Chapter 5
Life-Cycle Logistics (LCL)

5.0. Overview

5.0.1. Purpose

This chapter provides program managers (PMs) with a description of Life-Cycle Logistics (LCL) and its application in the acquisition and sustainment phases. A fundamental change in DoD policy is the designation of the program manager as the life cycle manager (Total Life Cycle Systems Management (TLCSM)), responsible for effective and timely acquisition and sustainment of the system throughout its life cycle. The program manager is responsible for providing the needed product support capability to maintain the readiness, sustainment and operational capability of a system. Emphasis is placed on increasing reliability and reducing logistics footprint in the systems engineering process, and providing for effective product support using performance based logistics (PBL) strategies. This approach is depicted in Figure 1.

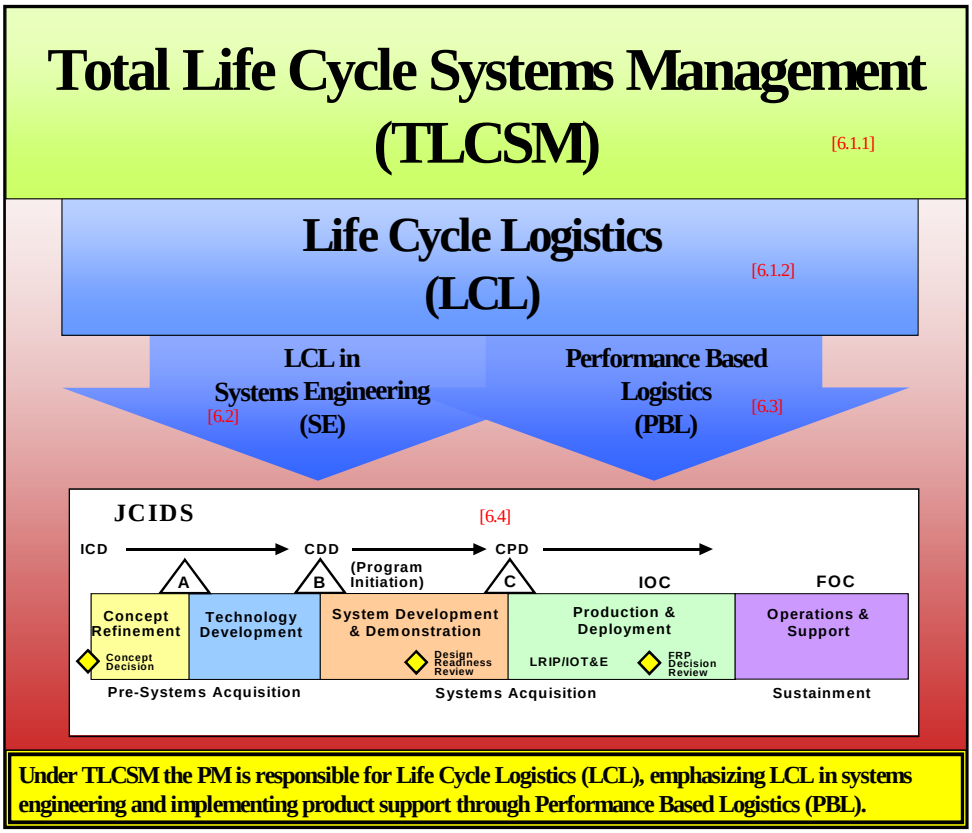

Figure 1. Overview

5.0.2. Contents

This chapter is organized in five sections, corresponding to Figure 1:

- Section 5.1, Life-Cycle Logistics, describes LCL, explains its role under Total Life Cycle Systems Management (TLCSM), and identifies the Program Manager's main

LCL responsibilities. It also identifies DoD's overall logistics goals, providing context for the conduct of all LCL related activities.

- Section 5.2, LCL in Systems Engineering, discusses LCL in Systems Engineering, focusing primarily on achieving affordable systems operational effectiveness. LCL considerations are addressed in the Joint Capabilities Integration and Development System (JCIDS) process, demonstrated in Test and Evaluation, and implemented in fielding and Sustainment of the system. The concept of "design for support, support the design" is presented in this section.
- Section 5.3, Performance Based Logistics, discusses DoD's preferred approach to product support, Performance Based Logistics (PBL), and provides a step-by-step process for implementing PBL. Performance Based Agreements and Source of Support are also discussed.
- Section 5.4, Key LCL Activities in the System Life Cycle, identifies key LCL activities in each phase of a program, whether it is a major new system, a modification to a fielded system, or a redesign of a product support system. This section applies the concepts and actions discussed in the previous sections, placing them sequentially in the Defense Acquisition Management Framework to demonstrate when LCL-related activities take place.
- Section 5.5, LCL Tools and References, provides LCL tools and references. These tools and references provide further explanation of critical items discussed in the chapter, as well as examples, templates, and other useful tools for LCL implementation.

5.1. Life-Cycle Logistics (LCL)

This section discusses LCL in the context of TLCSM and DoD's strategic logistics goals, and identifies the program manager's LCL responsibilities. Subsequent sections discuss the program manager's primary means of fulfilling those LCL responsibilities: the inclusion of LCL considerations in systems engineering and implementation of PBL in Product Support.

5.1.1. Total Life Cycle Systems Management (TLCSM)

TLCSM is the implementation, management, and oversight, by the designated Program Manager (PM), of all activities associated with the acquisition, development, production, fielding, sustainment, and disposal of a DoD weapon or materiel system across its life cycle (DoD Directive 5000.1). TLCSM bases major system development decisions on their effect on life cycle operational effectiveness and logistics affordability. TLCSM encompasses, but is not limited to, the following:

- Single point of accountability for accomplishing program logistics objectives including sustainment.
- Evolutionary acquisition strategies, including product support.
- An emphasis on LCL in the systems engineering process.
- Supportability as a key element of performance.
- Performance-based logistics strategies.
- Increased reliability and reduced logistics footprint.
- Continuing reviews of sustainment strategies.

Implementation of the TLCSM business approach means that all major materiel alternative considerations, and all major acquisition functional decisions demonstrate an understanding of their effects on operations and sustainment phase system effectiveness and affordability (see section 4.1).

In addition, TLCSM assigns the program manager responsibility for effective and timely acquisition, product support, availability, and sustainment of a system throughout its life cycle.

5.1.2. Life-Cycle Logistics (LCL)

LCL is the planning, development, implementation, and management of a comprehensive, affordable, and effective systems support strategy. Under TLCSM, Life-Cycle Logistics has a principal role during the acquisition and operational phases of the weapon or materiel system life cycle. LCL should be carried out by a cross-functional team of subject matter experts to ensure that supportability requirements are addressed comprehensively and consistently with cost, performance, and schedule during the life cycle. Affordable, effective support strategies must meet goals for operational effectiveness, optimum readiness, and the facilitation of iterative technology enhancements during the weapon system life cycle.

LCL also includes the planning, development, and implementation of Performance Based Logistics initiatives as the preferred approach to systems support (DoD Directive 5000.1). Examples of these initiatives include: managing performance agreements, integrating support strategies, and employing diagnostics, prognostics, and logistics chain management approaches to achieve operational effectiveness, system affordability, and reduced logistics footprint. LCL should be an integral part of the systems engineering process to insure that supportability considerations are implemented during the design, development, production, and sustainment of a weapon system.

DoD Strategic Intent: LCL fully supports DoD's strategic goals for acquisition and sustainment logistics as stated in the most recent Quadrennial Defense Review (QDR), Joint Vision 2020, and the Focused Logistics Campaign Plan (FLCP). DoD goals include:

- Project and sustain the force with minimal footprint (QDR).
- Implement Performance-Based Logistics.
- Reduce cycle times to industry standards (QDR).

LCL supports achievement of these goals within the context of TLCSM.

5.1.3. The Program Manager's LCL Responsibilities

The Program Manager is the life cycle manager. Program managers examine and implement appropriate, innovative, alternative logistics support practices, including best public sector and commercial practices and technology solutions. (See DoD Directive 5000.1 paragraphs E1.29 and E1.2.) The choice of alternative logistics support practices is based on the program manager's documented assessment that such actions can satisfy joint needs in a manner that is fully interoperable within DoD's operational and logistics systems, improve schedules, performance, or support; or reduce weapon system support costs. Regardless of the chosen support strategy, program managers, in collaboration with other key stakeholders, especially the warfighter, establish logistics support program goals for cost, customer support, and performance parameters over the program life cycle. Decisions are made to satisfy formal criteria, resulting in

systems that are interoperable and meet JCIDS and JCIDS-related performance capabilities needs.

LCL is a critical component in two of the program manager's key program management deliverables: the acquisition strategy, which includes the product support strategy; and the acquisition program baseline, which identifies program metrics.

Acquisition Strategy. As part of the acquisition strategy discussed in section 2.2, the program manager develops and documents a **Product Support Strategy** for life-cycle sustainment and continuous improvement of product affordability, reliability, and supportability, while sustaining readiness (see section 5.4.1.2.1). This effort ensures that system support and life-cycle affordability considerations are addressed and documented as an integral part of the program's overall acquisition strategy. The product support strategy defines the supportability planning, analyses, and trade-offs conducted to determine the optimum support concept for a materiel system and strategies for continuous affordability improvement throughout the product life cycle. The support strategy continues to evolve toward greater detail, so that by Milestone C, it contains sufficient detail to define how the program will address the fielding and support requirements that meet readiness and performance objectives, lower life cycle cost (LCC), reduce risks, reduce logistics footprint, and avoid harm to the environment and human health. The support strategy should address all applicable support requirements to include, but not be limited to, the following elements:

- Product Support (including software) (5.1.3.1);
- Interoperability (5.1.3.2);
- Data Management (DM) (5.1.3.3);
- Integrated Supply Chain Management (5.1.3.4);
- Life Cycle Cost Optimization (5.1.3.5);
- Logistics Footprint Minimization (5.1.3.6);
- Life Cycle Assessment (5.1.3.7);
- Demilitarization and Disposal (5.1.3.8);
- Environment, Safety, and Occupational Health (ESOH) (5.2.1.6 and 4.4.11); and
- Human Systems Integration (HSI) (5.2.1.6 and Chapter 6).

The Product Support Guide provides detailed information for developing product support strategies and related activities (see DUSD(LMR) Memorandum, November 2001, *Product Support Guide*).

Acquisition Program Baseline (APB). As discussed in section 2.1.1 of this Guidebook, the program manager and user prepare the APB at program initiation. Updates follow subsequent milestone reviews, program restructurings, and unrecoverable program deviations. The APB core is a transcription of the JCIDS' formal requirements for performance capability, schedules, and total program cost. The program manager can ensure effective consideration of life-cycle logistics factors by emphasizing supportability factors in the APB.

5.1.3.1. Product Support

Product support is a package of logistics support functions necessary to maintain the readiness, sustainment, and operational capability of the system.

The overall product support strategy, documented in the acquisition strategy, should include life-cycle support planning and address actions to assure sustainment and continually improve product affordability for programs in initial procurement, reprocurement, and post-production support.

Support concepts satisfy user specified requirements for sustaining support performance at the lowest possible life cycle cost for each evolutionary increment of capability to be delivered to the user, including:

- Availability of support to meet warfighter-specified levels of combat and peacetime performance.
- Logistics support that sustains both short and long-term readiness
- Minimal total life-cycle cost to own and operate (i.e., minimal total ownership cost).
- Maintenance concepts that optimize readiness while drawing upon both organic and industry sources.

Performance Based Logistics (PBL) is the preferred DoD approach to product support (see section 5.3), which serves to consolidate and integrate the support activities necessary to meet these objectives (see *Product Support Guide*).

5.1.3.2. Interoperability

Interoperability is a key LCL facilitator, which allows the program manager to take advantage of joint capabilities in designing and implementing a product support strategy. A modular open systems approach (MOSA) allows the logistician to apply risk mitigation analyses earlier in the system development process to reduce the required resources and overall life cycle costs. The life cycle logistician assists the program management team in the application of MOSA to provide interoperability, maintainability, and compatibility when developing the support strategy and follow-on logistics planning for sustainment. Materiel and operational interoperability for LCL should be considered throughout the systems engineering process.

In carrying out their product support responsibilities, the program manager should be mindful of the benefits of drawing support from other DoD Components and Allies. Acquisition cross-servicing agreements are a means of exploiting those potential benefits.

Acquisition Cross Servicing Agreements (ACSAs). Per DoD Instruction 5000.2, the program manager should be aware of and understand the legal authority for the acquisition and reciprocal transfer of logistic support, supplies, and services from eligible countries and international organizations. The program manager should explicitly consider the long-term potential of ACSAs in developing the support strategy. Further guidance on this subject is available in section 11.2.3 of this Guidebook.

5.1.3.3. Data Management (DM)

Under TLCSM, the Program manager is responsible for Data Management for the system throughout it's life cycle. Data Management is an important part of LCL. In that context, Data Management consists of the disciplined processes and systems that plan for, acquire and/or access, manage, and use data throughout the total system life cycle. Data Management in Systems Engineering is discussed in 4.2.3.7.

Data Management is defined as the process of applying policies, systems and procedures for identification and control of data requirements; for the timely and economical acquisition of such data; for assuring the adequacy of data; for the access, distribution or communication of the data to the point of use; and for analysis of data use. Data is defined as recorded information regardless of the form or method of recording. This section concentrates on technical, product, and logistics data in support of the development, production, operation, sustainment, improvement, demilitarization and disposal of a system. This includes both government and contractor created data.

The program manager should develop a long-term strategy that integrates data requirements across all functional disciplines to include logistics. A performance-based approach should be used to identify the minimal data required to cost-effectively operate, maintain and improve the fielded system and to foster source of support competition throughout the system life cycle. Data should be available in a format that is compatible with the intended user's environment and a quality assurance program should be implemented to guarantee the accuracy and completeness of the data.

In many cases, leaving Government acquired data in the physical possession of the contractor and having access to the contractor's data system is the ideal solution. In addition to data access, the requirement for Government use, reproduction, manipulation, altering or transfer of possession of data must be part of the data acquisition and management strategy. The contract must specify appropriate Government rights to the data acquired, in addition to requirements for delivery or access. Data, whenever it is delivered to the government, should be formatted in accordance with accepted data standards to ensure usability by the government. A list of data standard examples can be found in section 4.2.3.7, of this document. These decisions must be made early in the acquisition life cycle to avoid unexpected costs to procure, reformat and deliver data.

Whether the data is stored and managed by the government or by industry, the program manager is responsible for protecting system data. Policy applicable to data protection, marking, and release can be found in the following: DoD Directive 5230.24, *Distribution Statements on Technical Documents*; DoD Directive 5230.25, *Withholding of Unclassified Technical Data From Public Disclosure*; DoD 5400.7-R, *DoD Freedom of Information Act Program*; and Defense Federal Acquisition Regulations Supplement (DFARS) Part 252.227-7013 & 7014.

