address the IPS issues and criteria.

3–8. Materiel development procedures

The PEO PSM performs numerous activities to identify supportability deficiencies and find opportunities to improve Army materiel and their support, including the following:

a. Complying with environmental laws and regulations. Preventing pollution is the Army's preferred approach to maintaining compliance with environmental laws and regulations. AR 70–1 and AR 200–1 require acquisition programs to incorporate pollution prevention throughout the acquisition process. MATDEVs a PESHE as part of the AS. It is a living document required by MS B that includes the following:

(1) ESOH risks.

(2) Strategy for incorporating risks into the system engineering process.

(3) Methods for tracking progress in the management and mitigation of risks.

(4) ESOH responsibilities.

(5) Schedule for completing National Environmental Policy Act requirements.

b. Evaluating IPS implications in technology base assessments and experimentation.

c. Ensuring mutually satisfactory resolution of CAPDEV IPS issues and concerns.

d. Developing crosswalks between the LCSP and other key documents, such as the AS, the TEMP, and the contract requirements.

e. Ensuring that IPS considerations are fully addressed in developing the AS. The AS precedes or is prepared concurrently with the LCSP. The LCSP must also be compatible with the tailoring of acquisition processes established in the AS. The PEO PSM coordinates the IPS input with the PSMIPT members who provide assistance in developing alternate IPS strategies and impact assessments.

f. Submitting a TR to the Surface Deployment and Distribution Command Transportation Engineering Agency (SDDCTEA) no later than 30 days prior to MDR for MS A and 60 days prior to the MDRs for MS B and C. The TR describes the transportability characteristics of transportability problem item (see AR 70–47). The transportability approval provided by SDDCTEA is based on the TR and transportability approval is required before MS C (see AR 70–1).

g. The MDR for MS B is held to ensure that the materiel concept is viable and that all required program management documentation has been developed and is available to base the decision to proceed to the next phase of development. The decision review level is based on materiel cost, importance to Army, and congressional interest (see AR 70–1 for decision levels and criteria). An affirmative MDA decision permits continued development and acquisi- tion into the Engineering and Manufacturing Development (EMD) Phase.

Section IV
Engineering and Manufacturing Development Phase

3–9. Objectives and goals

a. The EMD Phase has two major efforts: Integrated Materiel Design, and Materiel Capability and the Manufacturing Process Demonstration. The purpose of EMD is to develop a materiel or an increment of capability; complete full integration; develop an affordable and executable manufacturing process; ensure operational supportability with particular attention to minimizing the logistics footprint; implement HSI; design for producibility; ensure affordability; and demonstrate integration, interoperability, safety, and utility. The CDD, AS, SEP, and TEMP guide this effort.

b. The objectives of IPS during the EMD Phase are to ensure the materiel design incorporates the critical supportability/logistics requirements, develops product support element capabilities, and demonstrates that support and sustainment capabilities are mature. The primary goals are materiel development, product support package development, and demonstration of both the materiel capabilities and supportability. The actions include efforts to—

(1) Minimize program risk (including integration, supportability and manufacturing risk).

(2) Select, build, and simulate prototypes.

(3) Test prototypes and the support system in integrated developmental and operational tests.

(4) Implement HSI.

(5) Reduce logistics footprint by appropriate consideration of mission reliability, logistics reliability, reliability growth, fuel or power efficiency, improvements in maintainability, and other supportability issues.

(6) Develop and update all LPD.

(7) Select or develop the product baseline.

(8) Ensure interoperability and utility.

(9) Design for producibility.

(10) Conduct DSOR Analysis.

(11) Ensure affordability and minimize LCC.

(12) Conduct the APSA for PBPSS.

(13) Select the Product Support Integrator (PSI), where applicable.

(14) Prepare draft performance-based arrangements (PBA).

3–10. Program initiation

a. The PEO designates an individual to serve as the PSM for the program. At that time, the CAPDEV PSMIPT function transfers to the MATDEV PSM. The MATDEV PSM chairs the PSMIPT and assumes the lead IPS management role for the materiel acquisition effort. The CAPDEV now assumes a supporting role and ensures that all IPS program actions are fully coordinated within the CAPDEV community. The CAPDEV ensures that required CAPDEV participants are advised and attend PSMIPT meetings, as necessary. The PSMIPT is the vehicle for keeping CAPDEV and MATDEV participants abreast of all IPS issues, actions, and milestones that affect the IPS Program.

b. The PSMIPT ensures that the overall PSA process is tailored to the materiel, reflects the current design configuration, and identifies and optimizes those product support and manpower, personnel, and training requirements necessary to support the deployed materiel.

c. The PSM, through the PSMIPT, coordinates and establishes requirements for contractor-prepared data products. All IPS points of contact submit their input to the PSM. The PSMIPT—

(1) Assists the MATDEV in developing PBAs, solicitation documents and contracts.

(2) Works in coordination with the MATDEV, Soldier, PSI, product support providers (PSPs), and other involved organizations to prepare PBAs to establish roles and product support performance requirements.

(3) Provides recommendations with regard to all proposed contract and PBA changes that impact product support or IPS objectives.

d. The PSM coordinates the contract requirements for materiel acquisitions with PSMIPT members.

e. The MATDEV, in finalizing the solicitation package, gives the PSM recommendations full consideration and seeks to resolve all issues. However, ultimate responsibility for the solicitation package rests with the MATDEV.

3–11. Documentation

a. The following program and IPS documents are initiated during EMD (table 3–3 provides a list of the objectives and goals, tasks, and documentation addressed in the EMD Phase)—

(1) The Basis of Issue Plan Feeder Data (BOIPFD) is provided to the U.S. Army Force Management Support Agency (USAFMSA). In preparing the BOIPFD, the MATDEV uses the STRAP, the updated CDD, results of the PSA, and relevant baseline and constraint data.

(2) A draft maintenance plan and draft Depot Maintenance Support Plan (DMSP) are prepared and provided to all involved organizations.

(3) The New Equipment Training Plan (NETP) is initiated. The PSM ensures that the New Equipment Training (NET) manager coordinates the NETP with the T/TD and CAPDEV. The approved plan is provided to the CAPDEV and is included in the STRAP.

(4) A draft Provisioning Plan (PP) is developed to guide the PSM, PSMIPT, and PSP.

(5) A Materiel Fielding Plan (MFP) is prepared using data in the CDD, AS, LCSP, PP, NETP, and DMSP.

(6) PBAs are developed and coordinated with the PSI, PSP, Soldier, and other affected organizations.

(7) An APSA is conducted to determine if a PBPSS is economically and operationally feasible for the materiel.

Table 3–3
Integrated Product Support in the Engineering, Manufacturing, and Development Phase

Objectives and goals	Tasks and documents
Promote engineering materiel development and IPS development. Translate the most promising design into a stable, interoperable, producible, supportable, and cost-effective design. Demonstrate materiel capabilities through testing and modeling and simulation (M&S). Demonstrate product support performance through test. Validate the manufacturing and production processes. Develop the product baseline.	Develop and test hardware, software, supportability, and interoperability. Develop and test the product support package. Identify Exit Criteria. Initiate the following documents— Capability Production Document (CPD). BOIPFD. DMSP. NETP. PP. Support Facility Annex (SFA). MFP. Materiel Fielding Agreement (MFA). Draft Equipment Manuals. Post Production Support Plans (PPSP). PBAs. System DEMIL and Disposal Plan. MANPRINT Assessment (occurs at MDR). Preservation and Storage of Unique Tooling. Logistics Demonstration (LD) Plan. ILA Report. Update the following documents— Acquisition Decision Memorandum (ADM). Affordability Assessment. AoA. AS. APB. MI. Technology Readiness Assessment. LCSP. TR. PESHE. APSA. SEP. RAM–C Report. TEMP. DSOR Analysis. CRLCMP. CPC Plan. IUID Plan. STRAP.

b. The following documents are updated during EMD and each update should be identified using an issue number, a date, a revision letter or some other method to differentiate it from other versions—

(1) ADM.
(2) Affordability assessment over the projected life cycle.
(3) AoA.
(4) Cost as an independent variable (CAIV) report.
(5) APB.
(6) AS.
(7) Current MI.
(8) Technology readiness assessment.
(9) APSA.
(10) LCSP (including the minimum required military support posture from CAPDEV).
(11) STRAP.
(12) TEMP.
(13) TR with transportability approval from SDDCTEA required before MS C.

(14) CRLCMP.

3–12. Integrated product support tasks

a. The PSM updates the LCSP to guide EMD and future IPS planning and implementation. The PSMIPT supports the PSM in taking the required actions during EMD.

b. The LCSP should be updated concurrently with the AS to ensure synchronization between the documents.

c. The TEMP is updated to reflect the IPS test objectives, issues, and criteria in test plans, LD, and T&E reports.

d. The T&E WIPT includes IPS representation from the PSM and appropriate PSMIPT members.

e. The product support package and NETP are developed and delivered within established milestones to support technical and operator tests.

f. PBAs are developed to document the PBPSS in terms of performance-based goals tied to performance metrics.

g. In coordination with the contractor, a PPSP is developed that describes the management and support activities necessary to ensure readiness and sustainability objectives are met after the production line for the materiel shuts down.

h. During EMD, the PSMIPT coordinates and verifies logistics requirements on behalf of the MATDEV. Coordination and cooperation among all PSMIPT members is critical to the success of the IPS program. The updated LCSP is the primary planning and execution document for IPS program management planning and coordination of IPS efforts.

i. IPS-related activities (for example, solicitations, contracts, funding, BOIPFD, and planning for training) accomplished in EMD are recorded in the appropriate documentation.

j. Begin equipment publications development.

k. Perform PSA and acquire the resultant LPD to define the requirements to support the materiel.

l. A transportability approval from SDDCTEA, in response to the materiel proponent's TR, is required before MS C (see AR 70–47).

m. Increased coordination with the gaining commands (GC) begins with the MFP, which prepares the MATDEV, Soldier, and other involved organizations for the fielding (see AR 700–142).

n. The type classification (TC) and materiel release (MR) process is conducted to ensure TC standard and full materiel release (FMR) by full-rate production (FRP) to verify that the materiel is safe, suitable, and logistically supportable in its intended environment before it is released to Soldiers (see AR 700–142).

Section V
Production and Deployment Phase

3–13. Objectives and goals

a. The Production and Deployment Phase has two major activities, which are, low rate initial production (LRIP) and FRP and deployment, and includes a full-rate production decision review (FRPDR). The purpose of the Production and Deployment Phase is to achieve an operational capability that satisfies mission needs. Entrance into this phase depends on the following criteria:

(1) Acceptable performance in developmental T&E and operational assessment (DOD operational T&E oversight programs).

(2) Mature software capability.

(3) No significant manufacturing risks.

(4) Manufacturing processes under control.

(5) An approved CPD.

(6) A refined integrated architecture.

(7) Acceptable interoperability.

(8) Acceptable operational supportability.

(9) Demonstration that the materiel is affordable throughout the life cycle, fully funded, and properly phased for rapid acquisition.

b. The objectives of IPS during the Production and Deployment Phase are to finalize equipment product support packages and maintenance plans, manage and deploy the initial product support capabilities, and demonstrate the product support capabilities and effectiveness. Once the capabilities and effectiveness have been demonstrated, the emphasis is on fully fielding and implementing the product support capabilities to provide the Soldiers the capabilities identified in their capability requirements documents (CRD).

c. The primary goal in production, deployment, operations, and support (PDOS) is to achieve an operational, affordable, and supportable capability that satisfies mission needs. PDOS entails the production and deployment of the materiel and IPS for life of the materiel (see table 3–4). The PDOS activities includes the following:

(1) Production contract award.

(2) Configuration management (CM).

(3) Publication of equipment publications including TMs, Electronic Technical Manuals (ETMs), and IETMs.

(4) Publication of the gaining units' table of organization and equipment (TOE) and modified TOE or table of distribution and allowances (TDA).
(5) Production tests and materiel acceptance.
(6) TC standard.
(7) Achieve FMR.
(8) Conduct NET.
(9) Conduct Materiel Fielding.
(10) Initial operational capability (IOC).
(11) Implement—
(a) PBPSS.
(b) PBAs for O&S of the materiel throughout its useful life.
(12) Schedule PSM reviews to assess and update PBAs, as required.
(13) Establish organic depot capability.

Table 3–4
Integrated Product Support in the Production and Deployment Phase

Objectives and goals	Tasks and documents
Initiate production (LRIP and FRP), fielding, O&S. Finalize all documentation. Train personnel for maintenance and operations. Verify authorizations, begin distribution, and perform field exercises to achieve IOC. Identify opportunities for Technology Insertion (TI).	Obtain TC Standard and achieve FMR. Award production contract. Implement PBPSS and PBAs. CM. Materiel fielding. ILA report. Establish organic depot capability. Sustainment reviews (SR). Initiate the following documents— post fielding support analysis (PFSA). Update and finalize the— ADM. MFA. MFP. SFA. DMSP. NETP. PBAs. Engineering change proposals (ECP). PPSP. System DEMIL and Disposal Plan. LCSP. MANPRINT assessment (occurs at MDR).

3–14. Integrated product support management

a. The PSM ensures that solicitations and contract documents contain provisions for all IPS elements required to support initial fielding, deployment, and continuing O&S of the new materiel.

b. The CAPDEV and MATDEV coordinate with T/TDs having training responsibilities for operation and maintenance support in order to assess institutional training for successful materiel fielding and sustainment operations.

c. The PSM and PSMIPT continue coordination with the GCs during deployment. The final MFP is coordinated and then a MFA is signed by the MATDEV and the GC to ensure successful total package fielding (TPF).

d. The PSMIPT coordinates materiel supportability considerations with the MR review board to obtain MR certifications which documents that the materiel is compliant with legal requirements, is safe, suitable, and logistically supportable in its intended environment.

e. The PSM updates PBAs to ensure the sustainment strategy is responsive to the Soldiers in the field. This includes coordination with Soldiers, PSIs, and PSPs.

f. The APSA is validated and updated post-implementation whenever there are major programmatic changes or at least every 5 years.

3–15. Total Package Fielding

TPF is the Army's standard fielding process (see AR 700–142 and DA Pam 700–142). The TPF process is designed to ensure thorough coordination in planning the materiel fielding effort among the MATDEV, CAPDEV, GCs, and units. It also results in Army units receiving all support equipment, TMs, and training required to operate and support the materiel. All TPF activity is documented and maintained by the MATDEV.

Section VI
Operations and Support Phase

3–16. Objectives and goals

a. The O&S Phase has two major activities, which are, life cycle sustainment and disposal. The purpose of the O&S Phase is to execute a support program that meets materiel readiness and operational support performance requirements, and sustains the materiel in the most cost-effective manner over its life cycle. Planning for this phase begins prior to program initiation and is documented in the LCSP. Entrance into the O&S Phase depends on meeting the following criteria:

(1) An approved CPD.

(2) An approved LCSP.

(3) A successful FRPDR.

b. Sustainment of the materiel begins prior to IOC as early production assets are delivered for T&E, LRIP, and/or other pre-operational uses. During O&S, the objective of IPS is to execute sustainment while continuously monitoring the performance of the materiel and assessing the effectiveness and affordability of the product support strategy. IPS assessments require close coordination with the Soldier, PSPs, and appropriate system engineering IPTs. A list of IPS objectives and goals along with key tasks and documentations is in table 3–5.

Table 3–5
Integrated Product Support in the Operations and Support Phase

Objectives and goals	Tasks and documents
Enhance the performance and cost-effectiveness of the end-to-end supply chain to ensure materiel readiness continues to meet Soldier needs. Identify redesign opportunities to enhance materiel effectiveness through materiel changes.	Monitor materiel usage and supply chain against design baseline criteria and assumptions. Review and assess all usage and supplier data to determine operational hazards, safety risks, and readiness degraders. Develop alternatives to resolve critical safety and readiness degrading issues. Identify sub-optimal performers in the fielded product support package and correct them through rebalanced product support elements, changes to the maintenance program, or materiel changes. Update— LCSP. materiel fielding team reports. Sustainment readiness review. PBA. Materiel changes (ECPs). Revise equipment publications (EP). PFSA.

3–17. Operations and support management

a. The final PPSP is completed prior to production phase-out and schedules are established for reviewing and updating the PPSP throughout the life cycle.

b. Following the fielding of all ACAT level materiel, equipment performance and readiness data will be gathered through the appropriate supporting logistics information systems and at the U.S. Army Materiel Command (AMC) Logistics Support Activity (LOGSA), who collects and monitors the data not available during developmental and acceptance testing. PFSA is a LOGSA tool that can be used to minimize support costs and develop either materiel modifications or new materiel with improved supportability and reduced life cycle costs.

c. After the initial fielding to Army units, the PSM plans and executes all transition activities identified in the LCSP.

One transition may be transitioning the support during production to support after production has been terminated (this should be reflected in the LCSP). Another transition may be the changeover from interim contractor support (ICS) or contractor logistics support (CLS) to the objective support identified in the LCSP. All transitions need to be planned far enough in advance to ensure that there is no interruption in the programming and budgeting functions for life cycle support resources.

d. The PSM, with the support of the PSMIPT, uses data collected from the field readiness and maintenance reporting system and field-training exercises for analysis with the objective of continually improving the support structure and reducing O&S costs. Efforts will include identifying cost drivers due to failure rates that increased costs of replacement parts, and performing a Level of Repair Analysis (LORA), as defined in SAE AS1390, to validate the established support structure. Automated tools, such as the PFSA, can be used to process and analyze the field data against specified metrics.

e. The PSM collects and evaluates the actual field data against the metrics specified in the PBA(s). These data and evaluation results will be provided to all PBA stakeholders and corrective actions are taken when required. PBAs will be updated as required throughout the materiel's life cycle to reflect revised product support strategies in terms of performance-based goals tied to performance metrics.

f. The MATDEV institutes a continual technology refreshment program and initiates materiel changes, as necessary, to improve supportability, reduce LCC, and decrease the logistics footprint of the materiel.

g. Refining the planning process assures the continuing sustainment and maintenance of materiel and can include the following:

(1) Life cycle savings through improved O&S methods.

(2) TI.

(3) Evolutionary acquisition and preplanned product improvements.

(4) Value engineering improvements.

3–18. Disposal and demilitarization operations

a. At the end of its useful life, materiel is demilitarized and disposed of in accordance with all legal and regulatory requirements and policies relating to safety (including explosives safety), security, and the environment. During the design process, MATDEV documents within the PESHE any hazardous materials contained in the materiel. The MATDEV should estimate and plan for the materiel DEMIL and safe disposal, to include helping the PSMIPT identify projected future costs for inclusion in the sustainment budget. The DEMIL of conventional ammunition (including any item containing propellants, explosives, or pyrotechnics) is considered during materiel design.

b. The MATDEV should coordinate with DOD Component logistics activities and the Defense Logistics Agency (DLA), as appropriate, to identify and apply applicable DEMIL requirements necessary to eliminate the functional or military capabilities of assets (see DOD 4140.1–R and DOD 4160.21–M–1). The MATDEV should coordinate with DLA to determine property disposal requirements for materiel, support assets, and by-products (see DOD 4160.21–M).

3–19. Integrated product support implementation

Disposal Implementation is based on each System DEMIL and Disposal Plan, class of supply, special considerations such as: hazardous materials (HAZMAT), communications security, aviation, small arms, and ammunition. Disposal is required for all excess, obsolete, and non-reparable items. The MATDEV develops the original plan for disposal but each organizational element applies the regulations or TM direction that is appropriate for its level of responsibility (see AR 700–127, AR 750–1, AR 710–2, DOD 4140.1–R, and DOD 4160.21–M–1). A list of IPS objectives and goals along with key tasks and documentation to fulfill them is in table 3–6.

Table 3–6
Integrated product support for disposal and demilitarization

Objectives and goals	Tasks and documents
Remove obsolete national stock numbers (NSNs). Recind EPs. Convert support equipment to other uses. Recind training materials. Recind PHS&T Guidance. Convert facilities to other uses. Revise TOE documents. Revise supply documents.	ADM. PESHE. System DEMIL and Disposal Plan.

Chapter 4
Product Support Management

Section I
Strategic Approach and Risk Management

4–1. Performance based product support strategies

a. MATDEVs are to develop PBPSS for executing affordable product support for materiel and software. DODI requires MATDEVs to: “employ effective performance-based logistics planning, development, implementa- tion, and management in developing a materiel’s product support arrangements.” Through this method, the accountabil- ity and responsibility for integration of IPS elements are linked to specific Soldier performance requirements that support materiel readiness and operational capability. A PBPSS—

(1) Delineates output performance goals and thresholds for materiel supportability and sustainment.

(2) Assigns responsibilities and implements incentives for the attainment of goals and thresholds.

(3) Focuses on overall life cycle management of reliability, sustainability, and O&S cost.

b. The goal of performance based product support is to design and build a—

(1) Reliable materiel that will reduce the demand for logistics.

(2) Maintainable materiel that reduces the resources required for product support, such as manpower, equipment and time.

c. The MATDEV, as the total life cycle system manager, must ensure that the materiel, as designed, maintained, and modified, minimizes the demand for logistics. The performance-based product support approach is based on DOD managing and sharing risk with the PSP’s set levels of reliability and supportability.

d. MATDEVs are required to develop PBPSS for acquisition and sustainment of products and services for all Army programs. The Defense Acquisition Guidebook states that within statutory limitations, support concepts for materiel shall use long-term logistics support based on best value over the materiel’s life cycle, and that support approaches be analyzed to provide a basis for a final decision. It is important that the selected PBPSS meet the CAPDEV’s requirements identified in the CRD, be operationally executable and support the mission. All PBPSSs and APSAs must include clearly defined metrics.

e. The PSM is responsible to the MATDEV for developing the PBPSS. The PSM must leverage the PSMIPT as the Army’s organizational stakeholders in developing the PBPSS. This process will ensure that the appropriate stakeholders in the PSMIPT are represented in the process supporting the MATDEV’s ultimate decision on selecting the program PBPSS.

f. For performance-based product support, “performance” is defined in terms of military objectives using the following criteria:

(1) Sustainment KPP— Consists of two components: Materiel Availability and Operational Availability. Respective- ly, they provide fleet-wide availability and operational unit availability. The Operational Availability metric is an integral step to determining the fleet-wide availability. The following provides guidance for development of both metrics:

(a) Materiel Availability (Am)—The measure of the percentage of the total inventory of a materiel that is operation- ally capable of performing an assigned mission, based on materiel condition. The total population of operational end items must account for all assets, which includes those to be fielded, in training, attrition reserve stock, pre-positioned stock, and in a non-operational materiel condition, such as for depot-level maintenance (DLM). Materiel Availability covers the total life cycle timeframe, from placement into operational service through the planned end of service life. Am=Number of operationally available end items divided by the total population of end items.

(b) Operational Availability (Ao)—The measure of the percentage of time that a specific materiel/end item or group of materiel within a unit during a specified period of time (for example week or month) is operationally capable of performing an assigned mission. Determining the optimum value for Operational Availability requires a comprehensive analysis of the materiel and its planned concept of operations, including the planned operating environment, operating tempo, reliability and maintenance concepts, and supply chain solutions. For this calculation downtime should only account for field level maintenance failures, not depot level repair or combat damage. Ao=uptime divided by (uptime+ downtime)

(2) Reliability KSA—The measure of the probability that the materiel will perform without failure over a specific interval, under specified conditions. Reliability must be sufficient to support the warfighting capability requirements, within expected operating environments. Considerations of reliability must support both availability metrics.

(3) O&S Cost KSA—O&S Cost metrics provide balance to the sustainment solution by ensuring that the O&S costs associated with availability and reliability are considered in making decisions. Costs are to be included regardless of funding source or management control. The O&S value should cover the planned life cycle timeframe, consistent with the timeframe and system population identified in the Materiel Availability metric. The O&S Cost KSA is to be completed using base year dollars.

(4) Meantime downtime — The average total downtime required to restore an asset to its full operational capability.

MDT includes the time from reporting of an asset being down to the asset being given back to operations/production to operate. MDT includes administrative time of reporting, logistics, and materials procurement and lock-out or tag-out of equipment for repair or preventive maintenance. MDT=Total Down Time for all failures divided by the total number of failures.

(5) Logistics footprint— The government and contractor size or "presence" of logistics support required to deploy, sustain, and move materiel. Measurable elements include inventory, equipment, personnel, facilities, transportation assets, and real estate.

g. The determination of the PBPSS should be assessed in the following manner:

(1) First, begin with an analysis of the available organic infrastructure to support the materiel and software. By building a PBPSS around available organic capability as the baseline strategy, the Army benefits from previous investment in the organic industrial base, the infusion of new equipment and facilities to keep capabilities current and relevant, supports mobilization, and promotes compliance with statutes addressing organic depots. The PBPSS in this scenario requires an APSA that summarizes the organic support capabilities and how it will fulfill CAPDEV require- ments. This is a document that describes the basis for the support selection and rationale to include the affordability of any additional organic investment.

(2) Second, when a fully organic PBPSS is not possible, the next step for developing a PBPSS is to explore potential PPP arrangements to leverage organic and contractor partner capabilities. These arrangements foster the sharing of technology and processes with organic depots and can encourage contractor investments in the organic infrastructure. Using a PPP requires an APSA that summarizes the organic support capabilities, the organic capability gaps that must be filled, the PPP capabilities, and how the partnering agreement fills organic gaps to deliver a PBPSS that will fulfill CAPDEV requirements. This will be a more extensive document than a completely organic PBPSS that describes the basis for the support selection and rationale to include the level of interest contractors have in entering a performance-based PPP arrangement, costs and risks.

(3) Third, after alternatives for an organic and PPPs PBPSS have been analyzed, if support gaps still exist, or contractors are unwilling to partner with the government, then alternatives for CLS should be assessed. A robust APSA must be conducted to provide a business case to validate that the PBPSS is the best value for the Army rather than an organic or PPP PBPSS. The APSA is the most rigorous and extensive analysis of the three PBPSS options. It assesses the support alternatives, risk for implementation, cost, and sensitivity to changes within each alternative with significant detail. The APSA should clearly justify why private-sector support cannot be provided through PPP arrangements.

h. It is acceptable to use ICS as a bridging strategy until the PBPSS identified in the LCSP is fully operational.

i. All PBPSSs are implemented through PBAs.

j. PBPSS should be considered when the following conditions exist:

(1) Availability is consistently below threshold.

(2) Supply demand has achieved a post-fielding stability that supports predictability of future demands.

(3) The number of potential PSPs is large enough to support a competitive market, or leverage exists to structure internal competitive pressure in limited or sole-source situations.

(4) Sufficient operational life remains for the materiel (typically 5 or more years).

(5) Actual sustainment costs exceed LCC estimates, or should cost management indicates an opportunity to lower the cost of required performance.

(6) Analysis shows that a minimum 5 percent annual cost savings over the life of the PBA is expected.

k. A PBPSS may not be feasible for newly fielded materiel when—

(1) Design stability has not been achieved.

(2) Sufficient post-fielding reliability and supply demand data is not available to reduce risk for a PBPSS.

4–2. Legacy materiel

Legacy materiel is materiel that is out of production but still being used in the Army. There may be conditions where developing a PBPSS is not feasible because of a program's maturity and investments already made in a product support structure. This generally applies to legacy materiel. When legacy materiel support alternatives are assessed and a PBPSS is not feasible, the MATDEV may decide to continue established product support for the remaining program life cycle. This decision should be documented by a single page APSA that describes the rationale for continuing the established support structure. Conditions where a PBPSS may not be feasible are when the program—

a. Is supported by a traditional sustainment strategy through organic or commercial means with less than 5 years of useful life expectancy remaining for the materiel.

b. Requires minimal logistics support such as "wooden round" armaments that require no maintenance or preparation time prior to loading for firing, or products under commercial warranties for the program life cycle.

c. Provides commercial products such as information technology, communications devices, and other technology where all fielded items are replaced by new capabilities in 5 years or less.

d. Did not Identify technical data requirements; did not acquire, secure and obtain technical data to permit competitive procurement of product support; gaining delivery of such technical data is unaffordable; and contractors are unwilling to enter a PBA.

e. Acquired the materiel under a sole source contractor that controls the technical data and is unwilling to enter into a PBA.

f. Materiel is employed in contingencies where supply demand and operations tempo are uncertain, adding higher risk under a PBPSS.

g. Analysis shows that a minimum 5 percent annual cost savings over the life of the PBA is not expected.

h. The current sustainment approach is effective and within LCC estimates, or should cost management indicates there is not an opportunity to lower the cost of the required performance.

4–3. Supportability risk management

a. Supportability risks must be an integral part of the MATDEV's risk management program. With logistics transformation, supportability is getting increased attention during MDRs. Supportability risks may be associated with program cost, funding, schedule, and performance. Supportability risks and constraints must be identified and assessed as product support plans are developed and acquisition program progress is evaluated. After supportability risks are identified, risk-management plans must be developed to reduce, control, or accept all risks that have been identified.

b. Phase or program specific exit criteria may be emplaced that require specific capabilities be achieved or risks mitigated before a program may be permitted to continue into the next phase of acquisition. Guidance for exit criteria is available in DODI 5000.02.

4–4. Risk identification procedures

a. Data and information needed to identify materiel support risks are collected during system engineering and acquisition activities and may include—

(1) Support risks associated with each support alternative and included in the LCSP.

(2) Support risks identified from analyses conducted by the system engineers, PSMIPT, or other members of the acquisition community to select the optimal support alternatives.

(3) Support risks are discovered during the T&E process.

(4) Determined through the IPS process and PSA.

(5) Identified in the ILA report.

(6) Associated with CPC.

b. Risk issues and required actions need to be identified by the system engineer, PSMIPT, and other members of the acquisition community any time there is a question about achieving objective or threshold capabilities within cost, schedule, performance, and supportability constraints. For example, there may be a risk of an inability to continue postproduction support for materiel at a reasonable cost if the technical data is not being acquired, secured, and obtained to support competitive procurement of additional materiel or secondary items. Rationale for risks and associated impacts should be provided even when risks are considered low.

c. Potential support risks and recommended solutions must be brought to the attention of the MATDEV and the PSMIPT. Coordination with all IPT members to resolve the potential risks is strongly encouraged. Support risks and plans for resolving them are documented for all MDRs.

4–5. Exit criteria identification procedures

a. The MDA identifies exit criteria for each milestone. Any supportability requirements, acquisition tasks, T&E activities, and risk-reduction efforts that should be called out as exit criteria may be recommended by the MATDEV, PSMIPT, or other members of the acquisition community. Supportability exit criteria are critical to sustainment of the materiel and are considered coequal and with cost, schedule, performance and supportability constraints. Incremental thresholds and KPP are identified for each acquisition program phase when objectives must be achieved in stages.

b. Critical requirements directly related to the CRD with direct impact on achieving cost, schedule, performance, or supportability thresholds are documented as exit criteria that must be achieved before proceeding into the next phase. However, the exit criteria must not duplicate key performance parameters already being evaluated as entrance criteria to the next phase.

(1) Specific supportability constraints identified in the CRD establish the baseline for exit criteria. The CRD must include specific supportability goals needed to satisfy the operational requirement.

(2) Critical acquisition tasks delineated in program management documentation or in the acquisition contract that has a significant impact on the ability to sustain the materiel within cost, schedule, performance, and supportability constraints also provide a potential source for exit criteria. Satisfactory completion of these tasks should be identified as exit criteria. Interim thresholds should be identified for time-phased tasks that must be completed before continuing into the next acquisition program phase.

(3) Risk reduction measures identified in the MDRs also provide exit criteria. Efforts that are required to reduce risks to levels within cost, schedule, performance, and supportability constraints should be identified as exit criteria.

(4) Critical supportability-related T&E activities delineated in the TEMP provide another potential source for exit

criteria. Satisfactory completion of any critical tests or evaluations needed to ensure the materiel can be sustained within cost, schedule, performance, and supportability constraints may be identified as exit criteria.

c. Potential exit criteria must be brought to the immediate attention of the MATDEV for inclusion in the acquisition program summary or modified acquisition program summary. Maximum coordination of potential exit criteria with other members of the acquisition community is strongly encouraged.

Section II
Organization

4–6. Product support manager

a. Army acquisition policy requires that MATDEVs consider supportability, LCC, performance and schedule as equal factors in making program decisions. MATDEVs are required to develop and implement a supportability performance measurement system for use in evaluating the materiel's performance against established supportability goals and standards. The MATDEV's responsibilities for the oversight and management of the product support function are delegated to a specifically designated PSM who leverages the IPS elements, leads the development and implementation of PBPSS, and ensures achievement of desired support outcomes during sustainment. The PSM is the MATDEV's "Trail Boss for Life Cycle Product Support." The PSM is a direct report to the MATDEV who is the performance rating official for the PSM (this MATDEV responsibility cannot be delegated).

b. The optimum time to designate a PSM is when the MDD is made. The PEO in anticipation of a program start should designate a PSM to work as a member of the CAPDEV PSMIPT through the MSA Phase and MS A. This ensures that the PSM has the ability to influence decisions and trades made prior to the assignment of a MATDEV. At program initiation, the PEO assigns a PSM to the program to support the MATDEV. At this time, the PSM takes over management of the PSMIPT, and is responsible for all PSM duties throughout the program life cycle. A PSM is assigned throughout the program life cycle (there is no phase-out of the PSM when the program enters sustainment).

c. The PSM is assigned to an ASA (ALT) approved Logistics Management Specialist 0346 Position Requirements Description for a PSM, on the PEO TDA.

d. PSMs are required to be highly qualified subject matter experts in Life Cycle Logistics (LCL) and possess cross-functional knowledge in other acquisition disciplines and operational logistics functional disciplines.

e. There are two tiers for PSM positions—

(1) Tier II PSMs are assigned to ACAT I or ACAT II programs. Individuals selected for Tier II PSM positions must be a minimum grade of an O-5, for military officers, or a GS-14 broad band equivalent for civilians. Tier II PSMs for ACAT I programs are key leadership positions. Tier II PSMs for ACAT II programs are critical acquisition positions.

(2) Tier I PSMs are assigned to ACAT III programs. Individuals selected for Tier I PSM positions must be a minimum grade of an O–5, for military officers, or a GS–13 broad band equivalent for civilians. Tier I PSMs for ACAT III programs are critical acquisition positions.

f. Individuals selected for Tier II PSM positions must meet the selection criteria in table 4-1. Individuals selected for Tier I PSM positions must meet the selection criteria in table 4–2.

Table 4–1
Selection criteria for Acquisition Category I and Acquisition Category II Programs - Tier II Product Support Manager

PSM selection	Acquisition Workforce Improvement Act (DAWIA) Certification	Experience LCL	Experience collocated in an ACAT I or ACAT II Program Office	Education level	Acquisition corps member
Required	LCL Level III LOG 365	10 years	5 years	Bachelors Degree	Yes
Desired	LCL Level III plus cross certification Level II or higher in Program Management, Contracting, System Engineering, or Business- Financial Management	15 years	10 years	Masters degree or higher	Yes

Table 4–2
Selection criteria for Acquisition Category III Programs - Tier I Product Support Manager

PSM selection	Acquisition Workforce Improvement Act (DAWIA) Certification	Experience LCL	Experience collocated in an ACAT I or ACAT II Program Office	Education level	Acquisition corps member
Required	LCL Level III LOG 365	5 years	1 year	Bachelors Degree	Yes
Desired	LCL Level III plus cross certification Level II or higher in Program Management, Contracting, System Engineering, or Business- Financial Management	8 years	3 years	Masters degree or higher	Yes

g. The PEO is responsible for establishing the PSM within the PEO organization structure provided the organizational construct complies with Army policy. There are two PSM constructs that may be used to effectively balance PSM designation to program requirements by assigning a PSM to manage a—

(1) *Single program.* This construct is best suited to large programs with other factors such as program complexity or volatility where the PSM would be fully engaged in the daily demands of a single program.

(2) *Portfolio of programs.* This construct is best suited to programs that are small, stable, and do not require full engagement of the PSM in the daily demands of the program. Portfolios of similar type materiel can be managed by a single PSM. Materiel that is transitioning from production to sustainment are ideal for portfolio management. The number and type of programs assigned to a portfolio PSM is at the discretion of the PEO. The ability of the PSM to manage multiple programs effectively is the greatest consideration for portfolio size.

4–7. Product support integrator

a. The PSM may choose to designate a PSI. The PSI function is to perform daily management of PBAs or portions of a PBA under the PSM's oversight. The PSM may also assign government matrix support personnel as functional team leads for specific LCL activities needed to implement the PBPSS. The difference between a functional team lead and a PSI (who may also be filled by government matrix support personnel) is the PSI is responsible for PBA management. The PSM will establish the PSI duties, responsibilities, and boundaries. PSIs must be government employees where PSI duties are inherently governmental. PSI designations may include the following:

(1) Government employees.

(2) Military officers.

(3) Contractors where duties are not inherently governmental.

b. AMC is the Army's PSI for the organic materiel enterprise. This includes organic depot and supply chain PPPs.

4–8. Product support provider

a. The PSP executes the product support functions identified in the terms of the PBA. The PSP is responsible for meeting or exceeding the performance outcomes required in the PBA and is accountable to the MATDEV for PSP performance. The PSP performance is measured according to the metrics in the PBA. The number of PSPs supporting a program will vary based upon the support required to execute the PBPSS.

b. The AMC and the appropriate LCMCs are the PSPs for Army organic depot and supply chain product support. This includes organic depot and supply chain PPPs.

4–9. Product Support Management Integrated Process Team

The PSM is responsible to the MATDEV for the management and oversight of life cycle product support for the materiel and software. When the program is initiated and a MATDEV assigned, the PSM becomes responsible for chairing the MATDEV PSMIPT and the CAPDEV's representative becomes a member. The PSMIPT includes key program stakeholders to ensure their input, expertise, and support is provided for the large array of functions needed to support the materiel and software. The MATDEV maintains the PSMIPT throughout the program life cycle to ensure that the PBPSS is defined, and documented in the LCSP, reviewed through each milestone, implemented according to plan, and issues are identified and resolved. The PSMIPT is a valuable forum for evaluating SRs and proposing corrective actions to keep the PBPSS relevant and effective. Organization of the PSMIPT is at the PSM's discretion.

4–10. Army Integrated Product Support Executive Committee

The Army Integrated Product Support Executive Committee is the DA's senior forum consisting of representatives in the rank of colonel or civilian equivalent that provides advice and counsel to the DASA (APL). The committee provides leadership insights for IPS policy, issues, concerns, and improvements. The committee reports to the DASA (APL). Meetings are scheduled at the DASA (APL)'s discretion.

Section III
Integrated Product Support Management of Joint Programs

4–11. Joint programs and joint logistics

a. Joint programs can be established when two or more Services agree that a mutual or similar need or capability gap exists. The JROC was created by charter under the auspices of the Joint Chiefs of Staff to promote and facilitate the establishment and use of joint programs.

b. Each joint acquisition program will have a lead Service assigned and a PSM will be assigned to execute the overall IPS program. The involved Services will comply with the individual IPS regulations of the involved Services unless an impasse occurs. The order of precedence will be DOD-level guidance followed by joint Service regulations and, finally, the lead Service IPS regulation. The lead Service will make every effort to accommodate the unique IPS requirements of the participating Services. All involved Services will standardize IPS requirements and data products as much as possible.

c. IPS coordination early in research and development is intended to effectively influence materiel design. Early consideration should be given to each Service's different missions, operating concepts, and operating environments, as well as their standard practices, procedures and doctrines to ensure optimum logistics support for each Service. Early involvement in all program planning is essential to ensure logistics requirements are planned, documented and coordinated among the participating Services. Joint IPS planning begins at program inception and continues throughout all phases of the life cycle.

4–12. Joint Service product support managers

When there are joint Service PSMs for a program, each of the Service's PSMs should—

a. Influence program operational requirements, AS, and materiel design to achieve and sustain established objectives of the IPS program while minimizing O&S costs.

b. Ensure all elements of support are planned, programmed, budgeted, developed, tested, evaluated, acquired, and deployed prior to or concurrent with the materiel.

c. Ensure proper coordination with the ultimate users of the materiel and support equipment, resulting in an effective handoff to the user, and maximizing readiness for the materiel.

d. Assist the MATDEV in ensuring compliance with policy, procedures, plans, and standards established for the effective acquisition and integration of IPS elements.

e. Improve materiel and associated logistics interoperability and standardization with DOD and allied nations.

f. Improve materiel and equipment affordability through the competitive bidding process, acquire technical data and reprocurement packages when appropriate, and require contractors to identify the actual hardware manufacturer.

g. Ensure the identification of all Service-unique IPS requirements and the incorporation of these requirements into the Joint Life Cycle Sustainment Plan (JLCSP) and Joint Memorandum of Agreement (JMOA).

h. Ensure all Services comply with DOD-regulated safety standards and requirements in relation to equipment configuration.

4–13. Lead Service product support managers

a. The lead Service designates a PSM prior to establishing an AS, to execute the IPS program, and provide support to the joint MATDEV in all matters related to the IPS program and to ensure that IPS considerations are properly included in the AS. The PSM must face the challenge of meeting the supportability requirements of more than one military Service. Each Service's unique supportability requirements need to be identified and provided to the MATDEV so they can be addressed.

b. The lead Service PSM coordinates the joint IPS efforts of the program to—

(1) Ensure that each participating Service designates a PSM as a focal point to serve on and support the IPS program. The Service PSM is responsible for identifying Service-unique requirements.

(2) Establish a joint PSMIPT to include representatives from each of the participating Services and ensure coordination in all major IPS program decisions, actions, and planning efforts.

(3) Ensure IPS requirements are addressed in the program JMOA and, if desired, prepare a separate IPS program JMOA in conjunction with participating Services.

(4) Ensure a single set of IPS elements are identified and agreed to during the formulation of the IPS program and the JMOA.

(5) Ensure that procedures for determining sources of funding for participating Service-unique IPS requirements are included in the JMOA.

(6) Identify and document maintenance and support concepts. Ensure that the participating Services' maintenance and support concept and deployment, transfer, or fielding requirements are identified, documented, and provided for incorporation into the JLCSP and JMOA. Ensure the planning process accommodates what is common and what is different in the Service concepts.

(7) Ensure that the operational requirements, AS, solicitation, contracting, and other planning documents include IPS program requirements and ensure that these requirements are consistent throughout all program management documentation. In conjunction with participating Services, identify Service-unique requirements, maintenance and support concepts, and data requirements for contracts. Ensure equal Service representation during the source selection process.

(8) Encourage joint use of centralized training facilities for common operator and maintenance training, to reduce duplication.

(9) Provide a joint ILA and coordinate the ILA with the participating Services for presentation at program decision review meetings (see DA Pam 700-28). The ILA should meet the requirements of DODI 5000.02.

4–14. Procedures

a. The IPS Program decisions are documented in the JMOA and will be used to formalize the responsibility and procedures for joint IPS program operation. The JMOA will also include procedures for resolving impasses between the Services involved. Within the context of the DOD guidance, participants in a joint program negotiate specific IPS roles, activities, responsibilities, and fiscal support to be provided by the lead and participating Services. The lead Service PSM obtains initial program instruction from the ADM specifying the lead DOD component and provides explicit guidance regarding the responsibilities of the participating Services.

b. When the Army is the lead joint Service, the CAPDEV will establish a CAPDEV led joint PSMIPT prior to assignment of the PSM. The CAPDEV led joint PSMIPT is chaired by the lead Service with membership including representatives from the other Services' CAPDEV and PEO communities. The CAPDEV PSMIPT requirements and joint participation in the PSMIPT will be defined in the IPS part of the JMOA. At program initiation, the CAPDEV PSMIPT will transition to the lead Service MATDEV's management. The MATDEV PSMIPT will be chaired by the lead Service PSM and meet as required to assist and support the lead Service PSM in accomplishing program related IPS functions. The PSMIPT requirements and joint participation in these teams will be defined in the IPS part of the JMOA.

c. The JLCSP should be initiated when the lead service PSM is designated. The JLCSP should be prepared by the lead Service in conjunction with the joint PSMIPT. The lead Service will update and expand on the JLCSP, as required.

d. The JMOA addressing the IPS program is included as a required annex to the plan. If necessary, each service's unique IPS program planning information and requirements should be contained in a separate JLCSP annex.

e. The lead Service PSM will participate in the joint T&E IPT to ensure supportability T&E issues are identified and evaluated. The JLCSP should be used as the basis for the supportability issues identified in the T&E criteria to include detailed maintenance planning. The lead Service PSM should ensure participating services are included in identifying supportability test issues and developing test plans for both hardware and software. Every effort should be made to avoid duplication of efforts and to use test assets as efficiently as possible while proving the operational effectiveness, and operational suitability of the materiel to include the testing required for proving out a Service-unique supportability issue for any services involved. Any separate service testing required for proving a Service-unique supportability issue not being addressed in the T&E plan should be surfaced by the Service's PSM and the lead Service's PSM as soon as possible. Additional independent Army testing will not be conducted unless there are unresolved test issues peculiar to the Army.

4–15. Unique Service requirements

a. Each of the military Services has unique processes for approving procurement funding for and fielding of acquisition materiel. TC is the Army's process for verifying the acceptability of materiel for procurement and introduction into the Army inventory (see AR 700–142). When the lead Service for the program is not the Army, materiel requirements may not be consistent with the Army's process for TC. If the Army is not the lead Service on a joint program, the Army Service PSM must ensure that the lead Service PSM is aware of this requirement and that provisions are made to meet the Army's TC requirement and document in the JMOA. Development of the program schedule must consider the time constraints required to allow the completion of the Army TC prerequisites.

b. The Army's process for materiel fielding is TPF and will be used for the introduction of materiel into Army units. The introduction of a new materiel in an Army operational environment differs from the other Services. The lead Service PSM and the Army PSM must consider these unique requirements and develop a detailed plan for how the Army's prerequisites for new equipment fielding will be met (see AR 700–142 and DA Pam 700–142). The program schedule must be built with the lead-times needed to complete the Army prerequisites. If the Army is serving as the lead, other Services' requirements must be considered. A clear understanding of each Service's fielding terms (for example, first unit equipped date versus IOC), should be established early in the program to avoid misunderstandings.

c. MR is the Army's process to assure that materiel is safe, operationally suitable, and is supportable before release for issue to users. The lead Service PSM and the Army PSM must develop a detailed plan for how the Army's requirement for MR will be met (see AR 700–142 and DA Pam 700–142).

Section IV
Implementing Performance Based Product Support Strategies

4–16. Metrics

a. Army acquisition policy states that supportability is integral to the success of a materiel and will be considered equal in importance with cost, schedule, and performance (see AR 70–1). In addition, DOD acquisition guidance requires MATDEVs to develop and implement a performance measurement system. Therefore, MATDEVs and PSMs (see the Defense Acquisition Guidebook and the updated Product Support Manager Guidebook) are required to develop and implement a supportability performance measurement system for use in evaluating a product support system's performance against established supportability goals and standards. The MATDEV's responsibilities for oversight and management of the product support function are delegated to the assigned PSM to lead the development and implementation of the PBPSS and to ensure achievement of desired support outcomes during sustainment. However, the MATDEV retains all authority and oversight of their assigned program and is the ultimate decision authority. The PSM employs a PSI, or a number of PSIs, as appropriate, and implements PBAs to achieve those outcomes.

b. The attainment of supportability requirements must be verified and based on quantitative measures or metrics and reviewed by operational testing supported by the Soldier.

c. MATDEVs are to ensure that all PBAs (organic and contract) include all appropriate DOD performance metrics to ensure government oversight and management of the PSP performance required under the PBA, and to reduce O&S cost. All PBAs must include the minimum metrics required in AR 700–127 as follows:

(1) Sustainment KPP with two subcomponents: Materiel Availability and Operational Availability.

(2) Reliability KSA.

(3) O&S Cost KSA.

(4) MDT.

(5) Logistics footprint.

d. Additional metrics to support IPS elements and performance measurement are in appendix B.

4–17. Performance based arrangements

All PBPSSs are implemented through PBAs that can be in the form of—

a. A memorandum of agreement (MOA) or memorandum of understanding (MOU) between government entities. Use of an MOA or MOU between government entities is at the MATDEV's discretion, and provides a tool for establishing a clear understanding of MATDEV, PSM, PSI, and PSP roles, responsibilities, performance requirements, incentives, and metrics. It is important that MOAs and MOUs be well coordinated to ensure that all stakeholders will support the requirements in the arrangement.

b. A PBA between the government and a contractor (contract PBA). A formal contract defining the contractor's responsibilities for the PBA is always required (see AR 700–127 for minimum contract requirements to support a PBPSS).

Section V
Contract Performance Based Arrangements

4–18. Requirements

It is vital that MATDEVs ensure all contract requirements and deliverables are identified and clearly included in all contracts. The requirements must be properly reflected in the contract to include the statement of work (SOW) or statement of objectives, DIDs, specifications, government and commercial standards, appropriate DOD performance metrics, and CDRLs. The CDRL is required to receive a deliverable from a contractor. History has shown instances where the government has failed to receive deliverables that were identified in the SOW or statement of objectives, because there was no CDRL in the contract to require the contractor to deliver a product. The PSM's early coordination with the supporting contracting officer is critical in achieving a common understanding of the contract requirements, required contract content, and expected deliverables.

4–19. Public-private partnerships

a. The Army's preference for implementing PBPSSs is PPP contract PBAs when organic product support capability gaps must be filled using contractor support. Government benefits include the following:

(1) Technology and process sharing and transfer.

(2) Contractor investment in organic infrastructure.

(3) Ability to support demand increases due to mobilization.

(4) Encourages long-term PPP relationships.

b. MATDEVs must explore all opportunities to use PPP PBAs to implement their PBPSS before selecting CLS alternatives.

c. Information on PPPs can be found in DODI 4151.21 and the Public-Private Partnering for Sustainment - A DOD Guidebook.

