USAWC STRATEGY RESEARCH PROJECT

**LIFE CYCLE MANAGEMENT COMMANDS: WARTIME PROCESS OR LONG-TERM SOLUTION?**

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# ABSTRACT

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Since the controversial 1997 letter directing that Program Mangers (PM) were responsible for complete weapon system lifecycle management (LCM), the Army acquisition and logistics communities have struggled to overcome resource and organizational obstacles to implementing integrated LCM. LCM reforms in the 1990s established the conditions for LCM, but peacetime programs like Apache Prime Vendor Support failed. Not until the demands of supporting the Global War on Terror (GWOT) and new Department of Defense policies, did the Army create the Life Cycle Management Commands (LCMC) in 2004. Subsequently, the roles and responsibilities of PMs have expanded and the LCMC initiative has successfully supported the Army. But is LCMC success a result of organizational reform or just wartime necessity overcoming old bureaucracy? This Strategic Research Paper (SRP) will review the acquisition reforms and resource policies that have divided acquisition and logistics communities and then evaluate the merits of the LCMC using the Abrams Tank and Apache programs.

# LIFE CYCLE MANAGEMENT COMMANDS: WARTIME PROCESS OR LONG-TERM SOLUTION?

In 1999, The Army began its 6th revolutionary change since 1940. Initially, this transformation focused almost entirely on the operational force by introducing a medium force (Stryker) and reorganizing its combat force into Modular Brigade Combat Teams. Modularity, for the warfighter communities, reorganized combat and combat support units into a greater number of deployable brigade combat teams (BCT). The challenge with Modularity is that it did nothing for the supporting Institutional Army. Faced with more requirements than resources, the Army has created the Life Cycle Management Commands (LCMC) to improve the efficiency and effectiveness of supporting the *Boots on the Ground* with the right equipment. The LCMC initiative within the Institutional Army reorganizes the acquisition, logistics, and technology organizations around common materiel products to harmonize equipment support for the Operational Force.

To the majority of the Army, the unstated issues behind sustaining the soldier with world class equipment are neither obvious nor important. However, there are traditional obstacles to coordinated weapon system support from development through sustainment that may be left unresolved under the current LCMC construct. Unlike the modularity concept with traditional brigade commanders and unity of command, the LCMC initiative relies on existing commodity commanders who employ unity of effort to provide materiel support. With Congressional supplemental appropriations expected to end after 2009, a significant reduction in wartime necessity could trigger pre-war disagreements between the supporting communities of acquisition and logistics. Unfortunately, the challenges of post-war budgets and inefficiencies are nothing new to the U.S. defense industry.

In his book *New Weapons, Old Politics*, Thomas L. McNaugher states:

> The nation handles acquisition well in war and crisis because such moments of recognized national peril move the political system to a resolve normally unattainable in peacetime. The arrangements generated by such circumstances have been ad hoc and often wasteful. But overall they have worked, and in crises that is all anyone has asked of the acquisition process.[1]

This observation raises a critical question that this paper will investigate: Has the Army's LCMC initiative achieved unified life cycle management, or is this initiative only another example of McNaugher's wartime solutions that will only fail once funding and wartime necessity are reduced? An historical review of the issues that have separated the Army's acquisition and logistic communities will highlight several of the challenges facing the LCMC. Two of the Army's largest sustainment programs, the Abrams tank and the Apache helicopter, will then provide

examples of how well the LCMC is doing.[2]  Finally, this paper will consider the progress of the LCMC to achieve Total Life Cycle System Management (TLCSM) and offer some recommendations for transitioning from an ad hoc organization to a long-term process in support of the Army's expanding challenges.

<u>I. Background – Past Challenges to a Unified Acquisition and Logistics Support Effort</u>

Origins of Uncoordinated Life Cycle Support: Organizations

      Modern acquisition reforms and the traditional friction between acquisition and logistic communities originate from resource and organizational policies within defense acquisition. Throughout most of the Cold War each of the services managed their own weapon system programs while Congress established rigid funding restrictions in an effort to maintain oversight. By the defense build up of the 1980s; even Congressional oversight had failed to curtail appetites for service-unique programs.  A Congressional Budget Office (CBO) report in 1985, for example, found that the aircraft budget had increased by 75 percent for only a 9 percent increase in aircraft; the missile budget had similarly increased by 91 percent for only 6 percent more missiles; and the budget for tanks increased by 147 percent for only 30 percent additional tanks.[3]  Trends like these were attributed to problems within defense acquisition, such as poor contracting procedures, requirements growth, and little civilian oversight.  As a result, reforms in the 1980s focused on acquisition procedures and Congressional oversight while ignoring the link to logistics and follow-on sustainment.