Industry standards, such as GEIA, ISO and ANSI, provide high level principles to guide integrated data management planning, and implementation. GEIA Standard, GEIA-859, *Data Management* is a guide that may be helpful for program managers and data managers. This standard and the emerging Handbook outline principles and processes for the management of data including data interoperability & longevity, best practices, and long term electronic storage, use, and recovery of data.

The Data Management strategy should be supported by an integrated data system that meets the needs of both the warfighter and the support community. Data systems supporting acquisition and sustainment should be connected, real-time or near real-time, to allow logisticians to address the overall effectiveness of the logistics process in contributing to weapon system availability and life cycle cost factors. Melding acquisition and sustainment data systems into a true total life cycle integrated data environment provides the capability needed to reduce

the logistics footprint and plan effectively for sustainment, while also insuring that acquisition planners have accurate information about total life cycle costs.

As discussed in Chapter 7, an integrated data management system:

- Facilitates technology insertion for affordability improvements during re-procurement and post-production support.
- Supports configuration management processes.
- Maintenance and sustainment analyses;
- Contract service risk assessments over the life of the system.

5.1.3.4. program managerIntegrated Supply Chain Management

DoD Components operate an integrated, synchronized, total-system, life-cycle logistics chain to meet user requirements for information and materiel. The objective is to promote user confidence in the logistics process by building a responsive, cost-effective capacity to ensure that warfighters get the materiel that they need, when they need it, with complete status information.

Under the Life-Cycle Logistics approach, the program manager is ultimately responsible for satisfying the user's request, regardless of who is executing the integrated logistics and supply chain action. The DoD logistics chain, however, emphasizes commodity management, rather than weapon system optimization, with multiple hand-offs through various links in the supply chain. As discussed in section 5.3 below, program managers can use a PBL strategy to address these limitations. Because PBL arrangements are weapon system-based, support is focused on the customer and conflicting commodity priorities are mitigated or eliminated. In summary, PBL enables the program manager to exploit supply chain processes and systems to provide flexible and timely materiel support response during crises and joint operations.

The program manager ensures that user support is based on collaborative planning, resulting in realistic performance expectations established through Performance Based Agreements (PBAs) (see 5.3.2). These agreements should be negotiated in conjunction with the product support integrator, support providers, and the service providers, e.g. distribution centers and transportation providers. PBA Templates and Guidance are available for use (see 5.5.5). Most of these supply chain activities are governed by DoD 4140.1-R, released 23 May 2003.

Although it is important in all aspects of LCL, integrated supply chain management places a premium on user collaboration.

User Collaboration. Implementation of the Life-Cycle Logistics approach, especially integrated supply chain management, requires program managers to collaborate with users, e.g. the force providers in conjunction with the Combatant Commands and the DoD Components of those commands, to determine optimal logistics strategies tailored to meet the users' needs and expectations, and produce a performance based agreement that codifies the negotiated user requirements and performance expectations (DoD Directive 5000.1). These agreements should be negotiated in conjunction with the product support integrator, support providers, and the service providers (e.g. distribution centers and transportation providers).

5.1.3.5. Life Cycle Cost Optimization

The program manager's overriding program objective is to maximize system effectiveness from the perspective of the warfighter. Given a resource-constrained environment; however,

trade-offs are inevitable among performance, availability, process efficiency, and cost. The program manager should think in both the short- and long-terms. Short-term pressures to achieve system performance and schedule imperatives are very real, and cannot be ignored. In any program there will always be financial constraints and unforeseen financial contingencies.

System long-term readiness and affordability are, however, equally important program elements to be maximized. Program success is also determined by executing the performance parameter threshold for "operational cost as a military requirement, with threshold values." (CJCS Instruction 3170.01) The focus should be taking a TLCSM approach to program resources and source selection weight decisions, as applied to operational cost effectiveness.

Defense system Life Cycle Cost is the total cost to the Government of acquisition and ownership of a system over its useful life. It includes the cost of development, acquisition, support, and disposal. LCC should be considered in all program decisions, especially in trade-offs affecting LCL. (See DoD Directive 5000.1, E1.4, E1.18, and E1.29.)

The program manager addresses these issues using the system operational effectiveness (SOE) model (5.2.2) – balancing consideration of performance, cost, schedule, system availability, and process efficiency components. A system that meets performance requirements but is not reliable, maintainable, and supportable is a liability to the warfighter. Ultimately, over the system life cycle, balancing this composite of long-term objectives will clearly provide greater benefit to the warfighter and to DoD.

Cost as an Independent Variable (CAIV). "Cost" is first treated as a formal military requirement via JCIDS cost-related performance parameters. Supportability-related cost performance criteria, such as O&S cost- per-operating-hour, should influence CAIV principles; as applied to program investment and prioritization intended to affect life cycle cost effectiveness and affordability. (See DoD Directive 5000.1 and this Guidebook section 3.2.4)

5.1.3.6. Logistics Footprint Minimization

In addition to minimizing costs, the program manager must also strive to minimize the logistical burden that a system will place on deployed forces. As stated in the QDR, an overarching DoD goal is to project and sustain the force with minimal logistics footprint. The 'footprint problem' is an engineering problem (see section 5.2.1.1), which is best addressed early in the life cycle. Program managers ensure that footprint metrics appropriate to the system and its operational environment are considered throughout the life cycle.

5.1.3.7. Life Cycle Assessment

While the greater part of the program manager responsibilities discussed above are first addressed in early, pre-deployment phases of the life cycle, TLCSM also requires the program manager to provide continuing support and assessment to deployed systems, and to manage the demilitarization and disposal of old systems.

The product support strategy addresses how the program manager and other responsible organizations will carry out ongoing assessment of the fielded system. Life cycle assessment identifies and properly addresses performance, readiness, ownership cost, and support issues. It includes both pre- and post-deployment evaluations to assess system performance and the support strategy, and to support technology insertion for continuous modernization and product affordability improvements. Life cycle assessment should be consistent with the written charter

of the program manager's authority, responsibilities, and accountability for accomplishing approved program objectives. Post-deployment evaluations are the primary means of providing program manager life cycle assessment.

Post Deployment Review. The program manager uses post-deployment reviews of the system, beginning at IOC, to verify whether the fielded system continues to meet or exceed thresholds and objectives for cost, performance, and support parameters approved at full-rate production. DoD policy requires that, "The Services shall conduct periodic assessments of system support strategies vis-à-vis actual vs. expected levels of performance and support. These reviews occur nominally every three to five years after IOC or when precipitated by changes in requirements/design or performance problems, and should include, at minimum:

- Product Support Integrator/Provider performance.
- Product improvements incorporated.
- Configuration control.
- Modification of performance based logistics agreements as needed based on changing war fighter requirements or system design changes." (USD(ATL) Memorandum, March 2003, TLCSM & PBL, p. 9)

Post-deployment reviews continue as operational support plans execute (including transition from organic to contract support and vice versa, if applicable), and should be regularly updated depending on the pace of technology. The program manager should use existing reporting systems and operational feedback to evaluate the fielded system whenever possible.

5.1.3.8. Demilitarization and Disposal

Given that the program manager is the total life cycle manager, it is important that program managers are aware, from the very beginning of a program, that they must consider and plan for the ultimate demilitarization and disposal of the system once it is no longer militarily useful.

The program manager considers materiel demilitarization and disposal during systems engineering (see 4.4.14). The program manager minimizes the Department of Defense's liability due to information and technology security, and ESOH issues. The program manager carefully considers the impacts of any hazardous material component requirements in the design stage to minimize their impact on the life cycle of the end item regarding item storage, packaging, handling, transportation, and disposition. The program manager coordinates with DoD Component logistics activities and DLA, as appropriate, to identify and apply applicable demilitarization requirements necessary to eliminate the functional or military capabilities of assets (DoD 4140.1-R and DoD 4160.21-M-1). The program manager coordinates with DLA to determine property disposal requirements for system equipment and by-products (DoD 4160.21-M). The Chief of Naval Operations N43 and NAVSEA/Supervisor of Shipbuilding act as managers for ship disposal and recycling.

5.2. LCL in Systems Engineering (SE)

PM Teams manage programs "through the application of a systems engineering approach that optimizes total system performance and minimizes total ownership costs" (DoD Directive 5000.1). Due to the nature of evolutionary acquisition and incremental/spiral development strategies, there is no longer a clear and definable line between design, development, deployment, and sustainment. Effective sustainment of weapons systems begins with the design

and development of reliable and maintainable systems through the continuous application of a robust systems engineering methodology that focuses on total system performance.

LCL should be considered early and iteratively in the design process, and life cycle supportability requirements are an integral part of the SE process, as discussed in section 4.4.9. A detailed discussion of the systems engineering process can be found in section 4.2 of this Guidebook. Also see Designing and Assessing Supportability in DoD Weapon Systems: A Guide to Increased Reliability and Reduced Logistics Footprint ('Supportability Guide'). Additional discussion of LCL activities by acquisition phase can be found in section 5.4 of this Guidebook.

Demonstration of assured supportability and life-cycle affordability should also be an entrance criterion for the Production and Deployment Phase. The specific requirements associated with integrating the support strategy into the system engineering process can be accomplished through IPPD.

This section first provides a list of LCL Considerations for systems engineering. Next it focuses on the achievement of affordable system operational effectiveness during Pre-Acquisition and Acquisition, including JCIDS analyses, design, Test and Evaluation, and Production (Design for Support). Finally, it briefly discusses LCL during Sustainment, to include Deployment, Operations, and Support (Support the Design).

5.2.1. LCL Considerations for Systems Engineering

The following are recommended considerations in managing LCL-related systems engineering activities, including JCIDS, design, test and evaluation, fielding, and sustainment.

5.2.1.1. Logistics Footprint Reduction

PM teams can best support evolving military strategy by providing US forces with the best possible system capabilities while minimizing the logistics footprint. PM teams are responsible for achieving program objectives throughout the life-cycle, from development through sustainment, while minimizing cost and logistics footprint (see DoD Directive 5000.1, E1.17 and E1.29). To minimize the logistics footprint, a deployed system must lessen the quantity of support resources required, including personnel, supplies, and support equipment. To achieve these goals, the supportability posture of weapon systems needs to be designed-in. The "footprint problem" is resolved through effective and early systems engineering – the opportunities for decreasing the logistics footprint decline significantly as the system evolves from design to production to deployment.

5.2.1.2. Condition Based Maintenance Plus (CBM+)

Program managers are required to "optimize operational readiness through affordable, integrated, embedded diagnostics and prognostics, … automatic identification technology; and iterative technology refreshment" (DoD Instruction 5000.2). It is also Department of Defense policy that Condition Based Maintenance (CBM) be "implemented to improve maintenance agility and responsiveness, increase operational availability, and reduce life cycle total ownership costs" (DUSD(LMR) Memorandum, November 2002, CBM+). The goal of CBM is to perform maintenance only upon evidence of need. CBM tenets include: designing systems that require minimum maintenance; need-driven maintenance; appropriate use of embedded diagnostics and prognostics through the application of RCM; improved maintenance analytical

and production technologies; automated maintenance information generation; trend based reliability and process improvements; integrated information systems providing logistics system response based on equipment maintenance condition; and smaller maintenance and logistics footprints. Condition Based Maintenance Plus (CBM+) expands on these basic concepts, encompassing other technologies, processes, and procedures that enable improved maintenance and logistics practices. CBM+ can be defined as a set of maintenance processes and capabilities derived, in large part, from real-time assessment of weapon system condition, obtained from embedded sensors and/or external tests and measurements. Ultimately, these practices can increase operational availability and readiness at a reduced cost throughout the weapon system life cycle.

Diagnostics: Applicable and effective on-board monitoring/recording devices and software, e.g. built-in test (BIT), that provide enhanced capability for fault detection and isolation, thus optimizing the time to repair. Emphasis must also be on accuracy and minimization of false alarms (DoD Instruction 5000.2).

Prognostics: Applicable and effective on-board monitoring/recording devices and software, e.g. BIT, that monitor various components and indicate out of range conditions, imminent failure probability, and similar proactive maintenance optimization actions (DoD Instruction 5000.2).

5.2.1.3. Serialized Item Management

Effective serialized item management programs provide accurate and timely item-related data that is easy to create and use, and their use is required (DoD Instruction 5000.2). Serialized item management is pursued to identify populations of select items (parts, components, and end items), to mark all items in the population with a universally Unique Item Identifier, to enable the generation, collection and analysis of maintenance data about each specific item. As a minimum, it is appropriate to consider selecting item populations from within the following categories:

- repairable items down to and including sub-component repairable unit level,
- life-limited, time-controlled, or items with records (e.g., logbooks, aeronautical equipment service records, etc.), and
- items that require technical directive tracking at the part number level.

For additional information and guidance, see DoD policy memorandum, September 4, 2002, *Serialized Item Management*.

Automatic Identification Technology. Automatic identification technology (AIT), also required, is considered an integral element of serialized item management programs and supporting supply and maintenance management information systems (DoD Instruction 5000.2). Items selected for serialized item management should be marked with AIT-compliant identification numbers. Item markings and accompanying AIT capabilities allow paperless identification, automatic data entry, and facilitate digital retrieval of maintenance-related information. For additional information and guidance, see DoD policy memorandum, July 29, 2003, Policy for Unique Identification (UID) of Tangible Items-New Equipment, Major Modifications, and Reprocurement of Equipment and Spares; and DoD policy memorandum, November 26, 2003, Update to Policy for Unique Identification (UID) of Tangible Items – New Equipment, Major Modifications, and Reprocurements of Equipment and Spares.

5.2.1.4. Configuration Management

Configuration Management (CM) is a process for establishing and maintaining the consistency of a product's physical and functional attributes with its design and operational information throughout its life. program managers are required to "base configuration management decisions on factors that best support implementing performance-based strategies throughout the product life cycle" (DoD Directive 5000.1). Integral to successful CM is the development of a CM plan. The program manager can find detailed guidance for documenting the CM plan in ANSI/EIA-649 *Configuration Management*.

The following are attributes of the Configuration Management Process:

A. Configuration Identification- uniquely identifying the functional and physical characteristics of an item

B. Configuration Change Management- controlling changes to a product using a systemic change process

C. Configuration Status Accounting- capturing and maintaining the configuration of an item throughout the lifecycle

D. Configuration Verification and Audit- ensuring product design is accurately documented and achieves agreed upon performance requirements.