4–20. Contractor logistics support (nonpublic-private partnership support)

a. MATDEVs may use CLS to fill organic product support capability gaps when PPP contract PBAs cannot be implemented. All CLS contracts are to be contract PBAs and include all appropriate DOD performance metrics.

b. When CLS is the product support alternative selected, the selection should be based upon the results of the APSA and show that it is the most cost effective, the best value product support alternative, and is clearly in the best interest of the government. The best value alternative to the government depends upon materiel complexity, materiel density, expected materiel life, availability of trained personnel, availability of spare parts, availability of tools and test equipment, and the availability of a commercial support system in the areas of the world where the materiel will be deployed.

c. Almost any task that the Army performs in maintenance and support of materiel can be performed by private industry. Before selecting contractor support, determine if—

(1) The advantages of contractor support can be sustained in a wartime environment.

(2) There will be a requirement to transfer to organic support and how difficult this transition will be.

d. Definitions for organic and CLS are—

(1) *Organic support.* Any logistics support performed by a military department under military control, using government owned or controlled facilities, tools, test equipment, spares, repair parts, and military or civilian personnel. Logistics support provided by one military Service to another is considered organic within DOD. Army organic support is any logistics function provided by an Army or a DOD organization.

(2) *Contractor logistics support.* Logistics support of Army materiel performed under contract by commercial organizations (including the original manufacturer). Support provided may include materials and facilities, as well as services, in the following areas:

(a) Supply and distribution.

(b) Maintenance.

(c) Training.

(d) Software support.

(e) Rebuild and overhaul.

(f) Modification.

(g) System technical support and engineering services.

e. The APSA and PSA must show that CLS provides the required support in both peacetime and war, is a cost-effective option for product support, and is in the government's best interest (best value) for CLS to be chosen. The three forms of CLS are—

(1) *Interim contractor support.* Applies only to acquisition programs initiated under an approved capability document ICD, CDD, or CPD. ICS is a bridging strategy (Army goal is not to exceed 3 years) until the support identified in the LCSP is fully operational. ICS does not apply to nonstandard equipment (NS–E) that has not been determined to be an acquisition program, and does not have an approved CRD. ICS is normally funded with procurement appropriation.

(2) *Life cycle contractor support.* A business decision for long-term contract support for acquisition programs. The option to use life cycle contractor support (LCCS) in lieu of PPP or organic support is determined by the PBPSS and validated by an APSA. LCCS provides all or part of a materiel's IPS support throughout its life cycle. MATDEVs may not apply LCCS to any depot maintenance workload associated with required core depot capabilities to ensure compliance with 10 USC 2464. LCCS is normally funded with operation and maintenance, Army (OMA) appropria- tion. When LCCS is selected as the PBPSS, MATDEVs are required to review the cost effectiveness of the LCCS every 5 years to validate continued use of LCCS in lieu of organic or PPP product support. Review will be based on applicable metrics and performance under the LCCS contract.

(3) *Contractor logistics support supporting nonstanadrd equipment.* Applies to the support of NS-E as a sustainment strategy until the NS-E is either determined to be an acquisition program and a CRD is approved; or the NS-E capability is sustained or terminated by HQDA decision. Investment in a permanent support infrastructure is not justified until the final decision for the NS-E is made. NS–E is normally funded with OMA appropriation. Major NS-E is defined as meeting the criteria for an ACAT I or ACAT II program in DODI 5000.02. When major NS-E is acquired and supported by CLS, within 5 years of fielding, a product support assessment team must convene to review support options, to include PPP and organic support, with emphasis on reducing O&S cost. The team is chaired by the

MATDEV, or their designee. The team includes the PSM and other appropriate program office personnel, and participation by representatives from—

(a) Deputy Chief of Staff, G–3/5/7 (DCS, G–3/5/7).

(b) DCS, G–4.

(c) DCS, G–8.

(d) AMC.

(e) TRADOC.

f. When a commercial or nondevelopmental item (NDI) is required to be fielded as soon as possible and prior to the availability of planned organic support, ICS may be used to support the materiel as organic capability is being developed and phased into the product support structure.

g. There may be cases where the product support strategy uses LCCS, and during the LCCS contract period of performance, the contractor notifies the MATDEV that the contractor is not interested in future follow-on LCCS contracts. The MATDEV must seek other vendors or develop an organic capability to sustain the materiel prior to completion of the LCCS contract period of performance. When the MATDEV fails to acquire, secure, and obtain technical data rights, the MATDEV may have an extremely difficult time providing cost-effective and timely support for such materiel.

4–21. Contractor support decisions

a. Operational tradeoffs must be made to determine the effects of support options on the ability of a materiel to accomplish its mission in the intended environment. Tradeoffs may be needed in the areas of readiness requirements, sustainability, useful materiel life, manpower and personnel requirements, and the wartime mission of the materiel. For example, a tradeoff may be made to accept a decrease in operational availability from 99 to 95 percent in order to achieve a 5 percent decrease in personnel at the unit level by using contractor repair of a component at the sustainment level.

b. Economic tradeoffs are accomplished by comparing the total O&S cost of various options. In the case of trading organic versus contract support options, it is essential to use O&S cost as these two methods incur their major costs at different places in the life cycle. For instance, establishing an organic depot maintenance capability requires an early expenditure for product description data on the materiel (such as design drawings). If life cycle contractor maintenance is chosen, these data may not be needed at all, but higher sustained costs for maintenance may be incurred as the materiel ages. All these costs must be assessed and compared against one another as decisions on support are being made.

c. Technical tradeoffs must be made in relation to various support options. Technology maturity or complexity of the individual components should be weighed against the types of support available. If, for example, a very new technology is being used and the exact component design is likely to change after initial fielding, then ICS for parts support and depot maintenance might be the best choice until the design stabilizes.

d. Given the need for some level of contractor support, there are still tradeoffs to be made over the depth, breadth and duration of support to be provided and contracting for part of the IPS functions versus all of them. These decisions must be made in conjunction with the technical, economic, and operational tradeoffs addressed above. Tradeoffs also can be made among different IPS functions. A contract for component replacement during ICS instead of component repair may not mirror the planned component repair under organic maintenance.

e. One well-documented method of doing tradeoffs of various support alternatives is the Army depot source of repair decision tree logic. The DSOR decision is a combination of the types of tradeoffs described above applied to the source of depot maintenance and overhaul (see AR 750–1). Decisions relative to depot level support alternatives must comply with public law. Another common tool is the LORA (see SAE AS1390).

f. The impact of having additional contractor personnel on the battlefield must be considered prior to final decisions on the type of contractor support to be used. Management and protection of civilian contractors on the battlefield and the associated operational and legal principles must be evaluated. It is essential to ensure contracts fully address all requirements for contractors on the battlefield (see AR 715–9).

4–22. Planning and documenting contractor support

a. Any contractor support will be identified in the AS and detailed in the LCSP and, if applicable, any standalone IPS element plans. If life cycle depot maintenance is to be provided by a support contractor, then this must be reflected in the DMSP, the plan for acquiring technical data, and the plan for supply support. It also would affect the strategy for acquiring LPD and the support resource funds and support transition planning for the depot level.

b. The MFP must describe all planned contractor support, including any contractor support of initial fielding and ICS (see AR 700–142). ICS must be coordinated in the MFP because early fielding may involve contractor support while later fielding may not.

c. Planning for transition from ICS to organic support is essential to continuous sustainment of the fielded materiel. Although a specific format for a transition plan is not specified, there are responsibilities for both MATDEV and the sustainer of the materiel. The content of a transition plan, which should be agreed to between the major parties, would include the following:

(1) Logistics functions included in the ICS.

(2) The length of time ICS will be required.

(3) Procedures for possible extension of the ICS.

(4) Funding requirements.

(5) Control structure for ICS.

(6) A checklist of actions to be completed before transition can take place.

(7) Milestone dates for major actions up to the transition date.

(8) Tracking and reporting procedures for transition.

(9) Contract data on maintenance actions, repair parts consumption, and other data beneficial to establishing organic support.

d. Choosing some form of contractor support has implications for the planning, programming, and budget execution process. In some cases (such as for initial provisioning, depot maintenance plant equipment, or technical manuals) expenditures might be deferred or eliminated because of contract support. There are also implications for wartime support and each contract should address the possibility of contractors on the battlefield and the measures taken to ensure their compliance with wartime contractual provisions.

4–23. Contract content

a. All MATDEVs are required to ensure that technical data rights are acquired, secured, and obtained to support analyses necessary to evaluate organic support alternatives, and identify opportunities for developing future organic product support capability that reduces O&S cost (even when LCCS is the selected alternative).

b. Use caution when tailoring requirements and ensure that the government can develop product support should the contract be terminated for nonperformance or the contractor no longer desires to provide support in the future.

c. The contract must be specific in defining the responsibilities between the government and the contractor, include appropriate CDRLs for reporting cost, and address the issue of contractors on the battlefield.

4–24. Reprocurement

a. See AR 70–1 for reprocurement policy.

b. Reprocurement using a new solicitation for materiel with the same capability may result in delivery of materiel which requires assignment of a new NSN. If the materiel provides the same capability, and not an upgraded capability, then the new NSN must be registered under the original line item number (LIN). For example, a reprocurement utilizing the same purchase description as the initial purchase, resulting in a new vendor being selected to provide the materiel would create a new NSN, which must be listed under the original LIN. New NSNs cause proliferation of spare and repair parts. Instead of disparate rebuys, it is preferable to use multiyear procurements or contract options to minimize the number of different models and potential growth of associated spare and repair parts.

c. Reprocurement may be needed when original makes and models are no longer available or when technological improvements offer improved performance, safety, reliability, or environmental impact. These cases should require a minimum of documentation, but the MATDEV must assess the logistics impact of any re-procurement consistent with the management of cost, schedule, performance, and supportability. In these situations, it is possible that a new LIN will be required. This is true when the materiel is an improvement over the original models, the capabilities have changed, or the purchase description is different. The following documentation will need review and update:

(1) Market investigation.

(2) Purchase description and performance specification.

(3) LCSP.

(4) TEMP.

(5) Training and NETP.

(6) BOIPFD.

(7) MFP.

(8) ESOH assessments.

(9) ILA.

(10) TR.

(11) TC.

(12) MR.

Chapter 5
Design

Section I
Design considerations

It is critical that MATDEVs influence the materiel design early in the acquisition process to ensure that the materiel can be supported in the intended operational environment at the lowest LCC. The PEO must assign a PSM to the CAPDEV's PSMIPT by MDD to ensure that early design decisions balance technical performance, supportability requirements and LCC goals. MATDEVs must consider design interface, MANPRINT, standardization and interoperability (S&I), reduced energy consumption, and ESOH in all materiel acquisitions.

5–1. Design Interface

a. The MATDEV must establish design interface parameters to influence the design of a materiel being acquired, including the product support structure associated with the new materiel. Design Interface is the IPS element best described as a relationship of supportability-engineering design parameters with its support requirements to the other system engineering disciplines. Design Interface parameters are expressed both quantitatively and qualitatively in operational terms and specifically relate to readiness objectives and the support costs of the materiel. The goal of design interface is acquisition of an effective materiel that can be supported in the intended operational environment at least LCC. Development of all IPS elements must be an integrated effort to ensure tradeoffs made during the design process do not compromise effective and affordable product support. It is essential that the PSM participate in the engineering IPT, test WIPT, and that appropriate engineers and test engineers participate in the PSMIPT, to ensure logistics design interface considerations are addressed and synchronized.

b. Influencing design of the materiel from a support perspective requires that quantifiable and measurable goals or constraints be established as part of the requirements formulation process. The goal is to select a design that will minimize resources required for materiel O&S. This is accomplished by performing early analyses addressing the total materiel in its operational environment. These analyses and tradeoffs must consider stakeholder requirements, impacts to product support, and potential impacts to other IPS elements. For example, constraining crew size may result in a task overload from a human engineering perspective, yet growth in the size of the crew may exceed established manpower constraints. Neither of these results is acceptable from a total materiel perspective. Potential solutions may include increasing the skill level requirements of the crew or the addition of software to reduce crew workload.

c. The objective of designing effective and efficient support for the materiel is aimed at reducing the overall logistics footprint and for the Army. The operational environment, inherent reliability, and the number and allocation of maintenance tasks are the primary drivers in designing the overall support structure. Minimizing operator and maintenance tasks may reduce the manpower, training, technical data, repair parts, and tool requirements associated with them. Reallocation of a task may produce economies in these same areas by consolidating tasks with common resource requirements. A smooth, seamless interface between logistics and all other related disciplines (such as system and software engineering, T&E, manufacturing, LCC cost and financial resources) is essential to overall program success. SA, such as comparative analysis of predecessor materiel or baseline materiel, trade studies, and market analysis of emerging technologies, can be used to influence design from the perspective of one engineering specialty, but may adversely impact another. Thus, an integrated approach is necessary to obtain a total materiel perspective.

d. Using reliability, availability, and maintainability (RAM) is an essential part of design interface. RAM is a key design parameter that influences both the performance (mission effectiveness and materiel availability) and economics (support requirements and LCC) of the materiel. RAM is an engineering design parameter that is usually managed as an engineering discipline. However, the performance aspects of RAM must be balanced with materiel supportability and cost aspects. It is essential that the PSM participate in the engineering IPT, test WIPT, and that appropriate engineers and test engineers participate in the PSMIPT, to ensure RAM is addressed effectively. Requirements limitations are to be coordinated with the PSM and documented in the CRD and LCSP.

(1) *Reliability.* The duration or probability of failure-free performance under stated conditions, or the probability that an item can perform its intended function for a specified interval under stated conditions. Examples of metrics for reliability are mission reliability, mean time between failure (MTBF), and mean time between operational mission failure.

(2) *Availability.* The measure of the degree to which an item is in an operable state and can be committed at the start of a mission when the mission is called for at an unknown (random) point in time. Availability, as measured by the user, is a function of how often failures occur and corrective maintenance is required, how often preventative maintenance is performed, how quickly indicated failures can be isolated and repaired, how quickly preventative maintenance tasks can be performed, and how long logistics support delays contribute to down time.

(3) *Maintainability.* The measure of the ability of an item to be retained in, or restored to, a specified condition when maintenance is performed by personnel having specified skill levels, using prescribed procedures and resources, at each specified level of maintenance and repair. Examples of metrics for maintainability are mean time to repair (MTTR), maintenance ratio, maximum time to repair, and mean active maintenance downtime (MAMDT) (see app B for more on metrics). RAM has a direct impact on both operational capability and survivability costs, and therefore are

important considerations for the Soldier. A materiel must perform its mission without experiencing a mission critical failure (reliability). An item must be able to be repaired in a timely or efficient manner (maintainability). The PSM should ensure close coordination with engineers, the CAPDEV, and maintenance PSPs to thoroughly address maintainability requirements and identify and mitigate maintainability constraints.

e. Poor RAM will unnecessarily consume warfighting resources and decrease the Soldier's ability to initiate and complete a mission. In addition, RAM characteristics of a materiel are major drivers of LCC and logistics footprint. The RAM effort for any acquisition program should emphasize—

(1) Understanding the performance requirements, readiness, physical environments (such as during operation, maintenance, storage, and transportation), resources (such as people and funding) available to support the mission, and associated risks. Once understood, these must be translated into materiel design requirements that can be verified.

(2) Managing the contributions to materiel RAM of hardware, software, and human elements of the materiel.

(3) Preventing design deficiencies (including single point failures), precluding the selection of unsuitable parts and materials, and minimizing the effects of variability in the manufacturing and support processes. Physics-of-failure based analyses can assist in preventing design deficiencies.

(4) Developing robust materiel, insensitive to the environments experienced throughout the materiel's life cycle and capable of being repaired under adverse or challenging conditions.

(5) Incorporating prognostics and intelligent diagnostics to minimize turnaround time.

f. Techniques and tools used to ensure RAM requirements are—

(1) Fault tree analysis and failure modes, effects, and criticality analysis (FMECA) can be used to help identify where degradation or failure could compromise the mission or the safety of the operator or maintainer. A FMECA is required to support LD.

(2) Thermal, shock, vibration (including resonant frequency), corrosion, durability, highly accelerated life testing, and other analyses or tests have proven beneficial design aids for electronic and mechanical equipment.

(3) Dormant reliability analyses for explosives, rocket motors, and other items that have shelf-life (dormant reliability) requirements or are susceptible to long term storage degradation and should be an integral part of the materiel design process.

(4) Prevention and elimination of unverified indications of failure (such as false alarms and "could not duplicate") should be an integral part of the materiel design process.

(5) Past component history, physical and environmental stresses, component criticality, use of common parts should be considered in the part selection process.

(6) Maintainability and supportability modeling to identify supportability drivers, simulate maintenance downtime, and analyze resources required for materiel sustainment.

5–2. Design for energy efficiency

a. The intent of energy efficiency considerations is to influence the design of materiel, platforms and equipment to increase the efficiency and effectiveness of the energy consumed. Optimizing fuel and electric power demand in capability solutions directly affects the burden on the force to provide and protect critical energy supplies while sustaining the capabilities required by the operational commander.

b. The PSA must consider fuel and electric power demand for materiel, including those for operating "off grid" for extended periods when necessary, consistent with future force plans and integrated security constructs.

5–3. Maintenance task design parameters

Ease of repair in the forward battlefield area is a key design parameter for all Army equipment. The maintenance task design interface for a materiel must emphasize—

a. Use of standard Army sets, kits, outfits, and tools and test, measurement and diagnostic equipment (TMDE) to meet tool and TMDE requirements.

b. Minimizing requirements for special tools and special test equipment.

c. Reducing required maintenance skill levels.

d. Designing for rapid repair.

e. Redundancy of mission essential functions.

f. Ease of implementing battlefield damage assessment and repair techniques.

g. Increased availability through—

(1) Increased MTBF.

(2) Reduced MTTR.

5–4. Condition-based maintenance plus in the design

a. CBM+ is the application and integration of appropriate processes, technologies, and knowledge-based capabilities to achieve the target availability, reliability, and operation and support costs of DOD materiel and components across their life cycle. At its core, CBM+ is maintenance performed based on evidence of need, integrating reliability centered maintenance (RCM) analysis with those enabling processes, technologies, and capabilities that enhance the readiness and maintenance effectiveness of DOD materiel. CBM+ uses a system engineering approach to collect data, enable analysis, and support the decision-making processes for materiel acquisition, modernization, sustainment, and operations.

b. CBM+ employs automated monitoring of a materiel's operational status to report impending failures in the materiel (see AR 750–1). The purpose of CBM+ is to detect the early indications of a fault or impending failure to allow time for maintenance and supply channels to react to minimize impact on materiel operational readiness and life cycle costs. The CBM+ concept provides a more proactive basis for maintenance decisions than predecessor mainte- nance concepts, because the goal is to predict materiel failures or at least to observe them in the earliest stage possible. CBM+ maximizes operational availability, reduces LCC, increases materiel safety, and reduces the logistics footprint. Data captured through CBM+ supports the RCM that gathers data from operating materiel performance and uses this data to improve the design and future maintenance.

c. CBM+ provides a means of reducing scheduled maintenance requirements. The flexibility and optimization of maintenance tasks with CBM+ also provide potential for reducing requirements for maintenance manpower, facilities, equipment, and other maintenance resources.

d. A CBM+ system must have a health-monitoring system that provides the ability to react to materiel failure immediately. Component health is monitored through the use of sensors that feed inputs to the CBM+ system. The CBM+ system must be able to evaluate the component's health based on these inputs and trigger appropriate operator supply, maintenance, and reporting actions as required. The CBM+ system must be able to consistently and correctly diagnose component health based on manual and autonomous inputs.

e. The system engineering process is used in order to determine CBM+ system structure and CBM+ system behavior from user and materiel requirements. On this basis, alternatives for CBM+ system design are developed and evaluated and must be validated by operational testing supported by the Soldier.

f. Technologies used to achieve CBM+ capability include various types of sensors for monitoring such parameters as vibration and temperature. Data communications from the materiel to a central data processing system are also required. Wireless options are preferred, but plug-in options may be considered when wireless options are not feasible.

g. MATDEVs use the Army Bulk CBM Data (ABCD) Interface Requirements Specification as a common data migration specification for engineering and parametric data collected from on-platform sensors. The ABCD Interface Requirements Specification is a common data migration specification for engineering/parametric data collected from on platform sensors. This standard specifies an interface format for the transmission and storage of parametric data that MATDEV's have identified as necessary to support CBM+ analyses for product improvement. ABCD is designed to conserve bandwidth during transmission, and provides an open standard specification for storing data in support of enterprise wide analysis. Platform and/or platform support MATDEVs are to use the ABCD Standard for transport and warehousing of CBM bulk data when the MATDEV determines it is cost effective. This operation can take place on platform, at platform on a maintenance support device, or off platform on a unit server.

5–5. Design for manpower and personnel integration

a. MANPRINT is a comprehensive management and technical program that focuses attention on human capabilities and limitations throughout the materiel's life cycle and places the human element (functioning as individual, crew, team, unit and organization) on equal footing with other design criteria such as hardware and software. It must be considered in establishing supportability-related design constraints and readiness requirements. MANPRINT is the Army's implementation of a management and technical human system integration program required by DODI 5000.02. It was initiated in recognition of the fact that the human is an integral part of the total materiel. MANPRINT must also be considered in establishing logistics-related design constraints and readiness requirements. MATDEVs must ensure MANPRINT is addressed prior to accepting and approving the materiel design. The entry point of MANPRINT in the acquisition process is through CRDs. The DCS, G–1 exercises Headquarters Department of the Army (HQDA) staff responsibility for the MANPRINT program.

b. MANPRINT involves the integration of seven human-related considerations (known as MANPRINT domains) with the hardware and software components of the total materiel—

(1) Manpower addresses the number of military and civilian personnel required and available to operate, maintain, sustain, and provide training for materiel.

(2) Personnel addresses the cognitive and physical characteristics and capabilities required to operate, maintain, and sustain materiel. Personnel capabilities are normally reflected as knowledge, skills, abilities, and other characteristics.

(3) Training is defined as the instruction or education, on-the-job, or self-development training required to provide all personnel and units with their essential job skills and knowledge. Training is required to bridge the gap between the target audiences' existing level of knowledge and that required to operate, deploy, employ, maintain and support the materiel effectively.

(4) Human factors engineering maximizes the ability of an individual or crew to operate and maintain materiel at

required levels by eliminating design-induced difficulty and error. Human factors engineers work with system engineers to design and evaluate human-materiel interfaces to ensure they are compatible with the capabilities and limitations of the user population.

(5) System safety covers the design features and operating characteristics of materiel that serve to minimize the potential for human or machine errors or failures that cause injurious situations. Safety considerations should be applied in materiel acquisition to minimize the potential for injury of personnel and mission failure (see AR 385–10, DA Pam 385–16, and MIL–STD–882).

(6) Health hazards address the design features and operating characteristics of materiel that create significant risks of bodily injury or death. Health Hazard categories include acoustic energy, biological substances, chemical substances, oxygen deficiency, radiation energy, shock, temperature extremes and humidity, trauma, vibration, and other hazards.

(7) Soldier survivability addresses the characteristics of materiel that can reduce detectability and the probability of being attacked, as well as minimize materiel damage, Soldier injury, and cognitive and physical fatigue. It focuses attention on those aspects of the total materiel that can minimize the loss of friendly troops' lives.

c. The MANPRINT program is governed by AR 602–2 that prescribes policies and assigns responsibilities for the program. This guide provides a list of documents that contain MANPRINT relevant information (along with domain references) to include brief synopses. The MANPRINT Web site at www.manprint.army.mil is a valuable source of information and guidance.

d. The improved performance research integration tool can be an aid in the development of maintenance man hour requirements and can provide information such as maintenance ratio, frequency distribution of crew size, and manpower requirements by military occupational specialty.

5–6. Design for standardization and interoperability

a. S&I is the process of achieving the most efficient use of total Army and DOD resources (money, manpower, readiness, time, facilities, and natural resources) and ensuring the Army can effectively and efficiently participate in combat, contingency, and operations with other military Services and allied forces.

b. Standardization is the process of developing concepts, doctrines, procedures and designs to achieve and sustain effective uniformity in the management and use of Army resources and maximize proficiency and readiness among Army Soldiers and units. Commonality is the ultimate goal of standardization. Interoperability is sought if commonality is not achievable. At a minimum, compatibility must be considered during design or market investigation. MATDEVs must consider standardization in operation, maintenance, and support of their materiel. For example, standard items such as hardware, components, tools, and support equipment should be used to the maximum extent possible.

c. The benefits of S&I are—

(1) Reduced logistics footprint.

(2) Lower parts costs.

(3) Smaller inventory requirements (range of parts required).

(4) Improved readiness.

d. Interoperability is the ability of systems, units, or forces to exchange services, materiel, and information with one another to enable them to operate effectively together. Interoperability within and among United States forces and allied forces is a key goal that must be met for all DOD materiel so that the United States has the ability to successfully conduct joint and combined operations. To the maximum extent possible, materiel and software are to be designed, consistent with U.S. export control laws and regulations, to permit use in a multinational environment with provisions made for current and future information disclosure guidance and constraints. In order to foster inter- operability with allied forces, consideration should be given to acquisition or modification of allied materiel or equipment, or cooperative development opportunities with one or more allied nations to meet user needs.

e. It is important that the CRD specifies KPPs and that the acquisition and T&E communities adopt a family-of-systems management approach. This will ensure that reviews of individual materiel include a thorough understanding of critical materiel interfaces related to other materiel needed in the operational environment. Also that the flow of consistent and reliable data, information, and services are shared among those materiel on the battlefield.

f. S&I considerations critical to any materiel acquisition program are to identify—

(1) Standard interfaces required to accommodate continuous technology refreshment during the life of the materiel.

(2) Data requirements (data, voice, video), computer network support, and anti-jamming requirements.

(3) Unique intelligence information requirements, including intelligence interfaces, communications, threat data, and data base support pertaining to target and mission planning activities.

(4) Requirements for Joint Service use and allied forces cross-servicing agreement.

(5) Procedural and technical interfaces, communications, protocols, and standards required to ensure compatibility and interoperability with other services and allied materiel.

(6) Applicable information technology standards required to support the DOD Joint Technical Architecture.

(7) Requirements for energy standardization and efficiency for fuels and electrical power.

g. S&I should comply with the DOD Information Enterprise Architecture, DODI 8320.02, AR 25–1, and the Army Information Architecture.

5–7. Design for environment, safety and occupational health

a. The focus of environmental and safety planning is to avoid the use of substances and procedures that can harm people, animals, or the environment. One of the primary considerations in system engineering and product support planning is to eliminate, or failing that, to minimize ESOH hazards during all phases of the acquisition process.

b. The CAPDEV and MATDEV must ensure that the PSA identifies HAZMAT, waste, pollutants, and processes (such as manufacturing and disposal processes). All potential or actual environmental impacts resulting from the materiel's operation, maintenance, and disposal must be identified, assessed, and documented.

c. Material used or proposed for use in new materiel must be checked against the toxic release inventory list from the Title 42 United States Code, Chapter 116. The toxic release inventory list is available at http://www.epa.gov/tri. If any material used or proposed for use is on this list, studies should be made to find substitutes for them. Justification must be provided for continued use of these materials (see AR 200–1).

d. The SA process must include an environmental risk assessment that includes reviews of the materiel being replaced by the new materiel (or similar materiel where there is no replaced materiel) to include the environmental assessments done for each materiel. Coordination with the MATDEVs, CAPDEV, testers, and activities supporting the replaced materiel (or similar materiel where there is no replaced materiel) would help ensure environmental impacts that could impact the new materiel were identified and addressed during the decision process. The risk assessment must be documented in the PESHE that is reviewed during the MS B decision process.

e. When ammunition is to be used, a study of the DEMIL explosive ordnance disposal (EOD) aspects of the munitions is required. Concurrent development of EOD procedures and equipment for the materiel is a mandatory requirement. Procedures are to allow EOD personnel access to—

(1) Fusing and render-safe mechanisms located within the munitions items.

(2) Munitions items through external packaging or containers designed to carry the munitions items (such as "wooden" rounds).

f. Maintenance and supply procedures that reduce environmental hazards, waste generation, and toxicity must be developed. Increased shelf-life, reuse, recycling, and reclamation should be considered in the planning process. If it is determined that HAZMAT must be used, procedures must be developed to ensure personnel safety, proper handling, operation, maintenance, storage, transportation, disposal, and DEMIL. Warning and caution information must be included on-equipment labels, in software messages, and in TMs.

g. Packaging, handling, storage and transportation requirements should be assessed for ESOH impacts. Necessary storage and transportation data must be developed and documented to ensure the maximum use of reusable, recyclable, or easily disposable packaging material.

h. Product stewardship is a comprehensive strategy that the MATDEV develops when the materiel design begins to factor in ESOH considerations. In the design phase the MATDEV must be careful to avoid decisions that will negatively impact Soldier safety, add risks of hazardous substance release in the environment, and create waste streams. The main components of product stewardship are—

(1) Identification and quantification of energy and raw materials inputs, outputs, and environmental releases into the air, water, and land during the operational life of the materiel including its disposal.

(2) Technical qualitative and quantitative characterization and assessment of environmental consequences.

(3) Continuous evaluation and implementation of opportunities to reduce environmental burden from effluents, airborne emissions, and solid wastes associated with basic life cycle processes of raw material acquisition, manufactur- ing, processing, distribution, transportation, operation, maintenance, recycling, and waste management.

i. Product stewardship extends throughout the logistics processes in all life cycle phases. There are many options to consider in implementing product stewardship—

(1) Providing guidance on environmental, regulatory, waste minimization or recycling, and pollution prevention and compliance.

(2) Developing materiel safety literature and advisory publications, and conducting safety seminars and provide technical assistance.

(3) Establishing a system for transporter screening, container recycling, packaging re-use, and safety information for handling and storage.

(4) Setting up a hotline to provide safety and emergency assistance, and for product and process feedback.

(5) Developing a system of accountability for analysis and monitoring of ESOH concerns.

(6) Providing internet addresses for guidance and information on ESOH.

5–8. Design for corrosion resistance

a. A sound CPC Program requires the knowledge and experience of a multifunctional team, which should include many of the members of the PSMIPT. The MATDEV should ensure that the CPC Program is in compliance with 48 Code of Federal Regulations, Part 223, Subpart 223.73 during design and materiel modification. There are many forms of corrosion, which can impact or be impacted by most of the IPS elements. The following are examples of questions that must be addressed when developing a CPC Program.

(1) How does corrosion impact manpower and personnel?

(2) Does the maintenance concept include repair actions due to corrosion?

(3) How does corrosion impact the number of hours required for preventive maintenance checks and services?

(4) What level of maintenance can perform CPC maintenance tasks?

(5) Have appropriate steps been taken to package for short and long-term storage?

(6) Do the EPs include the procedures for CPC?

(7) Are the various forms of corrosion identified in the EPs?

b. The following are examples of design features for corrosion resistance:

(1) Reduce or eliminate the galvanic corrosion potential where dissimilar metals come into contact without taking the necessary actions to mitigate corrosion.

(2) Watch for areas where water, dust, or mud can accumulate without proper drainage.

(3) Reduce or eliminate sharp edges which contribute to poor paint adhesion.

(4) Avoid skip welds wherever possible, but when necessary ensure proper sealing.

(5) Incorporate the latest versions of paint and coating specifications and standards.

5–9. Supply Management Army-Operations and Support Cost Reduction Program

Implementing guidance for the Supply Management Army-Operations and Support Cost Reduction (SMA–OSCR) Program is in appendix F.

Section II
Commercial and Nondevelopmental Items

5–10. Benefits

Use of previously developed items, whether commercial or military, saves research and development costs, reduces response times to meet operation needs, shortens deployment times, and reduces the risks associated with new development. Acquisition policy requires that selection of ASs for materiel be considered in the following order of priority:

a. Existing materiel within DOD inventory.

b. Commercial items and NDI.

c. Existing allied materiel.

d. Modifications to existing materiel and new development programs.

5–11. Market research

a. Initial market research associated with a specific acquisition is conducted to help determine whether sources of commercial items and NDI are available to satisfy the user's requirements. Items may satisfy those requirements either "as is" or with modification. This type of market research can be used to determine whether the CAPDEV's requirements can be adjusted, to a reasonable extent, to allow the use of commercial items. It can help to establish whether commercial items can be included in the procurement as components. In addition, it provides information on existing products, new technologies, product performance and quality, commercial practices, industrial capabilities, and support options.

b. The continuous ongoing effort by acquisition and development activities and laboratories to remain abreast of advances, changes, and trends within commodity areas is also referred to as market surveillance. This knowledge of the market can help to develop and modify materiel and operational requirements and result in increased opportunities for commercial and NDI acquisitions.

c. The next step following initial market research is to perform a MI.

5–12. Market investigation

a. More specific, detailed information from industry may be required before a final decision is made to purchase commercial or nondevelopmental items. In those cases a MI responding to the specific requirement (CAPDEV's need) is conducted.

b. The MATDEV is responsible for conducting the MI with input from the CAPDEV, the PSM, various functional engineers and technical experts, testers, LCC analysts, and logisticians. MIs are one of primary methods in the MSA activity leading toward an initial MDR to select commercial or NDI as the AS. MIs identify operational performance, reliability, supportability, cost effectiveness, manpower and personnel, ESOH, and other issues that must be addressed. The MI can also identify how product support should be provided, what additional testing should be conducted, and milestones necessary for inclusion in the AS.

c. MIs may vary from informal telephone inquiries to comprehensive industry-wide reviews. The scope will depend upon the nature and complexity of the materiel solution under consideration. Data are collected to support a definitive commercial or NDI decision. This may include requests for information or announcements in the *FedBizOpps*, as well as letters to embassies and other information sources on foreign items. The request for information is a brief narrative description of a requirement inviting interested vendors to respond. Respondents should be sent draft performance specifications and a detailed questionnaire designed specifically to determine their product's ability to meet requirements. Care should be taken to avoid descriptions focusing on a particular materiel solution. MIs may include the purchase or lease of test samples or test items to conduct operational and combat suitability tests. These tests and the resulting data help build the functional purchase description or product specification.

d. Information to be obtained from the MI includes the following:

(1) Product availability data, to include the following:

(a) Demonstrated product quality, electromagnetic capability, and RAM.

(b) Commercial and NDI products and company services satisfying identical or similar requirements.

(c) Modifications needed to the commercial or NDI.

(d) Product descriptions used by other government activities, or in commercial specifications and standards.

(e) Stability of current configuration and technology.

(2) Industry data, to include the following:

(a) Number and competitiveness of manufacturers.

(b) Size and location of manufacturers and their current market.

(c) Product distribution channels.

(d) Business practices in sales and distribution from manufacturers to user.

(e) Production capacity.

(f) PHS&T requirements and practices.

(g) Length of time the product has been produced by a manufacturer.

(3) Commercial market acceptability data, to include the following:

(a) Average time between model changes and parts support for phased out models.

(b) Contractor's quality controls (for example, statistical process controls).

(c) Warranty terms and practices.

(d) Need for preproduction or production qualification testing and quality assurance.

(e) Product evaluation criteria (including life cycle criteria, as applicable).

(f) Hardware, software, and manpower interface issues (for example, human factors and product safety).

(g) Capacity to meet a potential increase in production demands.

(4) Product support data, to include the following:

(a) Parts availability and lead times, documentation, pricing, and distribution.

(b) Customer service, installation, inspection and user maintenance instructions.

(c) Historical reliability, development, test, and evaluation (RAM) data.

(5) Requirements and provisions for manpower and personnel, to include the following:

(a) Competitive or sole source repair and support base.

(b) Training and training support requirements.

(c) Tools, test equipment, computer support resources, calibration procedures, operations and maintenance manuals.

e. A sample format of a MI report is shown in table 5–1.

Table 5–1
Sample Market Investigation report format

1. Cover (name of product).
2. Activity conducting the investigation.
3. Signature block for—
a. Principal investigator.
b. MATDEV.
c. PEO.
4. Executive summary—
a. Name of the product.
b. Purpose and scope of the MI.
c. Significant results.
d. General recommendations.
5. Table of contents.
6. Background reason for the MI.
7. Names and brief description of the product.
8. Purpose and scope (general scope of the coverage).
9. Objective of the MI.
10. Criteria list (criteria used to evaluate the product).
11. Data requirements (to include available software licenses and rights granted to any other government agency for the same item).
12. Test requirements (to include corrosion testing).
13. Data collection methods and sources.
14. Data sources.
15. Product summary (summary of each product's performance).
16. Analysis of products (compare product performance requirements versus criteria.
17. Compare production capability with production requirements.
18. Compare product with operational, IPS, and special issue criteria.
19. Show where requirements can be met and cannot be met.
20. Summary (discuss)—
a. Viable alternatives.
b. Tradeoffs.
c. Cost-benefit analysis for each alternative.
d. Conclusions.
e. Rationale for selecting alternatives.
21. Conclusions and recommendations.
22. Appendixes—
a. CRDs.
b. Criteria document or performance specification.
c. Product and vendor data sheets.
d. *FedBizOpps* synopsis.

5–13. Support considerations

a. In the case of commercial off-the-shelf (COTS) acquisitions, the design is already completed and the materiel specification will influence selection of the best COTS items for the materiel solution based upon materiel effectiveness, support structure required, and LCC. Once the decision is made to buy commercial or NDI items, the AS will be tailored. Supportability planning for commercial and NDI must be an integral part of the MI. In the MS A Phase, MANPRINT is a major consideration in determining if a commercial and NDI can be fielded by the Army in a strictly COTS configuration. Both IPS and MANPRINT will also determine if modification is required, or if there is no viable commercial or NDI solution.

b. Tailoring of the commercial or NDI acquisition program can bring the following benefits:

(1) Lower LCC.

(2) Rapid deployment.

(3) Proven state-of-the-art technology and capability.

(4) Increased competition and a broader industrial base.

c. Choosing the commercial or NDI AS also provides the following challenges:

(1) The CAPDEV may have to relax some performance requirements to accommodate the use of some commercial and NDI or components in production.

(2) Essential IPS activities must be accelerated and may require increased up-front funding.

(3) Proliferation of commercial software, hardware, and support items may cause IPS or training problems and unexpected O&S costs.

(4) Safety deficiencies may need to be approved as acceptable risks and procedural safeguards may need to be developed in lieu of modifying the materiel design.

(5) Items may not have robust corrosion resistance in the design.

(6) Authorization and documentation processes need to be accelerated to keep pace with the tailored acquisition.

(7) Evaluation of the commercial support packages and procedures is needed to ensure feasibility of military support.

(8) The MATDEV must be prepared for CM problems.

5–14. Integrated product support considerations for commercial items and non-developmental items

a. As in any other acquisition program, a successful commercial and NDI IPS Program can be achieved only through the joint efforts of the Soldier, PSM, PSMIPT, MATDEV and contractor. Based on the logistics support knowledge gained during the MI, a tailored LCSP is prepared and documented to include a description of—

(1) Overall IPS requirements, including budget estimates.

(2) Initial support package based on the operational requirements.

(3) Level of repair.

(4) How to achieve initial support capability.

(5) Post-production support.

(6) How to transition to organic support within a reasonable time period if required.

(7) Requirements and detailed plans for each function and element of IPS using information obtained from the MI and SA.

b. The goal is to select the best IPS alternative consistent with cost, operational, and programmatic considerations. In planning IPS for commercial and NDI all the factors considered in preparing an LCSP for a developmental materiel are addressed.

c. The following are considered in developing the support concept—

(1) Materiel performance requirements.

(2) Detailed operating parameters for hardware and software.

(3) ESOH requirements.

(4) Military unique demands or requirements.

(5) Usage modes (fixed, airborne, tactically deployable).

(6) Materiel interface and integration requirements.

(7) Speed, throughput, ports, memory and expansion potential.

(8) Radio transmission frequency requirements and rules for government use of frequency spectrum.

(9) Use of government open system interconnection profile communications protocols.

(10) Use of latest generation software language tools.

(11) Compliance with appropriate standards as cited in appropriate paragraphs of this DA Pam.

(12) Software portability to other communications and computer materiel.

(13) Ability to integrate into DOD or service communications computer environment.

(14) Operating duty cycle (24 hours, intermittent).

(15) Climate (operating, shipment and storage).

(16) Altitude (operating, shipment and storage).

(17) Shock and vibration thresholds (operating and shipment).

(18) Input power quality, (drops, surges, spikes, noise).

(19) Environmental stress screening requirement.

(20) Reliability requirements.

(21) Nuclear hardening requirements.

(22) Chemical, biological, and radiological survivability.

(23) Electromagnetic interference, electromagnetic compatibility, and telecommunications electronics material protected from emanating spurious transmissions requirements.

(24) Electrostatic discharge protection.

(25) Maintainability requirements.

(26) Self-test and prognostics requirements.

(27) Organizational-level support equipment limitations.

(28) Planned maintenance echelons.

(29) Maintainer proficiency levels.

(30) Software maintenance plans.

(31) Limitations on evacuation of reparables (battlefield, rough handling).

(32) Maintenance environment (weather, mud).

(33) Training needs.

(34) Technical data needs (completeness and usability of available commercial manuals).

(35) Warranty procedures and commercial repair capabilities.

(36) Documentation of manufacturer calibration, repair, and overhaul practices and capabilities.

(37) Manufacturer commitment to life cycle support.
(38) Technical data availability.
(39) Power sources and types.
(40) Transportability.
(41) Support equipment requirements (including TMDE and associated support items of equipment (ASIOE)).
d. In determining the availability of IPS, a potential vendor could be asked the following questions:
(1) What portions of the materiel do you intend to provide in the form of commercial and NDI?
(2) How will each item or assembly meet stated requirements?
(3) Must any of IPS be modified to meet requirements?
(4) Is the vendor willing to share design visibility and control with the government to ensure future support by the government?
(5) How stable is the design of the equipment?
(6) How mature is the current design, and what are your criteria for measuring that?
(7) How long has the item been on the commercial market?
(8) How many are in commercial use?
(9) What are the prospects for product longevity?
(10) How long will you support it?
(11) Will the item accommodate the latest state-of-the-art equipment or can it be upgraded to incorporate the latest state-of the-art advancement?
(12) What is the reliability history of the product (for example, mean time between materiel aborts, corrective maintenance actions)?
(13) What are the maintainability features of the design (such as self-test features, accessibility, need for separate test equipment to verify failures, corrective maintenance actions)?
(14) What flexibility do you offer for government maintenance (for example, allow the government to acquire licensing and subscription services to enable organic or competitive maintenance)?
(15) What is the interoperability of your item with other sub-materiel, and software, and its impact on overall materiel integrity?
(16) Is there a competitive market for contract repair and support of the proposed item(s)?
(17) What are the warranty provisions?
(18) Identify at least three commercial or government users of your product.
(19) What is your estimate of the product LCC?
(20) What training is needed to operate and maintain your product, and is such training available from sources other than yourself?
(21) How do you ensure that your sub-tier vendors do not provide counterfeit parts?
e. In addition to the questions above, the various functional discipline proponents and independent testers and evaluators, along with the technical experts, should provide questions to be answered by the MI process. Specific questions peculiar to the item to be procured (for example, performance, operation, and design features) need to be asked as they must be addressed in the TEMP.
f. The goal of commercial and NDI acquisitions is to provide reliable, supportable materiel to the operational forces in a timely manner and at a reasonable cost. A commercial and NDI may achieve this goal with a significant overall reduction in time and cost.

Chapter 6
Integrated Product Support Analysis and Software Tools

6–1. Purpose of analysis
Army policy requires all MATDEVs to consider performance, cost, schedule, and supportability as co-equal in importance. In order for materiel supportability to be adequately addressed it is necessary for product support-related analyses to be conducted. Comprehensive analyses must be conducted on an iterative basis through all phases of the product life cycle to satisfy supportability objectives. The level of detail of the analyses and timing of activity performance should be tailored to each product and be responsive to program schedules and milestones. As with other aspects of the acquisition program, analyses can be used to identify objectives, determine feasibility, assess risk, establish resource requirements, evaluate test results, and a variety of other items. Analysis of the IPS aspects of any program requires quantification of the factors being analyzed and employment of appropriate analyses. Use of supportability metrics provides a means for expressing IPS goals in quantitative terms. This chapter describes some of the software tools that can be used to conduct analyses related to IPS.

6–2. Product support analysis and logistics product data

a. Supportability is a design characteristic. The early focus of the PSA should result in establishment of support-related parameters in performance terms. As materiel design progresses, the PSA will address supportability requirements and provide a means to perform tradeoffs among these requirements and the materiel design. In order to be effective, a PSA will be conducted within the framework of the system engineering process. Examples of these analyses are: application assessment, LORA, task analysis, reliability predictions, RCM, trade analysis, FMECA, facilities analysis, sensitivity analysis, and LCC analysis. Use SAE TA–STD–0017 for PSA. Include SAE TA–STD–0017 in solicitation documents when contracting for PSA. Include SAE AS1390 in solicitation documents when contracting for LORA.

b. The PSA is conducted to determine the optimum set of logistics resource requirements for a materiel to achieve objective effectiveness at the minimum life cycle cost while minimizing the total Army logistics footprint. The PSA must be an integral part of the overall system engineering effort. The integrated analyses can include any number of tools, practices, or techniques to realize the goals.

c. LPD is the support and support-related engineering and logistics data acquired from contractors and is a product of a PSA. LPD are used by both the government and contractor to assess design status, conduct logistics planning, influence program decisions, and obtain required support resources. The DOD uses this data in existing DOD materiel management processes such as those for initial provisioning, cataloging, and item management. Use SAE GEIA–STD–0007 as contractual methods for acquiring LPD. If there is a requirement for the contractor to provide data for loading into a government database, then it will be necessary to specify the required data file format and data relationships as performance requirements for electronic data interchange.

d. Guidance on the PSA process can be found in MIL–HDBK–502. Guidance on the development of LPD can be found in SAE GEIA–HB–0007. These data can also be used by the government to verify that the contractor is meeting the materiel performance and supportability requirements as specified in contracts. The LPD must be verified by the government. The results of the PSA efforts may be reported in the form of PSA summaries such as—

(1) Maintenance planning summary.

(2) Repair summary.

(3) Support and test equipment summary.

(4) Supply support summary.

(5) Manpower, personnel, and training summary.

(6) Facilities requirements summary.

(7) PHS&T summary.

(8) Post-production support (PPS) summary.

e. A PSA is expensive and can result in the generation of massive amounts of data. Therefore, it is important to carefully tailor the PSA required for each program and to avoid the acquisition of redundant or unnecessary data. The requirements for the PSA must be tailored to acquire only the LPD necessary to perform the analyses required to support the program. When tailoring LPD requirements—

(1) Identify the logistics products required by the program.

(2) Define the LPD required from the results of the PSA and generate the logistics products.

(3) Contract for the LPD requirements.

f. Logistics support resources must be identified in a time frame, which considers the schedule for developing the required program documentation or meeting program milestones. Where possible any previous validated PSA results and LPD should be used. For example, support drivers may already have been identified and used as input to another program document. The quality and currency of the available results must be assessed, but if deemed adequate, the work already done may eliminate the need for further iterations or limit the effort to one of updating the available results.

g. The focus and level of detail for the PSA depend upon the AS and how far along the materiel is in the acquisition life cycle. The design maturity of the total materiel hardware, software, and support materiel design is a basic consideration in deciding what PSAs should be performed. Typically, commercial and NDI acquisitions offer the mature designs and most of the required data should already be available.

h. PSAs conducted within any acquisition phase should be properly aligned with the specific objectives of that phase as defined by the AS. During the TMRR Phase, the design of a materiel is more flexible and provides the best opportunities for identifying alternatives and examining tradeoffs from a supportability standpoint (for example, discard versus repair). During the EMD Phase, analyses are conducted to develop detailed information about required maintenance actions, spares, support equipment, training, and manpower. The PSA is also used to develop preliminary technical publications and all the details for the provisioning system. A PSA can also provide the information needed to assist in making program decisions such as selection of contractor versus organic support.

6–3. Analysis of product support alternatives

a. The MATDEV is responsible for developing the best PBPSS for a product considering costs, benefits and risks to the IPS program. The PSM performs an APSA on the PBPSS to inform the MATDEV of costs, benefits and risk implications of the support alternatives being considered. The APSA is the analysis method used for all PBPSSs and aids the MATDEV's decision process. The APSA does not make the decision as other factors influencing the selection of the PBPSS (such as legal compliance, balancing organic and contractor support for a healthy industrial base) must be considered in the decision process.

b. The APSA is a structured methodology and document that identifies and compares product support alternatives by assessing mission and business impacts (both financial and non-financial), risks and sensitivities. The APSA provides information to the MATDEV and PSM to determine the support alternative(s) and provide supporting rationale. The APSA is not an elaborate exercise in developing extensive documentation as a high cost project in itself. The APSA should reflect the appropriate analysis needed to provide a fair assessment of proposed product support alternatives. It should give a clear comparison of each alternative in terms of cost, benefits, and risk to aid the MATDEV in selecting the alternative that meets CAPDEV requirements at lowest O&S cost. Examples of formats that an APSA may take are cost benefits analysis, best value assessment, comparative analysis, and a BCA.

c. The level of analysis should be performed to the depth and rigor appropriate for the program. It is the PSM's responsibility to determine the depth of analysis required to effectively assess the program requirements, feasibility of alternatives, risk, cost, other factors such as statutory compliance, and sensitivity to changes within the alternatives. The PSM must ensure that APSAs are developed through collaboration with the PSMIPT to ensure stakeholder representation.

d. In some instances the MDA may require a more rigorous analysis for the APSA in the form of a BCA. The MDA should provide guidance on how the BCA should be conducted. The Department of Defense Product Support Business Case Analysis Guidebook can provide PSMs with additional insights and considerations when performing BCAs. The guidebook is available at https://acc.dau.mil/CommunityBrowser.aspx?id=452296&lang=en-US.

e. The goal of OMB Circular A–94 is to promote efficient resource allocation through well-informed decision-making by the government. It provides general guidance for conducting benefit-cost and cost-effectiveness analyses. It also provides specific guidance on the discount rates to be used in evaluating government programs whose benefits and costs are distributed over time. The general guidance will serve as a checklist of whether an agency has considered and properly dealt with all the elements for sound benefit-cost and cost-effectiveness analyses. OMB Circular A–94 is available at http://www.whitehouse.gov/omb/circulars_a094/.

f. The MATDEV should ensure that the PSM coordinates the process used to conduct the APSA with their Cost Analysis Directorate and applicable legal office to verify that appropriate procedures have been followed. For programs where the Defense Acquisition Executive or AAE is the MDA, the MATDEV should ensure that the PSM coordinates the process used with the Deputy Assistant Secretary of the Army, Cost and Economics.

g. Since the MDA approves the APSA, the MATDEV or PSM should consult with the MDA prior to initiating the analysis to ensure that the MDA agrees with the selected approach.

6–4. Life cycle cost analysis

a. The majority of a materiel's LCC can be attributed directly to O&S costs after the materiel is fielded. The LCC is a measure of the true cost of the materiel because it looks beyond the research, development, test and evaluation (RDT&E) and production costs and seeks to estimate LCC for the materiel's life cycle to disposal. Since these costs are largely determined by decisions made early in the materiel development period, it is important that MATDEVs evaluate the potential O&S costs of alternate designs and factor these into early design decisions. The LCC analysis is most effective as a tradeoff tool rather than as a way to generate precise cost estimates. It is used to produce cost estimates for evaluating alternatives on a life cycle basis: however, accuracy can be increased with careful selection of an appropriate methodology, use of validated algorithms, and a thorough data collection process. It is also important to document assumptions and constraints. The Cost Analysis Manual from the Army Cost and Economic Analysis Office at the Army Cost and Economic Analysis Center is available at http://asafm.army.mil/document.aspx.

b. There are many types of methodologies and models used for LCC analysis. Three of the major approaches are—

(1) The analogy or scaling models use historical costs from predecessor or analogous materiel and either applies these directly to the new materiel or applies a scaling factor to account for physical, functional, or operational differences between the analogous and new materiel. This approach is used during the MSA Phase.

(2) The parametric approach uses a set of standard cost estimating relationships for building cost estimates. This approach is also used early in the life cycle when limited actual cost data is available.

(3) The engineering or "bottom-up" approach involves the use of detailed algorithms which address the operational scenario, AS, and support concept of the materiel. This approach is used when a significant amount of data of the various aspects of the materiel is available during the EMD and Production and Deployment Phases.

c. A LCC analysis is required early in the program's life cycle (specifically the MSA Phase). Although much of the data available during the TMRR Phase may not be very accurate, the benefits of performing the LCC analysis will outweigh the detractors. As the program progresses and data become more reliable, it will be possible to improve the accuracy and detail in the LCC analysis.

d. It is important for the LCC analysis to cover the entire planned life of materiel rather than limiting it to a budget cycle or the 6 years required in the Future Years Defense Program. Also, all cost categories and all appropriation accounts RDT&E; procurement; military construction; OMA; and military personnel) should be included. All elements of IPS should be addressed through materiel DEMIL and disposal.

e. Manpower and personnel constitute the largest component of the DOD budget. It is important to include cost data on military and civilian personnel based on the skills and grades required to operate and support the materiel. The materiel should be engineered to minimize both the quantity and skill levels of manpower and personnel required to operate and support the materiel over its planned life cycle.

f. Software and its sustainment cost is a significant portion of the total materiel cost. Software cost estimating involves a large degree of experienced judgment, from both a project management and cost analysis perspective.

g. The analyst should not use residual values to reduce LCC. These costs are sunk by the time residual values come into play. Residual value is a benefit that is very speculative. It does not represent savings, but does represent a potential value. Salvage value is usually negligible.

h. Historically speaking, the top 12 sustainment cost drivers have been—

(1) Materiel (major items, secondary items, spare/repair parts, floats, and war reserves).

(2) Munitions.

(3) Petroleum, oil and lubricants.

(4) Facilities.

(5) Technical data (development and maintenance of technical data package, software and software documentation, EPs, and test program sets (TPS)).

(6) Transportability and transportation (transportability T&E, first- and second-destination transportation, and outside of the continental United States second-destination transportation).

(7) Supply support (supply operations at all echelons, supply and maintenance depot operations).

(8) Support equipment (test, service, training, and maintenance equipment).

(9) Training (training devices, aids, materials, and facilities).

(10) Packaging, handling, and storage (garrisoned and deployed).

(11) Maintenance (manpower and personnel, tools and test equipment, TMDE, materiel technical support (lifetime), recapitalization, upgrade, overhaul, rebuild).

(12) Environmental (compliance and stewardship, which must be budgeted for and will be included in assessments by the MATDEV, CAPDEV, and the Army Life Cycle Logistician).

6–5. Reliability centered maintenance analysis, failure mode, effects and criticality analysis, and fault tree analysis

a. RCM is the process that is used by the CAPDEVs and MATDEVs to determine the most effective approach to performing maintenance (see AR 750–1). RCM involves identifying actions that, when taken, will reduce the probability of failure and which are the most cost effective. It seeks the optimal mix of condition-based actions, interval actions (time-based or cycle-based), failure finding, or a run-to-failure approach. A FMECA is used to identify: the way that the materiel may fail; the impacts to performance; critical safety items; and corrective and preventive maintenance requirements. A fault tree analysis is conducted to evaluate safety critical functions in the materiel's design. Both of these analyses will be used to help develop the LD Plan.

b. RCM is a continuous process that gathers data from operating materiel's performance and uses this data to improve design and future maintenance. These maintenance strategies, rather than being applied independently, are integrated to take advantage of their respective strengths in order to optimize materiel availability while minimizing LCC.

c. The RCM process will be applied and implemented for all materiel at the earliest possible phase and across the total life cycle management structure. The MATDEV must plan, develop, program, implement, and maintain RCM processes and outputs.

d. MIL–STD–3034 provides process phases and procedures for performing RCM analysis on materiel.

e. The Logistics Information Warehouse (LIW) is the single authoritative Army database repository for RCM data (to include CBM data). The LIW is maintained by LOGSA.

f. RCM is based on the following precepts—

(1) The objective of maintenance is to preserve an item's function(s). RCM seeks to preserve a desired level of materiel or equipment functionality.

(2) The RCM process is a valuable life cycle management tool and should be applied from design through disposal.

(3) RCM seeks to manage the consequences of failure, not to prevent all failures.

(4) RCM identifies the most technically appropriate and effective maintenance task and default strategy.

(5) RCM is driven first by safety. When safety (or a similarly critical consideration) is not an issue, maintenance must be justified on the ability to complete the mission based on economic factors.

(6) RCM acknowledges design limitations and the operational environment. Maintenance cannot improve an item's inherent reliability. At best, maintenance can sustain the design level of reliability within the operating context over the life of an item.

g. RCM analyses must be sustained throughout the life cycle.

6–6. Level of repair analysis

a. Comprehensive and effective maintenance planning is heavily dependent upon the LORA for optimizing the support system in terms of LCC and materiel readiness (see SAE AS1390). The computerized model for predicting and analyzing support structures (COMPASS) is the Army's standard LORA model. A well-conducted and timely LORA is a powerful tool to assist decision-makers in resolving a wide variety of IPS related issues such as—

(1) Preferred maintenance concept.

(2) Optimum maintenance task distribution.

(3) Repair versus discard.

(4) Manpower and support equipment requirements at each level of maintenance.

(5) Alternative mixes of organic and contractor support.

(6) Extent and duration of ICS (when applicable).

(7) Support required for materiel fielding.

(8) Warranty considerations.

(9) Host nation support requirements.

(10) Facilities requirements for corrective maintenance.

(11) Product support cost to achieve target availability.

b. Any LORA must be carefully tailored to the specific acquisition program. The LORA must be tailored to the complexity, and life cycle phase of the materiel. The LORA should consider the type of acquisition program, amount of design freedom, funding, schedule, and availability of data. LORA data may be obtained from different sources such as LPD, the LIW, other system engineering analyses, and historical files such as LORAs previously conducted on similar or existing materiel. The LORA process should be executed using the procedures outlined in SAE standards AS1390 and SAE TA–STD–0017.

c. The LORA should be applied in an iterative manner with updates as the materiel matures and more reliable input data becomes available. During the MSA Phase, the design is conceptual and allows the best opportunity for identifying alternatives, conducting tradeoffs, and influencing design from a supportability perspective. During the TMRR Phase the main purpose of a LORA is to guide the design of the materiel for supportability (for example, repair versus discard). Sensitivity analysis must be conducted to assess how variations in the LORA input parameters affect the baseline maintenance concept and impact associated risks. During the EMD Phase and production, LORAs are usually conducted to establish an optimal support or maintenance structure for the materiel (for example, development of the maintenance allocation chart (MAC) or assignment of source, maintenance, and recoverability (SMR) codes)). It is recommended to rerun a LORA when there is an ECP, a proposed major change in contractor support, or a dramatic increase in failure rates or support costs. Additional guidance, to include specific regulatory guidance, can be found in AR 750–1. During post-deployment evaluation the LORA will be rerun no earlier than 1 year and no later than 3 years from first unit equipped date (FUED), using actual reliability data from fielded equipment to validate the support strategies and plans. The LORA must be rerun every 5 years throughout the materiel's life cycle. LORA files will be maintained in accordance with AR 25–400–2.

6–7. Modeling and simulation

a. M&S allows the analysis of a materiel's capabilities, capacities, and behaviors without requiring the construction of or experimentation with the real materiel. The DODI 5000.02 requires MATDEVs to integrate M&S activities into program planning and engineering efforts to support consistent analyses and decisions throughout the program's life cycle. The Army position is that more aggressive use of M&S is needed in materiel development to reduce materiel cost, schedule, and development risk (see AR 5–11). The U.S. Army Model and Simulation Office is an excellent source of information.

b. Application of M&S must be based on an integrated strategy and detailed planning. Army guidance states that MATDEV M&S support plans should be prepared in conjunction with the CAPDEV, operational and developmental testers, maintainers, and logisticians. Thorough coordination with these functional experts is needed to ensure M&S support plans lead to M&S that satisfy all the objectives. In addition, the MATDEV should plan for the integrated use of M&S that maximizes the use of existing M&S before developing system unique materiel products. Finally, M&S applications must be verified and validated before their results can be used.

c. M&S is seeing an increasing application as a tool to support all aspects and phases of the acquisition process, and plays a critical role in acquisition streamlining. Constructive (such as war-gaming) and virtual (such as human-in-the-loop) simulations are used to aid in concept exploration. Virtual prototyping, synthetic environments, materiel simulators, and hardware-in-the-loop simulation are useful in selecting, demonstrating and validating both technologies and designs. The EMD Phase uses virtual factory design, logistics modeling, and testing with modeled operational scenarios and synthetic environments, and stimuli, to support engineering efforts. Verification, validation, and accredit- ation are essential for M&S to be useful in program decision making. Models are validated based on comparison of results with knowledge and experience gained from actual observation (live test or field experience).

d. There are many types of M&S tools ranging from relatively simple software optimizing a specific aspect of the materiel to more complex virtual prototypes. The optimum use of M&S is the development and use of a virtual prototype that is defined as a digital end-to-end model or suite of models that represents the entire system process. Virtual prototypes allow the MATDEV to see in a virtual environment all materiel throughout engineering development. It also allows the MATDEV to see the effect design changes have on cost, schedule, performance, and supportability. The integrated use and reuse of M&S among and between the Army's M&S domains are vital to successful implementation of M&S-based acquisition.

6–8. Core logistics determination of applicability and core logistics analysis

All MATDEVs are required to conduct a core logistics determination of applicability and a CLA. The core determination and CLA are the first steps in the iterative process that evaluates and determines DLM sources of repair. Every Army acquisition program with a JCIDS CRD has a core requirement unless it is specifically excluded in 10 USC 2464. Reporting requirements are addressed in AR 750–1.

a. Core logistics determination of applicability—

(1) In accordance with 10 USC 2366a, a major defense acquisition program (MDAP) may not receive MS A approval or otherwise be initiated prior to MS B approval until the MDA certifies that a determination of applicability of core DLM and repair capabilities requirements has been made.

(2) For all other weapon systems, the MATDEV will determine core applicability by MS B or prior to MS C for weapon systems that enter after MS B.

b. CLA—

(1) A CLA is an early appraisal of a weapon system's DLM and repair requirements that identifies the core depot logistics requirements for new and modified weapon systems.

(2) In accordance with 10 USC 2366b, a MDAP may not receive MS B approval until the MDA certifies that an estimate has been made of the requirements for core DLM and repair capabilities, as well as the associated logistics capabilities and the associated sustaining workloads required to support such requirements.

c. The MATDEV—

(1) Conducts a core logistics determination of applicability prior to MS A for MDAPs, prior to MS B for systems that enter after MS A, or prior to MS C for those systems that enter after MS B. This should be a brief statement explaining why the weapon system will or will not have core depot requirements.

(2) Conducts a CLA prior to MS A for MDAPs or prior to MS B for weapon systems that enter after MS A, or prior to MS C for those weapon systems that enter after MS B.

(3) Develops the CLA in coordination with the PSMIPT.

(4) Submits the CLA through the supporting AMC LCMC(s) to AMC for concurrence.

(5) Documents the core determination of applicability and CLA in the LCSP Annex for Depot Level Maintenance Analyses and Determinations. A combined core logistics determination of applicability and CLA is authorized. This annex is to be amended as future DLM determinations are made.

(6) Revises the CLA prior to MS C if—

(a) The design is modified and is no longer excluded under 10 USC 2464.

(b) The support strategy changes to either require or discontinue DLM.

(7) Prepares a memorandum for notification to Congress if the weapon system meets one of the exclusions cited in 10 USC 2464. The memorandum must—

(a) Discuss why the weapon system is specifically excluded under 10 USC 2464.

(b) Be staffed through and approved by the PEO, LCMC, AMC, DCS, G–4, AAE, and Under Secretary of Defense (Acquisition, Technology and Logistics) (USD (AT&L)).

d. A suggested CLA template is provided in appendix C.

6–9. Core depot assessment

The MATDEV must conduct a CDA when the CLA determines that the system has core requirements. A CDA builds upon the CLA and is the second step in the iterative process that evaluates and determines DLM sources of repair. The CDA evaluates whether or not the system can be supported within the existing organic industrial base or requires establishing a new capability to repair the system, its components, and software. The CDA is an analysis of the potential providers for depot maintenance.

a. The development of a CDA is an iterative process and should begin as early as possible after completing the CLA. If no firm details and information are available yet because of the materiel AS, planning assumptions will be developed and used in the CDA based upon where the system is in the acquisition process. The CDA is a much more detailed analysis than the CLA so it will require more substantive program information to complete.

b. The CDA can be combined with the CLA in the LCSP Annex for Depot Level Maintenance Analyses and Determinations, since a CDA is only done if the CLA determines that the system is core.

c. The MATDEV—

(1) Uses the CLA as the basis for developing the CDA.

(2) Requests SMEs from the supporting LCMC(s), candidate depot(s), and LCMC Software Center(s) to assist with preparation of the CDA. These SMEs will be able to provide the detailed DLM capabilities information required to complete the CDA. The LCMC and depot supports the hardware evaluation, and the LCMC Software Center supports the software analysis. AMC support should also be requested for MDAPs.

(3) Completes the CDA by MS B or prior to MS C for those systems that enter after MS B. The CDA will be part of Production and Deployment Phase entrance criteria and be reviewed at MS C.

(4) Ensures that the required depot level support capability is established no later than 4 years after IOC.

(5) Ensures the CDA includes the initial estimates of the annual direct labor hours (DLH) that will be required to maintain the core capability and estimated annual depot workload for the system. The initial estimate should be as detailed and firm as possible: however, these estimates will continue to be refined until finalized in the DSOR. Analogous, engineering or parametric estimates can be used to develop the estimated DLH for a system under development and the associated maintenance workload prior to a final design for formal analysis. The CDA will specify—

(a) The annual depot maintenance DLHs to maintain the system.

(b) Estimated annual DLHs required for sustaining the core capability.

(6) Ensures the required depot level support capability is established no later than 4 years after IOC. An organic capability provides the resources necessary to ensure effective and timely response to a mobilization, national defense contingency situation and other emergency requirements. Significant planning may be required to stand up a new DLM capability, to include requesting funds to facilitize a depot (equipment, facilities, training, workforce skills, and technical data). All efforts must be synchronized to ensure that the new capability is in place to support the DLM.

(7) Submits the completed CDA through the supporting LCMC to AMC for concurrence.

(8) Documents the CDA in the LCSP Annex for Depot Level Maintenance Analyses and Determinations. A combined CLA and CDA is authorized, since the CDA is only required if the CLA determines the system is core.

(9) Reviews and updates the CDA when—

(a) The system is modified, and such modification impacts DLM requirements.

(b) The support strategy or other pertinent analysis is changed.

d. A suggested CDA template is provided in appendix C.

6–10. Depot source of repair analysis

a. This is the third and final step in the process. The DSOR analysis is the tool used to conduct an inter-Service competitive review ensuring all DOD facilities are considered in the depot selection process. It evaluates DLM providers and their capabilities, develops the annual DLHs required to sustain the core capability, and ensures that a DOD-wide best selection is made for all DLM, to include software. The DSOR analysis evaluates DLM sources of repair and builds upon the CLA and CDA.

b. The same supporting LCMC(s), candidate depot(s), and LCMC Software Center(s) that supported the CLA and CDA will normally continue to support the MATDEV in the DSOR designation process.

c. The MATDEV—

(1) Completes the DSOR analysis no later than 90 days after the critical design review (CDR). This is to allow for any down select decisions and finalization of system designs. The DSOR can be initiated and completed any time prior to this if the information is available. The DSOR will be part of Production and Deployment entrance criteria and be reviewed at MS C.

(2) Applies a risk mitigation analysis and consider factors such as cost, performance, and responsiveness to select sources of repair for depot maintenance workloads considered unnecessary for sustaining core depot capabilities. Such depot maintenance workloads may be performed using organic depot or private sector sources depending on best value to the government.

(3) Develops the DSOR recommendation(s) for the end item, components, and software. A DSOR must be identified for every item that will require DLM, to include software.

(4) Staffs the DSOR for internal Army agreement on the proposed source of repair with all stakeholders.

(5) Provides the recommended DSOR(s) through the LCMC to the Army MISMO at AMC. The MISMO will coordinate the DSOR with other DOD Services and Agencies to develop a joint Service approved DSOR recommendation(s). Once the other Services or Agencies have concurred with the DSOR recommendation(s), it is approved and the MISMO will publish this determination. If the DSOR recommendation(s) is for an ACAT ID, ACAT IAM, joint program, or USD (AT&L) special interest item, it must also be staffed with the USD (AT&L) and requires an additional approval from the Defense Acquisition Executive.

(6) Submits the DSOR recommendation(s) to the LCMC Maintenance inter-Service Officer for LCMC concurrence. The LCMC will then forward the DSOR recommendation(s) to the Army MISMO at AMC for concurrence and forwarding to the other Service MISMOs for Inter-Service coordination and concurrence.

(7) Documents the DSOR recommendation(s) in the LCSP Annex for Depot Level Maintenance Analyses and Determinations.

(8) Reviews and updates the DSOR recommendation(s) when—

(a) The system is modified, and such modification impacts depot maintenance requirements.

(b) The support strategy or other pertinent analysis is changed.

(c) The designated depot(s) source of repair, either organic or commercial, no longer provides the capability to repair, overhaul, modify, or restore the item.

d. The assignment of DLM workload can take several courses of action.

(1) The DSOR recommendation(s) will first meet all statutory requirements for establishing core workload. Assign new core depot workloads to an existing CITE, or designate a new CITE if none currently exists within the DOD.

(2) After the DSOR recommendation(s) has met all statutory requirements, a best value analysis can be used for determining the above core portion of the depot maintenance workload. This may consider organic, partnership, or commercial options. Considerations includes the following:

(a) Ensuring that the existing organic industrial base is fully considered in the best value process.

(b) Optimizing workload between organic and commercial sources of repair. If a decision is made to solicit industry for the DLM or repair of systems and software, the solicitation should include language requiring a PPP.

(c) Supporting Service requirements in 10 USC 2466.

(d) Avoiding duplication of existing infrastructure.

e. Figure 6–1 illustrates the DSOR determination process.

f. Figure 6–2 illustrates the statutory relationship of 10 USC 2460, 10 USC 2464, 10 USC 2466, and 10 USC 2474 for core and noncore workloads.

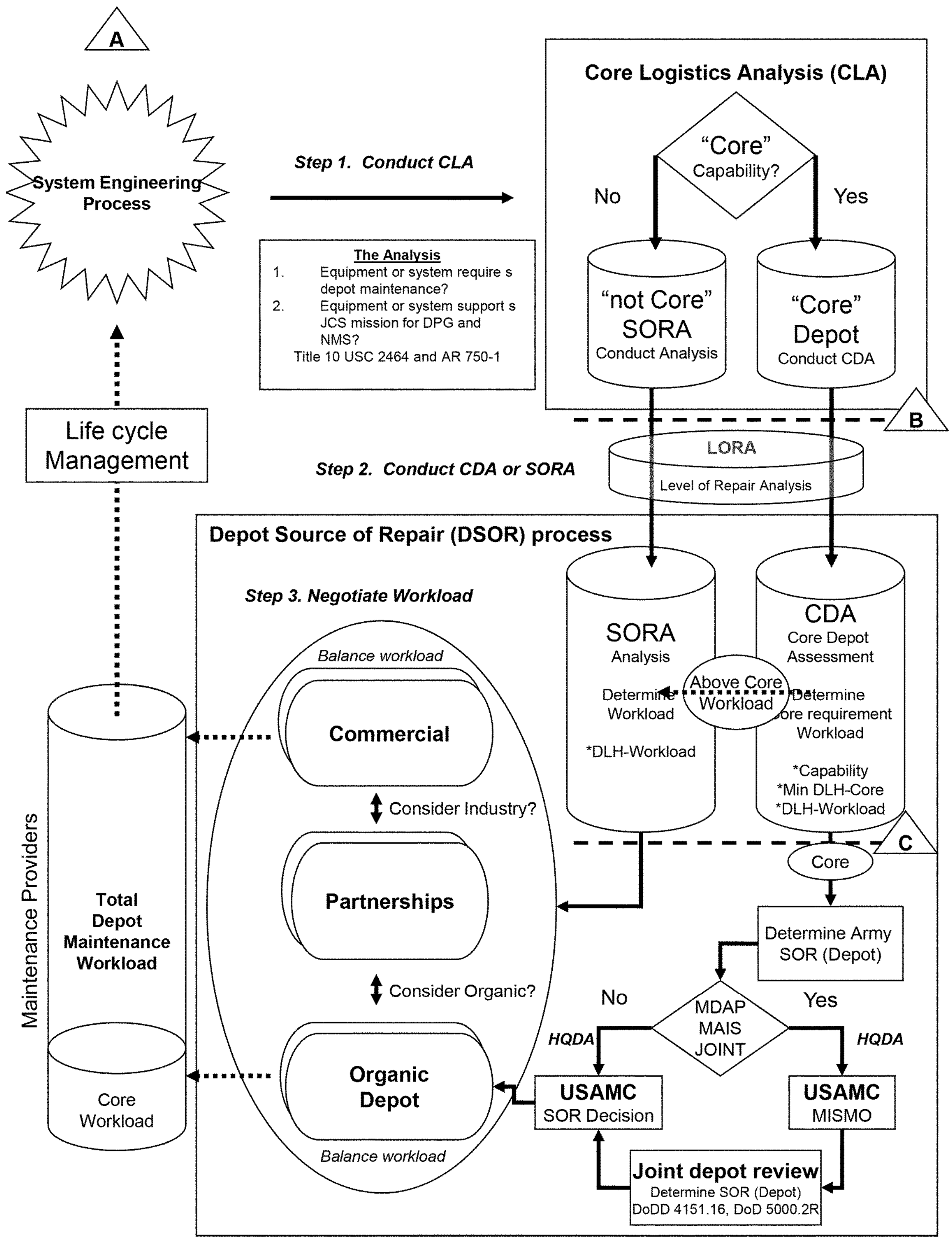


Figure 6–1. Depot source of repair determination process

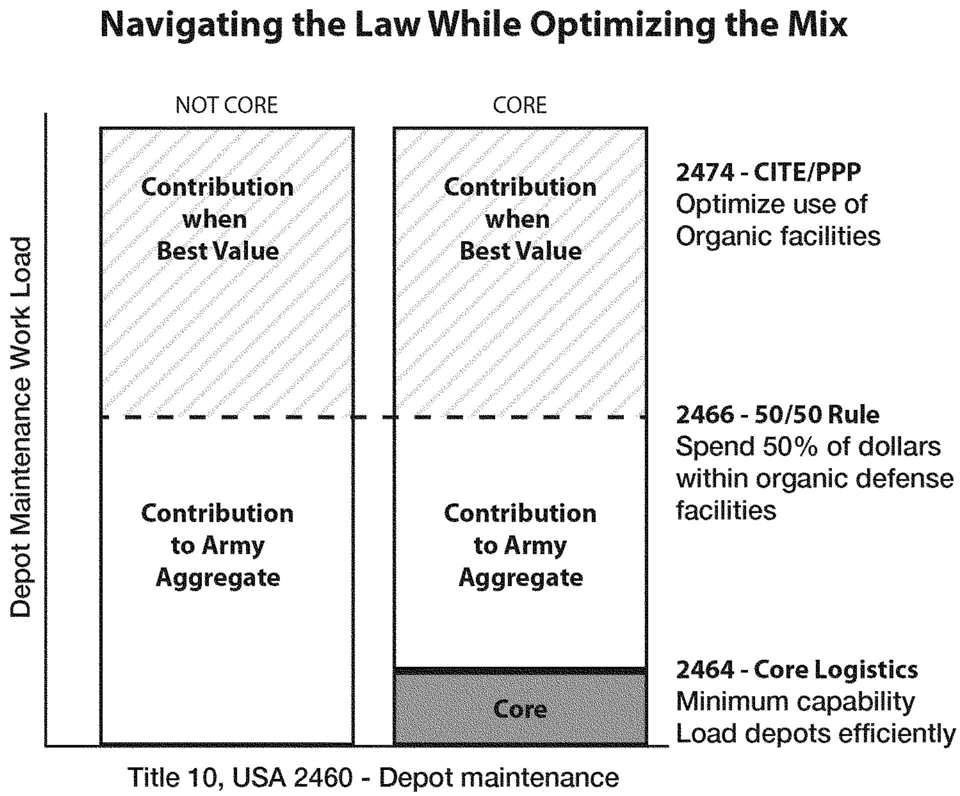


Figure 6–2. Statutory relationships

6–11. Provisioning analysis

a. The primary objectives of Army provisioning is to ensure that supply support for spare and repair parts is developed to support the materiel. Logistics data is updated with field experience to assure sustainment throughout the acquisition process (see AR 700–18). The objective for calculating initial operating stocks is to determine the least cost mix of spare and repair parts to sustain the materiel to the stated materiel availability or materiel readiness objectives until normal replenishment can be accomplished. MATDEVs are responsible for planning and applying an IPS program for assigned materiel acquisition efforts to ensure that provisioning for parts is accomplished to support the materiel.

b. Predicting the range and quantity of spare and repair parts requires extensive analysis. Army policy requires that the visual selected essential item stockage for availability method (SESAME) model be used as the standard methodology to calculate initial provisioning requirements. SESAME is a multi-echelon, multi-indenture inventory model that determines the optimal range and depth of spare and repair parts at all locations where the materiel will be fielded. Although SESAME is typically used for new materiel, it can also be used for follow-on provisioning (rebuy with the same contractor), reprovisioning (rebuy with a new contractor), or optimizing the mix of spares for materiel already in the field.

6–12. Post-fielding support analysis

a. Materiel must be sustained throughout their operational lives at an acceptable availability rate and minimum LCC. The PFSA is a structured means of evaluating the readiness, supportability, and resource requirements for fielded materiel. It is not a specific methodology but an integrated and detailed effort to continuously monitor the status of the entire IPS program for a fielded materiel. PFSA provides a mechanism to identify supportability-related problems, enhance readiness, optimize supportability, and reduce LCC. One benefit of PFSA is that much of the data can be collected and the analysis can be conducted without the need for actual field visits. Thus, PFSA may be less expensive than the former fielded materiel reviews where site visits occurred. Though PFSA may lower cost in some areas, management support and some resources are essential to the success of PFSA. PFSA must be applied iteratively as the end-item population ages because supportability is dynamic and involves many interrelated elements. A change in one of these elements of IPS will impact others.

b. PFSA planning should be conducted prior to fielding, and the PFSA plan should be completed and coordinated prior to FUED. The PFSA plan should specify the aspects of IPS to evaluate, define supportability metrics, and identify the data to be collected, and—

(1) Provide data sources.

(2) Explain data collection methods.

(3) Describe the analytical techniques to be used.

(4) Detail how results will be translated into the implementation of improvements.

c. Data collection for PFSA will begin during initial fielding. Once the materiel has been fielded, data should be used to track trends and pinpoint any major problems. It may take up to one year to obtain data accurately representing the supportability characteristics of the materiel in the field.

d. The PFSA can be incorporated within the LCSP as an optional annex.

6–13. Integrated product support software tools

A variety of IPS planning and analysis tools are available from different vendors. There are also some government owned logistics support planning and analysis tools which are available at no (or very low cost). Some of these software tools are described below. Table 6–1 displays the life cycle phases during which these tools can be used.

Table 6–1
Software tools for integrated product support planning and analysis

IPS support tools	MSA Phase	TMRR Phase	EMD Phase	Production and Deployment Phase	Operations and Support Phase
SYSPARS	X	X	X	X	X
ASOAR		X	X		
CASA	X	X	X	X	X
COMPASS	X	X	X	X	X
ACEIT			X	X	X
PowerLOG–J	X	X	X	X	X
SESAME			X	X	X
PFSA	X			X	X
Transportability modeling		X			

a. Automated cost estimating integrated tools.

(1) ACEIT is an automated framework for cost estimating and other analysis tasks. This tool is used to standardize and simplify LCC estimating. ACEIT is a generic, flexible, Windows-based system which consists of several software tools for the cost estimating community. Core features include a database to store technical and normalized cost data, statistical package to facilitate cost estimating relationship development and a spreadsheet that promotes structured model development. It also has built-in inflation, learning, time phasing, sensitivity, risk and other analysis capabilities.

(2) ACEIT is available for a fee, Web site: http://aceit.com.

b. Cost analysis strategy assessment model.

(1) The CASA model is a life cycle cost decision support tool. CASA can present the total LCC including RDT&E costs, production costs, O&S costs, and maintenance and training costs.

(2) CASA can perform LCC estimates, tradeoff analyses, production rate and quantity analyses, warranty analyses, spares provisioning, resource projections, reliability growth analyses, spares optimization for readiness, and support cost by individual line replaceable unit (LRU) analysis, and more.

(3) CASA is available at no cost. Information is available from AMC LOGSA (AMXLS–AA), Redstone Arsenal, AL 35898–7466, or http://www.logsa.army.mil/lec/casa.

c. Computerized Optimization Model for Predicting and Analyzing Support Structures.

(1) COMPASS is a system-wide LORA (SAE AS1390) model. A LORA determines the most economic maintenance repair level where removal and replacement or discard of items should take place. Several maintenance levels can be analyzed concurrently, including contractor repair as a separate level. COMPASS will optimize both maintenance and supply to achieve a stated Ao. COMPASS output data can be used to aid in the development of the MAC and SMR codes.

(2) COMPASS support and training are available. Information is available from AMC LOGSA (AMXLS–AA), Redstone Arsenal, AL 35898–7466; or http://www.logsa.army.mil/lec/compass.

d. Improved performance research integration.

(1) This program is a dynamic, discrete event, network modeling tool designed to help assess the interaction of Soldier and materiel performance throughout a materiel's life cycle. Task-level data are used to represent operational and maintenance missions to support a broad range of decision support analyses. The model can be used in the determination of man-hour requirements by military occupational specialty (MOS), D A civilians, and CLS. The tool can also be used to determine maintenance ratios and frequency distributions of crew size.

(2) The model is available at no cost. Information is available from Army Research Laboratory, Human Research and Engineering Directorate, Aberdeen Proving Ground, MD 21005–5425.

e. System Planning and Requirements Software.

(1) SYSPARS is a Web-based expert system for assisting MATDEVs in preparation of integrated acquisition and supportability planning documentation for materiel. The extensive knowledge base incorporates the latest policies and procedures, training information, lessons learned and expert knowledge and experience. Current SYSPARS modules include the following:

(a) Technology Development Strategy and/or AS.

(b) LCSP.

(c) Commercial PBA.

(d) IPS SOW.

(e) Transportability report.

(f) Provisioning Plan.

(g) Item Unique Identification Plan.

(h) Life Cycle Schedule.

(i) Diminishing Manufacturing Sources and Material Shortages Management Plan.

(j) APSA and/or BCA (product support).

(k) IPS performance specification.

(l) LPD attribute selection sheet.

(m) PBPSS

(n) Simulation Support Plan.

(o) Materiel Engineering Plan.

(p) Materiel Fielding Plan.

(q) Warranty advisor.

(2) SYSPARS is available to government and authorized support contractors. SYSPARS support and training are available through the AMC LOGSA (AMXLS–AI), Redstone Arsenal, AL 35898. Web site is https://www.logsa.army.mil/lec. E-mail: usarmy.redstone.logsa.mbx.tsb-smartdesk@mail.mil.

f. Post-fielding support analysis.

(1) PFSA is a Joint Service re-engineering logistics initiative aimed at improving logistics support for fielded materiel. By using current logistics data from the O&S of materiel, adjustments to the support structure and procedures to improve readiness can be elevated. MATDEVs can use PFSA to optimize the support, minimize costs, identify the need for major modifications and improve baseline logistics systems for major new starts. PFSA can also be used during the MSA Phase and TMRR Phase to support an APSA.

(2) The PFSA tool is available to government organizations. PFSA support and training are available through the AMC LOGSA (AMXLS–AI), Redstone Arsenal, AL 35898. Web site is https://www.logsa.army.mil/lec. E-mail: usarmy.redstone.logsa.mbx.tsb-smartdesk@mail.mil.

g. PowerLOGJ.

(1) This is a logistics support data management system used for acquisition logistics data management. It is a personal computer (PC)-based, multi-user, standalone, enterprise data base management system that satisfies the legacy MIL–STD–1388–2B and SAE GEIA–STD–0007 LPD specifications. PowerLOGJ replaces and enhances the popular PC logistics support analysis record system. It is designed to assist the Army, Navy, Air Force, Marine Corps, and other government agencies and contractors in developing and integrating the PSA data.

(2) PowerLOGJ is available to government and authorized support contractors. PowerLOGJ support and training are available through the AMC LOGSA, AMXLS–AI, Redstone Arsenal, AL 35898. Website is https://www.logsa.army.mil/lec. E-mail: usarmy.redstone.logsa.mbx.tsb-smartdesk@mail.mil.

h. Simulation software products.

(1) Simulation software products of three-dimensional transportability modeling and analysis can significantly reduce transportability testing costs.

(2) Using a three-dimensional model of the acquisition end item in conjunction with SDDCTEA's models of

transporters, and transportation constraints, SDDCTEA engineers can conduct static (no motion), kinematic (motion only), and dynamic (motion and forces applied) analyses to determine transportability restrictions.

(3) Information is available from SDDCTEA (SDTE–DPE), 1 Soldier Way Building 1900W, Scott Air Force Base, IL 62225 or http://www.tea.army.mil/dep/transport/default.asp.

i. Visual SESAME.

(1) Visual selected essential item stockage for availability method is a PC-based, user friendly multi-echelon, multi-indenture inventory model that determines the optimal range and depth of spare and repair parts at all locations where the materiel is fielded. It is the Army standard model and is required for initial provisioning decisions.

(2) Visual SESAME is available at no cost. Information is available from AMSAA (AMXSY–L), Aberdeen Proving Ground, MD 21005–5071.

j. Materiel Enterprise Capabilities Database.

(1) The MEC–D is a standardized market research tool with electronic access to Army organic industrial base (arsenals and depots).

(2) Relevant information on organic industrial base capabilities can be used through MEC–D to—

(a) Consider manufacturing and repair requirements.

(b) Conduct make-or-buy analyses.

(3) The MEC–D is managed by the TACOM LCMC - Industrial Base Office. The MEC–D Web site is: https//apps.aep.army.mil/sites/mecd.

k. The Defense Acquisition University hosts—

(1) An analytical tool database is available at https://acc.dau.mil/psa-tools.

(2) DOD Integrated Product Support Implementation Roadmap is available at https://dap.dau.mil/dodpsroadmap.

Chapter 7
Technical Data and Configuration Management

7–1. Technical data

Technical data encompasses all the management actions, procedures, and techniques needed to determine requirements for and to acquire the recorded materiel information, technical manuals and technical drawings associated with the materiel for its operation, maintenance, and support. Technical data for all support equipment are also included under this IPS element. Technical data means recorded information, regardless of the form or method of the recording, of a scientific or technical nature (including computer software documentation), but does not include software.

a. MATDEVs must identify and ask for delivery of the minimum technical data and software documentation necessary for the government’s intended purposes (such as competition and repairs) for their program and ensure that—

(1) Appropriate technical data requirements are included in the Intellectual Property Strategy prior to MS A. MIL–HDBK–502 provides guidance for technical data rights for LPD.

(2) Needed technical data is acquired, secured, and obtained from contractors. It can also be acquired from government sources such as government engineering centers.

b. Technical data includes the following:

(1) EPs.

(2) Technical bulletins.

(3) Supply bulletins.

(4) Commercial manuals and instructions.

(5) Transportability guidance TMs, lifting and tie down pamphlets and references.

(6) Identification lists.

(7) Component lists (to include sets, kits, outfits, and tools).

(8) Repair parts and special tools list (RPSTL).

(9) MAC.

(10) PTD.

(11) Calibration procedures.

(12) Drawings and specifications.

(13) Test data and reports.

(14) Software documentation.

(15) Skill and task analysis.

(16) Facilities utilization data and documentation.

(17) Packaging procedures and materials.

(18) Depot Maintenance Work Requirements (DMWR).
(19) National Maintenance Work Requirements (NMWR).
(20) LPD.
(21) Verification and validation documentation.
(22) IPS planning documentation and associated contractor deliverables.
(23) DEMIL and disposal procedures.
(24) MANPRINT documentation.
(25) EOD and render safe procedures.
(26) LD plan.
(27) Source listings.
(28) Data dictionaries.
(29) Operator and maintenance procedures.

c. The Intellectual Property Strategy (part of the AS) has a great deal of influence and impact on providing successful integrated product support. The purpose of the Intellectual Property Strategy is to document the program's short-term and long-term needs for technical data, software documentation, software licenses and the associated government's rights to use, modify, reproduce, release, perform, display, or disclose that data to enable competition or recompetition of production, sustainment, modification or upgrade. The government shall acquire only the technical data, software documentation, software licenses and the associated rights to use that data necessary to satisfy the agency's needs. It is critical that the PSM and PSMIPT assist the MATDEV in identifying the logistics needs for technical data, software documentation, and software licenses. Failure on the government's part to appropriately identify, order, evaluate, accept, use, store, and maintain the data and associated rights can severely restrict the government's ability to change support strategies at a later date. The following are examples of the needs the government might have (short-term and long-term) for this data: cataloging, provisioning, PSA, LPD, preparation of EPs, T&E. The government is to get the same rights, for this same item, as was granted to any other government agency and the same rights that are available to the public. Generally, the government has unlimited rights in the following types of data:
(1) Form, fit, function data.
(2) Operation, maintenance, installation, and training data.
(3) Correction of technical data previously delivered to the government.

7–2. Configuration management

a. MATDEVs are responsible for establishing CM as part of the system engineering process (see AR 70–1). A sound CM process will ensure MATDEV has control over the materiel design, technical data, and software as the materiel evolves throughout the life cycle. A CM Program identifies, controls, accounts, and audits the functional and physical characteristics of a materiel. The CM program provides for two configuration control baselines; the functional and product baselines. An allocated baseline though not mandatory, may be established because of the complexity of the item, for ease of project management, for contractual integration, or for division of the total task. Baselines are initially established with the documentation of the configuration identification, and are approved by the government. The PSM must ensure that IPS program requirements are coordinated with the MATDEV's lead CM system engineer and IPS representation is assigned to the MATDEV configuration control board. See MIL–HDBK–61A(SE) and SAE EIA–649–B for CM guidance.

b. Value engineering and value engineering change proposals provide opportunities to enhance product support, sustainment, materiel supportability, TI, and proactive diminishing manufacturing sources and material shortages and obsolescence mitigation. MATDEVs should exploit this process to achieve cost savings and enhance performance.

7–3. Logistics product data

LPD as defined by SAE GEIA-STD-0007 is a comprehensive list of data elements that can be generated as a result of the PSA conducted during the design, development, and initial fielding of materiel. It captures information related to logistics design requirements, RAM, materiel safety, maintenance engineering, support and test equipment, training and training devices, manpower and skills, facilities, transportation, supply support, and parts packaging. The volume of LPD generated is driven by the engineering level of effort that will be expended in each of the previously mentioned areas (for example, if existing facilities are used then little or no facilities data would be generated as LPD). This volume of data is also tempered by the hardware level of indenture that engineering analysis is required to be performed (for example, contract maintenance to the engine level). The most important aspect of LPD is that it is used to generate support products (for example, operator and maintainer manuals, supply support lists, training programs for operators and maintainers) required for the life cycle sustainment of a product. This is shown in figure 7–1 below steps 3, 4, and 5.

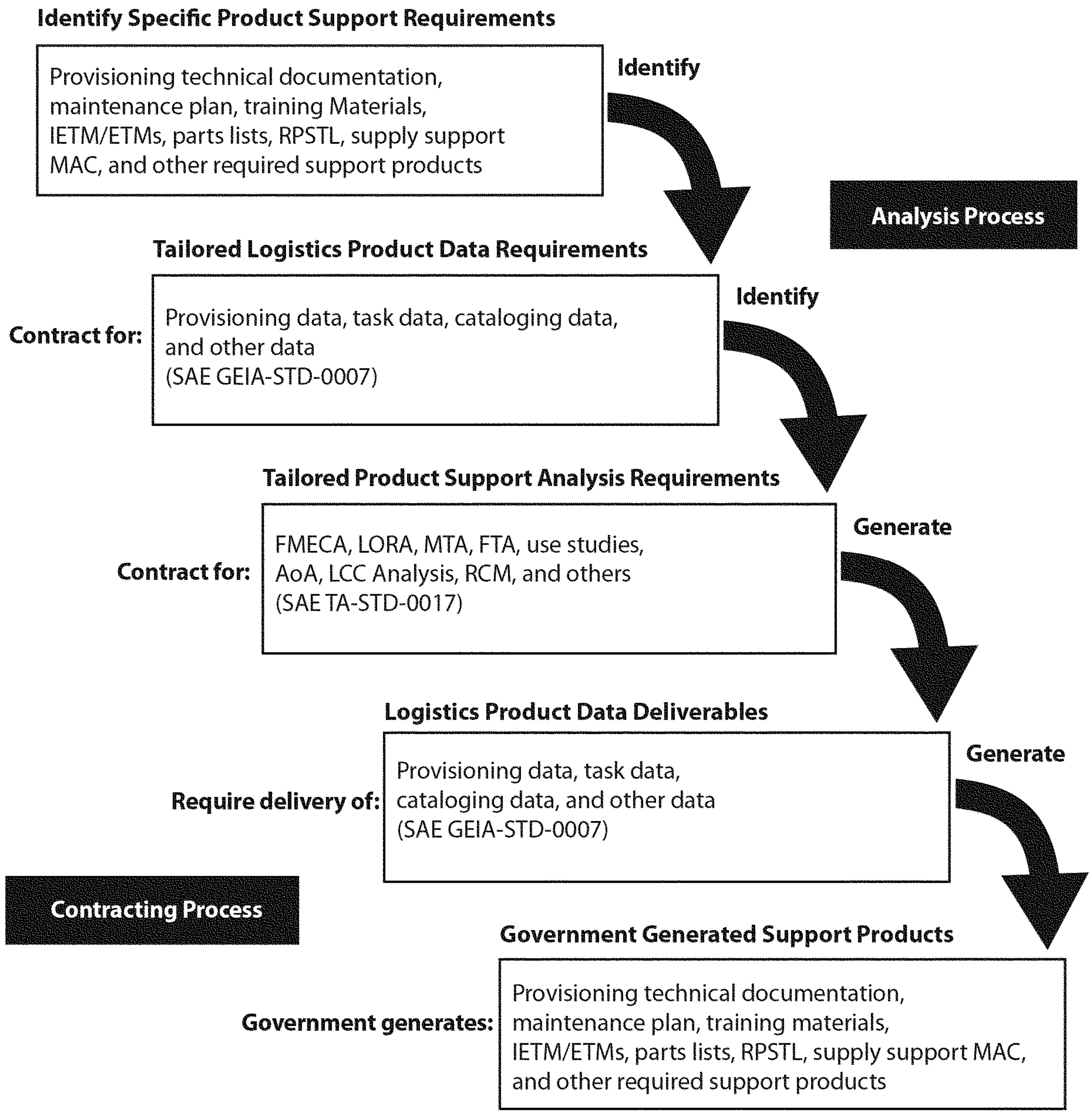


Figure 7–1. Logistics product data process

a. Introduction. Figure 7–1 depicts the processes required to generate the support products (for example, operator and maintainer manuals, supply support lists, training programs for operators and maintainers) required for the life cycle sustainment of a product.

b. Step 0 – Preprocessing. During the MS A Phase the supportability objectives are defined, product support capabilities are evaluated and support and maintenance concepts and technologies are identified. Once these tasks are completed and the program is in the TMRR Phase the supportability objectives are refined, and a product support strategy and ground rules and assumptions have been defined, the CBA, ICD, and AoA will provide the MATDEV with information to complete this step.

c. Step 1 – Identify Specific Product Support Requirements. After completion of the pre-processing step the MATDEV should be able to identify the products required to support the materiel and create a list such as PTD, maintenance plan, and EPs data, (for example, RPSTL, MAC, and ASIOE).

d. Step 2 – Tailored Logistics Product Data Requirements. Using the list of products created in Step 1 the MATDEV is able to identify a tailored list of LPD required, using SAE GEIA–STD–0007 and its two companion handbooks, SAE GEIA–HB–0007 Logistics Product Data Handbook, and SAE International Handbook SAE TA–HB–0007–1. To facilitate contracting for this required data, SAE GEIA–HB–0007 appendix A “Attribute Selection Sheet” is designed to record the information selected for attachment to the requisite DIDs.

e. Step 3 – Tailored Product Support Analysis Requirements. The MATDEV is now ready to define the analysis required to generate required LPD as identified in the Attribute Selection Sheet that was completed in Step 2. Use SAE TA–STD–0017 Product Support Analysis and its companion handbook MIL–HDBK–502 to assist in identifying and performing the appropriate analyses. The SAE TA–STD–0017 will also be utilized to determine which analyses will be required to be performed under contract in order to generate the required LPD.

f. Step 4 – Logistics Product Data Deliverables. As the analyses, identified in Step 3, are performed, the MATDEV should ensure that the resulting LPD is delivered and stored in the Logistics Product Data Store repository that is capable of producing the required LPD deliverables per SAE GEIA–STD–0007. The Logistics Product Data Store is maintained by the LOGSA.

g. Step 5 – Government Generated Support Products. The government will use the LPD provided in accordance with the SAE GEIA–STD–0007 format to produce the support products as originally defined in Step 1. PowerLOG-J is capable of generating most of the required logistics product support products required by the MATDEV.

7–4. Provisioning technical documentation

a. PTD is LPD needed to accomplish provisioning of new materiel. Provisioning is the process of determining and acquiring the range and quantity of support items (for example, spares, repair parts, bulk materiel, tools and test equipment) necessary to operate and maintain materiel. An essential element for success of PTD is access to the minimum technical data necessary for the government’s intended purposes. The LCSP, when updated and expanded during the EMD Phase, provides the major milestones used as the basis for updating the PP. The detailed support requirements, maintenance functions and allocations, and maintenance tasks are a matter of record during LPD development. The IPS requirements, technical data, and software documentation for provisioning are outputs of the PSA process. The MATDEV ensures that the provisioning technical data and software documentation requirements, and rights are addressed in the Intellectual Property Strategy.

b. PTD is required for all materiel acquired or modified under an Army acquisition program.

c. Provisioning planning is required to begin concurrently with the development of performance requirements for the materiel, or as early as possible in the EMD Phase. The Army requires that initial stockage quantities of support items be provided prior to or concurrent with the initial fielding of the materiel.

d. The MATDEV, PSM, and the PSMIPT plan for provisioning prior to preparation of the MFP. It is also their responsibility to plan for provisioning and subsequent life cycle support in appropriate documents (that is, standards, specifications, and solicitation documents) as an integral part of the materiel acquisition (see AR 700–18, DODD–4140.1, and SAE GEIA–STD–0007).

7–5. Equipment publications

a. EPs cover the operation, maintenance, installation, training, and parts support of Army materiel, including firing tables and trajectory charts. Equipment TMs, lubrication orders, modification work orders, technical bulletins, and supply catalogs are examples of EPs used to provide these essential instructions. EPs can be in the form of ETMs, interactive ETMs (IETM), or hardcopy (paper) TMs (see AR 25–30).

b. The EPs are required for all intended issue of Army materiel (that is, supportable end items) requiring operation and maintenance support at any level. They are essential elements of the IPS system for all materiel.

c. EPs are an essential element of the product support package that is a set of support elements that are used to determine the adequacy of the planned support capability. The product support package is provided by the MATDEV and required for all materiel and information systems. EPs should be evaluated during developmental test and evaluation (DT&E) and operational test and evaluation (OT&E) and prior to the LD. The DA-authenticated EPs are required to be available concurrently with the materiel fielding and FUED and must be maintained for the life cycle of the materiel.

d. The MATDEV includes EP requirements in the solicitation documents and contracts and ensures accuracy and adequacy of EP data and publications prior to government acceptance of the materiel. EPs must be validated by the contractor and verified by the government (see AR 25–30 and AR 750–1).