The program manager should consider industry standards and best practices. Those standards are documented in the following:

- ANSI/EIA 649A, *Configuration Management,* located on the GEIA website http://www.geia.org/ click on STANDARDS
- ISO 10007, *Quality Management – Guidelines for configuration management*
- EIA 836, *Configuration Management Data Exchange and Interoperability,* located on the GEIA website http://www.geia.org/ click on STANDARDS
- HDBK 649, *Configuration Management* – (in development, expected 12/05)

Program managers establish and maintain a configuration control program, and are required to "base configuration management decisions on factors that best support implementing performance-based strategies throughout the product life cycle" (DoD Directive 5000.1). The approach and activity that has responsibility for maintaining configuration control will depend on a number of program specific factors such as design rights, design responsibility, support concept, and associated costs and risk. Nominally the government maintains configuration control of the system design specification and the contractor(s) performs configuration management for the design. As such the Government retains the authority/responsibility for approving any design changes that impact the system's ability to meet specification requirements. The contractor(s) has the authority/responsibility to manage other design changes. The Government maintains the right to access configuration data at any level required to implement planned or potential design changes and support options. Configuration management of legacy systems should be addressed on a case by case basis as design changes are contemplated. (see also 4.2.3.6, EIA-649, and MIL HDBK 61A)

5.2.1.5. Continuous Technology Refreshment and Obsolescence

The program manager engineers the system architecture and establishes a rigorous change management process for life cycle support. Systems that integrate multiple commercial items can require extensive engineering to facilitate the insertion of planned new commercial technology. This is not a "one time" activity because unanticipated changes may drive reconsideration of engineering decisions throughout the life of the program.

Successful parts management addresses diminishing manufacturing sources and material shortages (DMSMS) in the proposal, design, and maintenance phases of a product – that is, throughout the product's life cycle. For further discussion see the *Supportability Guide*.

As discussed in section 5.3, PBL support arrangements give significant latitude to the Product Support Integrator (PSI) to manage technology refreshment. PSIs have responsibility for performance outcomes and are incentivized to maintain currency with state-of-the-art technology, maximize the use of COTS-NDI, and generally use readily available items to avoid the high cost of DMSMS over the life of the system.

5.2.1.6. Other LCL Related Considerations

Risk Management. The acquisition strategy addresses risk management, which should include LCL related risk.

Interoperability and Joint Architecture. Interoperability, which is required (DoD Directive 5000.1), is also important to LCL considerations such as supportability, maintainability, and footprint. For further discussion of interoperability see 5.1.3.2, 4.4.2, and Chapter 7.

Interoperability and Business Enterprise Architecture. The Business Enterprise Architecture for Logistics (BEA-Log) exists in the context of DoD's Business Enterprise Architecture (BEA) (DoD Directive 5000.1). For further information see http://www.bea-log.com.

Human Systems Integration. The program manager pursues HSI initiatives to optimize total system performance and minimize TOC. For further discussion see Chapter 6.

Environment, Safety and Occupational Health (ESOH). A support program, as defined in DoD Instruction 5000.2, includes ESOH (to include explosives safety), which must be addressed throughout the acquisition process (DoD Directive 5000.1). As part of the program's overall cost, schedule, and performance risk reduction, the program manager shall prevent ESOH hazards, where possible, and shall manage ESOH hazards where they cannot be avoided. (See also section 4.4.11)

A program manager's best means of insuring a system will meet its LCL goals and satisfy user supportability needs is to insure that these LCL considerations are infused in all phases of the program's life cycle. It is especially important that LCL considerations are included in Pre-Acquisition and Acquisition activities, including the Joint Capabilities Integration and Development System process and Test and Evaluation. (LCL related activities become prominent as a program moves into Production and Deployment, and Sustainment.

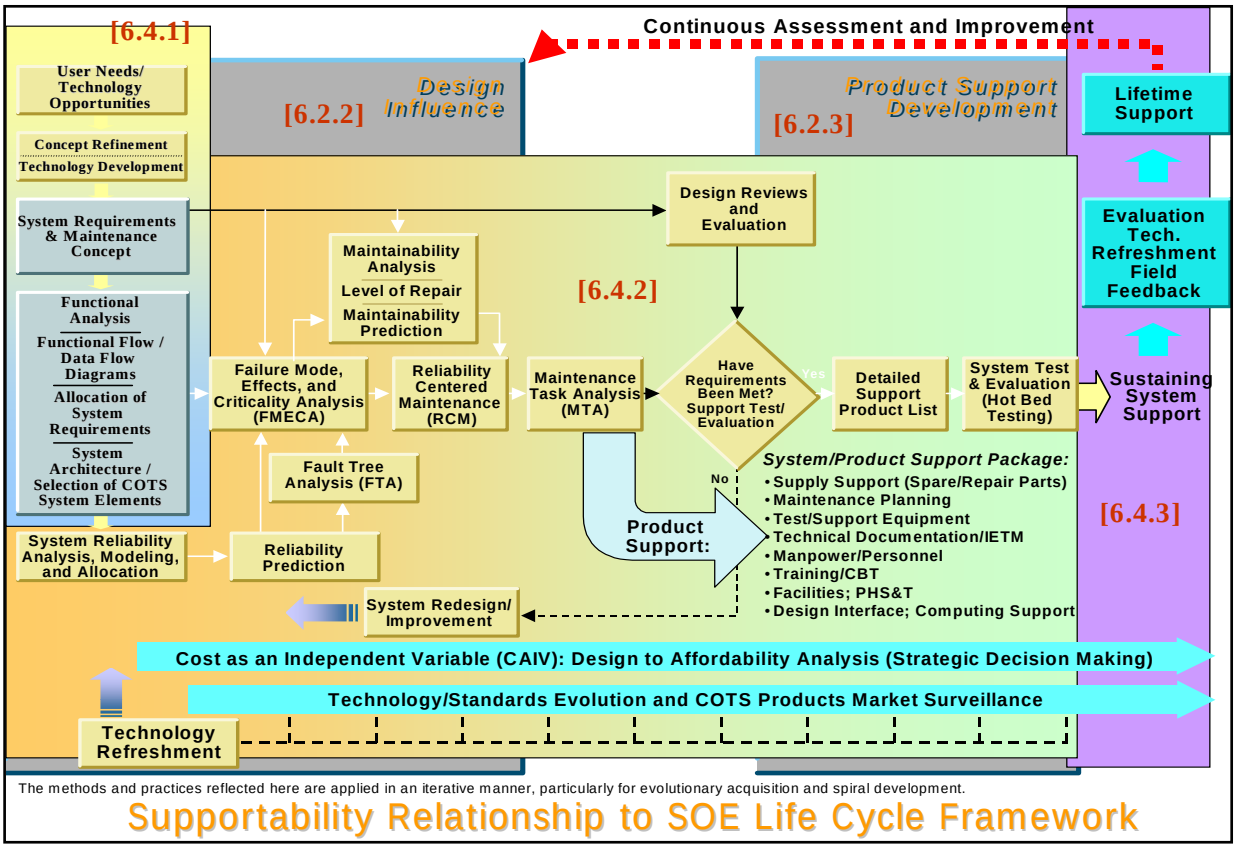

Figure 2. Supportability Relationships

5.2.2. Pre-Acquisition and Acquisition (Design for Support)

As discussed in section 4.4.9 and in the Supportability Guide, designing for optimal System Operational Effectiveness (SOE) requires balance between System Effectiveness and Life Cycle Cost. The emphasis is not only on the reliability and maintainability of the prime mission system or equipment to execute mission capability, but also on human factors engineering along with the cost-effective responsiveness and relevance of the support system and infrastructure. The key here is to smoothly integrate the DoD 5000 Defense Acquisition Management Framework (including its defined phases and milestones), together with the systems engineering and design maturation processes.

SOE is the composite of performance, availability, process efficiency, and total ownership cost. The objectives of the SOE concept can best be achieved through influencing early design and architecture, and through focusing on the supportability outputs. Reliability, reduced logistics footprint, and reduced system life cycle cost are most effectively achieved through inclusion from the very beginning of a program – starting with the definition of required capabilities. This process is depicted in Figure 2.

As Figure 2 illustrates, reliability, maintainability and supportability methods, practices, and processes must be integrated throughout the systems engineering process to facilitate the supportability assessment of a design, from conception through deployment and sustainment. As such, the concept of operations must be defined to provide the basis for defining both the top-level system requirements and capabilities, and the initial definition of the system maintenance and support concept. Formulating the system architecture and performing all associated trade studies with attention to system maintenance ensures a balanced and symbiotic relationship between the system and the associated support system.

Implementation of this disciplined approach, including systems engineering activities such as Failure Mode Effects and Criticality Analysis (FMECA), Fault Tree Analysis (FTA), and Reliability Centered Maintenance (RCM), will produce a Maintenance Task Analysis (MTA) directly linked to the system's Reliability Maintainability and Supportability (RMS). The technical input and MTA process identifies support tasks, which are then assessed for affordability and supportability. This in turn produces a Total System Product Support Package that identifies support requirements based upon the inherent reliability and maintainability of the system. This Total System Product Support Package provides detailed descriptions of the:

- Supply Support (Spare/Repair Parts)
- Maintenance Planning
- Test/Support Equipment
- Technical Documentation/Interactive Electronic Technical Manuals
- Manpower & Training/Computer Based Training
- Facilities
- Packaging Handling Storage & Transportation
- Design Interface/Computing Support

Continuous assessment of in-service system performance will identify needs for system improvements to enhance reliability, obsolescence, corrosion, or other LCL attributes.

The colored boxes in Figure 2 correspond to the phases of the Defense Acquisition Management Framework (Figure 27) and link to the appropriate discussion in section below: yellow/blue = Concept Refinement and Technology Development (Pre-Acquisition), tan/green = Systems Development and Demonstration (Acquisition), and Production and Deployment, and purple = Operations and Support (Sustainment). The gray box on the left links to Pre-Acquisition and Acquisition (Design for Support). The gray box on the right links to Sustainment (Support the Design). It is important to note, however, that these processes are typically iterative and overlapping – thus the boxes overlap. They are not necessarily carried out in a linear progression. Under evolutionary acquisition and incremental/spiral development, systems engineering and life-cycle logistics processes will often be repeated in progressive loops throughout the program life cycle.

Designing for optimal SOE provides balance. The emphasis is not only on the reliability and maintainability of the prime mission system or equipment to execute mission capability ('Design for Support'), but also on the cost-effective responsiveness and relevance of the support system and infrastructure ('Support the Design').

Achieving Affordable System Operational Effectiveness (SOE). The concept of SOE explains the dependency and interplay between system performance, availability (reliability, maintainability, and supportability), process efficiency (system operations, maintenance, and logistics support), and system life cycle cost. (See the Supportability Guide, Section 2.1.) This overarching perspective provides a context for the "trade space" available to a program manager along with the articulation of the overall objective of maximizing the operational effectiveness of weapon systems. SOE requires proactive, coordinated involvement of organizations and individuals from the requirements, acquisition, logistics, and user communities, along with industry. This applies equally to new weapon systems as well as to major modifications and opportunistic upgrading of existing, fielded systems. In all cases, full stakeholder participation is required in activities related to 'designing for support,' 'designing the support,' and 'supporting the design.' These factors and relationships are depicted in Figure 3:

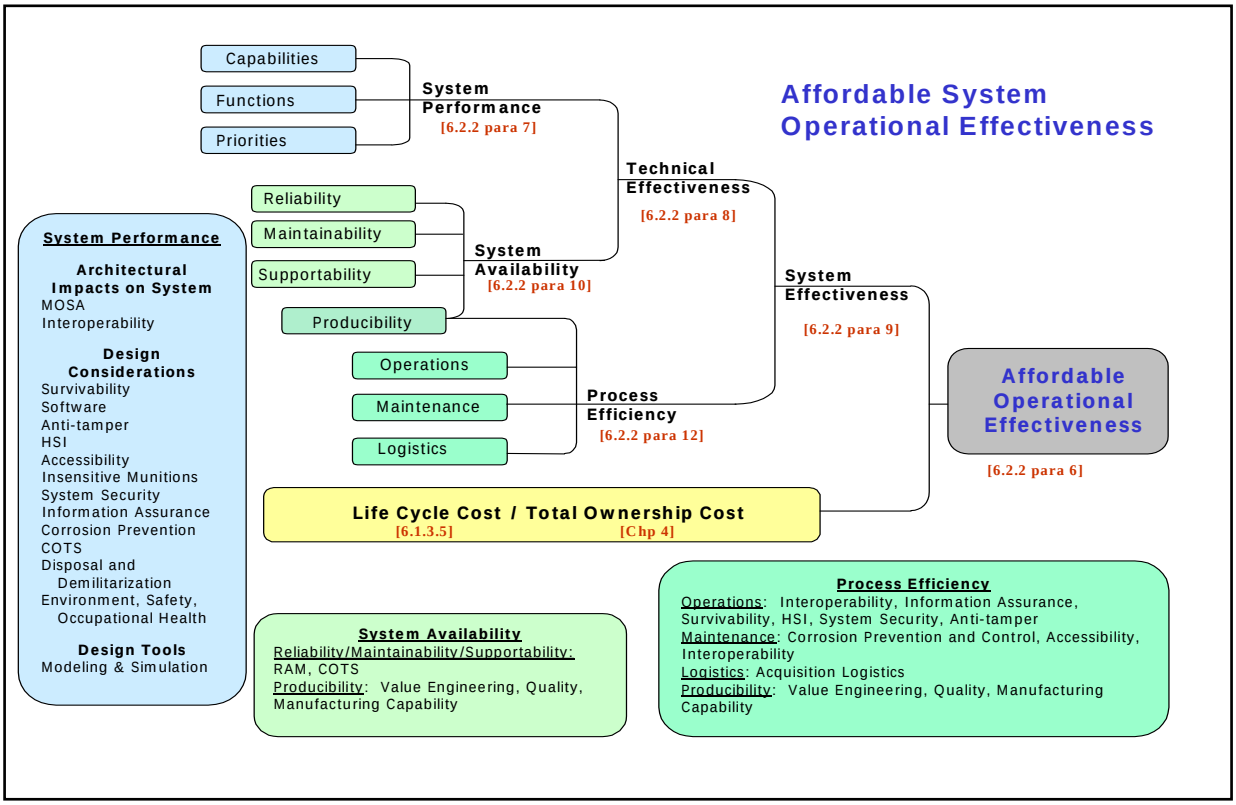

Figure 3. Affordable System Operational Effectiveness

System Performance. System performance is realized through designed-in system ***capabilities*** and ***functions***. In this context, the term ***capabilities*** refers to the various desired performance attributes and measures of the system, such as maximum speed, range, altitude, or weapons delivery accuracy. The term ***functions*** refers to the desired mission capabilities and mission scenarios that the system must be capable of executing in an operational environment. (See the Supportability Guide, section 2.2.1)

Technical Effectiveness. Technical effectiveness reflects the inherent balance between system performance and system availability. These two aspects of the system must be designed-

in synergistically and with full knowledge of the expected system missions in the context of a proposed system maintenance concept. (See the Supportability Guide, section 2.2.4)

System Effectiveness. System effectiveness reflects the balance achieved between the technical effectiveness and the process efficiency of the system. In this context, process efficiency is constituted by the system operational, maintenance, and logistics processes. System effectiveness reflects a holistic view of the real mission capability delivered to the field. (See the Supportability Guide, section 2.2.5)

System Availability. The components of system availability are defined to include: reliability, maintainability, supportability (RMS) (see section 4.4.8), and producibility, defined as follows:

- Reliability: The ability of a system to perform as designed in an operational environment over time without failure.
- Maintainability: The ability of a system to be repaired and restored to service when maintenance is conducted by personnel using specified skill levels and prescribed procedures and resources.
- Supportability: The inherent quality of a system - including design, technical support data, and maintenance procedures - to facilitate detection, isolation, and timely repair/replacement of system anomalies. This includes factors such as diagnostics, prognostics, real-time maintenance data collection, 'design for support' and 'support the design' aspects, corrosion protection and mitigation, reduced logistics footprint, and other factors that contribute to an optimum environment for developing and sustaining a stable, operational system (see section 4.4.9). Supportability also includes the degree to which a system's design and planned logistics resources support its readiness requirements and wartime utilization. Unlike reliability or maintainability, supportability includes activities and resources (such as fuel) that are necessary for system operation. It also includes all resources that contribute to the overall support cost (e.g. personnel, equipment, technical data, etc.).
- Producibility: The degree to which the design of the system facilitates the timely, affordable, and optimum-quality manufacture, assembly, and delivery of the system to the customer. Producibility is closely linked to other elements of availability and to costs. Items that feature design for producibility are also normally easier to maintain and have lower life cycle costs. (See section 4.4.6.1.)