7–6. Maintenance allocation chart

The MAC is included in applicable EPs and reflects a materiel’s maintenance plan. The MAC is a list of equipment maintenance functions showing the maintenance level for the performance of maintenance tasks on an identified end item or component. The MAC identifies and authorizes specific maintenance tasks (for example, inspect, test, replace, repair) for each maintenance level to be performed. The MAC follows the RPSTL order of assembly and subassembly listings. It establishes a time standard for each authorized maintenance task as a functional group entry, lists the tools and test equipment required for each maintenance task to the various maintenance levels, and contains supplemental instructions and explanatory notes for a particular maintenance task.

a. The MAC is required for all materiel.

b. A draft MAC is required as part of the preliminary product support package or DT&E and OT&E. It's evaluated during the LD and tested and evaluated during DT&E and OT&E.

c. The contractor is responsible for developing the MAC through PSA based on the Army's maintenance concept and plan (see AR 750–1).

7–7. Operator manuals
Operator manuals are EPs that provide operating instructions for the materiel.

7–8. Maintenance manuals
Maintenance manuals are EPs that provide maintenance instructions to support maintenance tasks and actions for the materiel.

7–9. Repair parts and special tools list
The RPSTL is an EP which contains tabular listings and indexes for repair parts, special tools, NSNs, part numbers, and reference designators for specified equipment items. Illustrations of support items and equipment needed to maintain the materiel, and exploded views of end items, components, and parts are included in the RPSTL. The RPSTL identifies the SMR code and whether or not the materiel is authorized for stockage. The initial draft RPSTL is derived from the allocation of maintenance tasks from the MAC, and the detailed task analyses conducted as part of the PSA. The RPSTL may be incorporated into the maintenance technical manual (for example, -23 & P) or published as a separate manual (for example, -23P).

a. The RPSTL is required in conjunction with the MAC to identify the spare and repair parts and bulk materiel authorized for each maintenance level task.

b. Unless there will be CLS for all materiel maintenance, a validated preliminary technical manual RPSTL is required as part of the product support package which is evaluated during the LD and tested and evaluated during DT&E and OT&E.

c. A HQDA-authenticated RPSTL must be available for issue concurrently with the materiel during materiel fielding.

d. The MATDEV has overall responsibility for RPSTL preparation and verification. Through the maintenance analyses process, the MATDEV may have the contractor develop a RPSTL. The RPSTL is structured in the same top- down, breakdown sequence as the MAC and the associated narrative maintenance manual repair or replace procedures. The MATDEV provides a validated RPSTL to test agencies as part of the testing and evaluation (see AR 25–30, AR 750–1, MIL–STD–40051–1, MIL–STD–40051–2, and S1000D).

7–10. Depot maintenance work requirements and national maintenance work requirements
a. DMWRs and NMWRs are the EPs that support overhaul, rebuild, and restoration of Army materiel to "like new" condition. DMWRs and NMWRs are validated and verified in the same manner as other EPs, using the appropriate target audience skill level. DMWRs and NMWRs should be updated throughout the life cycle of the materiel. These also address the repair method, procedures and techniques, modification requirements, fits and tolerances, equipment performance parameters, quality assurance and other essential factors to ensure that an acceptable and cost effective product is obtained. DMWRs and NMWRs should be developed for all materiel that require depot-level repair.

b. Authenticated DMWRs and NMWRs are required prior to the start of sustainment (see AR 25–30, AR 750–1, and DA Pam 25–40).

Chapter 8
Integrated Product Support Planning

8–1. Integrated product support planning considerations
a. MATDEVs must ensure that product support for materiel provides the most effective support to the Soldier at the lowest LCC. The product support planning must integrate with the materiel design, while leveraging existing Army and DOD infrastructure to the maximum extent possible. Product support for software has unique challenges due to rapid changes in technology and requires specialized expertise. All planning should consider the impact of the materiel's logistics footprint to the Army and Soldier. MATDEVs must also ensure that all resources to implement the LCSP are identified, requested, justified, and obtained.

b. MATDEVs must apply design interface and other IPS enablers for all materiel. To be successful, MATDEVs should explore the following IPS planning considerations—

(1) Develop improved RAM on materiel—

(a) Implement the RCM process early in the design process to develop the maintenance plan.

(b) Establish reliability growth programs.

(c) Design for the Army's maintenance system (see AR 750–1).

(d) Optimize modular plug-and-play components.

(e) Design materiel for easy access to components.

(f) Simplify maintenance task requirements.

(g) Minimize tool and test equipment requirements. Use Army standard TMDE, sets, kits, outfits, and tools, batteries and battery chargers.

(h) Design for testability.

(i) Integrate diagnostic and prognostic aids including embedded health management and CBM+ capabilities into the materiel design when cost effective.

(2) Include training strategies to use—

(a) Embedded training for operators, maintainers, and support personnel.

(b) Simulators, simulations, and innovative training strategies.

(3) Optimize S&I with—

(a) Army and allied materiel whenever possible, using common materials, components, and support.

(b) Energy-efficient power sources.

(c) Fuel requirements. Implement the provisions of AR 70–12 to standardize fuel requirements and reduce the logistics burdens of fuel transportation, storage, and control.

(4) Minimize use of HAZMAT and generation of waste streams.

(5) Evaluate environmental quality concerns (air, noise, and water quality) from materiel production, maintenance, operation and disposal.

(6) Optimize use of data-collection programs to verify RAM performance.

(7) Use item unique identification and automatic identification technology to provide total asset visibility for management of Army materiel.

(8) Decrease logistics footprint by minimizing requirements for special tools and test equipment and unique components.

(9) Optimize using the Army integrated logistics architecture to create a net centric common logistics operating environment.

(10) Apply historical lessons learned from accident data to minimize LCC.

c. Ensure that the IPS and acquisition planning activities are integrated early and throughout the program life cycle.

d. Develop TI strategies to minimize support burdens, reduce resource requirements, and reduce supportability risks related to potentially unstable designs.

e. Address obsolescence and diminishing manufacturing sources and material shortages in the PBPSS.

f. Use conventional organic capabilities (for example, the Defense Reutilization and Marketing Service) for the disposal of surplus assets unless an alternative disposal strategy can be justified.

8–2. Life Cycle Sustainment Plan

a. The LCSP is the key overarching IPS program planning document used by the MATDEV, PSM, acquisition program staff, and PSMIPT to guide daily planning, management and implementation of the PBPSS for the materiel. The purpose of the LCSP is to document the MATDEV PBPSS. It is a living document and is updated when changes to the PBPSS occur to keep the LCSP relevant. The LCSP is the MATDEV's tool for programs to effectively and affordably satisfy life cycle product support requirements and is required for all ACAT programs. The LCSP articulates the PBPSS to satisfy the CAPDEV's sustainment requirements through the delivery of a product support package. The LCSP remains an active management tool throughout the program life cycle. The MATDEV's staff and program stakeholders are to use the LCSP as a daily guide in synchronizing implementing activities. The LCSP is—

(1) The responsibility of the MATDEV.

(2) Developed by the PSM through the PSMIPT.

(3) A comprehensive plan for executing the full array of product support required to meet the CAPDEV requirements.

b. The LCSP should be a streamlined document that tells the reader how the PBPSS will be accomplished. Extraneous material such as restating policies should not be included in the LCSP.

c. An LCSP outline is at figure 8–1.

1.0 Introduction
2.0. Product Support Performance
  2.1. Sustainment Performance Requirements
  2.2. Demonstrated (tested) Sustainment Performance
3.0. Product Support Strategy
  3.1. Sustainment Strategy Considerations
  3.2. Sustainment Relationships
4.0. Product Support Arrangements
  4.1. Contracts
  4.2. Performance Based Arrangements
5.0. Product Support Package Status
  5.1. Program Review Results
  5.2. Product Support Package Assessment
6.0. Regulatory/Statutory Requirements that Influence Sustainment Performance
7.0. Integrated Schedule
8.0. Funding
9.0. Management
  9.1. Organization
  9.1.1. Government Program Office Organization
  9.1.2. Program Office Product Support Staffing Levels
  9.1.3. Contractor(s) Program Office Organization
  9.1.4. Product Support Team Organization
  9.2. Management Approach
  9.2.1. Product Support Manager Roles and Responsibilities
  9.2.2. Sustainment Risk Management
10.0. Product Support Analysis
  10.1. Design Interface
  10.1.1. Design Analysis
  10.1.2. Technical Reviews
  10.2. Product Support Element Determination
  10.3. Sustaining Engineering
11.0 Additional Sustainment Planning Factors
LCSP Annexes

Figure 8–1. Life Cycle Sustainment Plan Outline

d. The LCSP flow for HQDA staffing and coordination is depicted in figure 8–2.

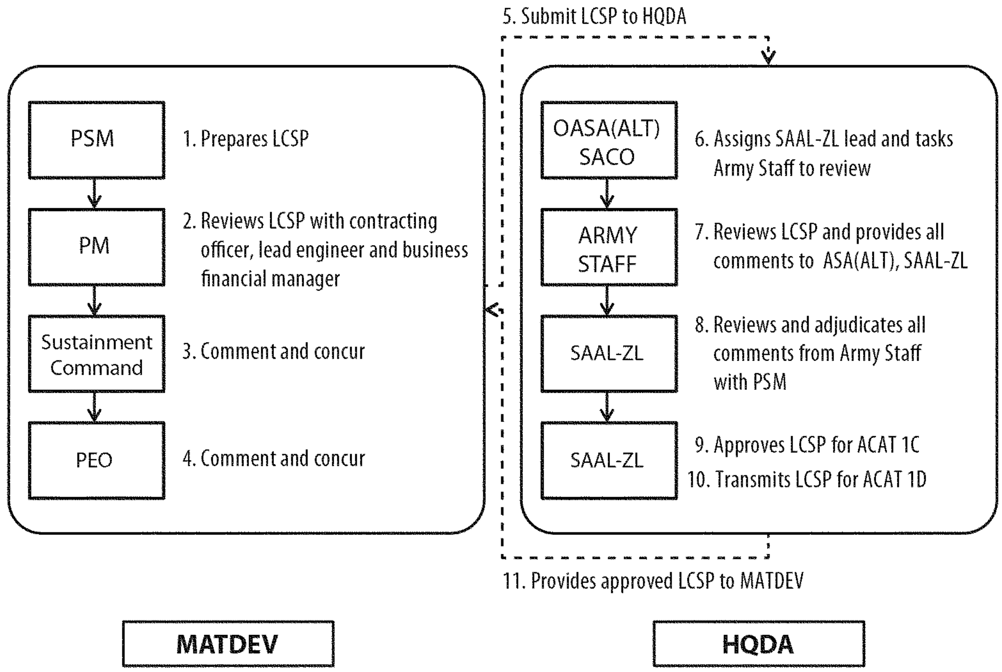


Figure 8–2. Life Cycle Sustainment Plan flow for Headquarters Department of the Army staffing and coordination

e. All LCSPs are coordinated in accordance with AR 700–127 for review and approval. Representatives signing for concurrence on LCSP coordination sheets following review (see figs 8–3 through 8–8 must provide written justification for reasons for a nonconcurrence and recommended changes to the LCSP to reach concurrence). The approval authority makes the final decision when full agreement cannot be reached.

f. LCSP approval and coordination page examples for ACAT ID programs are shown in figures 8–3 and 8–4.

g. LCSP approval and coordination page examples for ACAT IC and MAIS programs are shown in figures 8–5 and 8–6.

h. LCSP approval and coordination page examples for ACAT II and III programs are shown in figures 8–7 and 8–8.

PROGRAM NAME - ACAT ID LEVELS

LIFE-CYCLE SUSTAINMENT PLAN

VERSION [Insert #]

SUPPORTING MILESTONE [Insert #]

AND

[APPROPRIATE PHASE NAME]

[DATE]

OFFICE OF THE SECRETARY OF DEFENSE (OSD) APPROVAL

[Signature]	[Insert Date]
Assistant Secretary of Defense (Logistics and Materiel Readiness)	Date

Figure 8–3. Life Cycle Sustainment Plan Acquisition Category ID approval (cover sheet)

SUBMITTED BY

[Insert Name]	[Insert Date]
Name	Date
Product Support Manager	

REVIEW

[Insert Name]	[Insert Date]	[Insert Name]	[Insert Date]
Name	Date	Name	Date
Program Contracting Officer		Program Manager	
[Insert Name]	[Insert Date]	[Insert Name]	[Insert Date]
Name	Date	Name	Date
Program Lead Engineer		Program Financial Manager	

CONCURRENCE

[Insert Name]	[Insert Date]	[Insert Name]	[Insert Date]
Name	Date	Name	Date
CAPDEV Representative or Equivalent		Commander, USAMC or Equivalent	

COMPONENT APPROVAL (ACAT IC)

[Insert Name]	[Insert Date]
Name	Date

DOD Component Acquisition Executive (CAE) or designated representative

Figure 8–4. Life Cycle Sustainment Plan Acquisition Category ID coordination (second page)

PROGRAM – ACAT1 & SELECT II & MAIS LEVELS

LIFE-CYCLE SUSTAINMENT PLAN

VERSION [Insert #]

SUPPORTING MILESTONE [Insert #]

AND

[APPROPRIATE PHASE NAME]

[DATE]

OFFICE OF THE ASSISTANT SECRETARY OF THE ARMY, ACQUISITON LOGISTICS AND TECHNOLOGY APPROVAL

[Signature]	[Insert Date]
Deputy Assistant Secretary of the Army (Acquisition Policy and Logistics)	Date

Figure 8–5. Life Cycle Sustainment Plan Acquisition Category IC & Major Automated Information System approval (cover page)

SUBMITTED BY

[Signature]	[Insert Date]
Name Product Support Manager	Date

REVIEW

[Signature]	[Insert Date]	[Signature]	[Insert Date]
Name Program Contracting Officer	Date	Name Program Manager	Date
[Signature]	[Insert Date]	[Signature]	[Insert Date]
Name Program Lead Engineer	Date	Name Program Financial Manager	Date
[Signature]	[Insert Date]		
Name Life-Cycle Management Commander or designee	Date		

CONCURRENCE

[Signature]	[Insert Date]	[Signature]	[Insert Date]
Name Program Executive Officer or designee	Date	Name Life Cycle Management Commander or equivalent	Date
[Signature]	[Insert Date]		
Name CAPDEV Representative	Date		

Figure 8–6. Life Cycle Sustainment Plan Acquisition Category IC & Major Automated Information System coordination (second page)

PROGRAM NAME - ACAT II & III LEVELS

LIFE-CYCLE SUSTAINMENT PLAN

VERSION [Insert #]

SUPPORTING MILESTONE [Insert #]

AND

[APPROPRIATE PHASE NAME]

[DATE]

OFFICE OF THE ASSISTANT SECRETARY OF THE ARMY, ACQUISITON LOGISTICS AND TECHNOLOGY APPROVAL

[Signature]	[Insert Date]
Program Executive Officer	Date

Figure 8–7. Life Cycle Sustainment Plan Acquisition Category II and III approval (cover page)

SUBMITTED BY

[Insert Name] [Insert Date]

Name Date
Product Support Manager

REVIEW

[Insert Name] [Insert Date] Name Date MATDEV Contracting Officer	[Insert Name] [Insert Date] Name Date MATDEV (Product) Manager
[Insert Name] [Insert Date] Name Date MATDEV Lead Engineer	[Insert Name] [Insert Date] Name Date MATDEV Financial Manager

CONCURRENCE

[Insert Name] [Insert Date] Name Date MATDEV (Program) Manager or designee	[Insert Name] [Insert Date] Name Date Life Cycle Management Commander or equivalent
[Insert Name] [Insert Date] Name Date CAPDEV Representative	

Figure 8–8. Life Cycle Sustainment Plan Acquisition Category II and III coordination (second page)

8–3. Life Cycle Sustainment Plan content

Completed fields in the tables are sample data. Actual data, depth of content and the size of each table will depend on the program and its requirements. Consult the appropriate MDA staff before developing the LCSP to ensure MDA expectations will be met.

a. Section 1—Introduction—Answer the questions.

(1) What is the specific purpose, scope, focus and objective for the version of LCSP?

(2) Who will use the LCSP?

(3) How will the LCSP be updated and the criteria for doing so to include timing of updates, update authority, approval authority for different types of updates, and what revisions have been made (list all) since the last LCSP review (see sample in table 8–1).

Table 8–1
Sample revision table

Revision number	Date	Change and rationale	Approved by
0.7	April 2008	Added results of CDR and changes	MDA
0.8	June 2008	Updated with results of PBAs	MDA

b. Section 2—Product support performance.

(1) Sustainment performance requirements—

(a) Provide a table that lists the sustainment requirements KPP and KSAs that are integrated into the design process (see sample in table 8–2).

(b) Identify where each requirement is satisfied in PSAs and the applicable performance metrics.

Table 8–2
Sample for sustainment performance requirements

Requirement (KPP, KSA, Derived Requirement)	Documentation	Threshold/ Objective	RFP/Contract	TES /TEMP	IOC	FOC	Full Fielding
Sustainment (KPP)	CDD (date)	70%/ 80%	RFP (date)	TEMP (date)	100%	100%	80%
Reliability (KSA)	CPD (date) MTBF:	1,000 hours/ 1,500 hours	NA	NA	1,000 hours	1,200 hours	1,500 hours

(c) Provide a table that breaks down the system-level metrics to the level of detail required to develop the product support plan and deliver the product support package (see sample in table 8–3).

Table 8–3
Sample for system-level metrics

Requirement	Lower Level Metric	Documentation	Standard or Level
Sustainment (KPP).	Nonmission Capable Supply, Customer Wait Time.	Identify appropriate documentation.	Identify appropriate standards or levels.
O&S Costs.	Manpower, fuel consumption.	Identify appropriate documentation.	Identify appropriate standards or levels.

(2) Demonstrated (tested) sustainment performance—

(a) For each sustainment metric in table 8-3 include a table (see sample in table 8-4) that portrays the sustainment assessments and tests including: operational assessments, development tests, operational evaluations, reliability growth tests, and LD.

(b) Data in this table must map to the T&E strategy (TES), TEMP, and SEP.

(c) Include information for the design feature, location in the design specification and contract, when and how demonstrated, impacted IPS element, planned metric value on which the product support strategy and product support package are based, demonstrated performance measure and gap to requirement, and current estimate at IOC.

Table 8–4
Sample for demonstrated (tested) sustainment performance

Metric / Feature	Contract Requirements	Demonstration Schedule	Requirement / IPS Elements Impacted	Performance Objective / Product Support Package Baseline Value	Estimated Value / IOC Estimate
Low observable coating on external surfaces	Identify contract requirements	Maintainability demonstration first quarter 2011	Maintenance, Training, Facilities, Publications	Repair 1 square foot area in 4 hours	Yeti tested value: 7 hours / 5 hours projected at IOC
All maintenance and operational sites performed within 15 foot ceiling	Identify contract requirements	Maintainability demonstration first quarter 2011	Facilities	15 feet	14 feet / 14 feet

c. Section 3—Product support strategy—

(1) Provide the product's standard reference design concept showing major sub-systems and features illustrated in a figure. The figure(s) must be consistent with the program WBS.

(2) Include a table (tailored to the program) listing the following sustainment strategy elements—

(a) Sustainment concept (maintenance including software support, and other major supply chain elements).

(b) Roles and responsibilities.

(c) Plans for acquiring technical data rights, software documentation and software license rights (see Intellectual Property Strategy).

(3) Provide an illustration as a figure that shows the sustainment concept. The figure must identify roles and responsibilities for PSPs, list the planned supply chain performance metrics, and any planned joint support to include the roles and responsibilities of the major agencies, organizations and contractors planned as part of the materiel's product support.

(4) Sustainment strategy considerations—Provide a matrix of considerations and cost drivers that impact affor- dability of the sustainment strategy (see sample in table 8–5). These elements must map to the appropriate documents (such as cost analysis requirements description (CARD), manpower evaluation report, concept of operations)).

Table 8–5
Sample for matrix of considerations and cost drivers

Consideration	Core documents	Cost driver	IPS Element / Control
Design			
Nuclear Hardening	System CARD: reference CDD (April 30, 2013): paragraph X	Specialized test equipment at field and depot	Design Interface, Maintenance, Training, Support Equipment / Flight controls and weapon control and delivery system shielded
Facilities			
Low Observable	System CARD: Operational Support Facilities CDD (April 30, 2013): Assets required to achieve IOC	One shelter for each assigned deployed asset One repair hanger per 12 assigned aircraft	Design Interface, Maintenance, Training, Support Equipment, Facilities / Low observable coatings require individual shelters and specialized operational and depot facilities

(5) Sustainment relationships—

(a) Identify relationships of organizations included in the product support strategy. List planned provisions to ensure completion by PSPs remains a viable option throughout the materiel's life cycle.

(b) Provide a figure showing the relationships of the PSM, PSI(s), and PSPs. Include field activities, support centers, integration activities, and other stakeholders as appropriate. Indicate required actions to establish relationships when they are not yet in place, to include the individual responsible and timeline when relationships are planned to be established.

d. Section 4—Product support arrangements—

(1) Contracts— Provide a table of the sustainment related contract efforts as part of the product support package (see sample in table 8–6). Data in the table must map to the AS and provide sustainment specific provisions to include: name and contract line item numbers (CLIN), products and period of performance covered (including remaining actions to achieve contract award), responsibilities, authorities and functions, metrics, and incentives.

Table 8–6
Sample for product support related contracts

Product support related contracts				
Contract name	Organizations	Products/timeframe	Responsibilities/authority and functions	Metrics and incentives
Sustainment Contract CLIN: XXX Type: (FFP)	Program Office X Jane Doe (276)-XXX–XXXX	Engine	Responsibilities: Integrate all design and product support efforts for engines including CM Functions: Supply support Publications Training Transportation	Supply availability of 85%

(2) PBAs—
(a) Provide a table that lists PBAs in place or planned (see sample in table 8-7).
(b) Include performance metrics and incentives.

Table 8–7
Sample for performance-based arrangements

Performance based arrangements				
Contract name	Organizations	Products/schedule	Responsibilities/authority and functions	Performance Metrics and incentives
PBA XXX	Names and relationships	Engine / include period of performance	Description of responsibilities, authority and functions	Identify metrics and incentives in the PBA
PBA XXX	Names and relationships	Engine / include period of performance	Description of responsibilities, authority and functions	Identify metrics and incentives in the PBA

e. Section 5—Product support package status—
(1) Program review issues and corrective actions—
(a) Provide a table that identifies all reviews in which the PSMIPT participates (see sample in table 8–8).
(b) Include the open and in-work findings from the reviews and corrective actions and completion dates.

Table 8–8
Sample for program review issues and corrective actions

Review	Findings	Corrective Action / Planned Completion Date
ILA (September 30, 2013)	CDA not completed	Finalize CDA / October 31, 2013
LCSP (January 27, 2013)	Excessive performance metrics identified driving higher cost	Update metrics to reflect what is required to provide needed performance / April 30, 2013

(2) Product support package assessment—
(a) Provide a table of assessment results for the product support package covering all IPS elements (see sample in table 8–9).
(b) Include the plan for resolving each of the issues identified in the logistics assessment, the individual responsible for resolving the issue, and specify the steps and schedule for closing each unresolved issue.

Table 8–9
Sample for product support package assessment

IPS Element	Assessment	Discussion / Issues	Corrective Action / Planned Completion Date
Product Support Management	Amber (use amber color graphic)	APSA is 6 months behind schedule	Finalize APSA / November 18, 2013
Supply Support	Green (use green color graphic)	Supply availability metric of 85% included in draft PBA for supply support to provide needed performance	Finalize coordination and acceptance of the PBA by (company or agency X) / June 30, 2014

f. Section 6—Regulatory and statutory requirements that influence sustainment performance—

(1) Provide a table that lists all statutory and regulatory requirements that impact the sustainment of the materiel and office of primary responsibility (OPR) for ensuring compliance (see sample in table 8-10).

(2) Include those statutory and regulatory requirements that potentially affect sustainment performance.

Table 8–10
Sample for regulatory and statutory requirements that influence sustainment performance

Requirement	Documentation	OPR	Start Date / Implementation Date	CLIN	Review cycle	Affected performance metric
CLA	10 USC 2464	Program office X	January 15, 2013	XXX	MS A	Availability and O&S cost
PPP	10 USC 2474	Program office X	August 28, 2015	XXX	MS C	Sustainment KPP Reliability KSA

g. Section 7—Integrated schedule—

(1) Provide a detailed, integrated, life cycle schedule that is consistent with the program integrated master schedule, and that emphasizes the next acquisition phase. At a minimum include—

(a) Planned significant program activities that must be performed to produce the materiel (program and technical reviews, RFP release dates, software releases, key developmental, operational and integrated testing, production lot and phases, contract award including bridge contracts and sustainment contract awards, long-lead or advanced procurements, and performance agreements).

(b) Major logistics and sustainment events for each of the IPS elements with specific emphasis on the materiel and data development and deliveries. Include dependencies on applicable key sustainment planning documents (reliability growth plan, APSA, maintenance plans, CLA, DSOR analysis, training plan, diminishing manufacturing sources and material shortages plan, source repair assignment process, corrosion and prevention control plan, and planned post-implementation and post-IOC reviews).

(c) Major activation activities for sites in the supply chain required to support the materiel, to include maintenance sites (including activating core capabilities), software support, and training sites. Include events for ICS, and hardware (including support, test equipment, training devices).

(2) Incorporate the integrated schedule as a figure in the LCSP.

h. Section 8—Funding—

(1) Identify the life cycle sustainment logistics requirements for all appropriations.

(2) Identify the program's major sustainment funding requirements, the documentation of those requirements (for example program office cost estimate, Service cost estimate, independent cost estimate, System Sustainment Technical Support, and Post-Production Software Support) and the current budget documentation (for example POM and President's Budget (PB)). Funding must be traceable to the "Investment Program Funding and Quantities" chart in the program's AS template.

(3) A sample of one of the types of appropriations is in figure 8–9.

Template version PB 12.6	Program Funding and Quantities										
($ in Millions / Then Year)	Prior	FY 10	FY 11	FY 12	FY 13	FY 14	FY 15	FY 16	FY 12-16	To Complete	Program Total
Appropriation (RDT&E)											
Prior $ (PB 11)	75.8	6.0	8.2	9.9	9.9	0.0	0.0	0.0	27.0	0.0	**138.7**
Current $ (PB 12)	88.5	5.0	4.2	6.0	6.5	3.2	1.3	0.0	28.2	0.0	**137.2**
Delta $ (Current - Prior)	1.6	(.9)	(.7)	(.8)	3.2	1.3	(.9)	0.0	2.7	0.0	**(1.5)**
Required $	88.5	6.5	7.9	9.9	3.2	4.5	1.3	0.0	27.0	0.0	**140.3**
Delta $ (Current Required)	0.0	(.7)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**(5.2)**

Figure 8–9. Sample for program life cycle sustainment specific funding and quantities chart

i. Section 9—Management—

(1) Organization—

(a) Provide the planned program office organization structure as a figure with expanded detail on the product support function.

(b) Include an as-of-date and the organization to which the program office reports, the MATDEV, PSM, functional leads, core, matrix and contractor support personnel, field or additional service organizations, and legend as applicable (for example, color coding).

(c) Provide the PSM information to include name, office symbol, and contact information.

(2) Program office product support staffing levels—

(a) Summarize the program's product support staffing plan that shows the requirements for full-time equivalent positions (for example organic, matrix support, and contractor full-time equivalent positions) by key program events (for example MS and technical reviews).

(b) Provide supporting tables that breakout the positions by numbers (both authorized and assigned), position type, and major functions performed.

(3) Contractor(s) program office organization—

(a) Provide diagrams of the contractor(s) program office organization.

(b) Include contractor(s) staffing plans.

(4) Product support team organization—

(a) Provide a figure showing all IPT organizations (including government personnel and contractors assigned to sustainment related IPTs, working IPTs, and working groups). Show the vertical and horizontal interrelationships among the IPTs. Identify leadership for all teams.

(b) Provide IPT details in a table that includes IPT name and effective dates, point of contact, and contact information, functional team membership, IPT roles, responsibilities and authorities, IPT products, and IPT-specific metrics. A sample is in table 8–11.

Table 8–11
Sample for product support integrated process teams

Team name	Point of contact	Team Membership (by Function or Organization)	Team Role, Responsibility, and Authority	Products and Metrics
Program Name PSMIPT	PSM Jane Doe (703)-XXX-XXXX	Describe all team membership by function or organization	Describe the PSMIPT purpose, member responsibilities and authority, schedule and frequency of meetings, date of signed charter	Describe all deliverables and metrics
PPP	PSM Jane Doe (703) XXX–XXXX	Describe all sub-IPT membership by function or organization	Describe the PSMIPT sub-IPT purpose, member responsibilities and authority, schedule and frequency of meetings	Describe all deliverables and metrics

(5) Management approach—

(a) PSM roles and responsibilities should include a list of interfaces, deliverables and dependencies that the PSM and logistics staff must coordinate with other functional organizations to ensure that sustainment is aligned with program design, program management, and test reviews. List the program processes through which the PSM must integrate design and program decisions with sustainment considerations.

(b) Provide the PSM's specific roles, responsibilities, and authorities. Specify how the PSM will accomplish their roles and responsibilities (develop a PBPSS, leverage competition and DOD resources, develop and implement PBAs, identify required resources, assess and adjust resource allocations and performance requirements, conduct PBPSS reviews, validate APSAs, participate in IPTs, lead the PSMIPT.

(c) Provide the PSMIPT's specific roles, responsibilities, and authorities. Specify how the PSMIPT will support the PSM in accomplishing the PSM mission.

(d) Specify the sustainment risk management process. Indicate roles, responsibilities, and authorities for reporting and identifying risks, determining the criteria under which the risks are defined and categorized (typically based on probability of occurrence and consequence), adding and modifying risks, changing likelihood and consequences of a risk, and closing or retiring a risk. If risk review boards or risk management boards are part of the process, identify the chair, participants, and meeting frequency. If the program office and contractor(s) use different risk tools, identify the means by which information will be transferred among them. Use of the same tools is recommended. Provide a table that lists key risks identified in reviews. A sample is in table 8–12.

Table 8–12
Sample for identified risks

Risk	Risk rating	Driver	Mitigation plan	Status
Schedule	Medium	Initiate PBA by IOC	Expedite draft PBA and coordination with potential PSPs	Draft PBA completed and waiting response from interested PSPs due by August 14, 2014
Cost	High	Depot test equipment cost $75M for low density component	Conduct MI for alternative test equipment / explore PPP opportunities	MI in-process for alternative test equipment and PPP opportunities. MI to be completed June 18, 2014

j. Section 10—Product support analysis—

(1) Design interface—This section must match the SEP so the logistics community can reference one document for the FMECA to ensure a common understanding of failure modes.

(2) Design analysis—In table form, for each of the major or critical subsystems provide the details from the FMECA for materiel (break into subsystems as needed to highlight subsystems with reliability drivers or reliability issues), schedule (including planned updates), list subsystems, and modes driving changes to the baseline product support package, and impact on product support strategy or product support package baseline change. A sample is in table 8–13.

Table 8–13
Sample for failure mode effects and criticality analysis

Materiel	Schedule	Issues/likelihood	Impact/comments
Airframe IPT Lead	Complete update after IOT&E	New failure modes discovered due to projected corrosion issues around engine inlets Fuel tanks moved	Ensure there are sufficient doors and panels to allow accessibility to critical areas Verify fuel tanks are not adding stress to bulkheads during operations
Avionics IPT Lead	Complete prior to CDR	New failure modes discovered which current health monitoring systems cannot detect	Design out diagnostic ambiguity groups that cause false alarm rates taking into account the new failure modes

(a) Reliability growth plan issues—Provide a table that lists the results of the system engineering analysis efforts. The information must link with the current reliability growth plan and include the product support plan driver system, planned value in the reliability growth plan and corresponding de-rated value on which the product support strategy or package is based, current reliability estimate (measured and degraded) at IOC, confidence level that the target will be met, mitigation, and if the target is not reached, a trigger for action required to ensure the program remains on schedule. A sample is in table 8–14.

Table 8–14
Sample for reliability growth plan issues

Materiel	Planned / De-rated Values (failures per operating hours)	Estimate at IOC	Confidence Level	Migration efforts
Avionics system	.01/.15	.01/.25	50%	Buy additional spares Decision required at MS C
Rotor blades	.01/.15	.1/.10	50%	Buy additional spares Decision required at MS C

(b) Completed supportability trades—Provide a table that lists the major supportability trade studies that have been completed since the last LCSP update. Include in the table the trade study name and date completed, the lead IPT, options analyzed, criteria used to evaluate costs and benefits, results, and impact on the materiel design, product support strategy and package. A sample is in table 8–15.

Table 8–15
Sample for completed supportability trade studies

Completed supportability trade studies
July 27, 2012

Trade Study (Completed since 11/18/10)	IPT	Options analyzed	Results	Impact
Engine level of repair May 20, 2008	Engine IPT	Alternatives: 2 or 3 levels of repair Commercial or organic at second or third level Criteria: Materiel Availability and Operational Availability Program costs and O&S costs	3 levels of maintenance with second level being performed commercially at 3 central sites for hot sections Third level performed by industry	Competitive second and third level performance-based contract in place by IOC to cover all sustainment functions (for example design, maintenance, supply, transportation Complete drawing set needed for competition

(c) Planned supportability trade studies—Provide a table that lists the major upcoming trade studies to be conducted prior to the next MS and major trade studies in subsequent phases. Include the trade study name, lead IPT, alternatives to be analyzed and timeframe, objective, and criteria used to evaluate costs and benefits. A sample is in table 8–16.

Table 8–16
Sample for planned supportability trade studies

Planned Supportability Trade Studies
July 27, 2012

Trade Study	IPT	Options analyzed	Results	Impact
Engine sustainment capabilities	Engine IPT	January 2010 January 2011	Determine lowest LCC cost solution considering the risks associated with rapid change in technology while meeting the overall Materiel Availability	Alternatives: Commercial, PPP, or organic sustainment Best blend between sustainment functions (for example, design, maintenance, supply, transportation Criteria: Materiel Availability and Operational Availability Program costs and O&S costs
Avionics sustainment capabilities	Avionics IPT	January 2010 January 2011	Determine lowest LCC cost solution considering the risks associated with rapid change in technology while meeting the overall Materiel Availability	Alternatives: Commercial, PPP, or organic sustainment Best blend between sustainment functions (for example, design, maintenance, supply, transportation Criteria: Materiel Availability and Operational Availability Program costs and O&S costs

Post MS C Supportability Trade Studies
July 27, 2012

Table 8–16
Sample for planned supportability trade studies—Continued

Engine repair locations	Engine IPT	January 2014 - January 2015	Determine best locations for maintenance	Continental Unites States or Outside the Continental United States or mix International partners Criteria: Materiel Availability and Operational Availability Program costs and O&S costs

(3) Technical reviews—Provide a table that identifies information for each of the technical reviews identified in the SEP. Include the technical review schedule, review participants, sustainment related focus area, entry and exit criteria. A sample is in table 8–17.

Table 8–17
Sample for technical reviews

Review	Sustainment participants	Sustainment Focus	Criteria
Preliminary Design Review Second Quarter 2009	PSM PSA IPT Lead	Fire Control System prognostics capability Airframe access panel locations for corrosion control	Entry: TEMP Exit: Test criteria for operational testing Updated schedule
CDR Fourth Quarter 2010	PSM PSA IPT Lead	Fire Control System prognostics capability Airframe access panel locations for corrosion control	Entry: TEMP Exit: Test criteria for operational testing Updated schedule

(4) Product support element determination—Provide a table that identifies the PSA methods and tools (including the APSA) used to define the elements that comprise the product support package. Include the PSA processes addressed, schedule (identify when the tool will be applied and on what portion of the materiel), tools, output product, and product review or update timeframes. A sample is in table 8–18.

Table 8–18
Sample for product support analytical support methods and tools

Product Support Analytical Support Methods and Tools July 27, 2012				
Process / Analyst	Schedule	Tool	Output product	Update timeframe
Maintainability Analysis and Prediction / John Doe	February - April 2010	Identify guidance documents to be used	Maintenance Concept	October - November 2010
LORA	February - April 2010	COMPASS	Repair versus Discard and level of repair decision	MS C

(5) Sustaining engineering—Provide a table that lists the tools that will be used to monitor the performance of the product support package. Include the monitoring tool, OPR, metrics and data monitored and the frequency, feedback mechanism (including the method for highlighting to senior management the consequences and impacts on the sustainment KPP and KSAs of budget constraints), and the performance review timeframes. A sample is in table 8–19.

Table 8–19
Sample for sustainment performance data collection and reporting

Sustainment Performance Data Collection and Reporting				
Tool	OPR/IPT	Metrics / Data Monitored	Feedback Mechanism	Review Timeframes
SQC	PSM	Materiel Availability, Operational Availability, Reliability, MDT, O&S costs	Automatic updates to PEO and MDA through X (name) automated information system(s)	Quarterly
Post IOC review	PSM	Logistics assessment elements	Feedback from operators, PSIs and PSPs	Even years

k. Section 11—Additional sustainment planning factors— Provide a list of additional sustainment issues or risks that cross functional lines that could adversely impact sustainment or sustainment support across the materiel's life cycle that are not included elsewhere in the LCSP. Provide a summary of Post-Production Support Planning. If the topic is addressed in another document, provide a short summary and reference the source document. Also, provide a list of precious metals requiring recovery, items that are classified, export controlled, pilferable, or require special handling.

l. Annexes—The annexes to the LCSP include required annexes and additional annexes tailored to each program. The following annexes must be included in the LCSP—

(1) Annex A—Depot Level Maintenance Analyses and Determinations (at MS A, B, and C).
(2) Annex B—APSA (at MS A, B, and C).
(3) Annex C—Independent Logistics Assessment (ILA) Report, for ACAT I and II programs, (at MS A, B, and C).
(4) Annex D—Replaced System Sustainment Plan, for MDAPs only, (at MS B).
(5) Annex E—Computer Resources Life Cycle Management Plan (CRLCMP) (at MS B and C).
(6) Annex F—System DEMIL Plan (at MS B and C).
(7) Annex G—Preservation and Storage of Unique Tooling, for MDAPs only, (at MS C).
(8) Annex H—MFP(s) (at MS C).
(9) Annex I—Plan for MR (at MS C).
(10) Annex J—Post Production Support Plan (at MS C).
(11) Annex K—ICS to Objective Support Concept Transition Plan (no later than two years following the FPDR).
(12) Annex L—Sustainment Quad Chart (SQC) (at each program review).
(13) Annex M—Support Facility Annex.
(14) Additional annexes may be added at the PSM's discretion.

8–4. Maintenance support planning

a. Maintenance support planning is an integral part of the IPS process. Maintenance support planning is based on the Army's maintenance concept (see AR 750–1), the materiel requirements contained within the CRD, and the PSA which are used to develop the maintenance support plan. In developing alternatives and selecting a final maintenance concept, the MATDEV, in coordination with the CAPDEV, will evaluate factors such as—

(1) Compatibility with the Army maintenance system (present and planned).
(2) Complexity and criticality of the materiel and its software.
(3) Mobility and transportation requirements.
(4) Operational readiness objectives.
(5) Operational and logistics environment in which the materiel will operate.
(6) Support concept for subsystems.
(7) Projected O&S cost.
(8) Resource requirements.
(9) Opportunities for using CBM+.
(10) Requirements for ready to fight, maintenance float, warranty, Army Oil Analysis Program, TPF, weapon system designator code, maintenance expenditure limit, and DEMIL and disposal instructions.
(11) Availability of technical data and software license rights.
(12) CPC.

b. The maintenance support plan should be detailed in the LCSP and updated as required to ensure alignment with the applicable IPS evolution.

8–5. Logistics footprint

The Army's goal is for materiel to have the smallest logistics footprint needed to effectively provide product support. Implementing the Army's goal begins with the materiel design process and continues throughout the life cycle. The government and contractor size or "presence" of logistics support required to deploy, sustain, and move materiel should be minimized through IPS planning. The O&S cost for materiel is greatly increased when IPS planning does not include maximum use of common Army tools, test equipment, batteries and battery chargers. All MATDEVs must ensure that IPS planning minimizes the requirements for special tools, test equipment and unique components.

8–6. Special tools

Special tools provide required capabilities at the field level of maintenance beyond those found in the Army's common tool sets, kits, outfits, and tools (SKOT). They are designed to perform a specific task for use on a specific end-item or component of an end-item. These tools differ from common tools, which are used on multiple end-items and found in SKOTs as authorized by a supply catalog. Currently, special tools are provided by each individual MATDEV fielding new equipment and authorized by the repair parts and special tools list within the end-item's technical manual. Special tools have expanded the footprint of maintenance units, increasing operations and sustainment costs and creating a challenge to account for, locate, transport, store, and access them to effect timely repair on the battlefield. Maintenance CAPDEVs are the authorities for special tools and determine whether system or commodity-based strategies will be pursued. They assign the commodity grouping based on their portfolios and the maintenance tasks involved. Maintenance CAPDEVs are the U.S. Army Combined Arms Support Command for ground maintenance special tools, U.S. Army Aviation Center of Excellence for aviation maintenance special tools, and U.S. Army Medical Command for medical maintenance special tools. MATDEVs and CAPDEVs work with central tool managers (CTM) to ensure requirements for special tools are reviewed to eliminate redundancy. The Army CTMs are the Program Manager (PM) of SKOTs for all ground systems, PM Aviation Ground Support Equipment for all aviation and aviation support systems, and PM Medical Devices for medical and medical support systems.

8–7. Provisioning plan

The SYSPARS provides a PP module to aid MATDEVs in plan preparation. See AR 700–18 for provisioning policy.

8–8. Depot maintenance partnerships

a. MATDEVs are to develop PBPSSs that optimize public and private sector capabilities through government and industry partnering initiatives (see 10 USC 2474). The MATDEV, with support from the PSM and PSMIPT, is responsible for identifying and describing opportunities for DLM partnerships between the government and industry in the AS.

b. There are various types of partnerships that may be established, including work share agreements, facilities sharing arrangements, private or public depot equipment and facilities leases, and joint private-public contracts with a MATDEV.

c. Some of the many benefits of depot maintenance partnerships to the Government are—

(1) Increased DLM productivity.

(2) Reduced LCC.

(3) Reduction in excess infrastructure.

(4) Improved responsiveness to the Soldier.

(5) Built-in surge capability.

(6) Critical skill integration.

(7) Workforce stability.

(8) Focus on core competencies.

(9) Access to the most current business practices and techniques.

d. It is important that MATDEVs include available options for DLM partnerships in the PBPSS and LCSP.

8–9. Recapitalization Program

a. The Army Recapitalization Program is a key element in the modernization and sustainment of the Army's legacy force and an essential enabler of the Army's transformation to the objective force. The goals of recapitalization are—

(1) Extend materiel service life.

(2) Reduce growth in O&S costs.

(3) TI.

(4) Increased RAM and safety.

(5) Reduction in logistics footprint.

b. There are two types of recapitalization programs in the Army—

(1) Rebuild program, in which the materiel is restored to a like-new condition in appearance, performance, and life

expectancy. Some new technology may be inserted to reduce LCC or improve readiness, supportability, or safety. In a rebuild program the restored materiel maintains the same model number.

(2) Selected upgrade program, in which the materiel is not only rebuilt, but also receives upgrades which provide significant improvements in warfighting capability that are designed to address shortcomings in an approved CRD. Given the nature of the upgrades, the selected upgrade materiel receives a new model number.

c. If approved by the AAE and Vice Chief of Staff of the Army, the MATDEV must develop a recapitalization program baseline (RPB) for the materiel. The RPB serves as the management plan for the recapitalization program and includes a description of the "build to" configuration of the materiel along with the cost, schedule, performance, and supportability objectives. The RPB includes information on the following areas:

(1) Recapitalization program description as approved.

(2) Funding schedule including unit cost and LCC.

(3) Recapitalization schedules in terms of rebuilds per year.

(4) Metrics for assessing the effectiveness of the recapitalization process.

(5) Recapitalization partnerships and contracts including responsibilities.

(6) Test plans including facilities requirements and test dates.

(7) The performance-based product support approach is a critical component of the recapitalization program and includes a performance plan and agreements with PSPs and Soldiers and the application of a performance measurement system.

8–10. Depot Maintenance Support Plan

a. The DMSP provides the information necessary to plan, program, budget, coordinate, and schedule manpower, personnel, training, facilities, and equipment requirements for DLM. It provides a forecast of DLM workload, procedures for conducting the pilot overhaul or other first article test, and product assurance requirements. The DMSP also contains a time-phased schedule for the development of DLM capability for Army organic and any contractor provided capability.

b. The MATDEV prepares, coordinates, and approves the initial DMSP in the EMD Phase, but no later than the MS C decision. Early development of the DMSP ensures the timely identification of resource requirements for DLM. The resources are normally established during the Production and Deployment and O&S Phases to ensure the timely stand-up of required capabilities.

c. A DMSP is prepared for each materiel for which DLM support is required. The DMSP includes requirements for Army organic, continental United States (CONUS) and outside of the continental United States, contractor, host-nation support, and interservice support as set forth in the DLM study, depot maintenance inter-service (DMI) study, or PSA efforts.

d. The AMC national maintenance point and the PSMIPT participants are included in the coordination and evaluation processes for the DMSP and subsequent updates. The assigned depots provide vital capability data as well as a technical evaluation of the DMSP.

e. The DMSP is part of the IPS planning process. The approved DMSP enables DLM program implementation.

f. The DMSP is an Army-unique document and does not normally require coordination with the other services. However, for Joint Service programs and those using inter-service support, the MATDEV will coordinate the DMSP with the logistics representative(s) of the other services involved. A tailored coordination and distribution list will be developed and included as an annex to the DMSP.

g. The DMSP is a living document. Each section is updated by the MATDEV as new information becomes available to the PSMIPT, the user, or the depot, such as when changes warrant realigning manpower, personnel, training, or other support requirements. For materiel developed without organic depot maintenance support (ICS or CLS), the PSM and PSMIPT must conduct annual reviews of the DMSP to determine whether supportability issues warrant a change in the maintenance concept, including establishing organic DLM capability.

h. The MATDEV provides the initial DMSP and subsequent revisions to the depot and each addressee on the tailored coordination and distribution list.

i. The preparing office retains copies of all iterations of the DMSP until the materiel is fully supported as required by the approved maintenance concept. The MATDEV retains responsibility for the DMSP throughout the life cycle.

j. A DMSP contains the 10 sections listed below and any necessary annexes. The following provides detailed guidance on the contents of each section of a DMSP—

(1) Section I–Introduction.

(a) Purpose. Provide a brief statement on the anticipated uses of the DMSP. Summarize the planning actions to date that have been initiated or completed to establish a DLM capability. Include references to the depot maintenance support and PSA level of effort.

(b) Materiel description. Describe the materiel being acquired. Provide a separate description for each major and secondary item that is a depot maintenance candidate. Include all applicable information, to include nomenclature,

NSN, LIN, and model number (LIN and model number optional for secondary items). Identify any items being replaced by the new materiel.

(c) Key personnel. Identify all participating organizations and provide point of contact information for the individuals with a role in the development and execution of the DMSP. Point of contact information will include the individual's name, mailing and e-mail addresses, defense switching network and commercial telephone numbers, facsimile number, and alternate point of contact information.

(2) Section II–Scope.

(a) Maintenance concept. Describe the DLM concept aligned with the approved AS, and LCSP. Define the type of depot maintenance to be performed (for example, repair, and overhaul) and the extent of maintenance to be performed (such as complete overhaul, and limited overhaul).

(b) Applicability. Identify the organizations to which the DMSP applies including the MATDEV, national inventory control point, national maintenance point, DLM providers, contractor(s), and other service participants. State the planning years to which the DMSP applies; at a minimum include the fiscal year that depot maintenance capability is to be achieved and the next 4 out-years.

(c) Interservice support decision. Indicate methods used to satisfy the requirements of the Joint Logistics Commanders' directions for DMI. Provide for the DMI process a MS schedule that includes dates of DMI introduction, program and technical data availability, Army candidate depot designation, industrial activity capability and capacity response submission, DMI recommendation and decision, prime depot assignment, and preparation of depot maintenance interservice support agreement(s) (if applicable). Identify the DMI study number and DMI agreement number when assigned.

(d) Life cycle contractor support. Describe any planned LCCS and obtain LCCS. Document the LCCS approval date. Summarize transition planning for potential conversion to organic support or PPPs. Sections V through X of the DMSP may be used to facilitate LCCS planning. Identify each reparable component under LCCS by nomenclature, NSN, location of contractor facility responsible for complete repair, anticipated repair costs, efforts planned to develop competition for the component repair, and required Army organic depot actions.

(e) Interim contractor support. Describe any ICS planned for the materiel. Fully document the circumstances that require the use of ICS. Sections V through IX of the DMSP may be used to facilitate ICS planning. Identify each reparable component under ICS by nomenclature, NSN, location of contractor facility responsible for complete repair, candidate depot, projected date the transition to Army organic depot support will be completed and expected depot actions.

(f) Transition. Identify the required DLM capability dates (for example, inter-service to Army organic, LCCS sole source to LCCS competitive, ICS to Army organic). Attach detailed transition plans, including milestones, as an annex to the DMSP. Identify the candidate depot.

(g) Reparable components. List items identified through the PSA process. Include in the identification of each item the nomenclature, NSN, SMR code, and, where possible, an illustration.

(h) Warranty data. Identify items covered by warranty, procedure for implementing and administering the warranty, and expected depot actions.

(i) Licenses, approvals, agreements for special handling. Identify any special licenses, approvals, or agreements required (for example, a Nuclear Regulatory Commission license for radioactive material). Indicate whether any of the technical data or procedures will be classified, and identify where that data may be obtained. Include unique disposition instructions for non-reparable, unserviceable components (for example, DEMIL, HAZMAT, or hazardous waste disposal).