Reliability-Centered Maintenance (RCM). RCM is an analytical process, first and foremost, to reduce life cycle cost and is also used to determine preventive maintenance tasks as well as provide recommendations for other actions necessary to maintain a required level of safety, maximize equipment availability, and minimize operating cost. SAE JA1011 (Evaluation Criteria for RCM Programs) and SAE JA1012 (A Guide to the RCM Standard) are illustrative commercial standards for this method. (Supportability Guide)

Process Efficiency. Process Efficiency reflects how well the system can be produced, operated and maintained, and to what degree the logistics infrastructure and footprint have been reduced to provide an agile, deployable, and operationally effective system. Achieving process efficiency requires early and continuing emphasis on producibility, maintenance, and the various elements of logistics support. (See the Supportability Guide, Section 2.2.3)

5.2.3. Sustainment (Support the Design)

The program manager should apply the systems engineering processes for designing and assessing supportability not only during acquisition, but throughout the entire life cycle. These processes should be applied for all modifications including configuration changes resulting from evolutionary acquisition and spiral development. Supportability assessments, coordinated with systems engineering, may identify redesign opportunities for fielded systems that would enhance weapon system operational effectiveness. These assessments can also identify sub-optimal performers in the fielded product support system, which can be corrected through rebalanced logistics elements or changes to the maintenance program. Designing-in and subsequent continuing assessment of supportability throughout the life cycle is essential to maintaining the effectiveness of fielded systems, and are responsibilities of the program manager.

While acquisition phase activities are critical to designing and implementing a successful and affordable sustainment strategy, the ultimate measure of success is application of that strategy after the system has been deployed for operational use. Warfighters require operational readiness and operational effectiveness – systems accomplishing their missions in accordance with their design parameters in a mission environment. Systems, regardless of the application of design for supportability, suffer varying stresses during actual operational deployment and use.

Accordingly, the DoD Components conduct periodic assessments of system support strategies vis-à-vis actual vs. expected levels of performance and support. Modification of PBL agreements are made as needed, based on changing warfighter requirements or system design changes. When assessing and revising agreements and support strategies, the process should encompass all previous configuration/block increments, and also include elements of SDD phase activities, with an emphasis on not only 'adding on' new support as required, but also on addressing the support strategy in total across the entire platform and range of deployed configurations. This task requires close coordination with appropriate systems engineering IPTs.

5.3. Performance-Based Logistics (PBL)

Performance-Based Logistics (PBL) is DoD's preferred approach for product support implementation (DoD Directive 5000.1). As noted in section 5.1, program managers should establish a PBL approach in fulfilling their product support, integrated supply chain management, and other LCL responsibilities. PBL utilizes a performance-based acquisition strategy that is developed, refined, and implemented during the systems engineering process. PBL can help program managers optimize performance and cost objectives through the strategic implementation of varying degrees of Government-Industry partnerships. (See also Implementing a Performance-Based Business Environment.)

This section discusses PBL and presents a basic methodology for implementing PBL . It then provides detailed discussion of key aspects of PBL: Performance Based Agreements, and Source of Support, which includes Maintenance, Supply, Transportation, and a brief note regarding contractor logistics support.

PBL is the purchase of support as an integrated, affordable, performance package designed to optimize system readiness and meet performance goals for a weapon system through long-term support arrangements with clear lines of authority and responsibility. Additional guidance to help program managers apply PBL is contained in the Product Support Guide, Chapter 1.

The essence of PBL is buying performance outcomes, not the individual parts and repair actions. This is accomplished through a business relationship that is structured to meet the warfighter's requirements. PBL support strategies integrate responsibility for system support in the Product Support Integrator, who manages all sources of support. Source of support decisions for PBL do not favor either organic or commercial providers. The decision is based upon a best-value determination, evidenced through a business case analysis (BCA), of the provider's product support capability to meet set performance objectives. This major shift from the traditional approach to product support emphasizes what level of support program manager teams buy, not who they buy from. Instead of buying set levels of spares, repairs, tools, and data, the new focus is on buying a predetermined level of availability to meet the warfighter's objectives.

One of the most significant aspects of PBL is the concept of a negotiated agreement between the major stakeholders (e.g. the program manager, the force provider(s), and the support provider(s)) that formally documents the performance and support expectations, and commensurate resources, to achieve the desired PBL outcomes. Per DoD Instruction 5000.2, "The PM shall work with the users to document performance and support requirements in performance agreements specifying objective outcomes, measures, resource commitments, and stakeholder responsibilities." The term 'performance agreements,' as cited in DoD 5000-series policy, is an overarching term suitable for policy guidance. In actual PBL implementation guidance, the more specific term 'performance based agreements' is used to ensure clarity and consistency. Additional discussion of PBAs can be found in section 5.3.2, and in DUSD(LMR) Memorandum, March 2003, Implementing the Future Logistics Enterprise End-to-End Customer Support.

Tailoring. It is important to note that each PBL arrangement is unique and will vary from other PBL arrangements. A PBL arrangement may take many forms. There is no one-size-fits-all approach to PBL.

Earned Value Management (EVM). EVM is a valuable program management tool that can be extremely useful in PBL implementation. Please see 11.3.1 for a detailed discussion of EVM.

The Force Provider / PM / Support Provider relationship and PBA linkages are depicted in Figure 26, Performance Based Agreements (PBA).

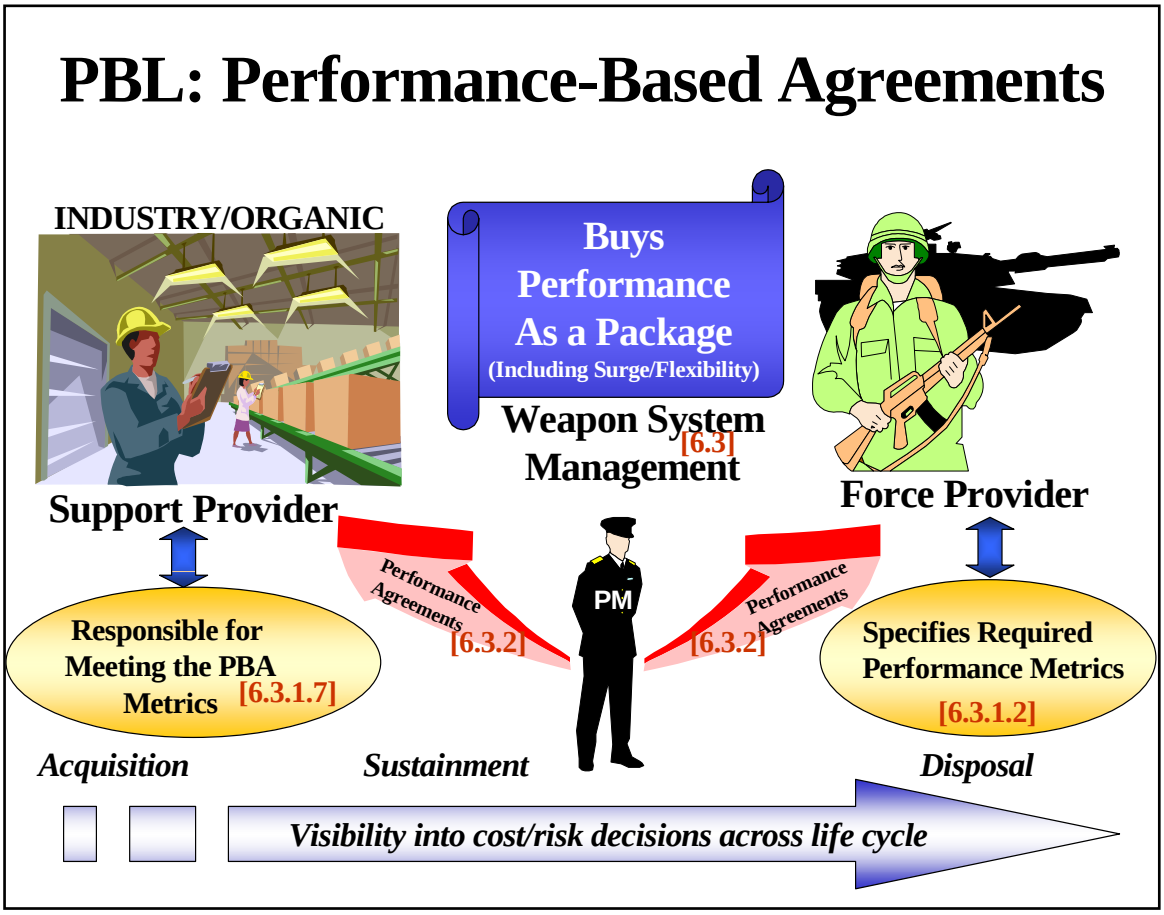

Figure 4. Performance Based Agreements (PBA)

The following are considerations for the program manager in implementing performance based logistics and developing performance based agreements.

5.3.1. Methodology for Implementing PBL

The PBL methodology, which is further detailed in the *Product Support Guide*, is an eight step process that can be applied to new, modified, or legacy systems:

1. Establish the PBL team. (5.3.1.1)
2. Determine warfighter requirements. (5.3.1.2)
3. Perform Business Case Analysis (BCA). (5.3.1.3)
4. Develop PBL strategy. (5.3.1.4)
5. Formalize warfighter performance agreement. (5.3.1.5)
6. Develop program baseline (performance and cost). (5.3.1.6)
7. Develop written agreement to implement strategy and monitor performance. (5.3.1.7)

8. Establish product support integrator. (5.3.1.8)

Developing the PBL strategy, formalizing the warfighter performance agreement, and establishing the product support integrator are key components of the product support strategy and should be documented in the acquisition strategy.

5.3.1.1. Establish the PBL Team

The program manager should establish a team to develop and manage the implementation of a PBL weapon system strategy. The team may consist of government and private-sector functional experts; however, it is important that they are able to work across organizational boundaries. Establishing the team is a cultural change, as it will sometimes be difficult to find people who are comfortable sharing information and working outside of functional, stove piped organizations. Team-building within PBL is similar to traditional integrated logistics support management, except the focus on individual support elements is diminished and replaced by a system orientation focused on performance outcome.

Integrating Across Traditional Stovepipe Organizational Boundaries. A team could include representatives from a component command headquarters and logistics representatives from supply, maintenance, and transportation staffs. It could also include representatives from operational commands, engineering, technical, procurement, comptroller, information technology organizations, and contract support. After the team is organized, the members establish their goals, develop plans of action and milestones, and obtain adequate resources.

Establishing the Public/Private Support Strategy IPT(s). These IPTs will ensure consideration, throughout support strategy design and development, of all factors and criteria necessary to achieve an optimum PBL strategy that utilizes the best capabilities of the public and private sectors in a cost effective manner.

5.3.1.2. Determine Warfighter Requirements

Understanding warfighter desires in terms of performance is essential to developing a meaningful support strategy. The program manager consults with the operational commands and organizations that support the warfighting combatant commanders. The operational commands are generally the weapon system customers. The performance requirements will be translated into performance and support metrics that will (a) be documented in Performance Based Agreements (PBAs), and (b) serve as the primary measures of support provider performance.

Understanding warfighter requirements is not a one-time event. As scenarios change and the operational environment evolves, performance requirements may change. Thus, understanding the requirements is a continual management process for the program manager.

5.3.1.3. Perform Business Case Analysis (BCA)

A business case provides a best value analysis, considering not only cost, but other quantifiable and non-quantifiable factors, supporting an investment decision. To effectively provide this justification it is critical that the process, scope, and objectives of the business case developers be clearly understood and communicated. A business case should be developed in an unbiased manner without prejudice, and not be constructed to justify a pre-ordained decision. The analysis should stand on its own and be able to withstand rigorous analysis and review by independent audit agencies. It is expected that the business case will be used throughout the life cycle of the project. Specifically:

- This business case is used in the initial decision to invest in a project.
- It specifically guides the decision to select among alternative approaches.
- The business case also is used to validate any proposed scope, schedule, or budget changes during the course of the project. The business case should be a living document – as project or organization changes occur they should be reflected in updates to the business case.

Finally, the business case should be used to validate that planned benefits are realized at the completion of the project. This information should be used in further decisions to sustain or enhance the solution. This information should also be used to refine estimation of benefits and costs for future projects in the organization.

A BCA is an expanded cost/benefit analysis with the intent of determining a best value solution for product support. Alternatives weigh total cost against total benefits to arrive at the optimum solution. The BCA process goes beyond cost/benefit or traditional economic analyses by linking each alternative to how it fulfills strategic objectives of the program; how it complies with product support performance measures; and the resulting impact on stakeholders. A BCA is a tailored process driven by the dynamics of the pending investment (PBL) decision. It independently, and without prejudice, identifies which alternative provides optimum mission performance given cost and other constraints, including qualitative or subjective factors. Development of PBL BCA should determine:

- The relative cost vs. benefits of different support strategies.
- The methods and rationale used to quantify benefits and costs.
- The impact and value of Performance/Cost/Schedule/Sustainment tradeoffs.
- Data required to support and justify the PBL strategy.
- Sensitivity of the data to change.
- Analysis and classification of risks
- A recommendation and summary plan of implementation for proceeding with the best value alternative.

BCA becomes an iterative process, conducted and updated as needed throughout the life cycle as program plans evolve and react to changes in the business and mission environment. For further discussion of PBL BCAs see USD(ATL) Memorandum, January 2004, Performance Based Logistics Business Case Analysis and USD(ATL) Memorandum, March 2004, System Planning Guidance PBL BCA.

5.3.1.4. Develop PBL Strategy

A PBL strategy focuses weapon system support on identified warfighter required performance outcomes, rather than on discrete transactional logistics functions. It must balance two major objectives throughout the life cycle of the weapon system: the requirement for logistics support must be minimized through technology insertion and refreshment, and the cost-effectiveness of logistics products and services must be continually improved. Careful balancing of investments in logistics and technology to leverage technological advances through the insertion of mature technology is critical. The program manager must insure that the PBL strategy addresses warfighter requirements during peacetime, contingency operations, and war.

The support strategy also addresses how the program manager and other responsible organizations will life cycle assessment of the fielded system. Life cycle assessment identifies and properly addresses performance, readiness, ownership cost, and support issues, and includes post-deployment evaluation to support planning for ensuring sustainment and implementing technology insertion, to continually improve product affordability.

The development of a PBL strategy is a lengthy, complex process, led by the program manager, involving a multitude of stakeholders. No two weapons system PBL strategies are exactly the same – each must be tailored to the unique requirements of the weapon system considering, at minimum, the factors and criteria listed below:

- Statutory requirements: Title 10 U.S.C. (Core, 50/50, public/private partnering, and others).
- Regulatory requirements: DoD Component policy (Contractors on the Battlefield, Service performance of organizational level support functions).
- Sources of support: Completion of the Depot Source of Repair (DSOR) process, market research, optimizing the best mix of public and private capabilities.
- Determining performance outcomes: Ensuring that warfighter performance requirements are commensurate with the available financial resources, ensuring flexibility in Performance Based Agreements to accommodate shifting financial priorities.

5.3.1.5. Formalize Warfighter Performance Agreement

Warfighter performance based agreements provide the objectives that form the basis of the PBL effort. Generally, a focus on a few performance based outcome metrics – such as weapon system availability, mission reliability, logistics footprint, and overall system readiness levels – will lead to more effective solutions. However, in developing the actual PBL support arrangements, it may not be possible to directly state the warfighter performance objectives as support metrics, due to lack of support provider control of all support activities necessary to produce the warfighter performance (e.g. availability). Most DoD Component logistics policies and/or guidance mandate a preference for DoD Component-performed organizational level maintenance and retail supply functions.

A support provider in a PBL arrangement cannot be held accountable for functions they do not directly perform or manage. Accordingly, the program manager may select the next echelon of metrics for which the support provider can be held accountable, and which most directly contribute to the warfighter performance metrics. The use of properly incentivized ranges of performance to define metrics can provide flexibility and is recommended. Many existing logistics and financial metrics can be related to top-level warfighter performance outcomes. These include, but are not limited to, not mission capable supply (NMCS), ratio of supply chain costs to sales, maintenance repair turnaround time, depot cycle time, and negotiated time definite delivery. In structuring the metrics and evaluating performance, it is important to clearly delineate any factors that could affect performance but are outside the control of the PBL providers.

While objective metrics form the bulk of the evaluation of a PBL provider's performance, some elements of product support requirements might be more appropriately evaluated subjectively by the warfighter and the program manager team. This approach allows some

flexibility for adjusting to potential support contingencies. For example, there may be different customer priorities to be balanced with overall objective measures of performance.

5.3.1.6. Develop Program Baseline (Performance and Cost)

To develop an effective support strategy, program managers identify the difference between existing and desired performance requirements. Accordingly, the program manager identifies and documents the current performance and cost baseline. The life cycle stage of a program determines the scope of a baselining effort. For new programs with no existing logistics structure, the baseline includes an examination of the cost to support the replaced systems. For new systems, the business model for supporting the product demonstrates its risks and benefits as part of the systems engineering process. This "proof of concept" for the support solution is part of the System Development and Demonstration phase. Once identified, the baseline can be used to assess the necessary establishment of, or revisions to, the support concept necessary to achieve the desired level of support.

5.3.1.7. Develop Written Agreement to Implement Strategy and Monitor Performance

A key logistics criterion for consideration in developing a product support strategy is documentation of a completed, approved, and funded product support/sustainment agreement. A documented performance-based agreement between the program manager, product support integrator, and force provider, that defines the system operational requirements (e.g. readiness, availability, response times, etc.), is essential. The program manager and product support provider(s) will define and include the required support metrics necessary to meet the system performance requirements (DoD Directive 5000.1). Support providers may be public, private, or a mix to include public-private partnerships. Examples of public support providers include DoD Component maintenance depots, DoD Component and Defense Logistics Agency (DLA) inventory control points, and DLA distribution depots.

As stated in DoD Directive 5000.1, "PMs shall develop and implement performance-based logistics strategies that optimize total system availability while minimizing cost and logistics footprint. Sustainment strategies shall include the best use of public and private sector capabilities through government/industry partnering initiatives, in accordance with statutory requirements." The product support strategy is included in the acquisition strategy.

5.3.1.8. Product Support Integrator Functions and Responsibilities

Within the PBL/PBA concept, the program manager selects a product support integrator from DoD or the private sector. Activities coordinated by support integrators can include, as appropriate, functions provided by organic organizations, private sector providers, or a partnership between organic and private sector providers. The program manager ensures that the product support concept is integrated with other logistics support and combat support functions to provide agile and robust combat capability. The program manager invites DoD Component and Defense Logistics Agency (DLA) logistics activities to participate in product support strategy development and integrated product teams (IPTs). These participants help to ensure effective integration of system-oriented approaches with commodity-oriented approaches (common support approaches), optimize support to users, and maximize total logistics system value.

As with the PBL strategy and the agreement with the warfighter, the product support integration function is a key component of the product support strategy documented in the

acquisition strategy. While product support execution is accomplished by numerous organizational entities, the product support integrator is the single point of accountability for integrating all sources of support necessary to meet the agreed to support/performance metrics. The most likely candidates for the integrator role include:

- The system's original equipment manufacturer or prime contractor.
- A DoD Component product or logistics command.
- A third-party logistics integrator from the private sector.
- The program manager's own logistics organization.

Further information can be found in the *Product Support Guide*.

5.3.2. Performance Based Agreements

Performance Based Agreements are one of the key components of an effective product support strategy. (See DoD Directive 5000.1 and DoD Instruction 5000.2.) They establish the negotiated baseline of performance, and corresponding support necessary to achieve that performance, whether provided by commercial or organic support providers. The Program Manager, utilizing the desired performance of the warfighter, negotiates the required level of support to achieve the desired performance at a cost consistent with available support funding. Once the performance, support, and cost are accepted by the stakeholders, the program manager enters into performance-based agreements with users, which specify the level of operational support and performance required by the users. Likewise, program managers enter into performance-based agreements with organic sources and contracts with commercial sources, which focus on supporting the users in terms of cost, schedule, performance, sustainment, and disposal. To coordinate the work and business relationships necessary to satisfy the user agreement, program managers select a product support integrator from the government or private sector, who serves as a single point of accountability to integrate support from all sources to achieve the performance outcomes specified in the performance-based agreement. The agreements maintain flexibility, to facilitate execution year funding and/or priority revisions. PBAs also reflect a range of support levels to facilitate revisions in support requirements without preparing new performance based agreements.

5.3.2.1. Performance Based Contracts

For support provided by commercial organizations, the contract is, in most cases, the performance-based agreement. Accordingly, the contract contains the agreed to performance and/or support metrics that have been identified as meeting the requirements of the warfighter. In most cases, the ultimate performance requirements (e.g., Availability) may be precluded as contract metrics because the contractor may not have full control or authority over all of the support functions that produce system availability – some support functions may continue to be performed by organic organizations or other support providers. Accordingly, the contract metrics reflect the highest level of metric(s) that are the most critical in producing the desired performance outcome(s). In order to motivate the contractor to achieve the desired metrics, appropriate contract incentives include award fee, award term, and cost sharing, which promote and facilitate contractor performance.

5.3.2.2. Agreements with Organic Providers and Users

For support provided by organic organizations, a performance-based agreement, similar in structure to a Memorandum of Agreement, Memorandum of Understanding, or Service Level Agreement may be used in lieu of a contract to represent and document the terms of the performance based agreement for organic support. One important distinction, however, between PBAs and other non-PBA type MOAs/MOUs is that PBAs contain the agreed to performance and/or support metrics that have been identified as meeting the warfighter requirements, and to which the warfighter has agreed to commit funding. The intent of agreements with organic support providers is to formally document the agreed to level of support, and associated funding, required to meet performance requirements. Organic providers, like commercial providers, will have a set of performance metrics that will be monitored, assessed, incentivized, and focused on the target weapon system. The PBA metrics reflect the highest level of metric(s) that are the most critical in producing the desired performance outcome(s).

5.3.3. Source of Support

The program manager should use the most effective source of support that optimizes the balance of performance and life cycle cost, consistent with required military capability and statutory requirements. The source of support may be organic or commercial, but its primary focus should be to optimize customer support and achieve maximum weapon system availability at the lowest LCC. Consistent with DoD Instruction 5000.2, in advance of contracting for operational support services, the program manager shall work with the manpower community to determine the most efficient and cost effective mix of DoD manpower and contract support. Source of support decisions should foster competition throughout the life of the system.

5.3.3.1. Maintenance Source of Support

10 U.S.C. 2464 and DoD policy require organic core maintenance capabilities. Such capabilities provide effective and timely response to surge demands, ensure competitive capabilities, and sustain institutional expertise. Best value over the life cycle of the system and use of existing contractor capabilities, particularly while the system is in production, should be considered key determinants in the overall decision process. The program manager provides for long-term access to the data required for competitive sourcing of systems support and maintenance throughout its life cycle. For additional information and guidance, see DoD Directive 4151.18.

The program manager shall ensure that maintenance source of support selection complies with statutory requirements identified in DoD Instruction 5000.2, Core Logistics Analysis/Source of Repair Analysis.

Core Logistics Capability. 10 U.S.C. 2464 requires core logistics capability that is Government-owned and Government operated (including Government personnel and Government-owned and Government-operated equipment and facilities) to ensure a ready and controlled source of technical competence and resources necessary to ensure effective and timely response to mobilization, national defense contingency situations, or other emergency requirements. These capabilities must be established no later than 4 years after achieving IOC (10 U.S.C. 2464). These capabilities will include those necessary to maintain and repair weapon systems and other military equipment that are identified as necessary to enable the armed forces to fulfill the strategic and contingency plans prepared by the Chairman of the Joint Chiefs of Staff. Excluded are special access programs, nuclear aircraft carriers, and commercial items. Sufficient workload will be provided to maintain these core capabilities and ensure cost

efficiency and technical competence in peacetime while preserving surge capacity and reconstitution capabilities necessary to fully support strategic and contingency plans. The program manager ensures that maintenance source of support decisions comply with this statutory requirement.

Depot Maintenance 50 Percent Limitation Requirement. 10 U.S.C. 2466 requires not more than 50 percent of the funds made available in a fiscal year to a military department or defense agency for depot-level maintenance and repair workload be used to contract for performance by non-Federal Government personnel. As this is a military department and agency level requirement and not a weapon system specific requirement, the program manager should not undertake depot maintenance source of support decisions without consultation with accountable acquisition and logistics officials to ensure compliance with this statutory requirement.

Government and Industry Support Partnerships. Public-private partnerships can contribute to more effective DoD maintenance operations, the introduction of innovative processes or technology, and the economical sustainment of organic capabilities. Depot maintenance partnerships can be an effective tool to implement Performance-Based Logistics (PBL) arrangements. PBL implementation strategies should consider partnering with public depot maintenance activities to satisfy the requirements of 10 U.S.C. 2464 and 10 U.S.C. 2466.

Depot maintenance operations in the Department of Defense can benefit from public-private partnerships that combine the best of commercial processes and practices with the Department's own extensive maintenance capabilities. It is in the mutual interests of both sectors to pursue the establishment and effective operation of partnerships across the widest possible segment of workload requirements.

Maintenance partnerships should be the preferred arrangements for maintaining and repairing DoD weapon systems, hardware, equipment, and software. For additional information and guidance, see DoD policy memorandum, January 30, 2002, P*ublic-Private Partnerships for Depot Maintenance*.

5.3.3.2. Supply Source of Support

DoD policy gives the program manager latitude in selecting a source of supply support, including support management functions, that maximizes service to the user, while minimizing cost. The program manager should select a source of supply support that gives the program manager and/or the support integrator sufficient control over financial and support functions to effectively make trade-off decisions that affect system readiness and cost. Supply requirements will be determined as a part of the maintenance planning process to ensure delivery of an integrated product.

Competitive Process. Supply support may be included as part of the overall system procurement or as a separate competition. The competitive selection process will result in a contract with a commercial source and/or an agreement with an organic source that prescribes a level of performance in terms of operational performance and cost. The program manager may use a competitive process to select the best value supply support provider, or supply support may be included in an overarching PBL support arrangement with a PSI. While access to multiple sources of supply may be encouraged to reduce the risks associated with a single source, it is imperative that a single entity (e.g. the PSI or a Prime Vendor arrangement) be established as a focal point of responsibility. Particular attention should be given to Prime Vendor contracts for

specific commodities and Virtual Prime Vendor contracts for a wide range of parts support for specific subsystems. Additional guidance appears in DoD Directive 4140.1 and DoD 4140.1- R.

Organic Supply Source of Support. The program manager selects organic supply sources of support when they offer the best value (DoD Directive 5000.1). When changing the support strategy for fielded equipment from organic support to contractor support or from contractor support to organic support, DoD-owned inventory that is unique to that system should be addressed in the source of support decision.

5.3.3.3. Transportation Source of Support

The program manager is encouraged to determine the best overall support strategy for the customer to include the use of all available transportation alternatives, and alternatives which may be provided by Original Equipment Manufacturers (OEMs) or commercial vendors. These alternatives may include the use of commercial transportation services and facilities to the maximum extent practicable; the use of organic transportation consistent with military needs; or the combination of both commercial and organic transportation to support customer requirements. In considering transportation options, program manager must also plan for transition of the supply and distribution chain from normal operations to expeditionary operations in austere locations that are not served, at least initially, by commercial transportation services and facilities. As in supply support, the program manager should strive to structure a support arrangement, such as PBL, that will consolidate the responsibility for transportation in a single entity, such as the PSI.