(j) Section III–References. Publications pertinent to the DMSP are listed in this section in the following sequence:

1. Administrative publications.

2. Directives include letters of instruction, MOA, and similar guidance.

3. Source of data. Identify any plans or other documents used to provide input to the DMSP such as the TEMP and the DLM study. Cross-reference these sources to the appropriate section of the DMSP. Describe methods used to develop requirements, forecasts, costs, or other data in the DMSP from these sources.

4. Equipment publications. List the publication numbers of the TMs, DMWRs, NMWRs, and other publications that support the materiel. If no EPs are available, so state. If contractor manuals are to be used in lieu of Army authenticated publications, list the manufacturer's manual number, manual publication date, and source information.

5. Equipment specifications. Include specifications required for overhaul and fabrication not provided in other technical documentation.

(k) Section IV–Forecast of overhaul workload. Forecast of Army organic, contract, and inter-service depot level repair or overhaul (maintenance) workload is based on the PSA and data sources documented in LPD. Sufficient detail is provided to establish the basis for depot maintenance capability for—

1. Peacetime. Include all projected DLM workload. As a minimum, project the depot maintenance workload for the fiscal year depot capability is to be achieved plus four out-years.

2. Modifications. For modifications, identify depot workload for modification or conversion and concurrent overhaul or inspect-and-repair programs. This is to be done in addition to the follow-on overhaul forecast.

3. Mobilization. Determine mobilization maintenance workload at the depot level in accordance with AR 700–90.

(l) Section V–Facility requirements. Include electrical, mechanical, and industrial requirements necessary to stand-up capability at the depot to repair LRUs and end items. Electrical requirements will state the power, voltage, phases, cycles, alternating current or direct current, and amperage. Mechanical requirements will state the hydraulic, pneumatic, cleanliness levels, clean room, and laminar flow necessities. Industrial requirements will include plant layouts, work station layouts, storage areas, square footage, height and material handing equipment (MHE) necessary for LRU and end item repair. Include—

1. Military construction, Army funded projects. When no existing facilities are available to satisfy the needs of the materiel as determined by the SFA, provide plans and schedule for new construction project processing, costing, and reporting, and execution in accordance with AR 420–1 and AR 700–90. In a detailed funding profile in this section, identify the fiscal year funding that is required, and type of funding. State whether the project is funded or unfunded. Include a cost summary in the consolidated funding profile (section IX of the DMSP). If not applicable, so state.

2. Modifications to existing facilities. When use of existing facilities depends upon modification or conversion, provide plans and associated schedule for project processing, costing, reporting, and execution (see AR 420–1 and AR 700–90). In a detailed funding profile in this section, identify the fiscal year of funding, type of funding, and category of funding (such as alteration, conversion). State whether the project is funded or unfunded. Include a cost summary of section IX. Provide statement of impact of modification on ongoing operations at the facility. If not applicable, so state.

3. Expansion of facilities. When the use of existing facilities depends upon expansion, provide plans and schedule for project processing, costing, reporting, and execution (see AR 420–1 and AR 700–90). In a detailed funding profile in this section, identify the fiscal year funding that is required, and type of funding (for example, addition). State whether the project is funded or unfunded. Include a cost summary in section IX of the DMSP. Provide a statement of impact of expansion on ongoing operations at the facility. If not applicable, so state.

4. Flow chart and layouts. Provide layouts depicting the facilities required for support of the materiel, and indicate the location of installed equipment within these facilities. Also provide flow charts depicting the movement of the materiel and components through the designated facilities during overhaul operations based on the workload projections in section IV.

(m) Section VI–Equipment requirements. Identify all equipment required to support depot operations for the materiel. Include—

1. Test, measurement, and diagnostic equipment. Identify TMDE items to be obtained with Army stock fund or procurement appropriations funds or from excess plant equipment stocks. Based on the approved 5-year maintenance workload projection given in section IV, identify the TMDE requirements by depot and include NSN, commercial and government entity code and part number, unit acquisition cost, required quantity, and estimated utilization rate. When all or part of the TMDE requirement can be satisfied with existing equipment available at the depot or from excess sources, identify the quantity available. If the requirement cannot be totally satisfied through the reallocation of existing equipment, outline plans to procure the additional TMDE and identify those items in a detailed funding profile. Include a cost summary in the consolidated funding profile (section IX).

2. Automatic test equipment. Identify ATE requirements and list them in a detailed funding profile. Include a cost summary in section IX. If a waiver to the Army standard ATE policy is required, provide a MS plan for obtaining the waiver from the AAE. Include the waiver approval document as an annex to the DMSP.

3. Special tools. Identify special tools (with quantities) required to perform tasks identified through the PSA process. When all or part of the special tools requirement can be satisfied with existing tools available at the depot or from excess sources, identify the quantity available. Identify special tools to be fabricated by the depot and cite applicable technical documentation. If the requirement cannot be totally satisfied through the reallocation of existing tools, outline plans to procure the additional tools and obtain funding for tool fabrication. Identify those requirements in a detailed funding profile in this section, and include a cost summary in section IX.

4. Test program set. For each reparable component requiring a TPS, identify the unit under test (UUT), the UUT-TPS maintenance concept, and supporting ATE systems. Include the TPS management plan and TPS transition plan as annexes to the DMSP. When the depot is required to develop TPS from technical requirements documents, indicate action required to assure compatibility of computer software and hardware at depot with contractor-prepared technical requirements documents. Provide detailed funding profile in this section and include a cost summary in section IX.

5. Other software. Identify required software changes to maintenance equipment and interconnecting devices required to test materiel on existing test stands and benches. Identify the source of these requirements. Provide a detailed funding profile in this section, and include a cost summary in section IX.

6. Material handling equipment. Identify materiel-peculiar MHE required for all depot operations, including receipt, induction, and issue. Indicate whether equipment is available at the depot or must be acquired. Provide a detailed funding profile in this section and include a cost summary in section IX. Indicate whether the requirement is funded or unfunded.

7. Calibration. Define the requirement for TMDE calibration and the coordination that must be effected with the

TMDE activities to obtain calibration support and acquisition approval in accordance with AR 750–43 and the supportability statement required for TMDE acquisition. Provide a detailed funding profile in this section and include a cost summary in section IX of the DMSP.

8. Industrial plant equipment. Identify the IPE required to support the materiel. Indicate if all or part of the required quantity is available from excess plant equipment sources (for example, Defense General Supply Center, Richmond). Identify items by plant equipment code and NSN, commercial and government entity code with part number (if applicable), unit acquisition cost (including shipping and installation costs), required quantity, and estimated utilization rates. Provide a detailed funding profile for obtaining required IPE in this section. Include a cost summary in section IX of the DMSP.

9. Other special equipment. Identify other equipment required to obtain full depot capability (such as laminar flow benches, laser welder, granite table, curing oven (autoclave)) for the materiel. Identify the source for each item. Provide a detailed funding profile in this section, to include a cost summary in section IX.

(n) Section VII—Personnel and skill requirements. Identify requirements for training by depot including the number of personnel to be trained, course start and completion, course location, cost, and whether this training is funded or unfunded. Include a cost summary in seciton IX of the DMSP. Describe plans to ensure depot training requirements are included in the NETP (see AR 350–1). Describe unusual or special skill requirements identified during materiel development, such as electro-optic repair or composite material repair. Identify the specific source from which the skill requirements originated (for example LPD).

(o) Section VIII–Pilot program. Address performance of depot maintenance on first asset inducted into the depot—

1. Pilot overhaul. Provide plans, schedules, and costs to accomplish overhaul objectives. Include the following information for the end item(s) and all secondary reparable components by depot: NSN, nomenclature, FY and type of funds, procurement request order number, work accomplishment code, direct labor man-hours per unit, direct labor cost per unit, material cost per unit, total unit cost, and total quantity. Provide detailed funding profile for the pilot program. Do not include costs previously identified in sections V through VII. Do not forget to include the pilot overhaul as a critical MS in the time-phased MS schedule in section X.

2. Confirmation of capability. Successful completion of a pilot overhaul will certify depot capability. Define quality assurance requirements. Identify plans for correcting any deficiencies and assessing the impact on achieving depot capability.

(p) Section IX–Consolidated funding profile. Provide a consolidated funding profile that summarizes the resource requirements identified in sections V, VI, VII, and VIII. Provide detailed cost data in the appropriate section (section V through VIII) for each depot level support element.

(q) Section X–Time-phased schedule. Establish a time-phased MS schedule for development and implementation of sections V, VI, VII, and VIII, including any projected mobilization planning requirements.

(r) Annexes. While sections I through VIII will primarily be in narrative form, detailed quantitative or tabular information is also often required to provide a meaningful document for planning and implementing depot maintenance capability. Any detailed plans or other information needed to support any portion of the DMSP are included as annexes to the DMSP.

8–11. Software support planning

a. Software support planning should be conducted prior to fielding. Planning includes the software portion of the LCSP, the CRLCMP, the computer resources integrated support document, the software support concept, software-related technical data, software quality evaluation procedures, and a software support transition plan.

b. Planning and managing software development and supportability are among the most difficult challenges facing the MATDEV. Support of software is as important as support of the hardware. More than two-thirds of DOD’s expenditures for software are for PPSS. No major weapon materiel can operate on today’s battlefield without a software capability and no aspect of any Soldier’s life is untouched by software. As with the hardware, software supportability considerations include technical data, personnel, training, special support equipment and CM. However, software support requires specialized expertise (such as a software engineering center) and software support activity).

c. The MATDEV, with support from the PSMIPT, must ensure that the software is supportable in the operational environment by successfully planning and implementing PPSS. PPSS is the sum of all activities required to ensure that a mission critical computer system continues to function properly in performing its operational mission, and readily accommodates both mission and production upgrades.

d. The application software programs for materiel computers which may be embedded, standalone, or networked are generally known by personnel involved in an acquisition program. These are represented above the waterline on the software iceberg (see fig 8–10). However, there are many support requirements (shown below the waterline in the illustration) for that software. The PSM and PSMIPT must ensure adequate software supportability, including adequate support equipment, maintenance software, technical data, personnel, resources and procedures, is available to facilitate—

(1) Modifying and installing software.

(2) Establishing an operational software baseline.

(3) Meeting user requirements.

e. Equipment such as software simulators, editors, compilers, test equipment, documentation, and other software tools must be procured with the materiel. MATDEV's must ensure that the contract includes all the necessary software support equipment.

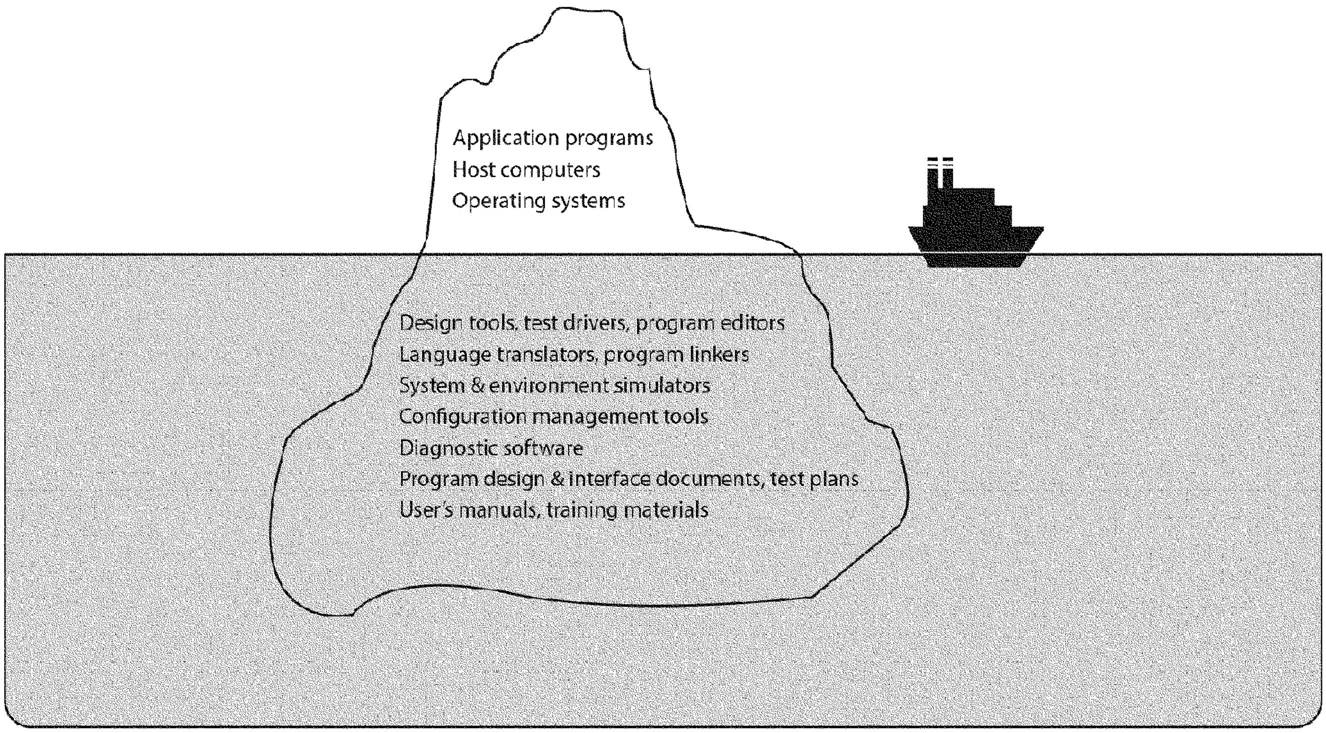


Figure 8–10. The software iceberg

f. The software support development process must include support requirements, design for supportability, and alternatives for lowering supportability risk and cost. The PSM will need support from the PSMIPT, acquiring organization, software engineering activity, software support activity, and the CAPDEV.

g. In preparing for PPSS, consideration must be given to factors such as materiel and software criticality, anticipated software change profile, interface requirements, and characteristics of the user community. Critical constraints such as staffing to include personnel skill and manpower, facilities, organization, and budgetary limitations must be included in the PPSS development.

8–12. Fielded software support

IPS for fielded software should consider the maintenance concept to be implemented for the materiel. It is important to align the software support tasks with the appropriate maintenance levels. Typical support tasks at each level include the following:

a. Field level to include the following:

(1) Software version installation.

(2) Local adaptation database modification.

(3) Test verification.

(4) Report and identification of problems.

(5) Collection of supporting data.

(6) Provision of recovery service.

b. Sustainment level to include the following:

(1) Creation and transmission of software version releases to operational units.

(2) Diagnostic support.

(3) Materiel programming support.

(4) Database administration.

(5) Software support.

(6) Software documentation maintenance.

(7) Support of the software tool set.

(8) Commercial and noncommercial software correction integration.

(9) CM.

(10) Materiel test.

(11) Changes to commercial and noncommercial software (usually performed by the vendor).

(12) Changes to reuse code (usually performed by the original software developer) or other customer program organization.

8–13. Computer Resources Life Cycle Management Plan

a. The CRLCMP can be used as the primary planning document for computer resources throughout the materiel life cycle. It complements the LCSP and its purpose is to—

(1) Document the software support concept and the resources needed to achieve the support posture.

(2) Document the computer resources development strategy.

(3) Identify the applicable directives, regulations, operating instructions, and EPs.

(4) Define any changes or new directives needed for the operation or support of computer resources.

(5) Define the scope of independent verification and validation.

b. Development of the CRLCMP is initiated during the TMRR Phase and coordinated with the CAPDEV and supporting organizations. The CRLCMP is updated as required in each phase of the life cycle. After the transition to the user, the support activity assumes responsibility for the CRLCMP. The CRLCMP at a minimum should include the following:

(1) *Software support resources.* Describe the software engineering effort and the test environments required to support the deliverable software.

(2) *Facilities.* Describe the types and functions of the facilities required to support the computer resources for the materiel).

(3) *Personnel.* Identify the personnel required to support the deliverable software, including the types of skills, number of personnel, security clearance, and skill level.

(4) *Training.* Describe the plans for identifying needed training, training curriculum for personnel who will manage and implement support of the deliverable software, the training schedule, duration, location for all training provided, and delineate between classroom training and hands-on training.

(5) *Transition planning.* Describe plans for transitioning the deliverable software to the support agency (including the needed resources) and identify the necessary resources and the procedures for installation and test of deliverable software in the support environment.

(6) *Software documentation.* Describes all of the software and associated documentation required to support the deliverable software.

(7) *Other resources.* Identify any other resources required for the support environment not mentioned elsewhere in the CRLCMP.

(8) *Software integration and testing.* Describe the procedures necessary to integrate and fully test all software modifications.

8–14. Resource planning

a. AR 700–127 requires that the costs associated with IPS execution will be planned, programmed, budgeted, funded, and monitored as an integral part of the acquisition program. The initial and subsequent IPS cost estimates are provided to the MATDEV for incorporation into the program cost estimates (PCEs) or the program objective memorandum (POM).

b. The MATDEV is responsible for preparing, submitting, and defending the life cycle resource requirements for a program, and to oversee resource execution in implementing the PBPSS. It is critical that all resourcing requirements are identified and aligned with the program schedule to ensure availability of funding, in the right appropriation, when the funds are needed.

c. It is critical that the PSM has sound justification for all resources to implement the PBPSS. This will greatly increase the MATDEV’s success in defending required resources throughout the POM process.

8–15. Operating and support cost

O&S cost consists of sustainment costs incurred from the initial materiel deployment through the end of materiel operations. It includes all costs of operating, maintaining, and supporting a fielded materiel. Specifically, this consists of the costs (organic and contractor) of personnel, equipment, supplies, software, and services associated with operating, modifying, maintaining, supplying, and otherwise supporting a materiel in the DOD inventory. The MAT- DEV is required to establish an O&S cost program which identifies O&S cost targets, O&S cost drivers, O&S cost reduction opportunities, and metrics to measure the cost-reduction progress.

8–16. Affordability

Affordability plays an important part in program decisions in the identification of capability needs throughout the life cycle. Program affordability is part of the JCIDS analysis process, which balances cost with performance in establishing KPPs. Cost goals are established in terms of thresholds and objectives to provide flexibility for program evolution and to support trade studies.

8–17. Cost as an independent variable (cost consciousness)

a. CAIV is an AS focusing on cost-performance tradeoffs in setting program goals and formalizes the process to achieve an affordable balance between performance and schedule. Objectives will be set as early as possible but not later than MS B to manage risks in achieving cost, schedule, performance, and supportability objectives.

b. CAIV is a DOD mandate requiring that the LCC be considered equally along with performance and schedule in ACAT I through III acquisitions. Non-major programs will use CAIV as a guideline. CAIV is a methodology for reducing LCC and improving performance. According to DODD 5000.01, "Cost must be viewed as an independent variable, and the DOD Components shall plan programs based on realistic projections of funding likely to be available in future years. To the greatest extent possible, the DOD Components shall identify the LCC, and at a minimum, the major drivers of LCC. CAIV involves developing, setting, and refining aggressive unit production cost objectives and O&S cost objectives while meeting Soldier requirements. It is vital to involve the user community in the tradeoff process from the beginning to achieve the best outcome for all parties involved and invest resources in the tradeoff analyses required in the requirement generation process. In addition, one of the most important aspects of CAIV requires investing in the training of key personnel and making sure the process is well understood. Consistent with the Chairman of the Joint Chiefs of Staff guidance on requirements generation, the user shall treat cost as a military requirement and state the amount the Department should be willing to invest to obtain, operate, and support the needed capability over its expected life cycle. MATDEVs shall establish aggressive but realistic objectives for all programs and follow through by working with the user to trade off performance and schedule, beginning early in the program (when the majority of costs are determined).

c. CAIV identifies the cost objectives for a program or project. As such, cost needs to be managed and controlled as closely as performance, schedule, and supportability. The total costs including the O&S costs are reflected in the CRD and are addressed as exit criteria at each program MDR.

d. The CAIV methodology will be utilized throughout the entire life cycle of the acquisition process to ensure operational capability of the total force is maximized for the given modernization investment. CAIV methodology entails the consideration of cost along with required materiel capabilities; cost is neither dominant nor dependent, but rather a peer with other capabilities. Cost will be formally considered for all MDRs by conducting and updating an analysis that relates cost and all materiel capabilities to the materiel's battlefield contribution. This approach is not independent of other work to determine specific capabilities but is a part of it. Cost performance analyses will be conducted on a continuous basis throughout the life cycle (see AR 70–1).

e. CAIV focuses on requirements, performance, and cost tradeoffs to ensure that acquisition programs are timely and efficient and meet customer needs. By including the customer as part of the PSMIPT throughout the program life cycle, the right mix of knowledge has been created to look at the tradeoffs in a dynamic environment. Adding in the powerful tool of simulation can better define the trade space, predict and benchmark performance, and enhance the cost goals.

f. CAIV goals are cost savings, reduced development time, and satisfaction of customer requirements. The program includes the following:

(1) Life cycle planning.

(2) Concurrent engineering through PSMIPT participation.

(3) Customer participation throughout the life cycle.

(4) Metrics to track and evaluate performance.

g. The MATDEV—

(1) Documents and coordinates plans for cost-performance trade-off studies as directed by the overarching IPT or as identified by the working level IPT (WIPT).

(2) Evaluates accomplishment of improvements against the estimated and actual O&S cost baselines.

(3) Prepares sustainment budgets for each materiel that accurately reflect the true needs of the materiel and aligns the CAIV objectives with the schedule of implementing improvements from the annex.

(4) Sets aggressive cost targets for development, procurement, O&S and disposal and reports on them during each MDR.

(5) Includes cost-performance objectives and cost targets in procurement documents and SOWs.

h. Exercises performance tradeoffs, multiyear contracts, and cost-incentive contracts to achieve CAIV objectives.

8–18. Program cost estimate

a. As described in AR 11–18, the PCE is a generic term denoting a complete, detailed, and fully documented estimate of a materiel LCC accomplished by the MATDEV. The PCE is a dynamic document that serves as the principal cost estimate for the materiel and throughout the acquisition life cycle. The PCE for any given materiel must be tailored to the program and be allowed to expand as the program matures. The IPS program cost must be identified and provided to the MATDEV for approval and PCE consolidation. The PCE is updated as the program matures and prior to each major MS. The MATDEV uses the PCE in developing POM submissions. For additional information and program funding authority breakdown, see DFAS-IN Manual 37-100.

b. The specific elements of a PCE are organized and delineated based on a WBS. The specific government and contractual cost elements and tasks for IPS will vary depending upon the acquisition schedule and complexity of the materiel being acquired. The IPS elements and tasks to track should be determined principally from the PCE. No two programs are identical, so cost estimates need to be tailored to meet the objectives of the proposed and associated subfunctions identified in the WBS (see app F). The PCE should be tailored to the program by deleting functions that are not required and by establishing any new functions and sub-functions as appropriate.

8–19. Funding appropriations

a. Various funding appropriations may be used to finance an IPS program (for example, IPS management, PSA and IPS products and deliverables during the materiel's life cycle).

b. Management of the IPS for any program falls into three broad areas—

(1) IPS management and program execution, which includes all IPS management functions associated with system engineering and program organizing, direction, coordination, and controlling.

(2) IPS product development, which includes the resource requirements to satisfy preparation and production of IPS deliverables (for example, technical publications; product support packages for test; EPs validation and verification; LD; support equipment; TMDE; PSA; and program documentation (such as LCSP and MFP).

(3) Materiel sustainment, which includes repair parts, maintenance personnel, other support personnel, technical school training, environmental compliance, petroleum, oils, and lubricants, qualifying alternative materials and processes, transportation, CM, technical data, EPs, environment, and other materiel support or personnel costs (such as recruitment, benefits, and retirement) charged to the materiel after initial fielding.

c. The program budget and funding structure consists of five appropriations—

(1) RDT&E is a multiyear appropriation available for obligation for two fiscal years. Program funds are provided by the MATDEV in support of the IPS program. These funds are used to plan, analyze, integrate, establish, and manage the development and acquisition of all IPS elements required to support fielding of the proposed materiel.

(2) Army procurement is a multiyear appropriation available for obligation over three fiscal years. The appropriation provides for TPF, acquisition of modification kits, installation of modification kits when performance is increased, NET, project and program salaries and benefits, ICS, and first destination transportation. Approved engineering changes generated during the Production and Deployment Phase which do not impact the performance envelope, but that impact the IPS documentation are Army procurement funded. Approved engineering changes that are incorporated into the logistics support documentation during the Production and Deployment Phase are Army procurement funded (see DFAS-IN Manual 37–100 for further detailed instructions on how Army procurement funds are used). Army procurement can be funded from five separate multiyear appropriations—

(a) Aircraft.

(b) Missiles.

(c) Wheeled and tracked combat vehicles.

(d) Ammunition.

(e) Other.

(3) OMA is an annual appropriation that funds operation and maintenance of all Army organizational equipment and facilities, including maintenance of Army materiel and materiel programs, DEMIL and disposal, supplies, training, and recruiting. OMA funds sustainment support functions performed in support of fielded materiel and operation of Service-wide activities such as medical activities, DLM, schools, and training (including cost of training civilian employees in programs from which salaries are payable). In addition, if a modification program is applied to an out-of- production materiel resulting in no performance envelope changes, then OMA will finance the phase I engineering and installation of the modification. These funds are used for costs associated with documentation changes or modifications that result in revisions being made to technical publications. Also, a modification program on an out-of-production materiel that results in IPS documentation being updated (phase III, application and data collection) is financed by OMA.

(4) MCA is a multiyear appropriation available for obligation for 5 years. The term military construction includes any construction, development, conversion, or extension of any kind carried out with respect to a military installation. A military construction project includes all military construction work necessary to produce a complete and useable

improvement to an existing facility. The term facility means a building, structure, or other improvement to real property. The PSM coordinates the facility requirements with the Corps of Engineers (COE). The COE's functions are identified in the PSA process. The COE will identify resource requirements in support of the MATDEV's program and submit budget documents through appropriate channels.

(5) Military Personnel, Army (MPA) appropriation funds military pay and allowances. MPA includes costs of retired pay accrual, individual clothing, subsistence, interest on savings deposits, death gratuities, permanent change of station travel, and per diem portion of temporary duty for active component Army members and U.S. Military Academy cadets, and expenses for the apprehension and delivery of deserters and prisoners. Because MPA is a significant portion of the Army budget, a goal of IPS is to minimize such costs through increased RAM and a decreased logistics footprint to include manpower requirements. MPA costs are not usually addressed in the LCSP, but these costs are considered when O&S costs and sustainment are included in the total logistic cost equation. If the materiel has either an increase or decrease in support personnel, the O&S costs are directly affected.

f. Examples of IPS funding by appropriation are as follows:

(1) TC standard must come from RDT&E dollars.

(2) Army procurement appropriation dollars are used to pay for producing the materiel (and its support) until production is complete.

(3) OMA funds pay for materiel sustainment during the operational life of the materiel, as well as any new IPS-related efforts for the materiel.

(4) MPA funds are used to pay the military personnel who operate, maintain and support the materiel and its support system.

(5) MCA funding is used to pay for new construction or modified facilities in excess of $750,000. OMA may be used to pay for new construction that costs less than $750,000.

e. The MATDEV pays the cost of support personnel. Funds are required for support personnel who manage and execute the approved IPS program and for preparation of IPS documentation and support structure to assure that the materiel is adequately supported once fielded.

f. IPS products that are required for support of a developmental, NDI or modification are financed by the requesting MATDEV. These funds are also used for the processing of technical data to develop LPD and EPs.

8–20. Replaced System Sustainment Plan

The RSSP is required for all MDAPs. The MATDEV for an existing legacy program is responsible for preparing a RSSP in coordination with the MATDEV for the new MDAP that will replace the legacy system. The RSSP must be developed prior to beginning development of an MDAP that will replace an existing system if the capability provided by the existing system will remain necessary and relevant during the fielding of, and transition to, the new system. The plan describes the budgeting requirements necessary to sustain the existing system until the new system assumes the majority of mission responsibility, the schedule for developing and fielding the new system, and an analysis of the ability of the existing system to maintain mission capability against relevant threats. An RSSP outline is provided in figure 8–11.

1.0 Program information

Program name
Acquisition category
System descriptions
Contact information.

2.0. Schedule

Top-level schedule combining existing (legacy) system and new program, include when the new system assumes the majority of the responsibility for the existing system.

3.0. Analysis of existing system

3.1. Funding

Anticipated funding necessary to ensure acceptable reliability and availability rates for the existing (legacy) system, and maintain mission capability of the existing system against relevant threats.

3.2. Technology transfer

Extent it is necessary and appropriate to transfer mature technologies from the new system or other systems to enhance the mission capability of the existing system against relevant threats.

3.3. Interoperability

Extent it is necessary and appropriate to provide interoperability with the new system during the period from initial fielding until the new system assumes the majority of responsibility for the mission of the existing system.

Figure 8–11. Replaced System Sustainment Plan outline

8–21. System Demilitarization and Disposal Plan

All MATDEVs must develop a System DEMIL and Disposal Plan. This plan identifies any DEMIL, disposition, and disposal requirements for the materiel. The MATDEV must ensure compliance with legal and regulatory requirements relating to safety, security, and the environment, and document these actions within this plan. A disposal analysis plan should be completed prior to OT&E (see MIL–HDBK–502). Detailed guidance for developing a System DEMIL and Disposal Plan is in AR 700–144.

8–22. Materiel fielding planning

The MFP provides coordinating guidance between the MATDEV and gaining units for fielding of new materiel. Detailed guidance for the MFP process is in AR 700–142 and DA Pam 700–142.

8–23. Post-production support planning

a. PPS activities include those management and support activities necessary to ensure attainment of readiness and sustainability objectives within economic parameters after termination of the Production and Deployment Phase.

b. PPS planning starts with a PSA to identify technological opportunities and evaluate design opportunities for improvement of supportability characteristics in new materiel. This data gathering can start during MIs and take place in every phase of the acquisition life cycle. The goal will be a PPSP to achieve effective and economical support throughout the expected service life of the materiel.

c. For commercial and NDI materiel, the PPS required may be as simple as replacing the obsolete materiel with the next-generation commercial item. Developmental materiel with life cycles from 20 to 50 years can involve planned upgrades of hardware and software, TI, and depot rebuild programs to increase capabilities and reduce supportability resource requirements.

d. Planning should be reviewed and updated as long as the materiel is in the active inventory.

e. Procedures—

(1) PPS planning is part of the system engineering function and is reflected in the early tradeoffs considered in materiel design. The initial PPSP will be included in the LCSP, as an annex, by MS C. The PPSP must be completed prior to production phase-out and updated throughout the materiel's life cycle.

(2) Designing for PPS begins with a technological opportunity analysis to identify any technology used in the design of the materiel that will probably be obsolete before the materiel has achieved its expected life. Thus evolutionary acquisition concepts should be applied to the design of the materiel to ensure growth paths to support block modifications or modularity to permit TI. As technology advances are made in these areas, the new technology can be applied to the materiel. Such design minimizes problems encountered in supporting materiel no longer in production.

(3) The MATDEV should conduct PPS decision meetings prior to issuance of the final production order. All program participants should be represented. The meeting is designed to avoid major nonrecurring costs if follow-on production is later required. Points of consideration should include, but not be limited to—

(a) Obtaining technical data and tooling required to support post-production competitive procurements. Requirements for the needed technical data should be priced to support a decision to acquire or determine if it is unaffordable.

(b) Purchasing major investment items such as manufacturing structures, forges and castings, insurance items (to cover battle damage), and raw materials.

8–24. Post Production Support Plan

A PPSP contains the five sections listed below and any necessary annexes. The following provides detailed guidance on the contents of each section and segment of a PPSP—

a. Section I is designated for the management of the PPS program. List the agencies (both government and contractor) responsible to jointly plan and execute the applicable elements of the PPSP.

b. Section II is designated for identifying the PPS objectives and materiel readiness objectives in the post-production time frame.

c. Section III is designated for known or potential PPS problem areas. Identify and assess the potential impacts of production phase out, technological change, and obsolescence on the materiel and its support system. This assessment should be on a 10-year projection, unless it is known where the materiel will be disposed of prior to that time.

d. Section IV is designated for PPS strategies. Attach the PFSA plan, which includes the following:

(1) Alternative PPS strategies to accommodate obsolescence or production phase out such as second sources, support buyouts, preplanned product improvement, CLS versus organic support and substitution of new technology. Strategies for continuing system engineering and effective CM of the end item and ASIOE for a 10-year strategy projection of support needs.

(2) Support strategy if the materiel life cycle is extended beyond the original projection.

(3) Support strategy of materiel declared obsolete to U.S. forces but retained by allies.

(4) Provisions for utilization, disposition and storage of government-owned tools, equipment and contractor developed tools, and test equipment.

e. Section V is designated for required actions. List responsible agencies, actions, and milestones to include, but not be limited to the following:

(1) Resources and management actions and responsibilities required to satisfy PPS objectives and production of required government furnished materiel, listed by NSN.

(2) Actions needed to obtain cost-effective competition of PPS requirements.

(3) Modifications to the LCSP to accommodate PPS needs.

f. Annexes covering additional information on PPS planning are to be added, as appropriate.

8–25. Preservation and storage of tooling for Major Defense Acquisition Programs

a. Section 815 of Public Law 110-417 requires unique tooling associated with the production of hardware for an MDAP to be preserved and stored through the end of the service life of the materiel. MATDEVs for MDAPs are required to develop a plan for preservation and storage of unique tooling as an annex to the LCSP and submit the plan to the MDA for approval at MS C.

b. A preservation and storage of tooling plan contains the six sections listed below and any necessary annexes. The following provides detailed guidance on the contents of each section of a preservation and storage of tooling plan—

(1) Section I is designated for a description of how the unique tools will be managed. Identify points of contact and responsibilities.

(2) Section II is designated for a list and description of unique tooling associated with the production hardware for the program, and how the tools will be preserved.

(3) Section III is designated for funding required for the preservation and storage of tooling.

(4) Section IV is designated for contract clauses for the preservation and storage of tooling.

(5) Section V is designated for facilities required for the preservation and storage of tooling.

(6) Section VI is designated for a description of how unique tooling retention will continue to be reviewed during the life of the program.

(7) Annexes covering additional information on tool management are to be added as appropriate.

Chapter 9
Force Development Documentation and Training Systems

Section I
Equipment and Personnel

9–1. Force development documentation

Force development documentation requires a significant effort from the MATDEV to ensure that new materiel is properly integrated into the Army Force Structure. Much of the required information is logistically based, making the PSM and the PSMIPT are responsible for compiling the initial BOIPFD submission and coordinating changes to the force development team throughout the life cycle. The BOIPFD requires significant coordination with the TRADOC schools and CAPDEV to develop the data that will provide the necessary input to force development documenters located at the USAFMSA. Force development documentation is used to identify Soldier personnel and equipment requirements as well as other logistically based information necessary to supply, maintain and transport the materiel throughout its life cycle. The required materiel-related information must be submitted to HQDA in a timely manner to effect successful integration and fielding of the materiel. The MATDEV is considered successful in developing and coordinating force development documentation when the materiel is type classified standard (mission essential) prior to FRP and receive a standard line item number (SLIN) from LOGSA (see AR 700–142). This results in the successful deployment (materiel fielding) and sustainment of the new materiel into units because the units TOEs and TDAs will have been adjusted to reflect the new materiel including all of its logistical support.

9–2. Line item numbers

a. The MATDEV is responsible for obtaining a developmental line item number (ZLIN), SLIN, non-standard LIN (NSLIN) and standard study number (SSN) for a new capability and materiel that is under development. A ZLIN is required to start the BOIPFD and manpower requirements criteria (MARC) processes (see AR 700-142 and DA Pam 700-142).

b. The standard study number – Line Item Number Automated Management and Integrating System (SLAMIS) is a Web-based application designed to provide Army users easy access to key major items of equipment "chain-of- custody" data relationships and management tools. This supports the equipment life cycle management for SLINs, NSLINs, and ZLINs of equipment. SLAMIS compiles and maintains data from authoritative Army data sources to support Army studies, analyses, and reports. The system also provides common data for audit trail purposes. In addition, SLAMIS automates and facilitates the coordination of life cycle management requirements. SLAMIS is a data mart operation that integrates authoritative data values for SSN, SLINs, NSN, common table of allowances, ZLINs, and NSLINs, while promoting synchronization efforts among several supporting Army databases. SLAMIS is the official Army source for requesting LINs. SLAMIS provides Armywide users (HQDA staff, MATDEVs, PEOs, item managers, and other logistics support activities), the means to request SSN, ZLIN, SSN–LIN linkage, TC processing and tracking, CARD number reference, download and processing, and resolution of data integrity issues. The data mart interfaces provide for electronic coordination, and synchronizes updates of corrected data to multiple Army databases.

c. The Army Enterprise Systems Integration Program is a Web-based application that serves as the technical enabler to link the field-level logistics system in the Global Combat Support System-Army with the national-level logistics system in the Logistics Modernization Program, and is the point of entry for other automation system seeking logistics data.

9–3. Basis of issue plan feeder data

a. The basis of issue plan feeder data (BOIPFD) is a compilation of information about a new or improved item of equipment at the LIN level. The MATDEV summarizes information obtained from a valid requirements document and other applicable sources needed to field the new major item. The BOIPFD identifies function, capabilities, intended use, basis of issue, support requirements, manpower requirements, component major item (CMI)/ASIOE, and points of contact, and additional information.

b. BOIPFD is the initial step to inform the Army BOIP process to document LINs in requirement and authorization documents.

c. Data interchange (DI) procedures in AR 710-1, must be followed for CMI and ASIOE. DI is the means to exchange logistical data on CMI and ASIOE between MATDEVs and the materiel acquisition community. DI is the Army's assurance that CMI and ASIOE requirements are properly documented, funded, and available to support the Force Modernization System fielding activities.

d. BOIPFD policy and guidance are contained in AR 71–32.

e. The AMC is responsible for providing the automated platform and matrix support for MATDEVs to compile and process BOIPFD which includes Direct Productive Annual Maintenance Manhours (DPAMMH) and Major Item System Map (MISM). This platform is the LIW.

(1) A major item requiring BOIPFD can be any Supply Class II (individual equipment), Class VII (major end items), or Class VIII (medical material) that is accounted for within SLAMIS. Assignment of Class of Supply occurs when the NSN is assigned. A major item system can be a weapons system, a support system, or an ammunition system.

(2) Only a LIN in chapter 2, Army Adopted Items of Materiel and Automatic Data Processing Equipment, or chapter 4, Developmental and Non Developmental Items, of DA Pam 708–3, or the supply bulletin (SB) 700–20, requires BOIPFD, MARC, and MISM.

f. CMI is a major end item LIN that is a part of the BOIPFD item configuration. CMI will not be listed separately in an authorization document. CMI is normally installed during production through wiring, mounting, and/or system interface. Removal of CMI prevents the materiel from fulfilling its mission. For example, the Intercommunication Set: AN/VIC-1 LIN K93373, is a CMI to the Tank Combat Full Tracked: 120MM Gun M1A2 (LIN T13305). Only a LIN listed in SB 700-20, chapter 2 and/or 4 can be used as a major item's CMI.

g. ASIOE is a major end item LIN that is part of the BOIPFD item configuration. ASIOE is documented separately in a TOE. ASIOE is a requirement to operate, maintain, or transport the new materiel. For example, a new materiel could need a generator set and environmental control system to operate; a tool kit and TMDE to maintain; and a truck or trailer to transport. Only a LIN in SB 700-20, chapter 2 and/or 4 can be used as a major item's ASIOE.

h. USAFMSA manages the Army's BOIPFD acceptance process. Upon acceptance by USAFMSA in the LIW, the BOIPFD is passed to the DA Force Management System (FMS) where it is assigned a BOIP number in FMS (see AR 71-32 and AR 700-142). To expedite BOIPFD staffing, MATDEVs must obtain CAPDEV concurrence on the basis of issue and DPAMMH data prior to uploading the data into LIW.

i. Since the MISM is updated by the initial or amended BOIPFD, the MATDEV maintains the MISM throughout the entire life cycle management process by the LIW Amended BOIPFD process. A change in CMI and/or ASIOE due to modernization, or a 20 percent increase and/or decrease in MARC requires an Amended BOIPFD be submitted.

j. Procedures for initial BOIPFD development.

(1) Upon receipt of a DA-approved developmental LIN (ZLIN) from the SLAMIS, the MATDEV develops the initial BOIPFD in LIW BOIPFD Update Module and submits the BOIPFD to USAFMSA within 60 days for acceptance.

(2) LIW BOIPFD includes: LIN and generic nomenclature, major item system code and system description, BOIP Number, Proposed Routing Identifier Code, Proposed Supply Class, Proposed Appropriation and Budget Activity Code, Estimated TC Date, Estimated First Unit Equip Date, Estimated Cost Production Model, SSN, Catalog of Approved Requirement Documents Number, Approved Requirements Document, Proponent Code, New Equipment Training (NET) Plan Number, Functional Capability, Prime Use, Employment, Basis of Issue, Physical Data (for example: length and width), Fuel Consumption, Transportability Requirements, Transporter Limits, Tactical Capacities, Power Consumption Data, Power Generation Data, DPAMMH for Prime LIN, CMI, Total DPAMMH for Prime LIN and CMI, Operator, Unique Duties/Tasks/Characteristics, ASIOE, Equipment to be Replaced, and Points of Contact (CAPDEV, MATDEV, BOIPFD preparer, BOIP preparer, MOS and Maintenance Manhours preparer, and materiel maintenance support proponent).

(3) Upon BOIPFD Acceptance by USAFMSA in the LIW, the BOIPFD is passed to the DA FMS where the BOIPFD is used by the BOIP Preparer to develop the BOIP in FMS.

(4) The MATDEV must type classify the ZLIN as a standard LIN in accordance with AR 700–142.

k. Procedure for BOIPFD update. The MATDEV reviews a materiel's BOIPFD throughout the entire life cycle management process and update when necessary. A change in CMI and/or ASIOE due to modernization, or a 20 percent increase and/or decrease in MARC requires the accepted BOIPFD to be updated.

l. The MATDEV updates BOIPFD by developing Amended BOIPFD in LIW and submitting to USAFMSA for acceptance.

9–4. Basis of issue plan

The BOIP is a distribution plan that identifies the new (or improved) item, its capabilities, planned quantity and the planned placement. It also identifies the MOSs needed to operate and maintain the item, its CMI, ASIOE and personnel, as well as the displacement of existing equipment and personnel. MATDEVs use BOIPs as input for concept studies, life cycle cost estimates, and trade-off analyses during the research and development process. Army Commands use BOIPs to plan the equipment, facilities, initial provisioning, and personnel required to support new or improved materiel. BOIPs also identify 100 percent of the mission essential wartime requirements for TOE units.

a. The BOIP is required for fielding of new (or improved) equipment. The BOIP process identifies mission essential wartime requirements for inclusion into organizations based on changes of doctrine, personnel, or materiel via TOE, TDA, Joint Tables of Allowances, and Additive Operational Projects.

b. A BOIP is required prior to MS C approval and TC Standard.

c. The DCS, G–3/5/7 is the approval authority for the BOIP (see AR 71-32 and AR 700-142).

9–5. Manpower requirements criteria

a. MARC is the HQDA-approved standard to determine minimum mission-essential wartime position requirements for combat support and combat service support functions in the TOE.

b. The MARC program provides a means of establishing and justifying the right quantity and mix of maintenance personnel for sustainment of Army materiel at the LIN level (see AR 71–32). The objective of the MARC maintenance program is to provide accurate DPAMMH for the determination of wartime maintenance personnel requirements for TOEs. It is critical that the initial MARC be as accurate as possible to support Army decisions regarding acquisition and life cycle costs. With accurate MARC data the Army can determine if maintenance burdens are correct, whether equipment modifications are needed, and if action should be taken to reduce or increase maintenance personnel. The Army might choose to modify the equipment design if the maintenance burden is too high and may also need to take action to prevent shortages or excesses of mechanics.

c. The proponent for the MARC program is the DCS, G–3/5/7. USAFMSA is the DCS, G–3/5/7 executive agent for MARC. ASA (ALT) and AMC maintain a structure to manage, maintain, record, and review the Army's maintenance data.

d. USAFMSA manages the LIW MARC Acceptance process. Upon acceptance by USAFMSA into the LIW, the MARC data is passed to the DA Force Management System (FMS) where an indirect time factor is added to the DPAMMH, and it becomes part of the FMS Army MARC Maintenance Database (see AR 71-32 and AR 700-142). The Army MARC Maintenance Database is used by the USAFMSA document integrator to determine the appropriate quantity and mix of Army maintenance manpower requirements in TOEs.

e. The AMC is responsible for providing the automated platform and matrix support for MATDEVs to compile and process DPAMMH. The AMC platform is the LIW maintained by the LOGSA.

f. The MATDEV is responsible for determining and maintaining auditable, accurate DPAMMH and MARC data at the LIN level for its materiel throughout the entire life cycle management process. The MATDEV reviews a materiel's MARC data every 3 years and updates when necessary. Priority of scarce MARC funding should be given to a ZLIN and/or to a LIN with the heaviest maintenance burden and highest fielded density. MARC for fielded equipment is derived from follow-on test data, sample data collection, or actual field maintenance data.

g. Upon receipt of a DA approved ZLIN from SLAMIS, the MATDEV develops the DPAMMH in LIW and submits to USAFMSA within 60 days for acceptance.

h. The initial MARC data is done in conjunction with the BOIPFD and MISM processes. The initial DPAMMH can be derived from engineering estimates, supportability analysis, and test data. With justification, DPAMMH can be derived from a predecessor (surrogate) materiel. It is Army policy that surrogate MARC data be used only when analytical proof can be presented that demonstrates that the use of surrogate data is reasonable and reflects the best estimate available for the materiel being acquired.

i. Updated DPAMMH are for fielded equipment and are derived from, but are not limited to, follow-on test data, actual field maintenance data, and sample data collection. The updated DPAMMH can be obtained from the LIW maintenance module, sample data collection, field exercise data collection, logistics assistance representative input, and recorded maintenance failure data. The updated DPAMMH is validated by the PSMIPT, which includes the CAPDEV, MATDEV, training developer, and materiel maintenance support proponent.

j. If the MARC data is determined by USAFMSA to be incorrect, then the MARC data is disapproved and returned to the MATDEV for further development, validation, and resubmission.

k. LIW maintains the maintenance module as a centralized database for ground and air field and sustainment DPAMMH. The LIW maintenance module receives and stores the field and sustainment DPAMMH data, which are mandatory entries. This data is available in LIW for use by the MATDEV, USAFMSA, and other organizations.

9–6. Major Item System Map

a. The MISM uniquely provides a weapon system view for Army equipment at the LIN level, and is critical to providing weapon system information across Army enterprises.

b. MISM is a major derivative product created by the MATDEV with the BOIPFD process (see AR 71-32), and aggregates the CMI and Associated ASIOE into a weapon system view. BOIPFD identifies materiel requirements, not funding sources.

c. The Total Army Analysis, Army Acquisition Objective, Army Flow Model, and Army War Reserve Deployment System use the MISM because MISM identifies the CMI(s) to a weapon's materiel that is not readily visible in the property accounting system.

d. The MISM is used in determining an end item's MARC and its total DPAMMH.

e. The MISM, in conjunction with the Structure and Composition System, is used by the AMC MARC Responsible Office in determining the Top 400 DPAMMH High Maintenance Drivers.

Section II
Training Systems and Devices

9–7. Overview

a. Training systems and devices (or trainers) are acquired to satisfy training deficiencies, reduce training costs, enhance training effectiveness or as an approved strategy in the Army's Combined Arms Training Strategy.

b. There are two broad categories of training systems—

(1) System trainers are designed for use with specific a system, family of systems, or items of equipment (for example, M1 Conduct of Fire Trainer). They may be standalone, embedded, component level, or appended training devices. System trainers may be either acquired by a MATDEV or the Program Executive Office for Simulation, Training and Instrumentation (PEO STRI) for the MATDEV. The requirement for system trainers must be documented in the materiel CRD and prioritized and funded with the materiel.

(2) Non-system trainers are acquired by the PEO STRI to support general military training (for example, battle staff trainer). They are not acquired to increase proficiency in operating or supporting a given weapon system. The requirements for non-system trainers are stated in training CRDs and are prioritized and funded in the training mission area.

c. Training systems and training devices are to be integrated into the total system using the procedures in DODD 1322.18 and DODD 1430.13. In accordance with these directives, a system training plan (STRAP) should be developed by MS B. The STRAP will include a description of the total training system and address the training and system development schedule.

d. MATDEVs retain authority and responsibility for the procurement and life cycle management of their materiel training systems and trainers and must collaborate with PEO STRI (see AR 70-1).

9–8. Pre-acquisition

a. PEO STRI has the responsibility to conduct concept formulation for all training devices (system and non-system). The MATDEV normally provides funding for concept formulation AoA for system training devices. Concept formulation or AoA consists of a series of analytical or tradeoff studies performed by the PEO STRI in coordination with the MATDEV, and CAPDEV to determine the best technical approach for developing and procuring the most cost- effective, proficiency-enhancing and operationally effective trainer. These analyses are performed for new systems, training devices identified as training sub-system, and for each non-system training device. The goal of AoA is to establish performance technical and economic specifications to satisfy the stated requirement.

b. System trainer requirements are analyzed as a part of new equipment acquisitions. The training system or training device CRD is prepared by the CAPDEV in accordance with DODI 5000.02 and provided to the PEO STRI or ATSC for processing. ATSC functions as the DCS, G-3/5/7 executive agent for ensuring compliance with training system and training device acquisition policies. ATSC will process the CRD in accordance with TRADOC guidelines. ATSC is also responsible for procuring training devices and training aids that cost less than $15,000.

c. The CAPDEV representative for a given trainer will be based upon the system commodity or Army branch (for example, the Armor School for armor trainers and the Artillery School for artillery trainers).

d. The CAPDEV initiates the acquisition process with PEO STRI support by preparing a CRD-based on identification of training deficiencies and needs.

e. CRDs must contain complete training system and training device strategies, and supporting documentation and rationale to be approved. A thorough analysis of resource requirements must be accomplished to justify any LCCS decision for maintenance and support of the trainer.

9–9. Acquisition

a. PEO STRI—

(1) Participates in the initial requirements analysis and executes the complete acquisition of approved and funded training systems and training devices.