Facilitating Vendor Shipments in the DoD Organic Distribution System. Many vendor contracts require vendors to distribute materiel using door-to-door commercial transportation. However, during certain circumstances such as crisis situations and contingency operations, door-to-door commercial delivery may not be possible. If this occurs, materiel enters the DoD organic distribution system for delivery to the ultimate user. Such materiel is often insufficiently marked and labeled, and subsequently it becomes 'frustrated.' To reduce the amount of frustrated materiel, program managers are advised that when it is known prior to award that shipments under the contract will enter the DoD organic distribution system, the contract and/or delivery order should require the contractor to comply with the business rules in DoD policy memorandum, July 23, 2003, *Facilitating Vendor Shipments in the DoD Organic Transportation System*. All solicitations requiring that deliveries be made using door-to-door commercial transportation must include a provision that requires vendors to notify the contracting officer or the contracting officer's designee when they are unable to use door-to-door commercial transportation and to request alternate shipping instructions. The contracting officer or contracting officer's designee must expeditiously provide alternate shipping instructions and make the appropriate contract price adjustments. For additional information, visit the on-line Defense TP Library.

Arms, Ammunition, and Explosives. Program Managers are encouraged to refer to DoD 4500.9-R, Defense Transportation Regulation, Part 2, for transportation considerations regarding the movement of Arms, Ammunition, and Explosives.

5.3.3.4. Contractor Logistics Support / Contractors on the Battlefield (CLS/COTB) Integration, In-Theater

Civilian contractors can execute support missions in a variety of contingency environments and operations other than war. When support strategies employ contractors, program managers should coordinate with users to identify the standards and procedures for integrating contractor logistics support into the theater of operations, per Joint Publication 4-0 Chapter 5, and DoD Component implementing guidance.

5.4. Key LCL Activities in the System Life Cycle

An acquisition program is structured in phases, which are separated by milestone decisions, in accordance with the Defense Acquisition Management Framework established in DoD Instruction 5000.2. In each phase of a program's life cycle, from concept to disposal, there are important life-cycle logistics issues and actions to be addressed by the program manager.

This section provides an overview of key LCL activities and outputs in the context of the Defense Acquisition Management Framework, as depicted in Figure 5, to help Program Managers effectively implement LCL, TLCSM, and PBL. By placing the topics discussed in previous sections in the context of the Framework, this section provides a basic roadmap program managers can follow to achieve LCL goals. This section can also serve as a benchmark for assessment of program PBL implementation in the design and development of weapon systems and associated sustainment strategies.

This section is by no means a complete discussion of all the activities a program manager must carry out during each acquisition phase and in preparation for each milestone. The purpose of this section is simply to highlight important LCL related activities and issues a program manager should be cognizant of at appropriate points when they first appear in the Acquisition Framework. Many of the issues discussed are applicable to multiple phases and the deliverables must be updated during subsequent phases, increments, or spirals.

For a complete discussion of all the activities and requirements encompassed in the Defense Acquisition Management Framework see DoD Instruction 5000.2. A complete and detailed discussion of LCL throughout the life cycle can be found in the TLCSM Template published by the USD(AT&L) and in Chapter 3 of the *Supportability Guide*.

Figure 5 depicts the Defense Acquisition Management Framework and breaks out the LCL related design and systems engineering activities discussed in section 5.2. The colored boxes correspond to the colored boxes in Figure 2. Again, it is important to note that these processes are not carried out in a strictly linear progression, they are typically carried out in iterative, progressive loops in keeping with evolutionary acquisition and spiral development. The colored phase boxes (upper) are linked to the appropriate text below. The colored breakout boxes (lower) are linked to the appropriate text in section 5.2.

Evolutionary acquisition presents new challenges and benefits to the program manager in both acquisition and sustainment activities. An obvious challenge is the potential cost and configuration control problems that can arise with multiple configurations of end-items as well as the support system. This must be addressed early in development and evolution of the acquisition strategy. If planned correctly, configuration control efforts can provide the program manager the opportunity to observe and evolve the success of tentative support strategies.

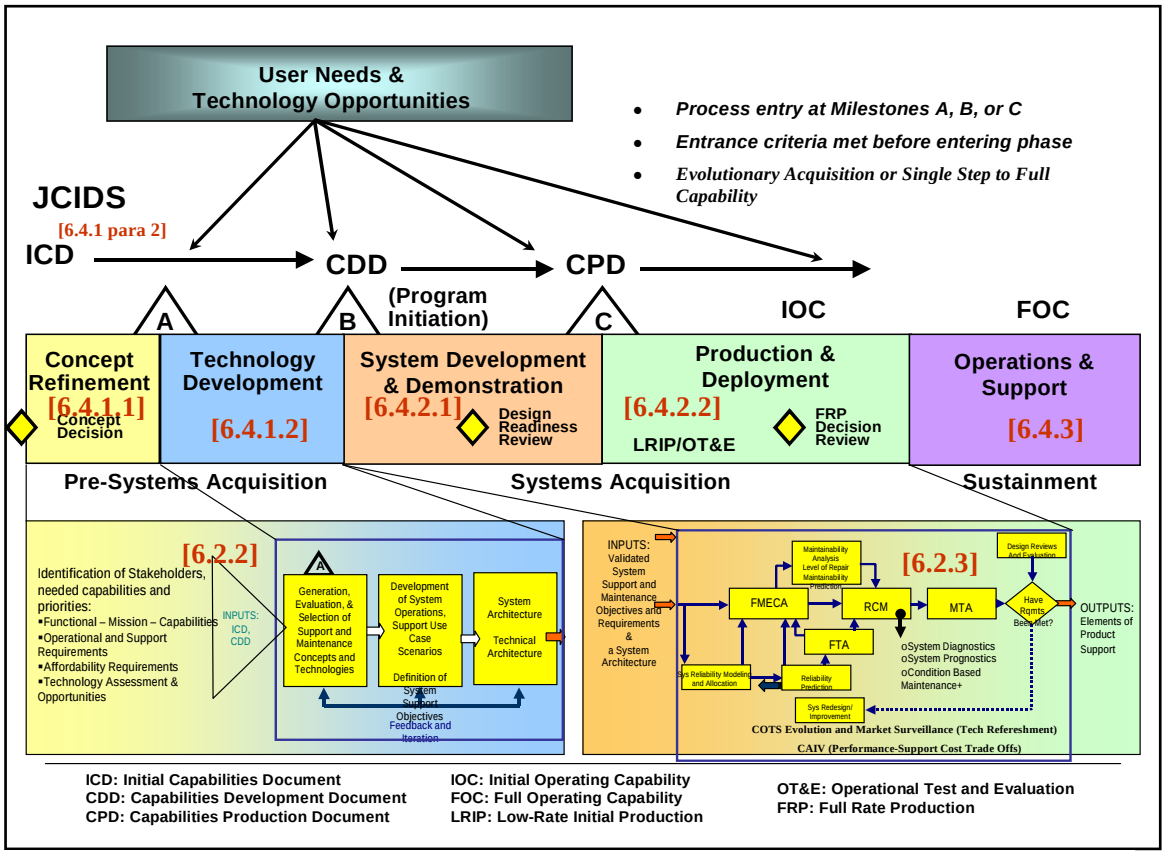

Figure 5. Defense Acquisition Management Framework

5.4.1. Pre-Acquisition

Pre-acquisition presents the first substantial opportunity to influence weapon systems supportability and affordability by balancing threat scenarios, technology opportunities, and operational requirements. Emphasizing the critical performance-sustainment link, desired user capabilities should be defined in terms not only of objective metrics (e.g. speed, lethality) of performance to meet mission requirements affordably, but also of the full range of operational requirements (logistics footprint, supportability criteria) to sustain the mission over the long term. Assessment and demonstration of technology risk includes those related to supportability and to product support. Reliability, reduced logistics footprint, and reduced system life cycle cost are most effectively achieved through inclusion from the very beginning of a program – starting with the definition of needed capabilities.

LCL in the Joint Capabilities Integration and Development System (JCIDS) process. An effective and affordable LCL support program should be represented as a performance capability priority. As discussed in section 1.3, the JCIDS process documents operational phase technical and support-related performance capabilities where warfighters, or their operational user representatives, identify needed supportability and support-related performance capabilities parameters (RMS, cost per operating hour, diagnostic effectiveness, etc.). Planning, resourcing, and allocation of resources for logistics supportability should be mapped to these specific

warfighter needs for support-related system performance. Further, program management can more easily invest in Condition Based Maintenance Plus (CBM+) and related embedded instrumentation technology, when they are tied to JCIDS performance capability parameters. Affordable operational effectiveness is the overarching LCL goal that should be considered during the JCIDS process.

The JCIDS analysis process is composed of a structured, four-step methodology that defines capability gaps, capability needs, and approaches to provide those capabilities within a specified functional or operational area. Based on national defense policy and centered on a common joint warfighting construct, the analyses initiate the development of integrated, joint capabilities from a common understanding of existing joint force operations and doctrine, organization, training, materiel, leadership and education, personnel and facilities (DOTMLPF) capabilities and deficiencies. The JCIDS analyses are led by the sponsor. The JCIDS process is initiated prior to concept refinement and remains linked into the Defense Acquisition Management Framework at each phase and milestone.

LCL-related JCIDS direction — for both the *initial* establishment of supportability and support-related performance criteria and for *each* evolutionary increment — includes the following:

- Cost (with threshold/objectives) is to be included in the JCIDS CDD as "life cycle" costs (CJCSM 3170.01, p. E-A-6, 15).
- Logistics supportability should be treated as an operational performance capability that's inherent to systems design and development (CJCSI 3170.01, p. A-9, (b)).
- Functional needs analysis must include supportability as an inherent part of defining capability needs (CJCSI 3170.01, p. A-4, 2(a)).
- Within the "capabilities based" approach to setting formal warfighter requirements, "supportability" is a key attribute to be defined (CJCSI 3170.01, p. A-5, e(1)).
- Logistics supportability is an inherent element of both Operational Effectiveness and Operational Suitability (CJCSI 3170.01, p. GL-11, by definition).
- Doctrine, Organization, Training, Materiel, Leadership and education, Personnel, and Facilities (DOTMLPF) considerations include key logistics criteria that will help minimize logistics footprint and reduce cost (CJCSM 3170.01, p E-A-5, 13).
- The JCIDS process validates each increment's support-related performance capability parameters, their threshold and objective values, and related metrics and measures of effectiveness.

Initial Capabilities Document (ICD). JCIDS analyses provide the necessary information for the development of the ICD. In the ICD, the user should document those lessons learned and cost drivers of current systems, and/or constraints that impact the supportability-related design requirements of the planned system, along with those of the support system. The following LCL 'drivers' should be considered in the ICD:

- System Maintenance/Support Profiles and Use Case Scenarios (Support Capability Packages)
- Reliability and Maintenance Rates
- Support Environment and Locations for Support

- Support and Maintenance Effectiveness
- Duration of Support

These details guide the acquisition community in refining the concept selected in the ICD and identifying potential constraints on operating and support resource requirements.

5.4.1.1. Concept Refinement Leading to Milestone A

The Concept Refinement phase accomplishes the refinement of the selected concept through development of an approved Analysis of Alternatives (AoA), leading to development of a Technology Development Strategy (TDS). This phase begins with the Milestone Decision Authority (MDA) approving the Analysis of Alternatives (AoA) Plan and establishing a date for MS A review, all documented in an Acquisition Decision Memorandum (ADM).

Concept Refinement leading to Milestone A {Unfinished}		
Predecessor documents incorporating LCL:		
Initial Capabilities Document (ICD)	[r]	5.4.1 para 5
Analysis of Alternatives Plan	[r]	5.4.1.1.2 para 3
Dependant Documents incorporating LCL:		
Analysis of Alternatives (AoA)	[r] (MDAPs and MAIS and other programs as determined by DoD Component)	5.4.1.1.1 para 3
Technology Development Strategy	[s]	5.4.1.1.2
Consideration of Technology Issues	[s]	5.4.1.1.2
T&E Strategy	[r]	5.4.1.2.1 para 5

5.4.1.1.1. LCL Deliverables During Concept Refinement

Performance Parameters – LCL Focus. Identification of LCL performance and related support parameters for inclusion in the CDD and other deliverables establishes their basis as design requirements for subsequent phases to affect availability, reliability, maintainability, interoperability, manpower, and deployment footprint – the overall capability of the system to perform and endure in the required mission operational environment. (DoD Instruction 5000.2)

An excellent example of a useful LCL performance parameter is Operational Availability (A_o). A_o is a calculation of various supportability functions at the systems level. The desired result of performing these calculations, coincident with system design, is to provide fielded systems with greater capability for the warfighter and enhanced support at the best possible value. A_o provides a method of predicting and assessing system performance and readiness during the acquisition process and then becomes the performance benchmark during initial operational capability (IOC), deployment, and operations/maintenance cycles.

Analysis of Alternatives (AoA). Analysis of alternatives is the evaluation of the operational effectiveness, operational suitability, and estimated cost of alternative systems to meet a mission capability. Operational effectiveness measures the overall ability of a system to accomplish a

mission, including its supportability. Operational suitability is the degree to which a system can be placed and sustained satisfactorily in field use with consideration given to availability, compatibility, transportability, interoperability, reliability, wartime usage rates, maintainability, safety, human factors, habitability, manpower, logistics, supportability, natural environment effects and impacts, documentation, and training requirements. It is very important that AoA include alternative operating and system support concepts, with specific consideration of performance-based options. Data collected and analyzed during AoA can be very useful for performing a PBL business cases analysis.

It is important to note that LCL-related data in all program deliverables must be updated during subsequent phases, especially prior to milestone decisions.

5.4.1.1.2. LCL Considerations During Concept Refinement

Important LCL related issues to be addressed during Concept Refinement, as well as in later phases, include (but are not limited to): technology maturity, modular open systems approach, and sustainability.

Maturity, use of COTS/NDI. Technology risk must receive intensive consideration as the system concept is developed (see section 4.4.1) Maximum use of mature technology provides the greatest opportunity to hold fast to program cost, schedule, and performance requirements and is consistent with an evolutionary acquisition approach.

Modular Open Systems Approach (MOSA). (See DoD Directive 5000.1.) program managers apply MOSA as an integrated business and technical strategy upon defining user needs. Program managers assess the feasibility of using widely supported commercial interface standards in developing systems. MOSA should be an integral part of the overall acquisition strategy to enable rapid acquisition with demonstrated technology, evolutionary and conventional development, interoperability, life-cycle supportability, and incremental system upgradeability without major redesign during initial procurement and reprocurement of systems, subsystems, components, spares, and services, and during post-production support. It should enable continued access to cutting edge technologies and products and prevent being locked in to proprietary technology. Program managers should document their approach for using MOSA and include a summary of their approach as part of their overall acquisition strategy.