(2) Assigns management responsibility to a PEO STRI MATDEV for acquisition of a given trainer based on trainer type and type of materiel simulated by the trainer. The PEO STRI MATDEV is responsible for coordinating and preparing the program management and contractual documentation to accomplish the acquisition.

(3) Catalogs all PEO STRI developed training aids, devices, simulators, and simulations.

b. Training system and training device acquisitions must comply with DODD 5000.01, DODI 5000.02, AR 70–1, and AR 71–9.

c. The required quantity of trainers will be based on the TRADOC-prepared training device fielding plan that identifies the quantities, sites, and organizations to receive the training devices. The final training device fielding plan must be approved by the DCS, G–3/5/7. Most training devices are assigned to the training support center based on the types and quantities of Army units that will use the training systems and training devices. The training support center is responsible for tracking and managing trainers and issues them to units, as needed. Issue may be long term or on a "use and return" basis.

9–10. Training system and training device fielding

a. Army training systems and training devices are typically fielded based on a low-density TDA.

b. Operations, supply, and maintenance support for system and non-system trainers and training devices is obtained by the PEO STRI using LCCS agreed upon by the MATDEV and the DA Military Operations-Training. PEO STRI will budget for LCCS for trainers validated by TRADOC and approved by the DA Military Operations - Training. The GC is relieved of the requirement to train instructors, operators, or maintenance personnel or to purchase spare and repair parts, special tools, or test equipment. Exceptions are non-LCCS training devices transitioned to an AMC commodity command or item manager for life cycle support and items procured or fabricated by TRADOC or other major command training support centers (see AR 350–38).

c. The Army's GCs are notified of pending training device fielding and requirements coordination by distribution of a memorandum of notification approximately 90 days prior to fielding. In some instances, more detailed coordination is required with the GC and is accomplished by a MFP.

9–11. Training system and training device support

a. The training system and training device support strategy should be determined during the early phases of the acquisition life cycle and be refined throughout the acquisition process. At the beginning of the acquisition life cycle, the MATDEV conducts analysis to compare alternative support strategies and select the best strategy. The results of the analyses will determine whether the support strategy will be organic support, organic support with ICS, LCCS, or a combination.

b. PSA for training systems and training devices must consider the—

(1) Availability requirements of the training device.

(2) Quantity of trainers that will be used at one time, at one range, at the unit.

(3) Required repair TAT.

(4) Quantity of training systems that are needed weekdays, and weekends.

(5) Usage annually, monthly, weekly, and daily.

(6) Maintenance and supply requirements.

(7) Personnel capabilities and availability.

(8) Support and test equipment needed.

(9) Locations and proximity of the trainers.

(10) Support facilities requirements.

(11) Transportation and transportability implications.

c. LCCS should be tailored and provide cost and effective training support for each training system and device. LCCS is typically the approved support strategy for PEO STRI fielded training devices and should consider—

(1) Tailoring the support strategy for a trainer to meet user requirements. The support concepts for different trainers require varying degrees of government and contractor involvement and responsibilities.

(2) Tailoring repair procedures to implement the approved support concepts. Support concepts must specify whether the government or contractor will conduct specific actions such as fault identification, preventive maintenance checks and services, removal and replacement of defective parts or components, and preparation for shipment to contractor facilities.

d. An onsite user representative may be required to serve as the contracting officer's technical representative or the technical oversight representative for ensuring the contractor performance meets the contract and user requirements.

9–12. Post-production software support

Computer software incorporated into training systems and devices must be maintained and updated. The CRLCMP should be completed by the MATDEV, with support from PEO STRI, before the MS C decision to document the software support strategy. PEO STRI budgets for PPSS to cover software maintenance; however, the cost of software upgrades or software enhancements is separate from software maintenance and must be budgeted and funded by the requiring agency.

9–13. New equipment training

a. NET provides for the initial training and transfer of knowledge from the MATDEV or contractor to the tester and user. It represents the knowledge that is needed for operation, maintenance, and logistics support during testing and initial introduction of new materiel into the Army inventory.

b. The NET team assists commanders in achieving operational capability in the shortest time practical by training Soldiers and maintainers how to operate and maintain the new or improved equipment. It also provides unit leaders with training support components needed to sustain the proficiency of operators and maintainers of the new or improved equipment.

c. NET should begin at the onset of program initiation. NET is provided as needed prior to testing and handoff of equipment to the GCs based on the STRAP which documents all NET requirements.

d. The MATDEV is responsible for providing the NET Team. TRADOC is responsible for providing any needed unit training and training support via a Doctrine and Tactics Training Team (see AR 350-1).

Chapter 10
Environment, Safety, and Occupational Health

10–1. Environmental impact

a. The IPS process ensures the readiness and supportability of Army materiel from cradle to grave while considering ESOH responsibilities during development, production, deployment, sustainment, and disposal of Army materiel. The focus of environmental and safety planning is to avoid the use of substances and procedures that can harm people, animals, or the environment. Therefore one of the primary considerations in system engineering and supportability planning is to eliminate, or failing that, to minimize ESOH hazards, to include HAZMAT use, during all phases of the acquisition process.

b. MATDEVs are required to prepare a PESHE as part of the AS. It is a living document required by MS B that should include—

(1) Environmental, safety, and occupational health risks.

(2) Strategy for incorporating risks into the system engineering process.

(3) Methods for tracking progress in the management and mitigation of risks.

(4) ESOH responsibilities.

(5) Schedule for completing National Environmental Policy Act and Executive Order documentation.

10–2. Environment, Safety, and Occupational Health considerations

a. The CAPDEV and MATDEV must emphasize to the system engineers the types of PSA needed to identify HAZMAT and waste, pollutants, and processes. All potential or actual environmental impacts resulting from the materiel's operation, maintenance, and disposal must be identified, assessed, and documented.

b. Material used or proposed for use in new materiel is checked against the toxic release inventory list from 42 USC Chapter 116. The toxic release inventory list is available at www.epa.gov/tri. If any material used or proposed for use is on this list, studies should be made to find substitutes for them. Justification must be provided for continued use of these materials (see AR 200–1).

c. The environmental risk assessment should begin by reviewing the materiel being replaced by the new materiel or similar materiel to include the environmental assessments done for that materiel. For the materiel being replaced or similar materiel, coordination with the MATDEVs, users, testers, and activity supporting those materiel would ensure environmental impacts that could affect the new materiel were identified and addressed during the decision making process. The risk assessment must be documented in the PESHE that is reviewed during the MS B decision process.

d. If ammunition is to be used, a study of the DEMIL EOD aspects of the materiel is required. There is a mandatory requirement for the concurrent development of EOD procedures and equipment for the materiel. Of additional concern is the requirement for developing "render safe" procedures, the equipment to conduct them, and the design to allow access to munitions. Procedures are to be developed that will allow EOD personnel access to fusing and render-safe mechanisms located within the munitions items. Of particular concern is the need for EOD personnel to have access to munitions items through external packaging or containers designed to carry the munitions items. In addition, maintenance (repair, renovation, and reconfiguration) procedures and requirements must be developed.

e. Maintenance and supply procedures that reduce environmental hazards, waste generation, and toxicity are planned. Increased shelf life, reuse, recycling, and reclamation all need to be planned. If it is determined that HAZMAT must be used in the new materiel, procedures must be developed to ensure personnel safety, and proper handling, operation, maintenance, storage, transportation, DEMIL and disposal. Applicable warning and caution information must also be provided using on-equipment labels, software messages, and included in EPs.

f. In the process of identifying, assessing, and documenting environmental and safety impacts, the area of packaging, handling, and storage must not be overlooked. Necessary storage and transportation data must be developed and used to ensure the maximum use of reusable, recyclable, or easily disposable packaging material.

g. Product stewardship is a comprehensive strategy to factor in ESOH considerations beginning in the design phase of the materiel's life. In the design phase most of the costs to develop, manufacture, and deploy are determined. The decisions at this point can affect user safety, risks of hazardous substance release in the environment, and waste streams.

(1) The main components of product stewardship are as follows:

(a) Identification and quantification of energy and raw materials inputs, outputs, and environmental releases to air, water, and land during the operational life of the materiel including its disposal.

(b) Technical qualitative and quantitative characterization and assessment of environmental consequences.

(c) Continuous evaluation and implementation of opportunities to reduce environmental burden from effluents, airborne emissions, and solid wastes associated with basic life cycle processes of raw material acquisition, manufactur- ing, processing, distribution, transportation, operation, maintenance, recycling, and waste management.

(2) Product stewardship extends throughout the IPS processes in all life cycle phases. There are many options to consider in implementing product stewardship—

(a) Providing guidance on environmental, regulatory, waste minimization or recycling, and pollution prevention and compliance.

(b) Developing system safety literature and advisory publications and conducting safety seminars and provide technical assistance.

(c) Establishing a system for transporter screening, container recycling, packaging re-use, and safety information for handling and storage.

(d) Setting up a hotline to provide safety and emergency assistance and for product and process feedback.

(e) Developing a system of accountability for analysis and monitoring of ESOH concerns.

(f) Providing Internet addresses for guidance and information on ESOH.

10–3. Hazardous materials

a. The IPS program participants will ensure that all aspects of the program address HAZMAT potential and minimize all environmental impacts. The requirements for HAZMAT in materiel designs will be kept to an absolute minimum to reduce hazards associated with transportation, storage, operation, maintenance, handling, and future disposal requirements. Materiel maintenance planning will consider, to the maximum extent practicable, the following factors:

(1) Elimination of virgin material requirements (any undeveloped resource that is, or with new technology, will become a source of raw materials).

(2) Use of recovered materials.

(3) Reuse of product.

(4) Recyclability.

(5) Use of environmentally preferable products.

(6) Waste prevention (including toxicity reduction or elimination).

(7) Ultimate disposal.

b. Potential hazards resulting from the operation, maintenance, and support of the materiel will be evaluated for environmental quality, safety, and occupational health considerations. These hazards may affect documents such as safety data sheets, operator manuals, and air and water permits as well as effects on local communities. Items documented on the safety data sheet to be procured or adopted as standard items will be processed in accordance with AR 700–141.

c. Costs associated with handling and disposition of HAZMAT will be reflected in LCC estimates. The requirement to reduce the environmental impact of materiel applies to both the materiel's design and supportability of the fielded materiel. This requirement is to be satisfied in a manner that minimizes the associated LCC. Four areas will be addressed by IPS program participants as part of the minimization process—

(1) *Pollution prevention.* The focus of pollution prevention will be on elimination or reduction of all forms of pollution at the source. Pollution prevention must be addressed during the design, manufacture, test, operations, maintenance, and disposal of materiel. AR 70–1 and AR 200–1 require acquisition programs to incorporate pollution prevention throughout the acquisition process.

(2) *Environmental compliance.* Environmental regulations-Federal, State, local, and in some cases international-are a source of external constraints that must be complied with. This involves identifying and integrating them into program execution as early as possible. Their major impact will occur during the testing, manufacturing, operation, and support of materiel.

(3) *Reducing hazardous material use.* Selection of material for products, corrosion prevention, manufacturing, maintenance, and DEMIL processes is critical to their safety, handling, maintenance, DEMIL, and disposal over the life of the materiel.

(4) *Render safe procedures.* These procedures focus on risk reduction when dealing with explosive components, radioactive material, and other hazardous chemicals or compounds.

Chapter 11
Test and Evaluation

11–1. Supportability test and evaluation

a. T&E is an essential part of the development and deployment of all Army materiel. T&E results provide essential information for MDRs. MATDEVs require test data to provide feedback on design elements in order to ensure adequate progress towards meeting the Soldier's requirements. Contractors use T&E information to ensure conformity to technical data, and to detect manufacturing or quality deficiencies. The importance of structuring a sound T&E program during the materiel acquisition process cannot be overemphasized. T&E reduces downstream costs (for example, upgrade, retrofit, and modernization) by exposing problems that can be fixed before the production of large numbers of items.

b. IPS and materiel supportability is an integral part of any T&E program. Supportability is a KPP and DOD and Army policy require evaluation of materiel supportability. OT&E policy mandates that materiel supportability be evaluated for suitability in the operational environment.

c. Planning, conducting and reporting of T&E are accomplished according to the policies and guidelines in AR 73–1.

d. The T&E WIPT, chaired by the MATDEV, plans all T&E to be conducted throughout the development and production of the materiel. Topics coordinated will include all supportability test issues and criteria, and all test and LD requirements contained in the TEMP.

e. The T&E WIPT is established to perform the T&E mission in support of acquisition programs. The T&E WIPT develops the TEMP and determines what T&E should be conducted during development and production of a materiel.

f. The conduct and reporting of all testing is integrated as much as possible. The ATEC in coordination with the T&E WIPT develops a single materiel evaluation plan, containing the test and simulation execution strategy that leads to a single materiel evaluation report (see AR 73–1).

11–2. Product support package

a. The product support package is a composite of the support resources that will be evaluated during a LD and tested and validated during developmental T&E. The LD is supported by applicable PSMIPT stakeholders. The product support package includes items such as spare and repair parts, EPs, training package, special tools, TMDE, and unique software.

b. The product support package, used to validate the support system, is to be differentiated from other logistics support resources and services required for initiating the test and maintaining test continuity.

c. The product support package must be stressed as a flexible instrument, tailored to the materiel-peculiar requirements, and related to supportability testing issues. However, once the product support package for any testing phase is developed and coordinated, it should not be compromised.

d. The MATDEV delivers the product support package—

(1) Component list to the PSMIPT 60 days before testing begins.

(2) To the test site not later than 30 days before testing begins.

11–3. Logistics demonstration

a. DODI 5000.02 requires that analysis, T&E results, or independent reviews confirm the adequacy of the proposed maintenance plan and programmed support resources to meet objectives for peacetime readiness and wartime employment. It also requires that the ability to support any materiel be demonstrated before the materiel is placed in the hands of the Soldier. The LD is conducted to confirm that support resources and tasks developed to sustain the materiel will function as intended and to ensure that the gaining unit has the logistics capability to achieve IOC. AR 700–127 identifies the LD as a means for satisfying DOD requirements for all Army acquisition programs. The LD is a validation process managed by the MATDEV.

b. The goals of the LD are to—

(1) Evaluate the—

(a) Supportability of the materiel design.

(b) Adequacy of maintenance planning for the materiel (such as maintenance concept, task allocation, maintenance procedures, troubleshooting procedures, and TPS, prognostics and embedded diagnostics, and support equipment).

(c) Final product support package to include interface compatibility of the TMDE and support equipment with the materiel.

(d) EPs.

(e) Training and training devices.

(f) Human factors engineering aspects and MANPRINT related to operator and maintainer tasks.

(g) TMDE including embedded diagnostics and prognostics.

(h) Common tools and special tools.

(i) Repair parts and special tools lists.

(2) Validate and update the LPD.

c. The LD data is supplemented by supportability related data obtained during DT&E and OT&E to confirm the correct resources and tasks have been developed.

d. Maximum use should be made of existing qualitative and quantitative data such as when the item is used by another service, industry, or country. In order to minimize cost and schedule risk, existing qualitative and quantitative demonstrations, evaluations, analyses, simulations and tests should be used to meet LD requirements.

e. The extent of the LD is based on the complexity and characteristics of the materiel (for example, there is no need to perform a maintenance demonstration if there are no maintenance tasks). If major configuration changes are required between test articles and production software and hardware, it would be advisable to repeat the affected portions of the LD. This would include repeating portions of the TM procedures.

f. The LD is conducted on a production representative item for all developmental materiel (hardware and software) or on a production item for commercial and NDI. If an early abbreviated LD is conducted on prototype materiel, some or all tasks may be required to be repeated on production representative materiel prior to being considered successfully demonstrated.

g. Modified items and all new changed TMDE, training devices, and support equipment intended for support of the materiel may also require a partial LD.

h. The LD may be conducted at a contractor's plant, government maintenance engineering evaluation facility, or test sites. Whenever feasible, the LD should be conducted at an existing support facility similar to intended user facilities to verify facility adequacy or identify any facility deficiencies.

i. The LD is normally conducted on those tasks performed at field level and some sustainment level, but must include the appropriate trained MOS and rank representative Soldiers.

j. For ammunition items, the LD normally consists of verification of render safe and EOD procedures. A LD will not be needed for ammunition items unless they have characteristics similar to smart weapons (e.g., have built-in test or other test measurement and diagnostic equipment capabilities) that would require a diagnostics/prognostics demonstration to validate that adequate capabilities exist to achieve IOC.

k. The requirements for a LD will be summarized in the TEMP.

l. The LD for commercial and NDI programs may be abbreviated if existing supportability data can be obtained and adequately evaluated. Inclusion of a logistician on the source selection evaluation board to evaluate such data is prudent. In some cases it may be necessary to perform a partial LD on commercial and NDI materiel after source selection to verify the maintainability and supportability of the materiel design.

m. A successful LD is the satisfactory completion of all tasks agreed to by the PSMIPT as documented in the LD plan. A delta LD that addresses tasks not tested is required if either tasks from the LD plan are not completed, or additional tasks are identified as part of the LD.

n. Procedures for LD are—

(1) *Review of requirements.* The PSM and PSMIPT members review the CRD, supplemental documentation, and contract specifications to ensure that the requirements are clearly defined and input data to the analyses are available and agreed upon.

(2) *Review of analyses.* The results of the LORA (see SAE AS1390), various PSAs, LPD, provisioning analysis, MANPRINT assessment, and transportability analysis are reviewed to identify logistics resources, tasks, and issues to be addressed in the LD.

(3) *Logistics Demonstration Plan.* The PSM with support of the PSMIPT prepares the LD plan based on the outcome of the requirements review and initial analyses of the materiel. The plan should address all opportunities for collection of data to confirm adequacy of the planned support. The LD plan is distributed prior to the PSMIPT meeting that will address the LD. The recommended LD plan outline is—

(a) General.

(b) Scope.

(c) Materiel description.

(d) LD strategy.

(e) Participating organizations, responsibilities, and milestones for delivery of the product support package.

(f) Procedures, detailed plans, and milestones for demonstration activities.

(g) Reports (describe who will provide input and the due dates).

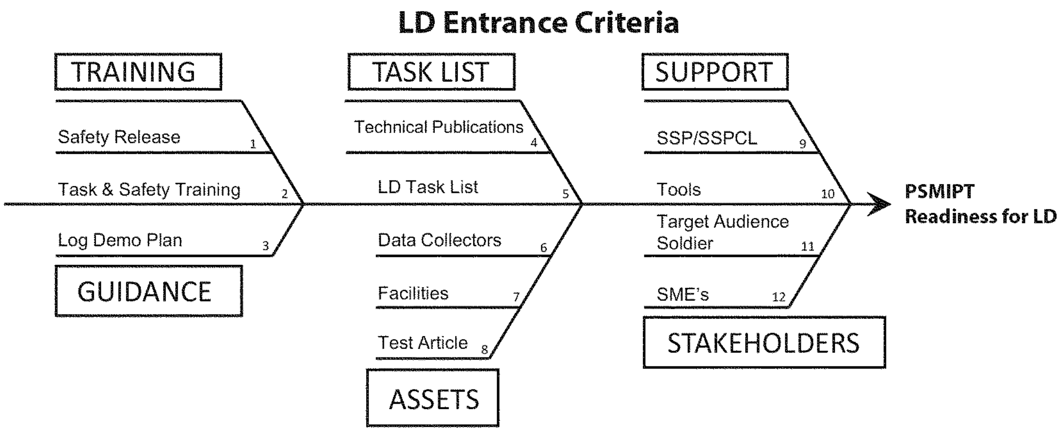
(h) References.

(i) Acronyms.

(j) Distribution.

(4) *Support resources.* These need to be programmed to include use of existing data from the contractor or other users, maintainability and prognostics and embedded diagnostics demonstrations, transportability analysis and testing, MANPRINT assessment, TMDE evaluation, and software evaluation.

(5) *Logistics Demonstration Readiness review.* The MATDEV must conduct a LD readiness review 30 days prior to the LD event to identify adequacy in planning, resource availability, and completion of requirements necessary to ensure reasonable confidence to successfully achieve LD objectives. The review is conducted by the PSM with the PSMIPT. The final LD plan will be summarized during the review. The PSM assesses readiness for entry into the LD based on status of entrance criteria in figure 11–1, and can use information in this figure to develop a preliminary LD checklist. The PSMIPT members provide recommendations to the PSM who advises the MATDEV on LD readiness. Results of the review is documented by the PSMIPT and annexed to the LD plan.



1. RESPONSIBILITY OF THE TEST AGENCY. FULL SAFETY RELEASE MAY NOT BE REQUIRED DEPENDING ON SYSTEM CONFIGURATION AND EMPLOYMENT DURING LD.
2. TRAINING FOR TARGET AUDIENCE REPRESENTATIVE SOLDIERS THAT IS SUFFICIENT FOR THE DEMONSTRATION OF LD TASKS.
3. SUBMITTED BY THE PSM TO THE PSMIPT 120 DAYS PRIOR TO LD AND FINALIZED 30 DAYS PRIOR IN CONJUNCTION WITH THE PSMIPT READINESS REVIEW.
4. TECHNICAL PUBLICATIONS MUST BE VALIDATED BY THE CONTRACTOR PRIOR TO THE LD. IT IS ESSENTIAL THAT TECHNICAL PUBLICATIONS ARE ADEQUATE FOR USE DURING LD.
5. THE LD TASKS WILL VARY BASED ON THE COMPLEXITY OF THE SYSTEM. PHYSICAL TEARDOWN CONSISTS OF ALL OPERATOR TASKS AND SPECIFIED FIELD LEVEL MAINTENANCE TASKS. 100% OF ALL CRITICAL TASKS (BASED ON THE FMECA) AND A SAMPLING OF ADDITIONAL TASKS MUST BE DEMONSTRATED DURING THE DIAGNOSTICS/PROGNOSTICS DEMONSTRATION. PROVIDE A COPY OF THE FMECA TO SUPPORT LD.
6. TRAINED DATA COLLECTORS ARE REQUIRED FOR THE LD. THERE ARE SEVERAL OPTIONS FOR DATA COLLECTORS INCLUDING ATEC TEST CENTERS OR INTERNALLY RESOURCED BY THE MATDEV OR CONTRACTOR.
7. LD SHOULD BE CONDUCTED IN A FACILITY WITH REPRESENTATIVE CONDITIONS TO THE SYSTEM'S EMPLOYED MAINTENANCE CONCEPT PER THE LCSP. CONDUCT AT A SIMILAR FACILITY TO IDENTIFY ANY FACILITY DEFICIENCIES.
8. PRODUCTION REPRESENTATIVE TEST ARTICLES AND ANY TEST EQUIPMENT REQUIRED TO PERFORM THE LD TASKS. PROTOTYPES (PRE-PRODUCTION) ARE SUFFICIENT ONLY FOR EARLY ABBREVIATED DEMONSTRATIONS. TASKS FROM EARLY ABBREVIATED DEMONSTRATIONS MAY SUPPORT LD ONLY IF TASKS ARE UNCHANGED AND THE PSMIPT CONCURS.
9. REPRESENTATIVE SYSTEM SUPPORT PACKAGE (SSP) / SYSTEM SUPPORT PACKAGE COMPONENT LIST (SSPCL) REQUIRED TO PERFORM LD TASKS.
10. COMMON AND UNIQUE TOOLS AND TMDE REQUIRED TO PERFORM LD TASKS.
11. REPRESENTATIVE SOLDIERS FOR PERFORMING LD TASKS. SOLDIER REQUESTS MUST BE SUBMITTED BY THE MATDEV THROUGH THE TEST SCHEDULE AND REVIEW COMMITTEE 6 MONTHS PRIOR TO LD (SEE AR 700-127 AND AR 73-1).
12. INCLUDE SUBJECT MATTER EXPERTS (SME) AS PART OF LD TEAM. THE LD TEAM CONSISTS OF PSMIPT MEMBERS THAT CONDUCT, PARTICIPATE, AND OBSERVE THE LD TO INCLUDE THE MATDEV, CAPDEV, TRAINING DEVELOPER, TESTER, AND EVALUATOR.

Figure 11–1. Logistics demonstration entrance criteria

(6) *Conduct of the logistics demonstration.* The LD can be accomplished in increments. LDs may be conducted on components and major subassemblies with a final system level LD to verify the component interface. Other tailored LD procedures may be required. The LD plan guides LD participants to ensure a complete and adequate LD. A successful LD will verify the ability of representative support personnel to perform each selected task with the support resources included in the product support package in an environment that approximates the expected operational profile. The LD normally consists of—

(a) Physical tear down. All specified LD tasks contained in EPs are performed by target audience Soldiers. This practice facilitates a proper review of the publications for accuracy, usability and completeness.

(b) Maintainability and prognostics and embedded diagnostics demonstration. Maintenance and troubleshooting tasks as the result of operations or fault simulation or insertion are to be accomplished by typical user personnel to

meet the intent of MIL–HDBK–470. Complex materiel may require additional demonstrations prior to fielding of TPSs or other support capabilities that are not available for the initial fielding.

(7) *Packaging and handling evaluation.* Packaging requirements are validated to meet the intent of AR 700–15 and AR 700–37.

(8) *MANPRINT assessment.* MANPRINT assessments are conducted by the DCS, G–1 for ACAT I and ACAT II programs or by TRADOC for other programs to determine the status and adequacy of MANPRINT efforts and identify any unresolved issues or concerns. Based on DA Pam 73—, the assessment of MANPRINT is an essential element of a materiel's evaluation strategy at each decision point. Also, AR 602–2 directs ATEC to include MANPRINT considerations in materiel T&E, of which the LD is an important source of data.

(9) *Test, measurement and diagnostic equipment evaluation.* TMDE requirements and supportability statement from the U.S. Army TMDE Activity is evaluated for interface compatibility during the LD.

(10) *Software evaluation.* Prognostics and diagnostic software are demonstrated during the LD through nondestructive fault insertion. The faults inserted include operator procedure errors and software processing errors that the operator and maintainer should be able to detect, fault isolate and correct. MIL–HDBK–470 may be used to determine fault insertion sample size. The designated center for software engineering conducts testing of software and evaluation of PPSS plans and capabilities.

(11) *Transportability engineering analysis.* SDDCTEA conducts transportability analysis and determines transportability testing needed to ensure transportability requirements are met in accordance with DODI 4540.7. A transportability demonstration may be required if analyses are insufficient to prove otherwise.

(12) *Final evaluation and report.* After the LD is completed, the MATDEV is responsible for evaluating LD results and preparing a report. The PSM prepares the LD report in coordination with the PSMIPT.

(a) The LD report includes the LD strategy, details on the conduct of the LD, data collection, analysis results, all quantitative and qualitative findings, and a description of all necessary follow-on actions.

(b) LD report findings may come from data existing prior to the LD, development and operational test data, and data derived from the LD. All corrective actions are incorporated and verified before the production decision.

(c) The LD report is required within 30 days after the LD is completed.

Chapter 12
Integrated Product Support Program Reviews and Reporting

12–1. Milestone Decision Review

a. The MDR is conducted at specified major decision points (MSs) during the acquisition process for all materiel. MDRs serve as the forum to discuss critical issues that must be resolved before program decisions can be made and to recommend alternatives to the appropriate MDA. The MDR is scheduled so that all the decisions made result in the optimal use of the resources in the next phase. Resources are not obligated or committed before the MDR. There are three levels of MDAP reviews that may be conducted. They are the Defense Acquisition Board (DAB), Army System Acquisition Review Council (ASARC) and the in-process review (IPR).

(1) The DAB provides information and recommendations to the Secretary of Defense when decisions are necessary on DOD major programs.

(2) The ASARC is required to develop the Army's course of action on DOD major programs in preparation for a DAB Review, and develops the basis for decision by the AAE on ASARC approved programs.

(3) The IPR is required to make recommendations to the appropriate decision authority when MS decisions are required for materiel under the IPR programs. The IPR membership includes the MATDEV, CAPDEV, logistician, trainer and others as required. Conflicting positions are forwarded to higher levels for resolution, as appropriate. The MATDEV is responsible for conducting the IPRs (see AR 70–1).

b. The MDR is required for all materiel acquisition programs.

c. An MDR is required, for traditional acquisition programs, prior to the three major MS reviews. Under non-traditional acquisition programs (rapid fielding, NS–E, and system enhancement program) the MDR is tailored to the appropriate program decision point in the acquisition cycle.

d. The MDA is responsible for program decisions on initiation of, or changes in, program commitments. These decisions include transition to different acquisition phases and courses of action in response to an actual or imminent breach of an approved program threshold. The MATDEV, CAPDEV, and TRADOC Capabilities Manager are responsible for periodically presenting informational briefings to these members.

12–2. Type classification

The TC process ensures and establishes the degree of acceptability of materiel for Army use prior to spending procurement funds at the FRP decision review. TC documents and provides data for authorization, procurement, IPS, asset visibility, maintenance and readiness reporting. It integrates the acquisition process with standard Army IPS processes that lead to production and deployment (materiel fielding) of the materiel (see AR 700–142 and DA PAM 700–142).

12–3. Materiel release

The materiel release process is used to certify that new and upgraded Army materiel is safe, suitable, and logistically supportable in the intended operational environment when used within stated operational parameters. The materiel release also ensures that critical developmental and OT&E issues have been resolved or that provisions for their resolution have been made before a FMR is granted and that all interoperability and network certifications requirements have been completed. Materiel release is a requirement prior to materiel fielding and deployment by Army units (see AR 700–142 and DA Pam 700–142).

12–4. Supportability assessment

The MATDEV, as the Total Life Cycle System Manager, is responsible for assessing materiel supportability with guidance from the DASA (APL). The IPS related assessments of supportability provide a structured process to assess the status of an IPS program to achieve the required product support goals and to address the specific supportability issues. These issues and considerations are broader in scope than the IPS Elements. The supportability assessments evaluate the characteristics of a materiel and its support system design which provides for sustained materiel performance at its required levels of operation and maintenance.

a. The supportability assessments are required for IPRs and to assist the MATDEV in preparing for MDRs and other designated evaluations and audits.

b. The MATDEV briefs a materiel's logistics assessment (ILA) to DASA (APL), SAAL–LC, prior to each MS decision review (IPR and MDR) starting at MS B.

c. All ACAT I and ACAT II weapon system programs require an ILA.

d. Non-ACAT I or ACAT II programs are encouraged to use the guidance in DA Pam 700–28 when conducting supportability assessments. This ensures that the IPS elements are thoroughly addressed in IPS program planning and execution.

12–5. Independent logistics assessment

All ACAT I and ACAT II weapon system programs require an ILA to ensure that the MATDEV's PBPSS will meet the CAPDEV requirements. The PEO is responsible for establishing an ILA lead and team of subject matter experts that are not assigned in support of the program under review. DA Pam 700–28 provides implementing guidance for conducting ILAs. Non-ACAT I or ACAT II programs are advised to use the guidance in DA Pam 700–28 for conducting internal program assessments to ensure the IPS elements are thoroughly addressed in IPS program planning and execution for all materiel and software products. DA Pam 700–28 provides guidance for MAIS programs should the PEO wish to have an ILA conducted.

12–6. Department of the Army integrated product support reviews

a. The DA Integrated Product Support Review (IPSR) serves as a final preparation for the DASA (APL) chaired review for program MDRs. The IPSR is convened to resolve open issues. The IPSR provides a forum to present the latest status of completed and current issues, and the impact on program status. The IPSR also addresses strategies for subsequent phases to maximize supportability at acceptable levels of cost and risk and minimize environmental impacts.

b. This applies to all ACAT I and II materiel being acquired for the Army or other services when the Army is the lead in the acquisition effort. The DASA (APL) may request an IPS review for ACAT III materiel, or for multiservice programs when the Army does not have the lead in the acquisition.

c. The Office of the DASA (APL), SAAL–LC develops the presentation for the IPSR in coordination with the PSM and other PSMIPT members. The IPSR addresses each IPS element using DA PAM 700–28, summarizing issues that have been resolved, detailing ongoing actions. Innovative strategies are highlighted, as will the use of commercial practices. Planning for transfer of a materiel being displaced is given equal consideration during the IPSR.

d. The scheduling of the IPSR reflects overarching IPT initiatives, where applicable, to resolve ongoing issues. The presentation is coordinated with all participating agencies prior to the presentation to the DASA (APL).

e. DA staff elements may request an IPSR be conducted through DASA (APL) who is the approval authority for these requests.

f. The DA IPSR is chaired by DASA (APL) and includes other IPSR participants that are a general officer or equivalent civilian-level representative from—

(1) ASA (ALT).

(2) Assistant Secretary of the Army, Financial Management & Comptroller.

(3) DCS, G–1. (4)

DCS, G–3/5/7.

(5) DCS, G–4.

(6) DCS, G–8.
(7) COE.
(8) Army Office of the Surgeon General.
(9) CAPDEV.
(10) MATDEV.
(11) AMC.
(12) Others as required (such as the TMDE manager, trainer, user, independent evaluator, depot support organization, and tester).
(13) Assistant Chief of Staff for Installation Management.

12–7. Sustainment reviews

a. SRs are designed to assess the performance of the product support strategy for a materiel once it has begun fielding to the Army. The focus of the SRs is to ensure that the materiel can be sustained throughout its life cycle to achieve its expected useful life, maintain readiness and availability requirements, ensure the product support strategy for materiel is meeting the sustainment objectives and thresholds established, evaluate actual and projected operation and support costs, and to coordinate the transition to post production sustainment funding. SRs evaluate actual performance against predicted performance parameters outlined in the LCSP, encompass all areas of logistics and sustainment, can recommend changes to the product support strategy and the LCSP, and focus on closing any outstanding acquisition activities.

b. No program can POM for or receive sustainment funding of any kind without having been through one of the two SRs as identified below.

c. The two types of SRs are—
(1) Weapon system review (WSR).
(2) Operations and support review (OSR).

d. The WSR is the forum that synchronizes equipping, sustaining, installation, operating tempo, and personnel (military and civilian) requirements for materiel. It focuses on life cycle weapon materiel and equipment funding requirements and is a cross Program Evaluation Group (PEG) integration review that occurs following the Long Range Investment Requirements Analysis each year.

(1) Deputy Assistant Secretary of the Army (Plans, Programs, and Resources) (DASA–ZR) develops and coordinates the overall WSR process in an annual letter of instruction that includes detailed guidance for that year WSRs, to include schedules and templates to be used for the reviews. DASA–ZR records and summarizes the outcome of each WSR and archive the data on Army Knowledge Online.

(2) The WSR is quad-chaired at the Colonel/GS–15/equivalent level by personnel from the DASA–ZR, the DCS, G–8 , the DCS, G–4, and the DCS, G–3/5/7. The chairs for each review are SAAL–ZR, the applicable DCS, G–8 Force Development and Resources and Directorate of Materiel Chief, the DCS, G–4 Director for Integrated Logistics Support and the DCS, G–3/5/7 (Director of Training Programs and Resources).

(3) During each review, the quad-chairs assess the requirements presented by the MATDEV to assess—
(a) Information gaps that require continued action or evaluation.
(b) How new or emerging requirements should be incorporated into the POM.
(c) Synchronization of all cross PEG requirements to ensure successful fielding and transition to sustainment, and standup of any required personnel or sustainment capabilities.
(d) Resource planning and actual execution by each type of funds for:
1. Prior year plans and actuals for all prior years of funding that could be obligated each year.
2. Budget year funds required, requested or validated, and funded.
3. Outyear funds required, requested, validated, and funded.
4. All PEGs and planning, programming, budget, and execution personnel are invited to participate in the WSR.

e. The OSR is a post-production decision formal review chaired by the MDA. The OSR occurs no later than two years after the FRPDR and serve as the final evaluation of O&S planning to ensure that O&S requirements have been completely thought through, can be implemented, and will meet Soldier needs. The OSR can be tailored to meet individual program needs as specified or required by the MDA.

(1) The MDA chairs the OSR no later than two years after the FRPDR. It may also occur—
(a) When precipitated by changes in requirements, design, performance or product support problems.
(b) When a materiel does not achieve DA readiness or availability goals.
(c) When requested by an Army command.
(d) When the MDA requests an OSR to address continuing concerns.
(2) The MATDEV is responsible for scheduling the OSR with the MDA at the appropriate time.
(a) The MDA is determined by the program's ACAT level or designation.

(b) If the MDA is the AAE, the MATDEV uses the ASARC as the forum for the OSR and follow all ASARC planning and review processes (see DA Pam 70–3).

(c) For those programs not reviewed by the ASARC, the PEO certifies to the ASARC that the review occurred and provide a copy of the program's slides for the ASARC to archive for future reference.

(d) The ASARC ensures all OSRs, regardless of ACAT level, are archived for future reference.

(3) The OSR evaluates—

(a) Remaining quantities to be procured to ensure all requirements have been evaluated and that the required resources (by type of funds) have been requested, validated, and funded in the POM for all required years of funding.

(b) Maintenance plans for the materiel at the field and sustainment levels to ensure that all product support capabilities are planned or in place to support the materiel (that is, software, depot, supply chain).

(c) MATDEV office drawdown plans as the office shifts from procurement and fielding to a sustainment role.

(d) Plans to transition the materiel to sustainment and ensure that all IPS elements have been addressed to support the materiel—

1. Ensure that the product support strategy is working effectively.

2. Measure product support strategy performance against the LCSP.

3. Recommend adjustments if the product support strategy is not achieving the desired readiness and availability outcomes.

4. Recommend design changes as required based upon RAM and supportability data.

5. Review transition plans from ICS to the end state support concept.

6. Report and resolve outstanding operational and developmental performance deficiencies identified at the FRPDR.

(e) The use of contractor field support representatives (CFSR)—

1. If CFSRs are used as part of an approved support strategy for CLS, the CFSR planned or actual support is reviewed during contract renewal or renegotiation. The Army preference is to optimize the number of CFSRs, or to use multifunctional or multi-materiel CFSRs when possible.

2. If CFSRs supplement organic support under ICS, the OSR will ensure planned transition to the end state support strategy.

3. If the end state is organic support, the OSR will review the joint MATDEV and AMC strategy to transition from CFSRs to organic support, to include logistics assistance representatives (LAR) and the detailed timelines and funding to ensure standup of the capability. The joint strategy will include a written concurrence or nonconcurrence with the transition strategy from all affected Army Commands. Any issues that delay the transition from CFSRs to organic support will include a transition plan with timelines and required resources that have been approved by the MDA.

(f) Closure of any remaining acquisition activities—

1. TC standard and FMR (see AR 700–142).

2. Standup of depot maintenance requirements no later than IOC plus four years in accordance with 10 USC 2464.

3. Funding requirements for all sustainment efforts must have been established in the POM (that is, operating tempo, field and sustainment maintenance, and second destination transportation).

4. Transition operational project code managed materiel. Ensure all PM owned stocks that should be released to the Army or DLA are no longer coded as PM owned stocks in the Logistics Modernization Program.

(g) Actual O&S information and data for—

1. Cost and performance parameters identified in the CPD from the FRPDR.

2. Field performance data suitable for comparing the CPD capabilities with the field performance.

3. A comparison of PBA performance requirements to actual performance data of the PSPs.

4. Product improvements that have been incorporated, as well as those that are currently scheduled and planned.

5. Configuration control.

6. Status of each item within the ICS to objective support concept transition plan. The transition plan must be included as an annex to the LCSP.

(h) OSR membership will be determined by the program's ACAT level. Membership for the ASARC is defined in DA Pam 70–3. For programs where the AAE is not the MDA, the OSR should include personnel from the following organizations at a minimum - the DASA (APL) Life Cycle Logistician, DASA (RI), DCS, G–4, AMC, the supporting L–C(s), Army Sustainment Command, Research and Development Engineering Command, U.S. Army Forces Command, and the CAPDEV. Membership from other organizations should be addressed on a program by program basis.

12–8. Sustainment quad chart

a. Increasing visibility of sustainment factors is vital to ensuring that programs meet required materiel readiness objectives while achieving long-term affordability requirements. The SQC is the MATDEV's "Program Report Card" that summarizes progress on implementing the LCSP. The SQC provides status for—

(1) The product support strategy to include the—

(a) Sustainment approach.

(b) Issues.
(c) Resolution (corrective actions to be taken).
(2) Sustainment schedule that includes an integrated view of key milestones and life cycle sustainment events.
(3) Metrics data for antecedent materiel actual, original program goal, current program goal, and current estimated actual for—
(a) Sustainment KPP with two subcomponents: Materiel Availability and Operational Availability.
(b) Reliability KSA.
(c) O&S cost KSA.
(d) MDT.
(e) Logistics footprint.
b. The LIW is the Army's authoritative source for logistics data.
c. MATDEVs must use authoritative metrics data from the LIW for materiel availability, materiel reliability, and MDT. The data must be accessed through the Universal Acquisition Data Display Entry (UADDE) system. The SQC metrics data must be used as the baseline for Defense Acquisition Management information and Retrieval reporting.
d. The SQC is annexed to the LCSP.
e. SQC instructions are in appendix G.
f. An SQC example is at figure 12–1.

SAMPLE PROGRAM: "ABC"

Date:

Product Support Strategy

Sustainment Approach
- Current (initial CLS covering total system)
- Future (sub-system based PBL contracts)

Issues
- Shortfall in O&M funding in FYDP
- Reliability and availability estimates are below goals
- LCSP requires update before DAB

Resolution
- POM request for O&M restoration submitted
- Reliability improvement plan with clear RAM goals up for final signature
- LCSP in draft

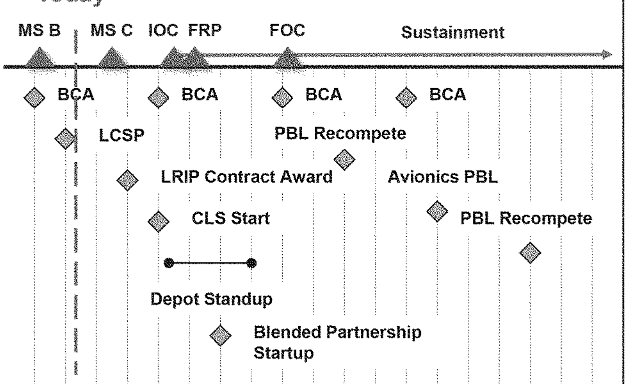
Metrics Data

Metric	Antecedent Actual	Original Goal	Current Goal	Demonstrated Performance	Current Estimate
Materiel Availability	76%	80%	77%	69%	75%
Reliability	37 hrs	50 hrs	50.5 hrs	46hrs	48 hrs
Operating & Support Cost	$7.6B	$9.8B	$10.4B	10.4B	$10.4B
Mean Down Time	12 hrs	20 hrs	18 hrs	18hrs	15 hrs

* Test or fielding event data derived from _______

Notes:

Sustainment Schedule



O&S Data

Cost Element	Antecedent Cost	ABC Original Baseline	ABC Current Cost
1.0 Unit-Level Manpower	175.5	139.4	158.7
2.0 Unit Operations	102.1	143.0	143.0
3.0 Maintenance	30.2	47.5	52.4
4.0 Sustaining Support	98.1	127.7	127.7
5.0 Continuing System Improvements	32.6	76.3	86.0
6.0 Indirect Support	38.9	80.8	79.6
Total	**$477.4**	**$614.7**	**$647.4**

Cost based on average annual per system in BY$K

Total O&S Costs	Antecedent	ABC
Base Year $M	$7,638.1M	$10,358.3M
Then Year $M	$8,936.6M	$12,749.9M

Figure 12–1. Sustainment quad chart example

Appendix A
References

Section I
Required Publications

AR 700–127
Integrated Product Support (Cited in paras 1–1, 2–1a, 3–19, 4–16c, 4–17b, 8–2e, 8–13a, and 11–3a.)

Section II
Related Publications

A related publication is a source of additional information. The user does not have to read a related publication to understand this publication. DOD publications are available at http://www.dtic.mil/whs/directives. Military standards and handbooks are available at http://assist.daps.dla.mil/quicksearch. SAE publications are available at http://standards.sae.org/.

AR 11–18
The Cost and Economic Analysis Program

AR 15–1
Committee Management

AR 25–30
The Army Publishing Program

AR 25–400–2
The Army Records Information Management System (ARIMS)

AR 40–10
Health Hazard Assessment Program in Support of the Army Acquisition Process

AR 70–1
Army Acquisition Policy

AR 70–12
Fuels and Lubricants Standardization policy for Equipment Design, Operation, and Logistics Support

AR 70–47
Engineering for Transportability Program

AR 71–9
Warfighting Capabilities Determination

AR 71–32
Force Development and Documentation—Consolidated Policies

AR 73–1
Test and Evaluation Policy

AR 75–15
Policy for Explosive Ordnance Disposal

AR 200–1
Environmental Protection and Enhancement

AR 350–1
Army Training and Leader Development

AR 350–38
Training Device Policies and Management

AR 385–10
Army Safety Program

AR 420–1
Army Facilities Managment

AR 602–2
Manpower and Personnel Integration (MANPRINT) in the System Acquisition Process

AR 700–15/NAVSUPINST 4030.28E/AFJMAN 24–206/MCO 4030.33E/DLAR 4145.7
Packaging of Materiel

AR 700–18
Provisioning of U.S. Army Equipment

AR 700–37
Packaging of Army Materiel

AR 700–90
Army Industrial Base Process

AR 700–138
Army Logistics Readiness and Sustainability

AR 700–141
Hazardous Materials Information Resource System

AR 700–142
Type Classification, Materiel Release, Fielding, and Transfer

AR 710–1
Centralized Inventory Management of the Army Supply System

AR 715–9
Operational Contract Support Planning and Management

ASD (Logistics and Materiel Readiness)
DOD Product Support Business Case Analysis (BCA) Guidebook

ASA (Financial, Management,and Comptroller) Resource Management Publications
Cost Analysis Manual (Available at www.asafm.army.mil/pubs/pubs.asp.)

CJCSI 3170.01
Joint Capabilities Integration and Development System (Available at http://dtic.mil/cjcs_directives/cjcs/instructions.htm.)

DA Pam 5–11
Verification, Validation, and Accreditation of Army Models and Simulations

DA Pam 25–40
Army Publishing Action Officers Guide

DA Pam 70–3
Army Acquisition Procedures

DA Pam 73–1
Test and Evaluation in Support of Systems Acquisition

DA Pam 385–16
System Safety Management Guide

DA Pam 700–28
Independent Logistics Assessment

DA Pam 700–142
Instructions for Materiel Release, Fielding, and Transfer

DA Pam 708–3
Cataloging Supplies and Equipment, Army Adopted Items of Materiel and List of Reportable Items (SB 700-20)

Defense Acquisition Guidebook
(Available at http://akss.dau.mil/jsp/default.jsp.)

DFAS–IN Manual 37–100
Financial Management–The Army Management Structure (Available at http://www.asafm.army.mil/budget/di/di.asp.)

DOD 4140.1–R
Supply Chain Materiel Management Regulation

DOD 4160.21–M–1
Defense Demilitarization Manual

DODD 1322.18
Military Training

DODD 1430.13
Training Simulators and Devices

DODD 4140.01
Supply Chain Materiel Management Policy

DODD 5000.01
The Defense Acquisition Manual

DODI 4151.20
Depot Maintenance Core Capabilities Determination

DODI 4151.21
Public-Private Partnerships for Depot-Level Maintenance

DODI 4540.7
Operation of the DOD Engineering for Transportability and Deployability Program

DODI 5000.02
Operation of the Defense Acquisition System

DODI 8320.02
Sharing Data, Information, and Information Technology (IT) Services on the Department of Defense

IEE/EIA 12207
Standard for Information Technology-Software Life Cycle Processes (IEEE guidelines may be obtained, free of charge to DOD organizations, from the Defense Automation and Production Service (DAPS). To request documents, prepare the request on organizational letterhead and send it by FAX to (215) 697–1462 or mail to DAPS, 700 Robbins Avenue, Building 4, Philadelphia, PA 19111–5094).

MIL–HDBK–61A (SE)
Configuration Management Handbook

MIL–HDBK–470
Designing and Developing Maintainable Products and Systems, Volume I and Volume II

MIL–HDBK–502
Acquisition Logistics

MIL–HDBK–881
Work Breakdown Structure

MIL–STD–209
Lifting and Tiedown Provisions

MIL–STD–882
Department of Defense Standard Practice for System Safety

MIL–STD–3034
Reliability-Centered Maintenance Process

MIL–STD–40051–1
Preparation of Digital Technical Information for Interactive Electronic Technical Manuals (IETMS)

MIL–STD–40051–2
Preparation of Digital Technical Information for Page–Based Technical Manuals

OMB Circular A–94
Guidelines and Discount Rates for Benefit-Cost Analysis of Federal Programs

Product Support Manager Guidebook
(Available at https://acc.dau.mil/psm-guidebook.)

Public–Private Partnering for Sustainment – A DOD Guidebook
(Available at https://acc.dau.mil/ppp-guidebook.)

SAE AS1390
Level of Repair Analysis (LORA)

SAE EIA–649–B
Configuration Management Standard

SAE GEIA–STD–0007
Logistics Product Data

SAE GEIA–HB–0007
Logistics Product Data Handbook

SAE GEIA–STD–0016
Diminishing Manufacturing sources and Materiel shortages

SAE TA–STD–0017
Product Support Analysis

SAE TA–HB–0007–1
Logistics Product Data Reports Handbook

S1000D
International Specification for Technical Publications Using a Common Source Database

Section 815 of Public Law 110–417
Preservation of Tooling for Major Defense Acquisition Programs

10 USC 2320
Rights in Technical Data

10 USC 2460
Definition of depot maintenance and repair

10 USC 2464
Core logistics capabilities

10 USC 2466
Limitations on the performance of civilian commercial or industrial type functions

10 USC 2474
Centers of Industrial and Technical excellence: designation; public-private partnerships

42 USC Chapter 116
Emergency Planning and Community Right-to-Know

43 CFR 223.7301
Policy

Section III
Prescribed Forms
This section contains no entries.

Section IV
Referenced Forms
Unless otherwise stated, DA Forms are available at APD Web site http://www.apd.army.mil. DD Forms are available at http://www.dtic.mil/whs/directives/infomat/form/formsprogram.htm.