Sustainability. Sustainability is the ability to maintain the necessary level and duration of operational activity to achieve military objectives (section 5.3.2). Sustainability is a function of providing for and maintaining those levels of ready forces, materiel, and consumables necessary to support military effort.

RMS. Emphasis on RMS (section 4.4.8) and producibility during Concept Refinement and later phases is guided by a concise understanding of concept of operations, system missions, mission profiles, and capabilities. Such understanding is invaluable to understanding the rationale behind functional and performance priorities. In turn, this rationale paves the way for decisions about necessary trade-offs between system performance, availability, and system cost, with impact on the cost effectiveness of system operation, maintenance, and logistics support. The focus on RMS must be complemented by emphasis on system manufacturing and assembly, both critical factors related to the production and manufacturing, and to the sustainment cost of complex systems.

5.4.1.2. Technology Development leading to Milestone B

Upon approval of the Technology Development Strategy and selection of an initial concept, the project enters the Technology Development phase at Milestone A. The purpose of this phase is to reduce technology risk and determine the appropriate set of technologies to be integrated into a full system.

Technology Development leading to Milestone B		
Predecessor documents Incorporating LCL:		
Analysis of Alternatives (AoA)	[r] (MDAPs and MAIS and other programs as determined by DoD Component)	5.4.1.1.1
Technology Development Strategy	[s]	5.4.1.2.1
Market Research	[s]	
Consideration of Technology Issues	[s]	5.4.1.2.2
T&E Strategy	[r]	5.4.1.2.1 para 5
Exit Criteria	[r]	
Dependant Documents incorporating LCL:		
AoA	[r]	5.4.1.1.2
TDS	[s]	5.4.1.1.2bullet 1
ICD and Capability Development Document	[r]	5.4.1 para 3, 5.4.2
Exit Criteria	[r]	
Technology Readiness Assessment	[r]	
C4I Support Plan	[r]	5.1.3.2
Acquisition Strategy	[r]	5.4.1.2.1 para 1
Cost Analysis Requirements Description (CARD)	[r] (MDAPs and MAIS acquisition programs only)	
Industrial Capabilities	[s]	
Core Logistics Analysis/Source of Repair Analysis	[s]	5.3.3.1 para 3
Competition Analysis for Depot-Level Maintenance >$3M	[s]	5.3.3.1 para 3
Cooperative Opportunities	[s]	5.1.3.2
C4I Support Plan Summary	[r]	5.1.3.2
Test and Evaluation Master Plan (TEMP)	[r]	5.4.1.2.1 para 5
Live-Fire Waiver and Alternative LFT&E Plan	[s] (covered systems only)	
Operational Test Agency Report of OT&E Results	[r]	
Independent Cost Estimate and Manpower Estimate	[s]	5.1.3.5, 5.1.3.6
Affordability Assessment	[r]	5.1.3.5
DoD Component Cost Analysis	[r] (mandatory for MAIS when an	5.1.3.5, 5.1.3.6

	Economic Analysis is required; only as requested by CAE for MDAPs)	
Acquisition Program Baseline (APB)	[s] for MDAPs; [r] for MAIS, non-MAIS, and non-MDAPs	5.1.3 para 5
Selected Acquisition Report (SAR)	[s]	
Spectrum Certification Compliance	[s]	
Registration of mission-critical and mission-essential information systems	[s]	

5.4.1.2.1. LCL Deliverables During Technology Development

Acquisition Strategy. LCL and product support is an integral part of the weapon system support strategy that program managers develop as part of their acquisition strategy (see section 5.1.3). Product Support is defined as a package of logistics support functions necessary to maintain the readiness and operational capability of a system or subsystem. The package of logistics support functions includes functions such as materiel management, distribution, technical data management, maintenance, training, cataloging, configuration management, engineering support, repair parts management, failure reporting and analysis, and reliability growth. The Acquisition Strategy documents the Product Support Strategy.

Product Support Strategy. Program managers are responsible for laying out and executing a strategic blueprint for the logistics process so that every part of the package is integrated and contributes to the warfighter's mission capability. The product support strategy is reviewed and updated at least every five years, or when support metrics are not being met (USD(ATL) Memorandum, March 2003, TLCSM & PBL, p. 9). Program managers balance multiple objectives in designing the strategy to achieve operational effectiveness while maintaining affordability. The program manager, product support provider(s) will define and include the required support metrics necessary to meet the system performance requirements. Support providers may be public, private, or a mix to include public-private partnerships. Examples of public support providers include DoD Component maintenance depots, DoD Component and Defense Logistics Agency (DLA) inventory control points and distribution depots. The program manager, product support integrator, and the support provider(s) will enter into documented performance-based agreements that define and include the required support metrics necessary to meet the system performance requirements. Further discussion of the Product Support Strategy can be found in sections 5.1.3 and 5.4.1.2.1.

Statutory, Policy, and Guidance Factors. The product support strategy must ensure compliance with all statutory and regulatory requirements, and in particular the statutory limitations of Title 10 United States Code, Sections 2464, 2466, and 2469. Congress has enacted a number of statues that place controls on what actions the Department can take in using commercial sector maintenance capabilities. These legislative and statutory issues must be considered as an integral and evolving aspect of product support acquisition decisions.

Acquisition Program Baseline (APB). As discussed in section 5.1.3, program managers must insure that a description of the appropriate logistics metrics, criteria, and funding requirements are included in the APB (see section 2.1.1).

Test and Evaluation Master Plan. Proper testing of supportability is critical to achieve LCL goals and objectives, as demonstrated in section 5.2. Program managers must therefore insure

that a description of the appropriate logistics considerations and test points are included in the Test and Evaluation Master Plan (DoD Instruction 5000.2 and Guidebook section 9.6.2).

Work Breakdown Structure (WBS). The WBS is a system management tool very commonly used by program managers and industry. Created early in the life of a program, the WBS identifies deliverable work products (such as products, work packages, activities, tasks, etc.). These work products are then further sub-divided into successively smaller units until individual tasks can be assigned to people or organizations. This allows responsibility to be assigned for individual tasks and provides traceability from low-level tasks to high level work products. It is important for the WBS to consider and account for LCL and related TLCSM considerations. (See MIL-HDBK-881)

The WBS is often used early in the life of the program to generate initial cost estimates, program plans, and to support contracting and reporting. The WBS can also be used to help create a program schedule. The initial WBS may be modified by adding additional tasks or re-assigning personnel as more is learned about the system during the design process.

It is important to note that LCL related data in all program deliverables must be updated during subsequent phases, especially prior to milestone decisions.

5.4.1.2.2. LCL Considerations During Technology Development

Commercial Integration (Items and Processes). Market analysis for system and product support capabilities (public and private) defines the extent and scope of opportunities for achieving support objectives through design and viable product support strategies. Analysis should include:

- Elements of support currently provided (for a legacy system to be replaced).
- Current measures used to evaluate support effectiveness.
- Current efficacy of required support.
- All existing support data across the logistics support elements.
- Assessment of existing technologies and associated support that impact the new system under development.

Cost/Schedule/Performance/Supportability Trade-Offs. The best time to reduce LCC and program schedule is early in the acquisition process. Continuous cost/schedule/performance/ supportability trade-off analyses can accomplish cost and schedule reductions. Cost, schedule, performance, and supportability may be traded within the "trade space" between the objective and the threshold without obtaining MDA approval. Trade-offs outside the trade space (i.e., program parameter changes) can require approval of both the MDA and Validation Authority. Validated key performance parameter (KPP) threshold values cannot be reduced without Validation Authority approval (CJCSM 3170.01, pp. B-4 (3), F-4 9b). The program manager and the operational capabilities needs developer jointly coordinate all trade-off decisions.

5.4.2. Acquisition

The system formally enters the acquisition process at Milestone B, when Milestone Decision Authority (MDA) approval permits the system to enter the System Development and Demonstration (SDD) phase (section 5.3.2.1). A key LCL emphasis during SDD is to ensure operational supportability with particular attention to minimizing the logistics footprint. Also

during SDD, the support concept and strategy are refined and potential PBL Product Support Integrator (PSI) and providers are identified. This is the most critical timeframe to optimize system sustainment through designed-in criteria.

Capability Development Document (CDD). The CDD is the sponsor's primary means of defining authoritative, measurable, and testable capabilities needed by the warfighters to support the SDD phase of an acquisition program. The CDD captures the information necessary to deliver an affordable and supportable capability using mature technology within a specific increment of an acquisition strategy. The following LCL 'drives' should be considered in the CDD:

- System Maintenance/Support Profiles and Use Case Scenarios (Support Capability Packages)
- Reliability and Maintenance Rates
- Support Environment and Locations for Support
- Support and Maintenance Effectiveness
- Duration of Support

5.4.2.1. System Development and Demonstration leading to Milestone C

The purposes of System Development and Demonstration are to: develop a system; reduce integration and manufacturing risk; ensure operational supportability with particular attention to reducing the logistics footprint; implement human systems integration; design for producibility; ensure affordability and protection of critical program information; and demonstrate system integration, interoperability, safety, and utility. In System Development and Demonstration, the program and the system architecture are defined based upon the selection and integration of the mature technology suite accomplished during Concept Refinement and Technology Development.

During System Development and Demonstration, system design requirements are allocated down to the major subsystem level. The support concept and strategy are refined, and potential PBL Product Support Integrator and providers are identified. LCL documents and analyses are refined as a result of developmental and operational tests, and iterative systems engineering analyses. LCL is also an important component of the technical reviews, such as the Critical Design Review, conducted during System Development and Demonstration.

System Development and Demonstration leading to a Milestone C		
System Integration, Predecessor documents Incorporating LCL:		
ICD and CDD	[r]	5.4.1 para. 3, 5.4.2
Acquisition Strategy	[r]	5.4.1.2.1 para 1
TDS	[s]	5.4.1.1.2bullet 1
APB and KPP	[s] [r]	5.1.3, 5.4.1.2.1 para 4
System Demonstration, Predecessor activities and documents incorporating LCL:		
Design Readiness Review	[r]	

Developmental T&E Report	[r] (MDAPs, selected IAMs, and DOT&E oversight programs)	
Cost Analysis Requirements Description (CARD)	[r] (MDAPs and MAIS acquisition programs only)	
Operational Test Plan	[s] (DOT&E oversight programs only)	
Dependant documents incorporating LCL:		
Updated documents from MS B		
Capability Production Document (CPD)	[r]	5.4.2.1

System Design for Affordable Operational Effectiveness. As discussed in section 5.1.1, the TLCSM approach increases the significance of design for system reliability, maintainability, manufacturability, and supportability. The inherent objective of TLCSM is to enhance warfighter capability through improved SOE for new and fielded weapon systems. SOE is the composite of performance, availability, process efficiency, and life cycle cost (see section 5.1.3). The objectives of the SOE concept can best be achieved through influencing early design and architecture and through focusing on system design for affordable operational effectiveness. The SOE concept provides a framework within which trade studies can be conducted in a proactive manner.

LCL Systems Engineering Processes. Figures 6.2 and 6.3 show how key selected system reliability, maintainability, and supportability engineering processes (in the tan boxes), which are part of the overall systems engineering process, fit within the Defense Acquisition Management Framework. A Failure Modes and Effects Criticality Analysis (FMECA) helps identify the ways in which systems can fail, performance consequences, and the support remedies for system failures. A Fault Tree Analysis (FTA) assesses the safety-critical functions within the system's architecture and design. A Maintainability Analysis and Prediction (MAP) assesses the maintenance aspects of the system's architecture, including maintenance times and resources. A level of repair analysis (LORA) optimally allocates maintenance functions for maximum affordability. Once FMECA, FTA, and MAP are completed and system design has been established, Reliability-Centered Maintenance (RCM) develops a focused, cost-effective system preventive maintenance program.

PBL Business Case Analysis (BCA). During this phase, the PBL BCA is developed to determine the relative cost vs. benefits of different support strategies; the impact and value of performance/cost/schedule/sustainment trade-offs; and the data required to support and justify the PBL strategy. See section 5.3.1.3 for further discussion of PBL BCAs.

Product Support Integrator. A concluding step in refining a product support strategy, prior to the Milestone C decision, is establishing a product support integrator function. For further information on selecting the Product Support Integrator, see the *Product Support Guide*.

Capability Production Document (CPD). The CPD is the sponsor's primary means of providing authoritative, testable capabilities for the Production and Deployment phase of an acquisition program. A CPD is finalized after design readiness review and is validated and approved before the Milestone C acquisition decision. The following LCL 'drives' should be considered in the ICD:

- System Maintenance/Support Profiles and Use Case Scenarios (Support Capability Packages)
- Reliability and Maintenance Rates
- Support Environment and Locations for Support
- Support and Maintenance Effectiveness
- Duration of Support

5.4.2.2. Production and Deployment

The purpose of the Production and Deployment phase is to achieve an operational capability that satisfies mission needs. Milestone C authorizes entry into Low-Rate Initial Production (LRIP), at which time the system design should be sufficient to initiate production. The system level technical requirements have been demonstrated to be adequate for acceptable operational capability. At this point, the product support strategy is fully defined, a PSI (Product Support Integrator) has been selected, and PBL agreements that reflect performance, support, and funding expectations should be documented and signed. Funding should be identified and available for testing and implementation of the selected performance based logistics strategy with a selected PSI.

Production and Deployment		
Predecessor documents incorporating LCL:		
Approved ADM and documents from MS C		
CDD and CPD	[r]	5.4.2, 5.4.2.1
Dependant Documents incorporating LCL:		
Updated documents from MS C		
LFT&E Report	[s]	
DoD Component LFT&E Report	[r] (at completion of LFT&E)	
C4I Supportability Certification	[r]	5.1.3.2
Post-Deployment Performance Review	[s]	5.1.3.7, 5.4.3.2

Pre-IOC Supportability Review and Analysis. This review should be performed at the DoD Component-level to:

- Confirm design maturity of the system.
- Determine status of correction of any deficiencies identified.

- Confirm configuration control.
- Certify product support integrator/providers plan to meet warfighter requirements.
- Verify product support integrator/providers agreements/contracts and funding are in place.

Establish Ongoing Support Strategy Review Process. Under TLCSM, the program manager is responsible for the product and related support activities throughout the life cycle. To accomplish this it is necessary for the program manager to establish an ongoing review process. Reviews should be conducted at defined intervals throughout the life cycle to identify needed revisions and corrections, and to allow for timely improvements in these strategies to meet performance requirements.

5.4.3. Sustainment: Operations and Support

While acquisition phase activities are critical to designing and implementing a successful and affordable sustainment strategy, the ultimate measure of success is application of that strategy after the system has been deployed for operational use. TLCSM, through single point accountability, and PBL, by designating performance outcomes vs. segmented functional support, enables that objective. Warfighters require operational readiness and operation effectiveness – systems accomplishing their missions in accordance with their design parameters in a mission environment. Systems, regardless of the application of design for supportability, will suffer varying stresses during actual operational deployment and use.

5.4.3.1. Continuing Post-IOC Product Support Strategy Assessments

The DoD Components conduct Post Deployment Reviews, periodic assessments of system support strategies vis-à-vis actual vs. expected levels of performance and support (USD(ATL) Memorandum, March 2003, TLCSM & PBL, p. 9). These reviews occur nominally every three to five years after IOC or when precipitated by changes in requirements/design or performance problems, and should at minimum include:

- Product Support Integrator/Provider performance.
- Product improvements incorporated.
- Configuration control.
- Modification of performance based logistics agreements as needed based on changing warfighter requirements or system design changes.

The program manager should perform reviews of PSI/PSP performance against the PBA on at least a quarterly basis and utilize that data to prepare for the DoD Component-level assessments.

5.4.3.2. Continuous Assessment and Product Improvements

Assessment and revision of agreements and support strategies should encompass all previous configuration/block increments, as well as elements of SDD phase activities. Life cycle assessments address not only ‘adding on’ new support as required, but also the total support strategy across the entire platform and range of deployed configurations.

Under TLCSM, the program manager assesses proposed system modifications in light of supportability and logistics support impact. Continued assessment of in-service system performance may identify system redesign needs to address inadequate characteristics, e.g., reliability, obsolescence, etc.

While some system deficiencies are best addressed through system design, many can be resolved by adjusting the product support strategy itself. Often, due to revisions in funding, mission requirements, or support organizations, logistics resources become out of balance or poorly-synchronized. Therefore, program manager efforts to increase weapon system availability while reducing life cycle costs and logistics footprint must include periodic assessments and, where necessary, improvements of the product support strategy (USD(ATL) Memorandum, March 2003, TLCSM & PBL, p. 9). Approaches useful to the program manager in making these improvements include:

- A Maintenance Plan Analysis: This analysis can help balance logistics support through thorough review of readiness degraders, maintenance data, maintenance program and implementation, and industrial coordination.
- PBAs: Under a PBL strategy, properly documented and incentivized PBAs with support providers encourage product support assessment and improvements. Performance-based agreements facilitate comparison of performance expectations against actual performance data.
- Changes to Product Support: Program managers can revise, correct, and improve product support strategies to meet performance requirements. Program managers can improve system supportability by balancing logistics resources and decreasing repair cycle times. Examples of product support improvements include performing an overhaul vs. repair, changing maintenance plans, improving off-aircraft diagnostic capabilities, transitioning to a commercial supply chain management system, etc.

The ability to continually compare performance against expectations takes actual equipment and support performance data to drive operational data analyses and a RCM decision analysis. Results are implemented through maintenance plan changes.

5.5. LCL Tools and References

The following tools and references provide further information on LCL and its implementation throughout the program life cycle.

5.5.1. The Professional Logistics Workforce: A Key Enabler.

The professional logistics workforce is critical to the success of LCL efforts and the achievement of DoD's overall logistics goals. It is the program manager's primary resource for understanding and implementing LCL.

DoD is required to maintain "a fully proficient acquisition, technology, and logistics workforce that is flexible and highly skilled across a range of management, technical, and business disciplines" (DoD Directive 5000.1). This workforce provides "cradle-to-grave" support, not only in laboratories and program offices, but also in product centers, inventory control points, maintenance depots, and other life-cycle logistics organizations. LCL requires the logistics workforce to be more diversified in their skill sets and proficient in executing a performance-based support philosophy. To that end, USD(AT&L) has worked with the DoD Components and DAU to update the logistics training criteria for Life Cycle Logisticians and enhance the logistics workforce's ability to support TLCSM and PBL initiatives. Further information on education, training, and career development programs for the workforce can be found in the Acquisition Community Connection, Logistics Management Training Center.

5.5.2. The Acquisition Community Connection (ACC) and the Logistics Community of Practice (LOG CoP)

The Acquisition Community Connection, sponsored by the Defense Acquisition University (DAU), is a tool to facilitate collaboration, sharing, and the transfer of knowledge across the DoD AT&L workforce. ACC is a collection of communities of practice centered on different functional disciplines within the acquisition community. The Logistics Community of Practice (LOG CoP), is one of the communities currently residing within the ACC framework. LOG CoP provides a number of resources for implementing life-cycle logistics. The community space also allows members to share (post to the website) their knowledge, lessons learned and business case related material so that the entire logistics community can access and benefit. The intention is to make LOG CoP the *"go to"* resource for the logistics community.

5.5.3. TLCSM Template

The TLCSM template, developed by the USD(AT&L), provides a synopsis of the key activities and outputs to assist program managers in effectively implementing TLCSM and PBL within the defense acquisition management framework. The template is a useful benchmark for assessment of program implementation of PBL in the design and development of weapon systems and associated sustainment strategies.

5.5.4. Business Case Guidance

Business case development and analysis is a tailored process. The scope of a product support investment decision substantiated by the business case can range from a complete system-of-systems, to that of individual sub-system components. Likewise, each DoD Component has established ownership and structure of how business case development and analysis are conducted to support their investment decisions. For this reason, one specific approach, format, or template may not fit all situations. The LOG CoP contains numerous references, guides, and templates to assist in business case development and analysis.

5.5.5. PBA Templates and Guidance

In addition to providing guidance and detailed explanations of PBL and related concepts, sample PBAs, policy and guidance, contractual incentives and other resources are available under the PBL section of LOG CoP.

5.5.6. PBA Process for Organic Supply Support

The PBA process is the framework for creating and sustaining end-to-end user support and begins with collaborative, direct negotiations between DoD supply sources of support and their warfighter users (see section 5.3.2). The PBA represents the codification of the negotiated user requirements and performance expectations. The PBA development stages are: *Evaluating Current Conditions, Gain Commitment to Proceed, Define Scope and Objectives and Finalize Agreement, Execute Agreement/Assess Results, and Identify Improvements*. These 5 stages are intended to guide the user through the basic process steps required to develop and implement a Performance Based Agreement. The LOG Cop has a PBA Toolkit.

5.5.7. PBA Template for Organic Supply Support

An End to End Customer Support PBA template has been developed to provide DoD organizations a common framework, a 'checklist' to consider, when undertaking a performance

based type agreement that may involve one or more supply chain support services. This template is guidance and not direction on how a PBA should be structured. As the PBA development and implementation process matures, "best practices" will evolve and define the PBA agreement structure and content. PBA terms and definitions can be found in the appendix. Consider the following elements when developing a Performance Based Agreement: Objective and Scope; Content; Roles and Responsibilities; Performance Measures; Revisions and Flexibility; Accountability and Oversight; Contingency Agreements; Execution of Agreement.

5.5.8. Time Definite Delivery Tool

Time Definite Delivery (TDD) plays a significant role in end-to-end user support. Defined as the capability to deliver required materiel to the user within a given period of time with 85 percent reliability, TDD is an important metric to gauge user support. To aid the program manager in determining a TDD tailored to a particular user, a TDD tool was created to compute DoD requisition delivery performance for the total pipeline time (TPT) tailored by user for possible use in initial negotiations of performance agreements. The tool is available at the Office of The Assistant Deputy Under Secretary of Defense (Logistics & Materiel Readiness) Supply Chain Integration web site.

5.5.9. Designing and Assessing Supportability in DoD Weapon Systems

This guide provides a template for program managers when assigned or responsible activities to use in defining and assessing their program activities to meet QDR objectives and DoD policy requirements throughout the weapon system life cycle. Emphasis is placed on designing for increased reliability and reduced logistics footprint and on providing for effective product support through performance-based logistics (PBL) strategies. (The Supportability Guide)

5.5.10. Product Support: A Program Manager's Guide to Buying Performance

This guide presents a performance-based logistics (PBL) strategy for product support of weapon systems. The guide is a tool for program managers as they design product support strategies for new programs or major modifications, or as they reengineer product support strategies for legacy weapon systems.

5.5.11. White Paper: Performance Agreements

A discussion of the performance agreements within PBL can be found in this white paper entitled Performance Agreements as a Critical Component of Performance Based Logistics, which was developed by OADUSD (Logistics Plans and Programs).

5.5.12. Environment, Safety and Occupational Health (ESOH)

DoD ESOH Guidance for systems acquisition programs can be found in the ESOH Special Interest Area on the Acquisition Community Connection.

5.5.13. Web References

This section contains a table designed to reference applicable Section 6 paragraphs to appropriate reference guide materials found on Web sites or attached as enclosures containing program examples, best practices illustrations, lessons learned and supporting guidance.

Section	Section Title	Link Name	Web Address
5.1	Life-Cycle Logistics	DoD Directive 5000.1	http://dod5000.dau.mil/DOCS/DoD%20Directive%205000.1-signed%20(May%2012,%202003).doc
		Quadrennial Defense Review	http://www.defenselink.mil/pubs/qdr2001.pdf
		Joint Vision 2020	http://www.dtic.mil/jointvision/
		Focused Logistics Campaign Plan	http://www.dtic.mil/jcs/j4/projects/foclog/focusedlogisitics.pdf
		DUSD(L&MR) Memo 6Nov01 Product Support Guide	http://www.acq.osd.mil/log/logistics_materiel_readiness/organizations/lpp/assetts/product_support/new_prd_spt_gde/morales_memo.pdf
		DoD Instruction 5000.2	http://dod5000.dau.mil/DOCS/DoDI%205000.2-signed%20(May%2012,%202003).doc
		DoD 4140.1-R	http://www.dtic.mil/whs/directives/corres/html/41401r.htm
		USD(AT&L) Memo 7Mar03 TLCSM & PBL	http://acc.dau.mil/simplify/ev.php?URL_ID=11679&URL_DO=DO_TOPIC&URL_SECTION=201&reload=1062159864
		DoD 4160.21-M-1	http://www.dtic.mil/whs/directives/corres/html/416021m1.htm
		Log Cop Training Center	http://acc.dau.mil/simplify/ev.php?URL_ID=10651&URL_DO=DO_TOPIC&URL_SECTION=201
5.2	LCL Systems Design	Supportability Guide	http://acc.dau.mil/simplify/ev.php?URL_ID=11633&URL_DO=DO_TOPIC&URL_SECTION=201&reload=1066394238

Section	Section Title	Link Name	Web Address
		DoD policy memorandum, September 4, 2002, Serialized Item Management	http://www.acq.osd.mil/log/logistics_materiel_readiness/organizations/mppr/assetts/general_policy/SIMmemo.pdf
		DoD policy memorandum, July 29, 2003, Policy for Unique Identification (UID) of Tangible Items-New Equipment, Major Modifications, and Reprocurement of Equipment and Spares	http://www.acq.osd.mil/uid/uid_signed_policy_memo_2003.07.29.pdf
		BEA-Log	www.bea-log.com
5.3	Performance Based Logistics (PBL)	DUSD(L&MR) Memorandum 6Mar03, Implementing the Future Logistics Enterprise End-to-End Customer Support	http://www.acq.osd.mil/log/logistics_materiel_readiness/organizations/sci/assetts/endtoend_distribution/End%20to%20End.pdf
		Product Support Guide	http://acc.dau.mil/simplify/ev.php?URL_ID=11634&URL_DO=DO_TOPIC&URL_SECTION=201&reload=1066831465
		10 U.S.C. 2464	http://uscode.house.gov/title_10.htm
		DoD Directive 4151.18	http://www.dtic.mil/whs/directives/corres/html/415118.htm
		10 U.S.C. 2466	http://uscode.house.gov/title_10.htm
		DoD policy memorandum, January 30, 2002, Public-Private Partnerships for Depot Maintenance	http://www.acq.osd.mil/log/logistics_materiel_readiness/organizations/mppr/assetts/depot_partnerships/public_private_partnerships_02.pdf
		DoD Directive 4140.1	http://www.dtic.mil/whs/directives/corres/html/41401.htm
		DoD 4140.1-R	http://www.dtic.mil/whs/directives/corres/html/41401r.htm

Section	Section Title	Link Name	Web Address
		DoD Directive 4500.9	http://www.acq.osd.mil/log/logistics_materiel_readiness/organizations/tp/html/trans_programs/defense_trans_library/5009/5009.html
		DoD policy memorandum, July 23, 2003, Facilitating Vendor Shipments in the DoD Organic Transportation System	http://www.acq.osd.mil/log/logistics_materiel_readiness/organizations/tp/html/trans_programs/defense_trans_library/policy_facilitating_vendor_shipments_in_the_dod_organic_distribution_system.pdf
		Defense TP Library	http://www.acq.osd.mil/log/tp/
		DoD 4500.9-R	www.transcom.mil/j5/pt/dtr.html
		Joint Pub 4-0 Chp 5	http://www.dtic.mil/doctrine/jel/new_pubs/jp4_0.pdf
		DoD 4000.25-1-M Military Standard Requisitioning and Issue Procedures (MILSTRIP)	http://www.dtic.mil/whs/directives/corres/html/4000251m.htm
		Subpart 251.1 Contractor Use of Government Supply Sources	http://www.acq.osd.mil/dp/dars/dfars/html/r20021122/251_1.htm
5.4	LCL Key Activities in the Program Life Cycle	CJCSI 3170.01	http://www.dtic.mil/cjcs_directives/cdata/unlimit/3170_01.pdf
5.5	LCL Tools and References	ACC	http://acc.dau.mil
		Log COP	http://log.dau.mil
		TLCSM Template	http://acc.dau.mil/simplify/ev.php?URL_ID=11679&URL_DO=DO_TOPIC&URL_SECTION=201&reload=1062159864
		Customer Support PBA template	http://www.acq.osd.mil/log/logistics_materiel_readiness/organizations/sci/assetts/toolkit/pba/pba_template_v1_may2003.pdf
		Time Definite Delivery Tool	http://www.acq.osd.mil/log/logistics_materiel_readiness/organizations/sci/html/tdd.html

Section	Section Title	Link Name	Web Address
		Program Manager's Guide to Buying Performance	http://acc.dau.mil/simplify/ev.php?URL_ID=11634&URL_DO=DO_TOPIC&URL_SECTION=201&reload=1066394562
		Whitepaper: Performance Agreements	http://acc.dau.mil/simplify/ev.php?URL_ID=14221&URL_DO=DO_TOPIC&URL_SECTION=201&reload=1066394651
		ESOH Guidance	http://acc.dau.mil/simplify/ev.php?URL_ID=8328&URL_DO=DO_TOPIC&URL_SECTION=201
		DoD Instruction 4500.9	http://www.dtic.mil/whs/directives/corres/html/45009.htm