DA Form 2028
Recommended Changes to Publications and Blank Forms

DD Form 1423
Contract Data Requirements List

Appendix B
Supportability Metrics for Integrated Product Support Elements

B–1. Measuring Integrated Product Support
Appropriate supportability metrics must be selected at the right time in the materiel acquisition life cycle to measure IPS program performance. When the IPS program is properly measured, IPS program shortfalls can be identified and adjustments can be made. Without selecting the right metrics and measuring IPS performance at the appropriate time, the materiel, design, performance, and product support system will be sub-optimized and result in higher LCC. This appendix provides guidance in selecting and implementing supportability metrics.

B–2. Supportability metrics definitions
a. Product support management. This is the measure to which the implementation of the product support strategy, LCSP, and funding for IPS elements provide effective product support performance that meets the CAPDEV requirements across the product support value-chain, from design through disposal.

b. Design interface.

(1) Mission reliability is the probability that a materiel will perform mission-essential functions for a period of time under the conditions stated in the mission profile. Measures of mission reliability include only those incidents affecting mission accomplishment.

(2) Logistics reliability is the probability that no corrective maintenance or unscheduled supply demand will occur following the completion of a specified mission profile.

(3) MTBF is a basic measure of reliability for materiel. The total functional life (time, rounds, hours, cycles, events) of a population or fleet of end items divided by the total number of failures within the population during the measurement interval. Typically there is a requirement for the end items to be operated within normal mission profiles and under specified operating conditions and environments.

(4) Mean time between critical failure is a basic measure of reliability which provides an indication of the probability that the materiel will perform essential mission functions. The total functional life (time, rounds, hours,

cycles, events, and so on) is a population or fleet of end items divided by the total number of critical failures within the population during the measurement interval. Typically there is a requirement for the end items to be operated within normal mission profiles and under specified operating conditions and environments.

(5) Mean time between maintenance actions (MTBMA) is the mean of a distribution of the time intervals between actions or groups of actions required to restore an item to, or maintain it in, a specified condition. Refer to SAE GEIA–STD–0007 appendix A Data Type Number 3280 for additional details.

(6) Mean time between removal is a measure of the materiel reliability parameter related to demand for logistics support. The total number of operational units (for example, miles, rounds, hours) divided by the total number of items removed from that materiel during a stated period of time. This term is defined to exclude removals performed to facilitate other maintenance and removals for product improvement. The algorithm for mean time between removal can be found by referring to SAE GEIA–STD–0007 appendix A Data Type Number 3340. Note: For a particular task to be applicable, it must meet all the following criteria:

(a) It must be either a "remove" or a "remove and replace" task.

(b) It must be categorized as either an "emergency" or an "unscheduled" task.

(c) The task must be performed by "operator/crew/unit-crew" or "organizational/on equipment/unit-organizational" or by a maintenance contact team.

(d) The task cannot be performed to facilitate other maintenance or for product improvement.

(7) MTBPM is the mean of the distribution of intervals, measured in hours, rounds, and so on, between preventive maintenance actions. This is one of the four categories of maintenance events contributing to the mean time between maintenance actions value. The algorithm for MTBPM can be found by referring to SAE GEIA–STD–0007 appendix A Data Type Number 3330.

(8) Mean time between failure mission abort is the mean of the distribution of intervals, measured in hours, rounds, between events that render a materiel incapable of performing its mission. The emphasis for this metric is on materiel failures which directly impact the mission functions rather than non-mission critical failures or preventive maintenance actions.

(9) Mean calendar time between mission failure is the mean of the distribution of calendar hours between events causing a materiel to be less capable in performing its mission. The emphasis of this metric is on materiel failures that cause aborts or directly reduces mission effectiveness. In addition to mission aborts, this measure accounts for the loss of interoperability or loss of equipment use that improves the materiel capability to perform a mission without causing a mission abort.

(10) Failure free operating period is defined as a period of time (or appropriate unit of operation) during which no failures, resulting in a loss of materiel functionality occur. It is a measure of reliability which can offer the user an increase in materiel effectiveness and enhanced operational availability above that reflected in the traditional MTBF. The emphasis for this metric is on reducing the probability of materiel failures which directly impact the mission functions.

(11) Mission completion success probability is the probability that an end item will perform all essential mission functions and complete its mission successfully. This probability can be derived by dividing the number of missions successfully completed by the total number of missions attempted by the population of end items.

(12) Combat rate is the average number of consecutive scheduled missions completed before an end item has critical failures. Number of successful missions=Number of scheduled missions divided by number of aborts.

(13) Operational readiness is measure of a materiel's ability to perform all of its combat missions without endangering the lives of crew or operators. The metric is best used when comparing the readiness rates of a new materiel to rates of the predecessor (baseline) materiel.

(14) Availability.

(a) Materiel availability is the measure of the percentage of the total inventory of a materiel operationally capable, based on materiel condition, of performing an assigned mission. This can be expressed mathematically as the number of operationally available end items/total population. The total population of operational end items includes those in training, attrition reserve, pre-positioned, and temporarily in a non-operational materiel condition, such as for DLM. Materiel availability covers the total life cycle timeframe, from placement into operational service through the planned end of service life.

(b) Operational availability (Ao) is the measure of the percentage of time that a materiel or group of materiel within a unit are operationally capable of performing an assigned mission and can be expressed as (uptime/(uptime + downtime)). Determining the optimum value for Operational Availability requires a comprehensive analysis of the materiel and its planned concept of operations, including the planned operating environment, operating tempo, reliabil- ity and maintenance concepts, and supply chain solutions. The algorithm for Ao can be found by referring to SAE GEIA–STD–0007 appendix A Data Type Number 3700.

(c) Achieved availability (Aa) is the probability that when used under stated conditions in an ideal support environment, a materiel will operate satisfactorily at any time. This differs from Inherent Availability only in its inclusion of consideration for preventive action. Aa excludes supply downtime and administrative downtime. The algorithm for Aa can be found by referring to SAE GEIA–STD–0007 appendix A Data Type Number 1010.

(d) Inherent availability (Ai) is the probability that when used under stated conditions in an ideal support environment without consideration for preventive action, a materiel will operate satisfactorily at any time. The "ideal support environment" referred to exists when the stipulated tools, parts, skilled manpower, manuals, support equipment and other support items required are available. Ai excludes whatever ready time, preventive maintenance downtime, supply downtime, and administrative downtime may be required. The algorithm for Ai can be found by referring to SAE GEIA–STD–0007 appendix A Data Type Number 2560.

(e) Training system availability is a measure of the reliability and maintainability of the training system(s) associated with a given acquisition materiel. This metric is a measure of how many mission hours that a training system is available. Trainer availability=mission available time divided by (mission available time) + (mission nonavailable time).

(15) Level of repair analysis progress is a measure of the rate of progress toward completion of all the LORA computer runs required for determining optimum allocation of repair candidate components and maintenance policies.

(16) LCC is the differential in a measure of the LCC of a materiel compared with the LCC of its antecedent materiel. This metric is the projected LCC of the new materiel divided by the LCC of the current materiel or baseline materiel. Goals can be established for incorporation into requirements and contract documentation to reduce LCC for a new materiel. O&S cost comparison is the goal in fielding a new materiel should be that the O&S costs for the new materiel, generally, should be no more than the costs of the displaced materiel. Knowledge of the costs of the displaced materiel will provide a benchmark early on in the development of the new materiel that the developer can aim for in planning the new materiel. Although the O&S costs for the new materiel will be based on engineering estimates, having a benchmark will help the MATDEV to consider supportability more nearly equally with cost, performance, and schedule. Historical data for the materiel to be displaced must be available.

(17) Extent of interoperability is the ability of materiel to provide services to and accept services from other materiel to enable them to operate effectively together. The goal of this metric is to provide a level of certainty that a given acquisition end item is able to support or operate with other predefined materiel in specified functional areas. Interoperability is a difficult metric to measure quantitatively. Interoperability with other materiel is verified through testing or simulation. Often, interoperability is measured simply by identifying whether or not the materiel is interoperable. A ratio for interoperability may be derived by dividing the number of materiel with which the acquisition materiel is interoperable by the total number of materiel with which the acquisition materiel should be interoperable. It may also be useful to compare the number of materiel which the acquisition materiel is interoperable with the number of materiel that the predecessor materiel was interoperable.

(18) Quality deficiency report rate is the one means of identifying possible problems in the fielding process by tracking the number of quality deficiency reports during a specified time interval (for example, each month). This number may be used as a means of comparison over a series of previous reporting periods to identify any trends in submission of customer/user complaints. This metric helps to confirm the effectiveness of the design effort. Number of quality deficiency reports/interval of time.

c. Sustaining engineering. This is the measure to which the identification, review, assessment, and resolution of design deficiencies throughout a materiel's life cycle are effectively managed and implemented.

d. Supply support

(1) *Customer wait time—not mission capable supply.* The time (days or hours) the materiel is inoperable due to delays in maintenance that are attributable to delays in obtaining parts.

(2) *Parts availability.*

(a) High-priority fill rate is a measure of the effectiveness of supply support. This metric can be calculated by dividing the number of high-priority requisitions filled (priority 01–04 based on Force Activity Designator) within a specified time limit by the total number of high-priority requisitions submitted. Any high-priority requisition must be met within the specified time limit to be considered a fill. This metric should concentrate on critical item stock availability (that is, maintenance and readiness drivers).

(b) Stock availability is a measure of the percentage of time that demands are satisfied from items in stock. The metric can be calculated by dividing the number of incidents when parts sought from the stock point were on hand by the number of total incidents when parts were requested from the stock point. This metric is similar to the old percent stock availability where 85 percent of all NSN items were required to be on hand.

(c) Authorized stockage list (ASL) percent fill is the percentage of time that demands are satisfied on the first pass from items on hand within the ASL stocks. Divide demands successfully filled from the ASL by total ASL demands and multiply by 100. Or the percentage of parts in stock at the ASL location versus the required stockage level. Example: ASL=10 main rotor blades ASL actual stock on hand=9 ASL percentage fill 9/10=.9=90 percent.

(d) Backorder rate is a measure of effectiveness of supply support. The number of repair parts or spares for a given materiel/end item which are not in stock at the time they are requisitioned divided by the total demands for parts. This metric may be calculated by dividing the number of workorders awaiting parts by the total number of workorders that required parts. Backorders cause delays in maintenance.

(e) Backorder duration time is the average amount of time elapsed between a requisition placed for a spare not in stock to receipt of the spare part to fill the order. The backorder duration time accounts for the time to receive a

procurement previously ordered, and the administrative and production lead times are contributing factors to this wait time.

(f) Controlled substitution rate is an additional means of identifying possible problems in supply by tracking the total number of controlled substitutions per month for a fleet of vehicles. This number may be used as a means of comparison over a series of previous reporting periods to identify any trends in supply within a fleet of materiel.

(g) Provisioning master record (PMR) failure factor accuracy is the number of changed failure factors during the 2 year period after PMR load compared to total number of PMR failure factors. This metric measures the accuracy of part usage predictions based upon failure factor data incorporated during the initial PMR build. The number of updates or changes of a given magnitude to PMR failures factors reflect the degree of accuracy of the provisioning process regarding determining the range and quantity of required spare and repair parts. This metric may be used as an incentive for a contractor to create an accurate PMR.

(h) Order ship time is the time elapsed between the initiation of stock replenishment action for a specific activity and the receipt by the activity of the materiel. Order ship time is applicable only to materiel within the supply system and is composed of the distinct elements, order time, and shipping time. It includes many segments such as order processing, shipping from depot to the consolidation point, consolidation point to the port of debarkation, in-transit, arrival at destination port, distribution to a supply point, and finally delivery to the requiring unit.

(i) Spares cost to LCC ratio is the total estimated cost of spares and repair parts divided by the total estimated life cycle cost for the materiel. This metric may be used to compare the supply support cost for a planned materiel with a predecessor or similar materiel. It may also be used to monitor the supply support cost for a given materiel at different points during its operational life to identify any changes or potential problems. A high proportion of spares costs may signal the need for reengineering or change to the support concept.

(j) Unit load-supply is the total weight, cube, or quantity of repair parts and spares required to support the materiel in a given type unit. This metric may be used to compare the supply support burden on a unit of a planned materiel with a predecessor or similar materiel in terms of extra materiel which a unit must manage, upload, and haul. It may also be used to monitor the supply support burden on a unit of a given materiel at different points during its operational life to identify any changes.

(k) Parts standardization is a measure of how well standardization criteria for use of standard parts/components have been met. One way of calculating this metric is to divide the number of standard new NSNs by the total number of NSNs for the materiel. Compare the percent of new lines to the historical average minus an improvement factor (such as 5 percent) as a standard for judging improvement/accomplishment. The percent of new parts is equal to the number of new parts divided by total parts multiplied by 100. Another way of calculating this metric is to divide the number of standard NSNs by the total number NSNs for the materiel.

(l) Float utilization rate is a means of optimizing the number of materiel reserved as floats by tracking the percentage of time the float materiel are on loan to customer units. The utilization ratio can be calculated by dividing calendar time during which the float items are on loan by the total amount of calendar time during which the float items are available. A low ratio may reveal that less float items are required. A high ratio may indicate the need for more float items.

(m) Recyclability may be used as a means of determining how well environmental design goals are being met. MATDEVs are being encouraged to set recycling goals for their acquisition materiel. Recycling helps reduce disposal problems for materiel and components. Recyclability can be quantified by simply counting the number of parts or components which can be recycled. This number can be compared to the number of recyclable parts in similar or predecessor materiel. If it is necessary to take into account the difference in total number of parts for the compared materiel, then the percentage of recyclable parts can be used.

(n) Percentage parts reduction metric may be used as a means of determining if goals have been achieved in reducing the number of different part numbers applied to a given materiel. It is derived by comparing the number of part numbers required for supporting the materiel against the number of part numbers required to support a similar or predecessor materiel. This metric may also be evaluated by comparing the number of materiel part numbers with a specific threshold or a goal which represents a specific percentage reduction from the total parts count on a predecessor materiel.

e. Maintenance planning and management.

(1) *Mean time to repair.* This is the basic measure of maintainability. It is the total corrective maintenance time (in hours) divided by the total number of failures within a particular measurement interval under stated conditions. The measurement interval can be units of time, miles, rounds, cycles, or some other measure of life units. Refer to SAE GEIA–STD–0007 appendix A Data Type Number 3360 for the MTTR algorithm.

(2) *Mean time to perform scheduled (preventive) maintenance.* This is a measure of the elapsed time when a materiel is down for schedule maintenance to the time the materiel is ready for operation. It is measured by the total scheduled maintenance hours divided by number of scheduled maintenance actions.

(3) *Mean time to repair by echelon.* This is a basic measure of maintainability for a materiel. It is measured by the sum of corrective maintenance hours at a specific level or echelon of repair divided by the number of corrective maintenance actions at the level of repair.

(4) *Mean active maintenance downtime.* This is the average of the actual “wrench-turning” times for all maintenance tasks during a specified period of time (clock hours). Refer to SAE GEIA–STD–0007 appendix A Data Type Number 3200.

(5) *Mean time to restore.* This is a mean of the elapsed times from the occurrence of a materiel failure or degradation requiring maintenance to the time the materiel is restored to its operational state. It is derived by dividing the sum of the elapsed times for all maintenance events by the total number of maintenance events. This metric includes more than just direct maintenance time. This top level metric embeds some logistics response times or an indication of the availability of supportability resources such as mechanics, support equipment, and facilities. It is measured by sum of times to restore the materiel divided by number of restoral events.

(6) *Mean time to restore (with shop stock spares).* This is the average amount of time to restore the materiel when spares are available in the shop stock. To determine mean time to restore (with shop stock parts), add military-induced repair delay time to the equipment MTTR. Repair delay time factors include non-availability of personnel, the non-collocation of spares with equipment, and so on. It is measured by sum of times to restore materiel to operation when spares are available divided by number of restoral events.

(7) *Maintenance ratio.* This is the cumulative number of direct labor maintenance man-hours expended during a given period of time, divided by the cumulative number of end item operating hours, miles, or rounds during that same time period. The maintenance ratio is expressed at each maintenance level and summarized for all levels of maintenance. Both corrective and preventive maintenance are included. The maintenance ratio is a useful measure of the relative maintenance burden associated with a materiel. It provides a means of comparing materiel and is useful in determining the compatibility of a materiel with the size of the maintenance organization.

(8) *Maximum time to repair.* This is the maximum corrective maintenance downtime within a specified percent (normally 90 or 95 percent), of all possible corrective maintenance actions for an end item.

(9) *Repair cycle time.* This is the elapsed time (days or hours) from the receipt of a failed item at a repair facility until the item is ready for reissue. The average elapsed amount of time from an item failure to the time the item failure is repaired and placed in stock or reissued. Refer to SAE GEIA–STD–0007 appendix A Data Type Number 4480.

(10) *O&S cost per operating hour.* This is the sum of all costs required to operate and support a materiel divided by the number of materiel operating hours. If more applicable, miles, cycles, or rounds can be substituted for hours. This metric may be used to compare the supportability cost rate for a planned materiel with a predecessor or similar materiel based on materiel usage. It may also be used to monitor the supportability cost rate for a given fleet of materiel at different points during its operational life. A similar type of metric could be used to calculate maintenance cost per operating hour. The costs considered would be restricted to maintenance-related costs only. This cost would then be divided by the number of materiel operating hours.

(11) *Maintenance task elimination.* This metric provides an indication of the relative reduction in maintenance burden in terms of quantity of maintenance tasks when compared to the number of tasks required for the baseline comparative materiel. The metric is derived by dividing the number of maintenance tasks that are not required for the planned materiel by the total number of tasks required in the baseline comparative materiel. Goals for maintenance task elimination can be built into requirements and contract documentation. This metric must be used with caution since elimination of many minor tasks may not reduce maintenance burden as much as a single major task. But, generally, less maintenance is considered better.

(12) *Maintenance down time.* This is the total time during which a materiel/equipment is not in a condition to perform its intended function and includes active maintenance time, administrative and logistics delay time.

(13) *Logistics delay time.* Refers to that maintenance downtime that is expended as a result of delay waiting for a resource to become available in order to perform active maintenance. Refer to SAE GEIA-STD-0007 appendix A Data Type Number 1090.

(14) *Repairs requiring evacuation.* This is the percentage of repair tasks which cannot be accomplished without materiel evacuation. This metric would be used to get an indication of the maintenance burden. Evacuation adds time to the repair process and consumes limited manpower and equipment resources.

(15) *Percent organic support.* This is a measure of the proportion of the materiel support, usually maintenance that is being provided organically and conversely, the proportion of the support being provided through agreements with contractors. This metric may be used as a means of comparison of the strategy used for supporting the predecessor or a baseline materiel. The proportion of support being provided organically versus contractor support may also need to be tracked over the life of the materiel after fielding. One specific means of measurement may be used by dividing the number of work orders organically supported by the total number of work orders.

(16) *Maintenance test flight hours.* One means of determining if maintenance requirements are increasing in a fleet of aircraft is to track the number of test flight hours due to maintenance being flown per aircraft per month. This number may be used as a means of comparison over a series of previous reporting periods to identify any trends within a fleet of aircraft.

f. Packaging, handling, storage, and transportation.

(1) *Percentage of packaging data.* This is a measure of the percentage of repair parts (that will be used to support the end item in a forward deployed scenario) which have the packaging engineering data developed. It is the

relationship between the number of repair parts provisioned to the number of repair parts with military packaging data. The quantitative goal is 100 percent.

(2) *Percentage long-life reusable container.* This is a direct measure of the impact of the packaging methodology on the Soldier. The higher the percentage, the less packaging training and equipment required by the Soldier. It is the relationship between the number of repair parts that require evacuation for overhaul to the number of these parts provided with a long-life reusable container. A high number is also a direct indicator of a lower life cycle cost for packaging and a lower environmental impact. The quantitative goal is 100 percent.

(3) *Reduced weight and cube.* An objective and threshold percentage or specified reduction in materiel weight and cube, as well as the weight and cube of the materiel support package may be incorporated into requirements documents and contracts. This metric (or set of metrics) may be used to set a requirement for minimizing the transport burden of the materiel. The actual quantitative requirements are derived by analyzing the weight and cube of predecessor or baseline materiel.

(4) *Reduced special storage requirements.* An objective and threshold percentage or specified reduction in special storage requirements may be incorporated into requirements documents and contracts. This metric is typically used to set a requirement or goal for conditions under which the materiel can be efficiently and effectively stored. Some project managers have set a requirement for no special storage requirements. The goal is typically derived by analyzing the special storage requirements for predecessor or baseline materiel.

(5) *Reduced handling requirements.* Minimize preparation for shipment. An objective or specified reduction in time (manhours and total elapsed time) is required to prepare a materiel for shipment. The quantitative goal is typically derived by analyzing the time required for preparation for shipment for predecessor or similar materiel.

(6) *No special handling.* An objective and threshold percentage or specified reduction in special handling requirements may be incorporated into requirements documents and contracts. This metric is typically used to set a requirement or goal for the ease of handling for the materiel when being prepared for shipment. Some project managers have set a requirement for no special handling requirements. The goal is typically derived by analyzing the special handling requirements for predecessor or baseline materiel.

(7) *Hazardous material limits.* Objective and threshold percentages set to represent reduction in types and quantity of HAZMAT associated with the operation, sustainment, or disposal of an acquisition materiel. The baseline may be a predecessor materiel. Total elimination of HAZMAT may be the goal.

(8) *Transportability.*

(a) Time to load and/or unload from transport vehicle. A metric compares the load and unload times for a proposed materiel to the load and unload times of a predecessor or baseline materiel.

(b) Time to configure materiel for transport. A requirement of a time limit (such as one hour) within which the materiel must be able to be configured for transport by a given mode of transport (for example, air, ocean, or rail).

(9) *Minimize transportability equipment.* An objective and threshold percentage or specified reduction in transportability peculiar equipment required to prepare a materiel for shipment. The quantitative goal is typically derived by analyzing the transportability peculiar equipment requirements for predecessor or similar materiel.

(10) *Surface Deployment and Distribution Command rating.*

(a) Transportability quantifiers are numerical determinations of the relative transportability of materiel, based on predetermined values. These quantifiers measure the transportability of one materiel versus another to give a better idea to decision-makers just how good or how poor is the transportability of various materiel. The quantifiers are based upon a rating of 0 to 100 percent transportable for each of the methods of transport: fixed-wing air, rotary-wing air, ocean logistics-over-the-shore, highway, and rail, as well as lifting and tie-down provisions.

(b) Tables B–11 through B–18 provides information on transport materiel ratings. Each of the methods has predetermined values based upon varying levels of transportability within each of the methods. These levels are based upon numbers of restrictions the item would face during transport as well as the number of transportation assets available to transport the item. The fewer the restrictions and the greater the number of available transportation assets, the higher the score.

(c) Transportability quantifiers only measure the ability of a single item to move through the Defense Transportation System. They do not measure the impact that an item will have on the deployability of the force. It is possible that an item can be as transportable as another item, yet have a completely different impact on the deployability of the force. Therefore, transportability quantifier values must not be used in a vacuum. They need to be used in conjunction with a deployability analysis.

g. Technical data.

(1) *Technical data accuracy.* An indicator of the quality of TMs and EPs can be obtained by comparing the number of change pages required to correct errors with the total number of TMs pages or the total number of change pages for all reasons. For electronic TMs it is necessary to track individual changes instead of change pages. Given the fluid nature of EPs, this metric may be difficult and not cost effective to track.

(2) *Technical manuals quality (DA Form 2028s).* This is an indicator of the quality of TMs and equipment delivered by tracking the quantity of DA Form 2028s submitted from the field used to correct errors in the TMs. As a practical matter, the users may not send in DA Form 2028s.

(3) *Documentation rewrite.* This is a measure of the quality of the TMs and EPs derived by tracking the number of hours spent rewriting documentation to correct errors as a percentage of original document preparation time. A high rate of rewrite would indicate poor quality.

(4) *Percentage of technical manuals onboard or embedded.* This is a measure of the percentage of the TMs and EPs which are available within the materiel itself. Such technical documentation is typically computer-based and may be incorporated within the materiel along with other system software. This metric can be used to set threshold and objective goals for the percentage of on-board or embedded technical documentation that should be incorporated into the materiel. A requirement may also be established for an increase in on-board or embedded technical documentation over that contained within a similar or predecessor materiel. The advantage of onboard and embedded technical documentation is that it is available to the user upon demand.

(5) *Technical manuals effectiveness.*

(a) Technical manuals effectiveness rate. This is the total number of tasks performed successfully using the specified TMs divided by the total number of tasks performed. This metric provides an indication of how well the TMs contribute to the optimization of the maintenance task by reducing time and effort to accomplish the task. This metric can be used in a requirements or contract document to set an objective and/or threshold level of effectiveness for TMs. Typically, the requirement should always be 100 percent effectiveness. It may be used as a means of comparison with a predecessor or baseline materiel. It can also be used to identify changes in the TMs effectiveness for a given materiel at different points in its life cycle.

(b) No evidence of failure rate. The NEOF metric used for measuring the effectiveness of fault diagnostics and fault isolation with regard to support equipment can also be used as an indicator of problems with the EPs. High NEOF can be a symptom of such shortcomings as ineffective TMs, poorly designed support equipment, and ineffective training. This metric is further described under the support equipment ILS element.

(6) *Availability of technical data.*

(a) The total number of TMs available compared to the total number of TMs required. This metric would typically be used to set goals or requirements for percentage of range of quantity of TMs available at the time of materiel fielding.

(b) The total number of TMs produced versus the total number of TMs required. This metric would typically be used to set goals or requirements for percentage of range of quantity of TMs actually published and distributed at the time of materiel fielding.

h. Support equipment.

(1) On-materiel diagnostics and prognostics.

(a) Built-in test detectability level percentage. A built-in test consists of an integral capability of the mission equipment that provides an onboard automated test capability to detect, diagnose, or isolate materiel failures. The fault detection/isolation capability is used for momentary or continuous monitoring of a materiel's operational health, and for observation/diagnosis as a prelude to maintenance action. Built-in test sub-system may be designed as an analysis tool for components. Detectability level is the probability that the malfunction or failure of the UUT will be detected by BIT.

(b) Percent built-in test fault detection. This is a measure of the percentage of total materiel fault diagnostic capability performed via built-in test equipment/software embedded within the materiel itself. Such diagnostic capabil- ity is typically computer-based and is often incorporated within the materiel along with other system software. This metric can be used to set threshold and objective goals for the percentage of imbedded diagnostics which should be incorporated into the materiel. A requirement may also be established for an increase in imbedded diagnostics over that contained within a similar or predecessor materiel. It is important to specify the level of ambiguity or the level of detail to which the BIT must diagnose faults.

(c) Percent prognostic aids. This is a measure of the percentage of total materiel prognostic capability which is performed via equipment/software embedded within the materiel itself. Such prognostic capability is typically computer-based and is often incorporated within the materiel along with other system software. This metric can be used to set threshold and objective goals for the percentage of imbedded prognostics which should be incorporated into the materiel. A requirement may also be established for an increase in embedded prognostics over that contained within a similar or predecessor materiel.

(2) *Unit load-support equipment.* This is the total cube or weight of support equipment required to maintain the materiel in a given type unit. This metric may be used to compare the maintenance burden on a unit of a planned materiel with a predecessor or similar materiel in terms of extra materiel which the unit must deal with. It may also be used to monitor the maintenance burden on a unit of a given materiel at different points during its operational life to identify any changes.

(3) *Fault diagnostic effectiveness.* Test accuracy ratio is a measure of the accuracy of TMDE calculated by dividing the number of materiel faults accurately diagnosed by the materiel TMDE by the total number of materiel faults tested by the TMDE. This metric is typically used in a requirements or contract document to set an objective and/or threshold level of performance for accurate fault diagnosis and/or isolation. The diagnostic performance is usually verified during

development, operational, production verification, and follow-on T&E It may be used as a means of comparison with a predecessor or baseline materiel.

(4) *No evidence of failure rate.*

(a) The NEOF rate is a measure of the effectiveness of fault diagnostics and fault isolation. The number of components which were falsely diagnosed as faulty divided by the total number of components diagnosed. Another way of measuring this metric would be to divide the number false removal by the total number of removals. Excessive rates of NEOF cause unnecessary delays in maintenance and extraordinarily high demands for spares and repair parts. High NEOF can be a symptom of such shortcomings as poorly designed support equipment or ineffective training.

(b) This metric is typically used in a requirements or contract document to set an objective and/or threshold level of performance for accurate fault diagnosis and fault isolation. It may be used as a means of comparison with a predecessor or baseline materiel. It can also be used to identify changes in the NEOF rate for a given materiel at different points in its life cycle. Percent NEOF=number of NEOF items divided by the total number of items tested multiplied by 100. A comparison could be accomplished using the average number of NEOFs added for large, medium, and small materiel, and could serve as an indicator of the adequacy of engineering and maintenance planning. Compare the percent of NEOFs to the historical average minus an improvement factor (that is, 5 percent) as a standard for judging adequacy of engineering and maintenance procedure designs.

(5) *Fraction of faults isolatable.* This is a measure of the fault isolation coverage of TMDE calculated by dividing the total number of materiel faults that can be consistently isolated by the materiel TMDE by the total number of materiel faults testable by that TMDE. This metric can be used in a requirements or contract document to set an objective and threshold level of testability with regard to fault isolation. During materiel development, the isolation capability can be verified during developmental T&E, operational T&E, and the LD.

(6) *Tools effectiveness.* This is the total number of tasks performed successfully using the specified tools divided by the total number of tasks performed. This metric provides an indication of how well the tools contribute to the optimization of the maintenance task by reducing time and effort to accomplish the task. This metric can be used in a requirements or contract document to set an objective and/or threshold level of effectiveness for tools. Typically, the requirement should always be 100 percent effectiveness. It may be used as a means of comparison with a predecessor or baseline materiel. It can also be used to identify changes in the tools effectiveness for a given materiel at different points in its life cycle.

(7) *Reduce support equipment burden.* To minimize special tools and TMDE, this is an objective and threshold percentage or specified reduction in the number of different types of special tools and support equipment required to support an acquisition end item may be incorporated into requirements documents and contracts. This metric can be used to set a goal for special tools and TMDE required to support a materiel. Some project managers have set a requirement for no special tools or test equipment. The quantitative goal can be derived by using the number of different types of special tools and TMDE requirements for predecessor or similar materiel as a baseline.

(8) *Support equipment reduction.* The number of items eliminated during a given life cycle phase divided by the total number of items at the start of the life cycle phase. The support equipment recommendation data list may be used as the source document to collect the data for this metric. Support equipment can be reduced in terms of number of different types of support equipment and in terms of the ratio of number of a given item of support equipment required per end item supported.

(9) *Tools and test, measurement and diagnostic equipment available.* This is the total number of items of TMDE required compared to the total number of items of TMDE available. This metric would typically be used to set goals or requirements for percentage of range of quantity of TMDE available at the time of materiel fielding.

(10) *Associated support items of equipment available.* The total number of ASIOE required compared to the total number of ASIOE available. This metric would typically be used to set goals or requirements for percentage of range of quantity of ASIOE available at the time of materiel fielding.

i. Training and training support.

(1) *Time to achieve proficiency.* This is the average time required for operator and/or support personnel to become proficient in effectively, efficiently, and correctly performing the required tasks associated with operation or maintenance of the materiel. This metric would typically be used to compare the time to train operators and maintainers to perform tasks on a new materiel with the time required on a predecessor or baseline materiel. Care must be taken in using this metric. The goal is to provide effective training in all required tasks in the least amount of time.

(2) *Student failure rate or student pass rate.* This is the percentage of students who are not able to achieve or, conversely, who do achieve the training objectives after completion of the training course. This metric provides an indication of the effectiveness of the training in helping the target audience to learn the training objectives. This metric would typically be used to set threshold and objective goals for failure or pass rates. The content and length of programs of instruction should be determined based on the training required to prepare Soldiers to successfully perform their MOS-related tasks with minimal on-the-job training in the field.

(3) *Percentage embedded training.* This is a measure of the percentage of total operator and/or support personnel training available within the materiel itself. Such training is typically computer-based and is simply incorporated within the materiel along with other system software. This metric can be used to set threshold and objective goals for the

percentage of imbedded training which should be incorporated into the materiel. A requirement may also be established for an increase in embedded training over that contained within a similar or predecessor materiel. The advantage of embedded training is that it allows frequent review and is available to the user upon demand.

(4) *Ratio of training costs to life cycle costs.* This is a simple measure of the relative cost of training to the total materiel LCC. The total training costs divided by the total life cycle costs. This metric may be used to compare the relative cost of training between planned and current materiel. It can also be used to identify changes in the relative cost of training for a given materiel at different points in its life cycle.

(5) *Number of personnel trained versus number required.* This provides a measure of the amount of training which has been accomplished for a given MOSs at the site where the materiel is being fielded currently. Calculate using number of trained personnel of a given MOS divided by the total number of personnel of that type MOS at the site of fielding.

(6) *Training materiel available.* This is the number of training materiel available at a given training facility versus the number of training materiel required. This metric would provide an indication of how well training requirements can be met.

j. Manpower and personnel.

(1) *Crew size.* The number of personnel required to operate a given materiel and perform all required mission functions. From a cost and supportability view, it is typically better to minimize crew size. This metric is typically used in a requirements or contract document to set an objective and threshold crew size required to operate and maintain a materiel. The quantitative goal is typically derived by comparing the crew size requirements for predecessor or similar materiel.

(2) *Maintainer cost per operating hour.* This is used to obtain an indication of the cost of maintenance personnel for a given materiel. The total cost of maintainer personnel divided by the total number of operating hours. This metric may be used to compare the labor cost maintainers for a planned materiel with a predecessor or similar materiel. It may also be used to monitor the maintenance labor cost for a given materiel at different points during its operational life to identify any changes or revise budget requirements.

(3) *Skill level limit.* This is a measure of the level of expertise required for materiel operators to competently operate the materiel or for maintainers to competently repair or service the materiel. This metric is typically used in a requirements or contract document to set an objective and/or threshold reduction in the skills required to operate and maintain a materiel. The quantitative goal is typically derived by comparing skill level requirements for predecessor or similar materiel.

(4) *Maintenance manhour requirements for each MOS.* This is the number of man-hours required to support the materiel for a given MOS. This metric gives an indication of the maintenance workload for a materiel by MOS. It would typically be used to compare the support of a planned materiel with that of a predecessor or baseline materiel.

(5) *Direct annual maintenance manhours.* This is the sum of the working time of each skill specialty code required for the performance of a unit of work on the materiel accumulated for a period of 1 year.

(6) *Mean maintenance manhours per operating hour.* This metric is derived by dividing the number of maintenance manhours required to keep a materiel operational by the number of operating hours of that materiel. This metric provides an indication of the maintenance burden of a materiel. It would typically be used to compare the maintenance burdens of similar materiel or to track the maintenance burden of a given type of materiel over time.

(7) *Ratio of personnel cost to operations and support cost.* This is an estimate of total cost for personnel (pay, benefits, and overhead) to operate and support the materiel divided by the total estimated operating and support costs of the materiel. The metric can be used to compare the relative cost of personnel between planned and current materiel. It can also be used to identify changes in the relative cost of personnel for a given materiel at different points in its life cycle.

(8) *Number of personnel on hand versus number personnel.* This is the number of personnel of a given MOS on hand divided by the number of personnel of that MOS type required at the site of fielding to operate or support the materiel. This metric provides an indication of how well the materiel will be supported. Requirements for the same MOS horizontally across several different types of weapons materiel/end items in the same unit must often be considered.

(9) *Number of personnel required versus authorized.* This is a comparison of personnel required to operate and support a materiel to the number of personnel authorized for that materiel. This metric provides an indication of the capability of the materiel to be properly operated and supported.

(10) *Mechanic utilization.* This is a measure of the workload for a specified maintainer or group of maintainers. This metric can be derived by dividing actual hours worked by the total hours which the mechanic was available for work. This metric can be used to monitor changes in the utilization rates of maintenance personnel over time or as means of comparison with predecessor materiel.

k. Facilities and infrastructure.

(1) *Facilities limitation.* This is an objective and threshold percentage or specified reduction in facilities requirements. This may be presented as an objective and threshold facilities engineering quantity (for example: area, feet, miles), percentage, in requirements documents and contracts. This metric is typically used in a requirements or contract

document to set a goal for facilities required to support the materiel. Some project managers have set a requirement for no new facilities. The quantitative goal is typically derived by analyzing the facilities requirements for predecessor or similar materiel. Independent analyses are conducted by the Chief of Engineers for ACAT I and select ACAT II materiel which is documented in the Support Facility Annex to the LCSP.

(2) *Facilities throughput.* This is a requirements driven measure used to establish facility capacity and flow and optimizes spatial and functional relationships within a facility. Similar to a production line, this metric seeks to quantify the rate for completing a task or function to standards within a given set of conditions and specified period of time.

(3) *Facilities funded.* This is a metric used to determine if sufficient funding is programmed to support facility addition and upgrade. It is necessary to compare programmed funding to estimated funding requirements on a fiscal year basis. The formula is expressed as MCA programmed funding divided by facilities funding requirements.

(4) *Facilities utilization rate.* This is a measure of the workload for a specific type of facility. This metric can be derived by dividing actual capacity of the facility used by the total capacity available during a given time period. This metric can be used to monitor changes in the utilization rates of facilities over time or as means of comparing facilities utilization rates with that of predecessor materiel. The type of units to be used for capacity will depend upon the type of facility being tracked. For a storage facility, square feet may be the best measure of capacity. A maintenance facility may require capacity to be measured in terms of the number of hours a day during which the maintenance bays are filled with materiel under repair. A more production-oriented facility may have capacity measured in units output per unit of time.

l. Computer resources.

(1) *Defect density.* This is a measure of the number of errors found in newly developed software. The defect or fault density is derived by dividing the number of software faults which are identified by the number of lines of code in the software program. A specific defect density goal may be included in the software specification to provide a quantitative measure by which to determine whether the government will accept delivery of the software.

(2) *Software reliability.*

(a) The software mean time to defect is a basic measure related to the reliability of software. The total functional life (time, rounds, hours, cycles, events, and so on) of a population or fleet of end items is divided by the total number of software failures within the population during the measurement interval given the end items are operated within normal mission profiles and under specified operating conditions and environments.

(b) The software modification rate is a measure of the quality of the software development effort. The rate is derived by counting the frequency of materiel software modification over a specified interval of time. This metric may have some value when compared to a predecessor or baseline materiel. Caution must be used in using this metric. Software enhancements must be differentiated from software fixes and those driven by hardware modifications.

(c) Ratio of software modification costs to life cycle cost. This is a simple measure of the relative cost of software modifications compared to the total materiel life cycle cost. The total software modification costs divided by the total life cycle costs. This metric may be used to compare the relative cost of software modification between planned and current materiel. It can also be used to identify changes in the relative cost of software modification for a given materiel at different points in its life cycle. Caution must be used in using this metric. Software enhancements must be differentiated from software fixes.

(3) *Computer resources available.* This is the total range and quantity of computer resources (hardware, software, firmware, documentation, support items) available versus the total range and number of computer resources required. This metric would typically be used to set goals or requirements for percentage of range of quantity of computer resources available at the time of materiel fielding.

(4) *Minimization of post-production software support requirements.* This is an objective and threshold percentage or specified reduction in the number of different types of support equipment, software, and firmware required to support the software of an acquisition end item after fielding. This metric may be incorporated into requirements documents and contracts. This metric can be used to set a goal for the PPSS burden required to support the software of a materiel. The quantitative goal can be derived by using the support requirements for predecessor or similar materiel as a baseline.

B–3. Supportability metrics

a. Tables B–1 through B–10 provide a list of various supportability metrics for each element of IPS and tables B–11 through B–18 provide transportability ratings. The metrics given here are not mandatory but serve as examples of the types of metrics available for use. Supportability metrics must be tailored for each individual acquisition program. There are other metrics not included in these tables. Paragraph B-2 provides definitions for each of the supportability metrics listed. Column 1, Supportability metric title' contains the name of the IPS or supportability metric.

b. Column 2, Evaluation Phase, identifies the phase during which adequate data should be available and analysis and evaluation is conducted to determine if the supportability goals, set at program inception, have been or will be achieved. It is Army policy to address supportability throughout the development, acquisition, production, fielding, and operation phase of the materiel.

c. Column 3, Source document, provides likely places where the supportability requirement has been or will be documented. The requirements may be recorded in other documents.

d. Column 4, Data source, indicates the best data sources for deriving the actual values of the supportability-related parameters being measured.

Table B–1
Supportability metrics for maintenance planning

Supportability metric title	Evaluation Phase	Source document	Data source
Mean time to repair	EMD	CDD/specification	LPD/LD/LIDB
Mean restore time	EMD	CDD/specification	LPD/LD/LIDB
MR	EMD	CDD/specification	LPD/LD/LIDB
Max time to repair	EMD	CDD/specification	LPD/LD/LIDB
Repair cycle time	EMD	CDD/specification	LPD/History/APB
O&S cost/operating hours	EMD	AS/specification	LPD/LIDB
Maintenance task elimination	EMD	LCSP/specifiation	LPD
Maintenance downtime	PDOS	LCSP/specification	LIDB
Customer wait time-not mission capable-maintenance (NMCM)	PDOS	MATDEV	LIDB
Repairs requiring evacuation	EMD	LCSP/specification	LPD/T&E/LIDB
Percent organic support	PDOS	LCSP/specification	LDB
Maintenance flight hours	PDOS	MATDEV	LIDB

Table B–2
Supportability metrics for manpower and personnel

Supportability metric title	Evaluation Phase	Source document	Data source
Crew size	EMD	ICD/CDD/CPD	LPD/T&E/LIDB
Maintainer cost/operating hour	EMD	AS/specification	LPD/T&E/LIDB
Skill level limit	EMD	CDD/LCSP/specification	LPD/T&E
Maintenance hours by Military Occupational Specialty (MOS)	EMD	CDD/specification	LPD/LD/LIDB
Annual maintenance man-hours	PDOS	CDD/specification	LPD/History/APB
Personnel cost/O&S cost	EMD	AS/specification	LPD/LIDB
Personnel on-hand/required	PDOS	MFP/BOIPFD	LPD/BOIPFD
Personnel required/authorized	EMD	LCSP/MFP/BOIPFD	LPD/LIDB
Mechanic utilization	PDOS	LCSP/ MATDEV	LPD/LIDB

Table B–3
Supportability metrics for supply support

Supportability metric title	Evaluation Phase	Source document	Data source
Wait time—not mission capable—supply (NMCS)	PDOS	MATDEV	LIDB
Parts availability	EMD	LCSP/specification	LPD/LIDB
Backorder rate	EMD	MATDEV	LIDB
Backorder duration time	EMD	MATDEV	LIDB
Controlled substitution rate	EMD	LCSP/MATDEV	LIDB
Failure factor accuracy	EMD	LCSP/specification	LPD/T&E/LIDB
Order ship time	EMD	MATDEV	LIDB
Spares cost to LCC ratio	PDOS	AS/specification	LPD/LIDB
Unit load—supply	PDOS	CDD/specification	LIDB
Parts standardization	EMD	LCSP/specification	LPD/T&E/LIDB
Float utilization rate	EMD	LCSP/MATDEV	LDB
Recyclability	EMD	AS/specification	LPD/LIDB
Percentage part reduction	EMD	LCSP	LPD

Table B–4
Supportability metrics for support equipment

Supportability metric title	Evaluation Phase	Source document	Data source
On materiel diagnostics	EMD	CDD/LCSP/specification	LPD/LD/LIDB
Unit load—support equipment	EMD	CDD/specification	LPD/T&E/LIDB
Diagnostics effectiveness	EMD	CDD/LCSP/specification	T&E/LIDB
Tools effectiveness	EMD	LCSP/specification	LPD/LD/LIDB
Support equipment reduction	EMD	CDD/LCSP/specification	LPD/T&E/LIDB
Support equipment available	PDOS	LCSP/MFP/specifiation	LPD/T&E/LIDB
ASIOE	PDOS	LCSP/MFP/specification	LPD/T&E/LIDB

Table B–5
Supportability metrics for technical data

Supportability metric title	Evaluation Phase	Source document	Data source
TM quality	PDOS	LCSP/specification	LPD/Validation and Verification/ LD
Percent on-board/embedded TMs	EMD	LCSP/specification	T&E/LIDB
TMs effectiveness	EMD	LCSP/specification	Validation and Verification/LD/ field
TMs available	PDOS	LCSP/MFP/specification	T&E/LIDB

Table B–6
Supportability metrics for training and training support

Supportability metric title	Evaluation Phase	Source document	Data source
Time to achieve proficiency	EMD	NETP/STP	LPD/T&E/LIDB
Student failure percent	PDOS	STP/specification	T&E/LIDB
Percent embedded training	EMD	STP/LCSP/specification	LPD/T&E
Training costs	EMD	NETP/Specification	LPD/T&E/NET
Number Trained/number required	PDOS	NETP/BOIPFD	LPD/NET/LIDB
Training materiel available	PDOS	STP/MFP	LPD/LIDB

Table B–7
Supportability metrics for computer resources support

Supportability metric title	Evaluation Phase	Source document	Data source
Defect or fault density	EMD	CRLCMP/specification	LPD/T&E/field
Software reliability	EMD	CRLCMP	LPD/T&E/field
Software modification costs	EMD	CRLCMP	Contractor/LIDB
Computer resources available	EMD	CRLCMP	Contractor/LIDB
Minimum PPSS requirements	EMD	CRLCMP/specification	LPD

Table B–8
Supportability metrics for facilities

Supportability metric title	Evaluation Phase	Source document	Data source
Facilities limitation	EMD	LCSP/specification	LPD/LIDB
Facilities funded	EMD	LCSP/specification	Budget/funding documents
Facilities throughput	EMD	LCSP/specification	LIDB
Facilities utilization rate	PDOS	LCSP/specification	LIDB

Table B–9
Packaging, handling, storage, and transportation

Supportability metric title	Evaluation Phase	Source document	Data source
Percent damage free deliveries	PDOS	MATDEV/specification	Quality deficiency reports
Percent packaging data	PDOS	LCSP/specification	LPD/LIDB
Percent reusable container	PDOS	LCSP/specification	LPD/LIDB
Minimize weight, cube	EMD	CDD/LCSP/specification	LPD/T&E/LIDB
Minimize special storage	EMD	CDD/LCSP/specification	LPD/T&E/LIDB
Reduced handling requirements	EMD	CDD/LCSP/specification	LPD/T&E/LIDB
HAZMAT limit	EMD	CDD/LCSP/specification	LPD/T&E
Transport—load, unload time	EMD	CDD/LCSP/specification	LPD/T&E/LIDB
Min. transportability equipment	EMD	CDD/LCSP/specification	LPD/T&E/LIDB
SDDC rating—air transport	EMD	CDD/LCSP/specification	LPD/T&E/transportability report
SDDC rating—ocean	EMD	CDD/LCSP/specification	LPD/T&E/transportability report
SDDC rating—highway	EMD	CDD/LCSP/specification	LPD/T&E/SDDC report
SDDC rating—rail	EMD	CDD/LCSP/specification	LPD/T&E/MSDDC report

Table B–9
Packaging, handling, storage, and transportation—Continued

Supportability metric title	Evaluation Phase	Source document	Data source
SDDC rating life/tie-down	EMD	CDD/LCSP/specification	LPD/T&E/MSDDCreport

Table B–10
Design interface

Supportability metric title	Evaluation Phase	Source document	Data source
Reliability	EMD	CDD/specification	LPD/T&E//LIDB
Mission success	EMD	CDD/specification	LPD/T&E/LIDB
Operational readiness	EMD	CDD/specification	LPD/T&E/LIDB
Availability (Ao, Aa, Ai)	EMD	LCSP/specification	LPD/T&E/LIDB
LORA progress	EMD	LCSP/specification	LPD/progress report
LCC cost comparison	EMD	AS/specification	LPD/APD/history
Extent of interoperability	EMD	ICD/CDD/CPD/specification	LPD/T&E/field
Quality deficiency report rate	PDOS	MATDEV/warranty	LIDB

Table B–11
Ratings for fixed-winged air transport

Item	Total number of aircraft	Rating
C–130 airdrop	366	100%
C–130 transport	366	90%
C–17 airdrop	102	36%
C–17 transport	102	32%
C–5 airdrop	104	18%
C–5 transport	104	16%
	0	0%

*Subtract 10 percent if crew prep time is greater than 15 minutes for C–130 or 60 minutes for C–17 and C–5; subtract 10 percent of value if equipment is required for loading or vehicle preparation; subtract 10 percent of value if approach or sleeper shoring is required.

Table B–12
Ratings for rotary-winged external air transport

Item	Total number of aircraft	Rating
UH–60L: High-hot (6,630 lb. lift)	780	100%
UH–60L: 2k ft. AGL–70 (9K lb. lift)	780	96%
CH–47D: High-hot (16,644 lb. lift)	400	67%
CH–47D: 2k ft. AGL–70 F (23,396 lb. lift)	400	0%
No helicopter external lift	0	

Table B–13
Ratings for ocean transport

Item	Total number of aircraft	Rating
Container ships	2	100%
Break-bulk/Combination Ships	17	96%
Roll-on/Roll-off Ships	38	67%
Not Ocean Transportable	0	0%

Note: *Subtract 10 percent of value if length exceeds 432 inches; subtract 10 percent of value if width exceeds 180 inches; subtract 10 percent of value if height exceeds 132 inches; subtract 10 percent of value if weight exceeds 50 tons; subtract 10 percent of value if item cannot negotiate a 15 degree ramp.

Table B–14
Ratings for logistics-over-the-shore transport

Item	Total number of aircraft	Rating
LCM–8	52	100%
LCU–1646	17	56%
LCU–2000	38	39%
LSV	8	7%
Not LOTS transportable	0	0%

Table B–15
Ratings for highway transport

Item	Total number of aircraft	Rating
M172 series *	1,500	100%
M871 series*	8,200	93%
M872 series*	8,500	58%
M870 series*	2,400	21%
M1000 series*	2,300	10%
Not highway transportable	0	0%

Note: *Use only the highest applicable subtraction from the following four categories: Subtract 10 % of value if permits required by North Atlantic Treaty Organization (NATO) countries; subtract 20 % of value if CONUS length or width permits are required; subtract 50 % of value if CONUS height or weight permits are required; subtract 90 % of value if certification as essential to national defense is required.

Table B–16
Ratings for self-deployable vehicles

Item	Rating
No highway permits required at gross vehicle weight, CONUS, or NATO	100%
No highway permits at gross vehicle weight in CONUS, permits for NATO	90%
CONUS length or width permits required	80%
CONUS height or weight permits required	51%
Certification as essential to national defense required	10%
Not highway transportable	0%

Table B–17
Ratings for rail transport

Item	Rating
Fits within Gabarit International de Chargement envelope*	100%
Fits within envelope B	85%
Fits within Association of American Railroads diagram	75%
Fits within DOD diagram	35%
Fits within width of DOD diagram and double stack	10%
Not highway transportable	0%

Note: *For Gabarit International Chargement only, subtract 10 % of value if length exceeds 492 inches; subtract 10 % of value if width exceeds 101 inches; subtract 100% of value if weight exceeds 22 tons.

Table B–18
Lifting and tie-down provisions

Item	Rating
Lifting provisions meet MIL–STD–209 strength requirements plus	35%
Lifting provisions meet MIL–STD–209 dimensional and location requirements plus	15%
Tie-down provisions meet MIL–STD–209 strength requirements plus	35%
Tie-down provisions meet MIL–STD–209 dimensional and locations requirements	15%
Total value	100%

Note: *Subtract 20% of total lifting values if common, lateral spreader bars are required; subtract 50 % of total lifting values if special spreader bars are required; subtract 10% of total lifting values if special slings are required; subtract 10% of total lifting/tie-down values if provisions are removable; subtract 10% of total tie-down values if more than 4 tie-down provisions required; subtract 50% of total lifting/tie-down values if item is a cargo carrier and tie-down provisions do not meet the size, number, or strength requirements of MIL–STD–209.

Appendix C
Depot Maintenance Analysis and Assessment Templates

C–1. Core logistics determination of applicability

There is only one section in this determination. The memorandum will be included in the LCSP annex for depot level maintenance analyses and determinations and remain in subsequent LCSP revisions as an archived record.

C–2. Core logistics determination of applicability content

The memorandum from the MATDEV to the MDA should address—

a. The materiel name

b. Cite the 10 USC 2366a requirement to make the determination.

c. Note at which MS the determination is being made. Note whether the materiel will or will not have a core requirement.

C–3. Core logistics analysis outline

The CLA is included in the LCSP annex for depot level maintenance analyses and determinations and remains in subsequent LCSP revisions as an archived record. If the CLA is revised, the original and revised CLAs are documented in the LCSP annex for depot level maintenance analyses and determinations. There are three sections for the CLA as follows—

a. Section I–Executive Summary (two pages maximum).

(1) Provide a brief description of the program—

(a) Based on known information, define the new materiel.

(*b*) If the materiel is replacing legacy materiel, identify the materiel(s) that this will replace.

(2) Identify the ACAT and projected IOC date.

(3) Identify the procurement quantity and Army acquisition objective.

(4) Identify whether the materiel has joint Service requirements, and include the joint partners in the materiel.

(5) Include all point of contacts and their organization address, telephone number(s), and e-mail address.

b. Section II- Depot Level Maintenance Requirements (two pages maximum).

(1) Based on the known information, define the anticipated DLM requirements for both hardware and software. This should be as detailed as the information you have at the time.

(2) If applicable, identify the current legacy depot capability, if there is a plan to evaluate that capability for depot level repair of the new materiel, and any depot capability that will be displaced by the new materiel.

(3) If this information is not available yet, discuss in the LCSP Annex for Depot Level Maintenance Analyses and Determinations when in the approved AS this information will be available so that the CDA and DSOR are both completed no later than 90 days after the CDR.

c. Section III–MATDEV core capabilities planning considerations (two pages maximum).

(1) Identify any anticipated new core capabilities, and the plan to establish that capability no later than 4 years after IOC.

(2) Identify the planned coordination with the LCMC(s), candidate depot(s) and LCMC Software Center(s).

(3) Address any technical data that will be required to complete the CDA. Identify where the requirements are defined in the AS and Intellectual Property Strategy. Summarize the technical data delivery requirements that will be included in the program's contracts to ensure the availability of required technical data.

C–4. Abbreviated core logistics analysis outline

This abbreviated CLA template is to be used only when the materiel has been determined to be excluded from 10 USC 2464. The CLA is included in the LCSP annex for depot level maintenance analyses and determinations and remains in subsequent LCSP revisions as an archived record. If the CLA is revised, the original and revised CLAs are documented in the LCSP Annex for Depot Level Maintenance Analyses and Determinations. There are two sections as follows:

a. Section I–Program Information (one page maximum).

(1) Provide a brief description of the program.

(2) Identify the ACAT and projected IOC date.

(3) Include all point of contacts and their organization address, telephone number(s), and e-mail address.

b. Section II–Rationale for Exclusion (3 pages maximum).

(1) Provide a detailed justification why the materiel is not core.

(2) If the exclusion is because this is a commercial item, include the following information in the justification—

(*a*) The estimated percentage of commonality between the item that is sold or leased in the commercial marketplace and the government's version.

(*b*) The estimated cost to procure the unique support, test equipment, and tools necessary to support the materiel if were to be maintained by the government.

(*c*) A comparison of the estimated life cycle logistics support costs that would be incurred by the government if the item were maintained by the private sector vice maintained by the government.

(3) If the exclusion is because there is no DLM on the materiel, discuss why the materiel will have no depot maintenance requirements.

(4) This information will serve as the basis for the required notification to Congress that the materiel is excluded from core.

C–5. Core depot assessment outline

The CDA is included in the LCSP Annex for Depot Level Maintenance Analyses and Determinations and remains in subsequent LCSP revisions as an archived record. If the CDA is revised, the original and revised CDAs are documented in the LCSP Annex for Depot Level Maintenance Analyses and Determinations. There are four sections for the CDA as follows:

a. Section I–Executive Summary (3 pages maximum).

(1) Provide a brief description of the program.

(*a*) Define the end item, to include all sub-assemblies, LRUs, shop replaceable units (SRUs), and any other repairable components that will require DLM.

(*b*) If the materiel is replacing legacy materiel, discuss the planned replacement strategy, to include phasing the new materiel and phasing out the legacy materiel. Will the new materiel completely replace the legacy materiel?

(2) Identify and discuss any changes to the ACAT and projected IOC date since the CLA.

(3) Identify and discuss any changes to the procurement quantity and Army Acquisition Objective since the CLA.

(4) If this is a joint program, briefly discuss common requirements, any differences between Service requirements, and any changes in requirements (for any Service) since the CLA.

(5) Identify any similar programs within the Army or other Services.

(6) Include all points of contact and their organization address, telephone number(s), and e-mail address.

b. Section II- Depot Maintenance Requirements (5 pages maximum).

(1) Define the depot maintenance requirements for both hardware and software on all items listed in Section 1 (1)(a).

(2) Identify any unique technologies and characteristics that potentially impact the organic depot maintenance capability for facilities, equipment, tools, support equipment, technical data (in accordance with the definition in 10 USC 2320 and Defense Federal Acquisition Regulation Supplement subsection 227) and workforce training.

(3) Are existing facilities sufficient? Are new facilities or modifications to existing facilities required to standup this core capability? Is there a need to establish a new maintenance line to support the new materiel while the legacy materiel is still being maintained? Has required funding been requested?

(4) Is the existing MHE sufficient, or is new MHE required to stand up this core capability? Has required funding been requested?

(5) Depot maintenance plant equipment, ATE, TPS, TMDE, special tools and fixtures. Is existing tooling and test equipment sufficient, or is new tooling and test equipment required to stand up this core capability? Has required funding been requested?

(6) Technical data to develop DMWRs, NMWRs, and other required procedures. Has all required technical data been procured? Has required funding been requested?

(7) Training. Has a pilot program been established at the depot to build the DMWR scope of work? If not, when will it be established? Is any new training required for depot personnel to repair this item? If so, when will it be established? Has required funding been requested?

(8) Manpower—

(a) Estimated funding required to establish core capability by appropriation. This should be a detailed discussion of the required, requested, and funded resources for each effort that must be established.

(b) Use the Department of Defense Instruction (DODI) 4151.20 (Depot Maintenance Core Capabilities Determination Process) Part I and Part II spreadsheets to calculate and report annual core workload required measured in DLHs to sustain the core depot capability for the end item and depot level repairable components.

(9) Provide the rationale for the estimated frequency of DLM required on the materiel for both hardware and software.

(10) Discuss transition plans from ICS to the objective support concept.

c. Section III- Coordination—

(1) Describe in detail the required plan for coordinating and timing efforts to establish the core capability. Include the planned methods for coordination (for example site visits, video teleconference, formal meetings and reviews).

(2) List the point of contact for each organization that will concur or non-concur on the CDA.

d. Section IV- Schedule—

(1) Provide an integrated master schedule that identifies the major events and reviews that must occur and timelines to achieve core capability.

(2) Include a description of any risks identified and plans for mitigating each risk.

e. Annexes-include as appropriate for each program.

Appendix D
Software Supportability Considerations in the Integrated Product Support Elements

D–1. Product support management

a. Plan and manage cost and IPS performance across the life cycle.

b. Plan, manage, and fund product support across all IPS elements.

D–2. Design interface

a. Interoperability.

b. Reliability.

c. Maintainability.

d. Supportability.

e. IPS elements.

f. Affordability.

g. CM.

h. Safety requirements.

i. Human systems Integration.
j. Open architecture.
k. Memory capacity.
l. Throughput capacity.
m. Exception handling.
n. Field versus sustainment (depot).
o. Modularity.
p. Commercial items.
q. Process modeling.
r. Reuse.
s. Object oriented programming system and object oriented design.
t. Test voids.
u. Life cycle costing.
v. Software engineering.
w. HAZMAT requirements.
x. Disposal.
y. Legal requirements.

D–3. Sustaining engineering

a. Support in-service materiel in their operational environment.
b. Collection and triage of all service use and maintenance data.
c. Analysis of failure causes and effects, and reliability and maintainability trends.
d. Assess operational usage profile changes.
e. Root cause analysis of in-service problems.
f. Development of required changes to resolve operational issues.
g. Other activities necessary to ensure cost-effective life cycle IPS.

D–4. Supply support

a. Requirement (who gets it).
b. Firmware.
c. Write once, read many.
d. Erasable programmable read only memory.
e. Stock numbers for blank and programmed memory.
f. Communication transfer.
g. Security.
h. Inventory management.
i. Licensing.
j. CM.
k. Software cataloging.

D–5. Maintenance planning and management

a. Software maintenance concept.
b. CRLCMP.
c. Transfer of information during transition phase.
d. Maintainability.
e. Preplanned product improvement.
f. Recertify reliability.
g. SMR code.
h. Contractor versus in-house support.

D–6. Packaging, handling, storage, and transportation

a. Media.
b. Electronic and magnetic isolation.
c. Labeling.
d. Communication reliability.
e. Volume and scheduling.

f. Backup.

D–7. Technical data

a. Specifications.
b. User's manuals.
c. Source listings.
d. Data dictionaries.
e. Operator procedures.
f. Continuous acquisition and life cycle support.
g. Accuracy.
h. Currency.
i. Accessibility.
j. Visibility.
k. Regulation conflicts (technical order and software data).
l. Proprietary.
m. Failure reporting.

D–8. Support equipment

a. Memory loader and verifier.
b. Reprogramming workstations.
c. Integration support facility.
d. At the depot and in the field.
e. Software tools.
f. Management.
g. PSA.
h. Current integrated product support tools.
i. Failure analysis and preventative maintenance.
j. Test hardware.
k. Simulation and simulators.
l. Actual hardware (hot mock-up).
m. Documentation tools.
n. Computer-aided software engineering tools.

D–9. Training and training support

a. Language training.
b. User training.
c. Documentation preparation.
d. Maintainer training.
e. Software logistics.
f. Simulators.
g. Development methodology.
h. Computer-aided instruction.
i. Tutorials and help features imbedded.
j. Diagnostics.
k. Interface.
l. Human factors.
m. PSA.
n. Media for training.
o. Failure reporting training.
p. Trainer software.

D–10. Manpower and personnel

a. Contractor and in-house.
b. Military and civilian.
c. Management and technology.
d. Skill mix.
e. Fix and enhance.

f. Process definition.
g. Automation processes.
h. Specifying in the contract skill levels.
i. Core software logisticians.

D–11. Facilities and infrastructure
a. In-house or contractor.
b. Operational location or depot.
c. Special utilities requirements.
d. Foreign military sales support.
e. Security.
f. Telecommunications electronics material protected from emanating spurious transmissions space planning.
g. Communications.
h. Human factors.
i. Backup provisions.

D–12. Computer resources
a. Integrated support facility.
b. Support environment.
c. Equipment.
d. Security partitioning.
e. CRLCMP.
f. Support software.

Appendix E
Army Work Breakdown Structure

E–1. Summary
The following is a summary WBS for common use for all Army materiel (see MIL–HDBK–881 for detailed guidance). The WBS drives the accounting structure so the initial product should be constructed with cost accounting in mind.

a. Level 1 comprises the entire materiel, such as a tank, truck, missile system, or airplane.

b. Level 2 covers sub-system and major components (hardware, not defined here). Examples include engines, cannons, radios (those not standalone Level 1), fire control, missiles, and airframes. Non-hardware areas are identified to correspond to the hardware items.

c. Level 3 includes subcomponents (that contain Level 4 or lower piece-parts that are the lowest level breakdown possible). Below Level 3 may be Levels 4 and 5, which eventually cannot be broken down further. Included in Level 3 are the nonhardware-related areas described in this appendix (see table E–1).

Table E–1
Summary work breakdown structure

Level 1, Army materiel	Level 2, Sub-system and/or major components	Level 3, Subcomponents
Weapon materiel	Program management	IPS element management
	System engineering	Reliability engineering Maintainability engineering Human factors engineering Other engineering specialties Supportability analysis
	Data	Technical publications Engineering data Management data Support data Data depository
	Training	Equipment Services Facilities

Table E–1
Summary work breakdown structure—Continued

	Support equipment	Test and/or diagnostic equipment Handling equipment Tools Other support equipment
	Initial spares and repair parts	
	Materiel test and evaluation	DT&E OT&E Mockups Test and evaluation support Test facilities Logistics demonstration
	Facilities	Construction and/or modification Utilities

E–2. Work breakdown structure definitions

The following is a summary listing of WBS definitions applicable to all materiel regardless of type. Army materiel refers to any and all equipment required to develop and produce the capability of employing a materiel or equipment in an operational environment to meet its technical or operational requirements as stated in an approved requirements document. Sub-system and major components (hardware, not defined here) include the following:

a. System engineering and program management is defined as system engineering and technical control, configuration control, management, business management of particular system engineering, and project management efforts.

(1) This element encompasses the planning, directing, management, and control of the definition, determination, and development of a system engineering effort. It includes the overall functions of logistics engineering and IPS management and PSM functions, such as maintenance support, facilities, personnel, training, testing, and activation of a materiel and system engineering and project management efforts that can be associated specifically with contractual or engineering significance (like subcontractors).

(2) The element refers to the technical and management efforts of directing and controlling a totally integrated engineering effort and encompasses the system engineering effort to define the materiel and the integrated planning and control of the technical program efforts of design engineering and integrated test planning.

(3) It includes but is not limited to the system engineering effort to transform an operational need or statement of deficiency into a description of materiel requirements and leads to a preferred materiel configuration, the logistics engineering effort to define, optimize, and integrate the support analyses and insert logistics considerations into the engineering effort.

(4) It serves to ensure the development and production of a supportable and cost-effective materiel along with the technical planning and control effort for monitoring, measuring, evaluating, directing, and managing the technical program. It excludes the actual design and production engineering directly related to the products or services of a deliverable end item. Examples of system engineering efforts includes the following:

(a) System engineering, the materiel design; design integrity analysis; materiel optimization; materiel cost effectiveness analysis; intra-materiel and inter-materiel compatibility and assurance; the integration and tradeoffs between reliability, maintainability, supportability; producibility, safety, transportability, and survivability; human factors, surety and security; configuration identification and control; quality assurance; value engineering; preparation of equipment and component performance specifications; design of tests; and LD plans.

(b) Engineering planning and management, the preparation of the SEP; specification tree; program risk analysis; materiel test planning; decision control process; technical performance measurement; technical reviews; subcontractor and vendor reviews; work authorization; and technical documentation control.

(c) Logistics engineering, the disciplined, unified, and iterative work associated with the management, analysis, and technical activities required for IPS determinations. It includes the integration of all support considerations into the materiel design; all the analysis that causes support considerations to influence the materiel design; the final optimum product support package; and the efforts required to develop, plan, manage, and acquire all support requirements. It also includes defining optimum support requirements as they relate to design and to each other; identifying required organic or contractor support, those activities and efforts planned and performed to cause supply and maintenance to be performed at each appropriate level; and identifying and acquiring necessary support and test equipment, timely provisioning, distribution, inventory replenishment of spares and repair parts, and the repair of reparables. This element includes the functional requirements and actions necessary to ensure the capability to transport, preserve, package, store, and handle the materiel; and the planning and analysis activities to ensure that all required facilities are identified and available. It also includes defining requirements for trained operator and maintenance personnel; identifying the need for training, training devices and support instructions; defining computer and computer resource requirements

(firmware and software); and generating manning plans. It excludes financial data and information related to contract administration.

b. Reliability engineering is the engineering process and series of tasks required to examine the probability of a materiel performing its mission adequately for the period of time intended under the operating conditions expected to be encountered in the fielded environment.

c. Maintainability engineering is the engineering process and series of tasks required to measure the ability of an item or materiel to be retained in or restored to a specified condition of readiness, using prescribed procedures and resources at specified levels of maintenance, using specified skill levels and tools and test equipment.

d. Human factors engineering is the engineering process and series of tasks required to define, as a comprehensive technical and engineering effort, the integration of doctrine, manpower and personnel, and operational effectiveness. It includes human characteristics, skill capabilities, performance, anthropometric data, biomedical factors, safety factors, training, manning implications, and other related elements into a comprehensive effort. It also includes the tasks required to provide supportable conclusions and recommendations, the analysis performed in support of the materiel development, and preliminary reviews and analysis of problems that may be sufficiently critical to preclude the materiel from proceeding into the next phase of the life cycle.

e. The non-IPS functions associated with system engineering allow for the establishment of a total system engineering budget, less the logistics analysis functions, and RAM and human factors engineering elements, and for tracking the cost, schedule, performance, and supportability of the materiel specialty engineering efforts of nuclear, biological and chemical, nuclear survivability, environmental considerations, energy management, and all other system engineering specialties.

f. Supportability analysis is the process and series of tasks performed to examine all elements of the proposed materiel and equipment to determine the logistics support required to keep the materiel usable for its intended purpose, and to influence the design so that both the materiel and its required support can be provided at an acceptable cost. It includes all the generic tasks required for IPS element determination, the analysis required to verify the adequacy of the logistics support, and to provide the necessary logistics support.

g. IPS element management is the logistics task management and technical control effort and the management of particular elements of IPS. It encompasses the LCSP, PSM, and PSMIPT participation, and IPS evaluation and supportability assurance required for an affordable and supportable materiel. This element includes management of all the functions of logistics support: maintenance support planning; support facilities planning; support equipment; supply support; packaging, handling, storage, and transportation; provisioning requirements determination and planning; training materiel requirements determination; computer resource determination; field and sustainment level maintenance determination; and data management. It excludes the effort that can be associated specifically with the hardware, contract management, and materiel specialty engineering.

h. Program management is the business and administrative planning, organizing, directing, coordinating, controlling and approving actions designated to accomplish overall project objectives that are not associated with specific hardware elements and are not included in system engineering. Examples include cost, schedule, performance measurements, warranty administration, contract management, vendor liaison, contract WBS, funds status, financial management directly charged to the project, and other appropriate management tasks.

E–3. Data

The data elements are defined as all specific deliverable data required to be listed on a DD Form 1423 (Contract Data Requirements List). The data requirements, selected from the DOD Index of Specifications and Standards and the Acquisition Management System and Data Requirements Control List, consist of elements that include only such efforts that can be reduced or will not be incurred if the data items are eliminated. If the data are government peculiar, they include the efforts for acquiring, writing, assembling, reproducing, packaging, and shipping. They also include the efforts for redesigning into government format (with reproduction and shipment) if the data are identical to those used by the contractor, but required in a different format. These data elements include value engineering change proposals, ECPs, and other configuration control management changes as a function of data management and data depository. These elements and their sub-elements exclude the overall planning, management, and task analysis functions inherent in the WBS element system engineering and program management.

a. Technical publications are those formal TMs and documents (as well as advanced, commercial, real property installed equipment and miscellaneous manuals) for the installation, operation, maintenance, overhaul, and training of a materiel. Also included are references on hardware materiel, computer programs, contractor instructional materials, inspection documentation, and historical records that may accompany individual items of equipment.

b. Engineering data are those engineering drawings, associated lists, specifications, and other documentation required by the government. It includes, for example, all final plans, procedures, reports, and documentation pertaining to materiel, computer and computer resource programs, component engineering, OT&E, human factors, and other engineering analysis. It also includes the direct effort associated with the technical data rights for follow-on acquisitions (reprocurement package), and the completed technical data rights associated with the materiel itself.

c. Management data are those data items necessary for configuration control management, cost, schedule, contractual data management, program management, and so on, required by the government. For example, this element includes contractor cost reports, cost performance reports, contractor fund status reports, schedule, milestone, networks, and LCSPs.

d. Support data are those data items designed to support planning. It includes PSA documentation and LPD maintenance and delivery; supply; general maintenance plans and reports; training and training support data; packaging, packing, handling, and transportation information; facilities data; data to support the provisioning process, and any other support data.

e. Data depository is a facility designated to act as custodian in establishing and maintaining a master engineering specification and drawing depository service for government approved documents that are the property of the government. As custodian for the government, the contractor is authorized by approved change orders to maintain these master documents at the latest approved revision level. When documentation is called for on a given item of data retained in the depository, the charges (if charged direct) will be to the appropriate data element. This element represents a distinct entity of its own and includes all efforts of drafting, clerical, filing, and so on, required to provide the services outlined above. All similar efforts for the contractor's internal specification and drawing control system, in support of their engineering and production activities, are excluded.

E–4. Training

The training element is defined as the deliverable training services, devices, accessories, aids, equipment, and parts used to facilitate instruction, through which personnel will acquire sufficient concepts, skills, and aptitudes to operate and maintain the materiel with maximum efficiency. It includes all efforts associated with the design, development, and production of deliverable training equipment, as well as the execution of specific training services. It excludes the overall planning, management, and task analysis functions inherent in the system engineering and program management element.

a. Equipment are those distinctive deliverable end items of training equipment assigned by either a contractor or military service required to meet specific training objectives. This element includes, for example, operational trainers (simulators), maintenance trainers (maintenance training units), and other items such as cutaways, mockups, and models.

b. Services consist of those deliverable services, accessories, and aids necessary to accomplish the objectives of training. It includes, for example, training course materials, contractor-conducted training (including in-plant and service training), and materials and curriculum required to design, execute, and produce a contractor developed training program. It also includes the material, courseware, and associated documentation development necessary to accomplish the contracted-for objective of training (primarily the software, courseware, and training aids developed or constructed solely for the training mission). It encompasses the materials used for acquainting the trainees with the materiel or establishing trainee proficiency.

c. Facilities are the special construction planning and execution necessary to accomplish the training objective and include the rehabilitation of existing facilities used to accomplish the objective of training (primarily the brick-and-mortar type facility used or constructed solely for the training mission). Excluded is the installed building equipment used for acquainting the trainees with the new materiel and associated equipment or establishing trainee proficiency.

E–5. Common support equipment

Common support equipment is defined as those deliverable items and associated software and firmware to support and maintain the materiel. It will also support portions of the materiel, while not directly engaged in the performance of its mission and which are presently in the DOD inventory for support of other materiel, or commercially common within industry. It includes all efforts associated with the design, development, and production of common support equipment required to support the materiel. It also includes the acquisition of additional quantities of the equipment caused by the introduction of the materiel into operational service use. For example, it includes equipment, and tools used to refuel, service, transport, hoist, repair, overhaul, disassemble, assemble, test, inspect, or otherwise maintain the equipment in an operable condition. Excluded are the overall planning, management, and task analysis functions inherent in the System Engineering and Program Management element.

a. Test and measurement equipment consists of all items that are of a common and supplementary nature to test and measure a component or materiel. It consists of the groupings of TMDE, precision measuring equipment, automated test equipment (ATE), manual test equipment, automatic test systems, special test equipment, TPS, and their related software, firmware, and support hardware. It includes all common items or devices deliverable under the contract used to evaluate the operational condition of a materiel and to identify and isolate actual or potential malfunctions at all levels of equipment support. It also includes packages that enable an LRU, SRU, printed circuit board, or similar item to be diagnosed using ATE, to include TPS packages, appropriate interconnecting devices, automated load modules, taps, or other equipment that allows an operator and maintainer to perform a diagnostics, screening, or quality assurance function at any level of materiel support.

b. Support and handling equipment consist of all deliverable tools (factory tooling is specifically excluded) and handling equipment used for support of the materiel, not defined as TMDE, ATE, or TPS. It would typically include support handling equipment and associated software identified as necessary to support and test the operational capabilities and availability of the materiel for operating forces and supporting maintenance activities. This element consists of the group of tools or tooling assembled and issued for a specific support or maintenance purpose, of a common nature, used at any level of materiel support. It typically includes common ground support equipment, vehicular support equipment, powered support equipment, nonpowered support equipment, MHE, munitions MHE, IPE, basic issue items, and common tools.

E–6. Peculiar support equipment

Peculiar support equipment is defined as those deliverable items and associated software required to support and maintain a particular materiel, while it is not directly engaged in the performance of its mission. It includes, for example, vehicles, equipment, and tools, used to refuel, service, transport, hoist, repair, overhaul, assemble, disassem- ble, test, inspect, or otherwise maintain the materiel. It also includes all efforts associated with the design, develop- ment, and production of peculiar support equipment. It specifically excludes the overall planning, management, and task analysis functions inherent in the WBS element of materiel engineering and program management, and common government and industry support equipment.

a. Test and measurement equipment is defined as a collection of peculiar or unique testing and measurement equipment that is distinctive and of a supplementary nature to a materiel. It consists of the grouping of test, TMDE, PME, ATE, automatic test systems, special test equipment, and their related software, firmware, and support hardware. It includes the deliverable peculiar testing and measuring equipment required by the contract, and that used at all levels of maintenance. It also includes packages that enable an LRU, SRU, printed circuit board, or similar item, to be diagnosed using ATE. It includes TPSs, interconnect devices, automated load modules, tapes or diagnostics, screening or quality assurance functions at any level of materiel support.

b. Support and handling equipment is defined as the physically deliverable tools (factory tooling excluded) and handling equipment used for support of the materiel, which are not defined as ATE, TMDE, or TPSs. It would typically include materiel-peculiar ground support equipment, MHE, IPE, basic issue items, and special tools and equipment identified as necessary to support or handle operational capabilities and availability of the materiel for the operating force and maintenance activities at all levels of materiel support.

E–7. Initial spares and initial repair parts

a. The initial spares and initial repair parts element is defined as the deliverable spare components or assemblies used for initial replacement purposes in the materiel. It also includes the repairable spares and the repair parts required as initial stockage to support and maintain the newly fielded materiel during the initial phase of service, including pipeline quantities needed at all levels of maintenance and support. It excludes test spares, and spares provided specifically for use during installation, assembly and checkout onsite, and the overall management, planning, and task analysis function inherent in the system engineering and project management element.

b. Subsystem and subcomponent, initial issue spares and initial repair parts is defined as the common or unique initial spares and repair items, components or assemblies, or replacement item for each sub-system, which together make up the materiel. In this element, common and unique spares and repair parts are captured and reported, by sub-system, at each appropriate indenture level and each level of support.

E–8. Materiel test and evaluation

The materiel T&E element is defined as the use of prototype, production, or specially fabricated hardware to obtain or validate engineering data on the performance of the materiel. This element includes the detailed planning, conduct, support, data reduction and reports from such testing, and all hardware items consumed or planned to be consumed, in the conduct of such testing. It also includes all efforts associated with the design and production of models, specimens, fixtures, and instrumentation in support of the test program. Test articles that are complete units (functionally configured as required by the mission equipment) are excluded. Also excluded are development testing, component acceptance testing, and so on, that can be specifically associated with the hardware, unless these tests are of special contractual or engineering significance.

a. Developmental test and evaluation.

(1) The DT&E element is defined as those tests and evaluation conducted to—

(a) Demonstrate that the engineering design and development process is complete.

(b) Demonstrate that the design risks have been minimized.

(c) Demonstrate that the materiel will meet specifications.

(d) Determine the materiel's military utility when fielded.

(e) Determine whether the engineering design is supportable (practical, maintainable, safe, and so on) for operational use.

(f) Provide test data to examine and evaluate tradeoffs against materiel specification requirements, life cycle costs, and schedule.

(2) DT&E is planned, conducted and monitored by the development command. It includes, for example, such

models and tests as wind tunnel, static, drop, fatigue, ground integration, sea integration, and aviation integration tests on—

(a) Air, ship, and land vehicles.

(b) Command and launch equipment.

(c) Integrated surface vehicle and command and launch equipment.

(d) Test bed and associated support equipment.

(e) Development test, test instrumentation, and test equipment, including its support equipment.

(f) Chase craft and associated support.

b. Operational test and evaluation. This element is defined as that T&E conducted by agencies other than the development command to assess the prospective materiel's military utility, operational effectiveness, operational suitability, cost, and need for modifications. Initial OT&E conducted during the development of a materiel will be included in this element. It encompasses such tests as integrated materiel tests, flight tests, sea trials, and land trials, as required to prove the operational capability of the deliverable materiel. It also includes contractor support (such as technical assistance, maintenance, labor, material) consumed during this phase of testing.

c. Mockups. These are defined as the design engineering and production of materiel mockups which have special contractual or engineering significance, or which are not required for the conduct of one of the above elements of testing.

d. Test and evaluation support. This element is defined as all support elements necessary to operate and maintain materiel during testing and evaluation that are not consumed during a particular category of testing. This element includes, for example, instrumentation, reparable spares, repair of reparables, test and support equipment, contractor technical support, drones, surveillance aircraft, land and sea tracking vessels not allocable to other T&E elements. Excluded are operator and maintenance personnel, consumables, special fixtures, and special instrumentation that are included, utilized and consumed in a single element of testing.

e. Test facilities. These are those special test facilities, sites, ships, or land bases required for performance of the various developmental tests necessary to prove the design and reliability of the materiel. It includes, for example, test chambers, white rooms, and shakers. The brick-and-mortar type facilities allocable to industrial facilities are excluded.

f. Logistics testing. This is the specific testing performed to evaluate the logistics supportability of the materiel. Logistics testing is to be differentiated from support resources and services required for initiating and supporting a test. Logistics testing includes the efforts required to evaluate the achievement of supportability goals, such as the adequacy of tools, test equipment, technical publications, maintenance instructions, and personnel skill requirements. It is the verification of the selection and allocation of repair parts, tools, test equipment, tasks (to appropriate maintenance level), and the adequacy and accuracy of maintenance time standards. The product support package (composite of the support resources that will be evaluated, tested, and validated during the testing process) will be separately captured and reported, as will LDs. Specifically, excluded are factory tooling and any costs directly associated with DT&E and OT&E.

Appendix F
Supply Management Army-Operating and Support Cost Reduction Program

F–1. Definition

The SMA–OSCR is an Army investment program that provides funds to accommodate engineering design efforts of secondary items to reduce the acquisition cost, extend the life, and improve reliability, maintainability and supportability. The goal is to minimize total LCC. Characteristics of potential SMA–OSCR initiatives include the following:

a. Items with high failure rates.

b. Items with high acquisition cost.

c. Items with high supportability or maintenance costs.

d. Unique items.

F–2. Criteria for selecting candidates

a. The criteria for SMA–OSCR candidates are as follows:

(1) Affects a secondary item.

(2) Reduces sustainment costs.

(3) Reduces unit cost, extends the life of the item, or improves reliability, maintainability or supportability.

(4) Funds required will only be used for engineering design, prototype, and testing.

b. The SMA–OSCR will not fund—

(1) Assessing the feasibility of a candidate item.

(2) Documenting the study requirements.

(3) Preparing and awarding a contract.

(4) Managing and tracking SMA–OSCR initiatives.

(5) Assessing the finished product or conducting post-investment analysis.

(6) Purchasing or applying new or replacement items or kits.

(7) Updating technical or maintenance manuals.

(8) Purchasing or updating test equipment or office automation hardware and software.

(9) Implementing managerial improvements.

(10) Reconfiguring production or maintenance lines.

(11) Conducting item reduction and standardization studies.

(12) Conducting studies that do not physically impact the secondary items.

(13) Cost reduction engineering efforts that change end items rather than secondary items fall under the purview of reliability, maintainability, and supportability initiatives and will not be funded by SMA–OSCR.

F–3. Initiative process outline

a. The steps in the SMA–OSCR process include the following:

(1) Identifying the O&S cost reduction (OSCR) candidate (submit idea to a command OSCR office).

(2) Performing the preliminary proposal.

(3) Obtaining MATDEV authorization.

(4) Performing and validating an economic analysis.

(5) Submitting the initiative showing the cost to benefit ratio.

(6) Obtaining approval (less than $100,000 requires LCMC-level approval, more than $100,000 requires AMC approval).

(7) Obtaining funds for implementation.

(8) Implementing the OSCR initiative.

(9) Tracking and reporting on the OSCR initiative.

b. An example of one method used in the OSCR program is TI, which replaces obsolete, unreliable, costly, or difficult to obtain or maintain components with redesigned items using state-of-the-art technology. This includes reengineering the item if it will reduce support costs, increase reliability, or reduce maintenance time or complexity. If the item is—

(1) A Class IX item or a depot level repairable, it can be a TI candidate.

(2) On a unit property book record as an end item or component of an end item, or the effort will change the nomenclature or model number of the item, then the effort will be handled as a modification rather than TI.

c. The flow of the process of TI is to identify candidate items, evaluate proposed technology for suitability, determine cost benefits and supportability, obtain approval by the item configuration manager, and get funding approval at the LCMC level.

(1) Identification of candidate items for TI can come from any source. Normally, the item manager and production and maintenance engineers will be involved. The engineers will identify items causing reliability or maintainability problems which need to be "designed out." They will also identify items using components that are becoming obsolete or are not readily available. The item manager identifies items with unusually high demands or procurement lead times. Other sources will include suggestions from users, value engineering proposals, or opportunities to switch to common components.

(2) TI candidates are evaluated in several steps to ensure the item is appropriate for redesign. The technical aspects are examined to ensure performance and reliability requirements are met and the best technical approach has been selected. An economic analysis is done to verify that a cost benefit will be realized.

(3) TI proposals are put into an ECP format and are submitted to the configuration manager and the configuration control board.

(4) The item manager then has approval authority for the funding of TI proposals intended to reduce the O&S costs for Army materiel.

Appendix G
Sustainment Quad Chart Instructions

G–1. General

The SQC is a tool used to provide management insight into critical logistics and materiel readiness requirements, strategy, cost, and affordability aspects of the program acquisition and life cycle sustainment strategy. The chart also informs various program life cycle decisions.

G–2. Top left quad: Product Support Strategy

This quad is used to summarize the product support strategy. Cite the current sustainment approach and any future differences. Define and highlight key product support elements to support an assessment that planning is adequate for the life cycle decision at hand, and sufficient to meet materiel readiness goals throughout the life cycle. Highlight the key aspects relevant to the specific program life cycle phase. For example, a MS–A program should strive to develop a supportable capability, and effective and affordable support.

a. Sustainment approach. :

(1) Highlight the key support elements, at a minimum include:

(a) Personnel (military, government civilian, contractor).

(b) Maintenance (field, sustainment/depot, software).

(c) Supply (initial and replenishment consumables/reparables).

(d) Data (data rights requirements/strategy and data maintenance).

(2) Define overall performance based approach and supporting analysis, APSA, PBA and contract strategy, along with the results of sustainment-related analysis to date that indicates the chosen strategy is a good deal for all parties including the Soldier, and taxpayer.

b. Issues. :

(1) Cite any sustainment issues the program is currently experiencing, along with risks and alternative courses of action.

(2) The goal is no unresolved sustainment issues before a program review.

c. Resolution. : Identify planned resolutions to noted issues.

G–3. Bottom left quad: Sustainment Schedule

Highlight key elements to support an assessment that the sustainment schedule is adequate for the life cycle decision at hand, and sufficient to meet materiel readiness goals throughout the life cycle. Sustainment elements must be synchronized with the integrated master schedule.

a. Include prior year's completion of significant past sustainment events (for example, ILA, APSA, CLA, CDA, and DSOR).

b. Future years should cover Five-Year Defense Plan and post- Five-Year Defense Plan significant events:

(1) Contracts

(2) Major milestones and decision reviews.

(3) IOC and first unit equipped dates.

(4) LCSP and/or performance-based product support related decision support (for example APSA updates).

(5) ICS or CLS organic transition dates.

(6) Include vertical line for current date.

c. Include key life cycle sustainment events: APSAs, performance-based product support decisions, ICS, CLS, organic transitions, core logistics determinations, depot standup, and sustainment re-competes**.**

G–4. Top right quad: Metrics Data

Display current estimates of sustainment performance versus goals and actuals for antecedent systems. This section highlights and compares key sustainment metrics, requirements, and support an assessment that performance is adequate for the life cycle decision at hand, and is sufficient to meet materiel availability goals throughout the life cycle. Metrics data should reflect the most recent sustainment performance and estimates.

a. Metrics: At a minimum include Materiel Availability, Materiel Reliability, O&S Cost (in Base Year $) and MDT, per Chairman of the Joint Chiefs of Staff 3170 and program Defense Acquisition Management Information Retrieval submission (for MDAPs). Other relevant sustainment metrics are allowed as needed.

b. Antecedent actual:

(1) Include the four metrics for the antecedent system that the new materiel is replacing.

(2) For MDAPs the antecedent is the system cited in the selected acquisition report (SAR).

c. Original goal:

(1) Values for each metric based on the original sustainment requirements or the original sustainment metrics submission (first Defense Acquisition Management Information Retrieval submission (for MDAPs)). For older programs that did not have the metrics as design requirements, the original goal is the value of their first sustainment metrics submission.

(2) The goal is equivalent to threshold for programs with sustainment KPP and KSAs.

d. Current goal:

(1) Value for each metric according to the current baseline.

(2) The goal is equivalent to threshold for programs with sustainment KPP and KSAs**.**

(3) Cite the rationale for any changes.

e. Demonstrated performance:

(1) Actual performance to date.

(2) MATDEV assigns color rating based on estimate versus current goal:

(3) Green: At or exceeding goal.

(4) Yellow: less than 10 percent adverse delta from goal.

(5) Red: greater than10 percent adverse delta from goal.

f. Current estimate:

(1) Projected performance at full fielding for each metric.

(2) The MATDEV assigns color rating based on estimate versus current goal:

(a) Green: At or exceeding goal.

(b) Yellow: less than 10 percent adverse delta from goal.

(c) Red: greater than10 percent adverse delta from goal.

g. Test or fielding event data derived from: Cite the test, fielding event, or modeling and simulation tool that led to the current estimate.

h. Notes: Include any relevant or additional information concerning metrics definitions.

G–5. Bottom right quad: Operations and Support Data

Highlight and compare O&S costs (estimates or actuals) and support an assessment that the program is affordable throughout the life cycle. Field structure reflects the SAR O&S section for MDAPs.

a. Cost element:

(1) Refer to the 2007 Cost Analysis Improvement Group (Cost Assessment and Program Evaluation (CAPE)) Cost Estimating Guide for individual cost elements.

(2) For MDAPs, these definitions should be consistent with the SAR O&S cost section (which should be based on identical definitions). Cost estimating assumptions, constraints, ground rules, limitations, methodologies and results must match the current cost estimate.

b. Antecedent cost:

(1) Cost of the existing system according to the CAPE cost elements.

(2) Average annual cost per operating unit (either per system or entire fleet of systems). For MDAPs, use the SAR as the basis for determining the unit.

c. Program original baseline:

(1) For MDAPs, in accordance with the CAPE cost elements, and according to the first SAR submission.

(2) The base costs on average annual cost per operating unit (example: squadron, hull, or brigade).

d. Program current cost:

(1) For MDAPs, in accordance with the CAPE cost elements, and according to the most recent estimate (for example: independent cost estimate).

(2) The base costs on average annual cost per operating unit (example: squadron, hull, or brigade).

(3) The MATDEV assigns color rating based on estimate versus current goal:

(a) Green: At or exceeding goal.

(b) Yellow: less than 10 percent adverse delta from goal.

(c) Red: greater than10 percent adverse delta from goal.

e. Total O&S costs: Comparison of antecedent program vs. current Total O&S present cost totals in both Then Year dollars and Base Year dollars.

(1) Based on most recent O&S estimate, not the last SAR (for MDAPs).

(2) For MDAPs, provide notes explaining any major differences with respect to the CAPE estimate.

Note. If the quantity of the new system being acquired is significantly different than antecedent system, match quantities in O&S totals and notate total quantities of each.

Glossary

Section I
Abbreviations

Aa
achieved availability

AAE
Army acquisition executive

ACAT
acquisition category

ACEIT
automated cost estimating integrated tool

ADM
acquisition decision memorandum

ANSI
American National Standards Institute

AMC
U.S. Army Materiel Command

AoA
analysis of alternatives

APB
acquisition program baseline

APSA
analysis of product support alternatives

AR
Army regulation

AS
acquisition strategy

ASA (ALT)
Assistant Secretary of the Army (Acquisition, Logistics, and Technology)

ASARC
Army Systems Acquisition Review Council

ASL
authorized stockage list

ASIOE
associated support items of equipment

ATE
automatic test equipment

ATEC
Army Test and Evaluation Command

ATSC
Army Training Support Center

BCA
business case analysis

BOIP
basis of issue plan

BOIPFD
basis of issue plan feeder data

CAIV
cost as an independent variable

CAPDEV
capabilities developer

CASA
cost analysis strategy assessment

CBM
condition-based maintenance

CBM +
condition-based maintenance plus

CDA
core depot assessment

CDD
capabilities development document

CDRL
contract data requirements list

CFSR
contractor field service representative

CLA
core logistics analysis

CLIN
contract line item number

CLS
contractor logistics support

CM
configuration management

CMI
component major item

COE
U.S. Army Corps of Engineers

COMPASS
Computerized Optimization Model for Predicting and Analyzing Support Structures

CONUS
continental United States

COTS
commercial-off-the-shelf

CPC
corrosion prevention and control

CPD
capability production document

CRD
capability requirements document

CRLCMP
computer resources life cycle management plan

CTM
central tool managers

DA
Department of the Army

DA Pam
Department of the Army pamphlet

DAB
Defense Acquisition Board

DASA (APL)
Deputy Assistant Secretary of the Army (Acquisition Policy and Logistics)

DCS, G-3/5/7
Deputy Chief of Staff, G–3/5/7

DEMIL
demilitarization

DI
data interchange

DID
data item description

DLA
Defense Logistics Agency

DLH
direct labor hours

DLM
depot-level maintenance

DMI
depot maintenance interservice

DMSP
depot maintenance support plan

DMWR
depot maintenance work requirement

DOD
Department of Defense

DODD
Department of Defense directive

DODI
Department of Defense instruction

DOTMLPF–P
Doctrine, organization, training, materiel, leadership and education, personnel, facilities, and policy

DPAMMH
direct productive annual maintenance man-hours

DSOR
depot source of repair

DT&E
developmental test and evaluation

EMD
engineering and manufacturing development

EOD
explosive ordnance disposal

EP
equipment publication

ESOH
environmental, safety, and occupational health

ETM
electronic technical manual

FMECA
failure modes, effects, and criticality analysis

FMR
full materiel release

FMS
Force Management System

FUED
first unit equipped date

GC
gaining commands

GEIA
Government Electronics and Information Technology Association

HAZMAT
hazardous materials

HDBK
handbook

HSI
Human Systems Integration

HQDA
Headquarters, Department of the Army

ICD
initial capabilities document

ICS
interim contractor support

IETM
interactive electronic technical manual

ILA
independent logistics assessment

IOC
initial operational capability

IPE
industrial plant equipment

IPR
in-process review

IPS
integrated product support

IPT
integrated product team

IUID
item unique identification

JCIDS
Joint Capabilities Integration and Development System

JMOA
joint memorandum of agreement

JROC
Joint Requirements Oversight Council

KPP
key performance parameter

KSA
key system attribute

LCC
life cycle cost

LCCS
life cycle contractor support

LCL
Life Cycle Logistics

LCMC
Life Cycle Management Command

LCSP
life cycle sustainment plan

LD
logistics demonstration

LDT
logistics delay time

LIDB
Logistics Integrated Data Base

LIN
line item number

LIW
Logistics Information Warehouse

LOGSA
AMC Logistics Support Activity

LORA
level of repair analysis

LPD
logistics product data

LRIP
low-rate initial production

LRU
line replaceable unit

M&S
modeling and simulation

MAC
maintenance allocation chart

MAMDT
mean active maintenance downtime

MANPRINT
manpower and personnel integration

MARC
manpower requirements criteria

MATDEV
materiel developer

MCA
military construction, Army

MDA
milestone decision authority

MDAP
Major Defense Acquisition Program

MDD
materiel development decision

MDR
milestone decision review

MDT
mean down time

MFA
materiel fielding agreement

MFP
materiel fielding plan

MHE
material handling equipment

MI
market investigation

MIL–HDBK
military handbook

MISM
major item system map

MOA
memorandum of agreement

MON
memorandum of notification

MOS
military occupational specialty

MOU
memorandum of understanding

MPA
military personnel, Army

MS
milestone

MSA
materiel solution analysis

MTBF
mean time between failure

MTBM
mean time between maintenance

MTBMA
mean time between maintenance actions

MTBPM
mean time between preventive maintenance

MTPM
mean time to perform preventive maintenance

MTTR
mean time to repair

NATO
North Atlantic Treaty Organization

NBC
nuclear, biological, and chemical

NC
number of corrective maintenance actions

NDI
nondevelopmental item

NEOF
no evidence of failure

NET
new equipment training

NETP
new equipment training plan

NMWR
national maintenance work requirement

NSLIN
non-standard line item number

NSN
national stock number

O&S
operations and support

OMA
operations and maintenance, Army

OPR
office of primary responsibility

OSR
operations and support review

OT&E
operational test and evaluation

PB
President's Budget

PBA
performance-based arrangement

PBPSS
performance-based product support strategy

PDOS
production, deployment, operations, and support

PEG
program evaluation group

PEO
program executive office or officer

PEO STRI
Program Executive Officer, Simulation, Training and Instrumentation

PESHE
programmatic environment, safety and occupational health evaluation

PHS&T
packaging, handling, storage and transportation

PMR
provisioning master record

POM
program objective memorandum

PP
provisioning plan

PPP
public-private partnership

PPS
post-production support

PPSS
post-production software support

PPSP
post-production support plan

PSA
product support analysis

PSE
peculiar support equipment

PSI
product support integrator

PSM
product support manager

PSMIPT
product support management integrated product team

PSP
product support provider

PTD
provisioning technical documentation

RAM
reliability, availability, and maintainability

RAM–C
reliability, availability and maintainability cost rationale report

RCM
reliability-centered maintenance

RDT&E
research, development, test, and evaluation

RFP
request for proposal

RPB
recapitalization program baseline

RSSP
replaced system sustainment plan

RST
retrograde shipping time

S&I
standardization and interoperability

SAR
selected acquisition report

SB
supply bulletin

SDDC
Surface Deployment and Distribution Command

SDDCTEA
Surface Deployment and Distribution Command-Transportation Engineering Agency

SEP
system engineering plan

SESAME
selected essential item stockage for availability method

SFA
support facility annex

SKOT
sets, kits, outfits, and tools

SLAMIS
Standard Study Number-Line Item Number Automated Management and Integrating System

SLIN
standard line item number

SMA–OSCR
supply management Army-operating and support cost reduction

SMR
source, maintenance, and recoverability

SOW
statement of work

SQC
sustainment quad chart

SR
sustainment review

SSN
standard study number

STP
software transition plan

STRAP
system training plan

T&E
test and evaluation

TC
type classification

TDA
table of distribution and allowances

TDS
technology development strategy

TEMP
test and evaluation master plan

TES
test and evaluation strategy

TI
technology insertion

TM
technical manual

TMDE
test, measurement, and diagnostic equipment

TMRR
technology maturation and risk reduction

T/TD
trainer/training developer

TOE
table of organization and equipment

TPF
total package fielding

TPS
test program set

TR
transportability report

TRADOC
U.S. Army Training and Doctrine Command

UUT
unit under test

USAFMSA
U.S. Army Force Management Support Agency

WBS
work breakdown structure

WIPT
working-level integrated product team

WSR
weapon system review

ZLIN
developmental line item number

Section II
Terms
This section contains no entries.

Section III
Special Abbreviations and Terms

ABCD
Army Bulk CBM Data Interface Requirements Specification

Ao
Operational availability

Ai
inherent availability

BIT
built-in test

CARD
cost analysis requirements description

CAPE
cost assessment and program evaluation

FRPDR
full-rate production decision review

HB
handbook

IPSR
integrated product support review

LCL
life cycle logistics

JLCSP
joint life cycle sustainment plan

MDT
mean down time

MEC–D
Materiel Enterprise Database

NS–E
non-standard equipment

PFSA
post-fielding support analysis

RPSTL
repair parts and special tools list

SAE
SAE International

SYSPARS
System Planning and Requirements Software

TA
TechAmerica