      Knowing that defense procurement needed reform, Congress commissioned the former Deputy Secretary of Defense, David Packard, to conduct a broad review of defense acquisition policies and procedures that later reorganized defense acquisition.  President Ronald Reagan adopted most of the findings from the Packard Commission[4] in National Security Decision Directive (NSDD) 219, which were then put into law by the 1986 Defense Acquisition Reform Act (DARA).[5]  The reforms effected organizational policy by separating the acquisition and logistics organizations into two chains of command/responsibility.

      The first chain, the acquisition chain, included the designation of a new Under Secretary of Defense for Acquisition (USD(A))[6] as well as Defense and Service Acquisition Executives (D/SAE) to oversee the implementation of acquisition policies and to implement business-like rigor to the research, development, and acquisition programs.  The USD(A)/DAE and the SAEs were to report directly to the Secretary of Defense (SECDEF) and service secretaries respectively.  NSDD 219 also directed SAEs to appoint Program Executive Officers (PEO) to

oversee major weapon system programs managed by Program Managers (PM). In order to streamline decision-making, PMs could only have one level of approval between them and the SAE and then only one more approval by the DAE.  This maximum of two levels of approval along with changes in the requirements process were intended to "substantially reduce the number of acquisition personnel… and improve the cost-efficiency, quality and timeliness of procurements."[7]  Therefore, since 1986 PEOs and their assigned PMs in the Army have reported to the Assistant Secretary of the Army for Acquisition, Logistics, and Technology (ASA(ALT), initially ASA for Research, Development, and Acquisition (ASA(RDA).  While the new defense reorganization streamlined acquisition program management and oversight, it simultaneously removed developmental programs from the Title X responsibilities of the Service Chiefs.

The second chain, the logistics (also referred to as sustainment) chain, remains a Title X responsibility of the service chiefs.  For The Army, the Chief of Staff of the Army's (CSA) lead organization for weapon system operations and sustainment (O&S) is the Army Materiel Command (AMC).   AMC has maintained budget and execution responsibilities for weapon system sustainment, to include repair parts and government depots, mostly through direct and indirect funding from the Operational Army.  Figure 1 below demonstrates the separation of the acquisition and logistics (sustainment) chains of command/responsibility before and after LCMC and how this separation is maintained.
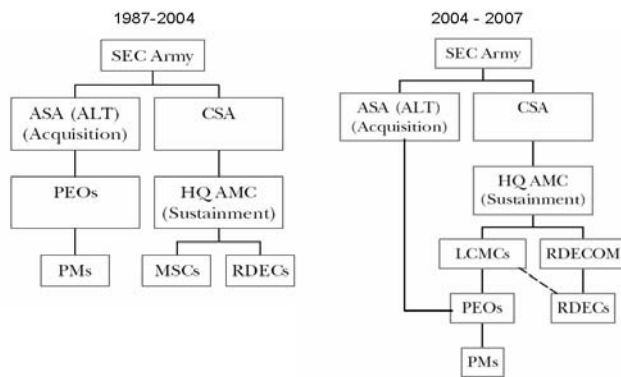


Figure 1: Acquisition and Sustainment organizations before and after LCMC[8]

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Origins of Uncoordinated Life Cycle Support: Resourcing

The separation of acquisition and logistics also exists in how Congress and the Army resource weapon systems from development through sustainment.  Congressional rules establish restrictions on how money is used throughout the acquisition lifecycle, which in turn has effected how the Army plans, programs and executes its resources.  Resource obstacles to unity of effort start with types of funding and end with how AMC and the Army manage that funding using the Army Working Capital Fund (AWCF) and the Program Execution Groups (PEG) that manage program accounts in the Pentagon.

Distrusting defense acquisition, Congress has always achieved oversight of large defense spending by specifying funding authorizations and appropriations in terms of the weapon system life cycle. Army appropriations, for example, are divided between Research, Development, Testing and Evaluation (RDTE) funding for early in the life cycle, Procurement Army (PA) for production, and Operations and Maintenance Army (OMA) for sustainment of weapon systems.  These separate funding sources remain the first source of competition between acquisition and logistic communities, since RDTE and PA funding is allocated exclusively to acquisition organizations and OMA is nearly exclusively allocated to logistic organizations and the Operational Army.

Budget planning and programming oversight within The Army Staff is managed by six staff groups designated Program Execution Groups (PEG), functionally organized to manage the different congressional appropriations: Sustaining (SS, OMA funding), Equipping (EE, RDTE and PA funding), Training (TT, OMA funding), Manning (MM, OMA funding), Organizing (OO, OMA funding) and Installation (II, Military Construction funding).  The SS and EE PEGs manage all of the weapon system specific funding.    Before 2005, these two PEGs neither coordinated nor consolidated funding for weapon systems. Rather, they both separately planned their programs with the organizations associated with equipping and sustaining - ASA(ALT) and AMC respectively.  (Note – the 1999 Abrams Integrated Management (AIM) program is one exception and will be discussed later). Because the funds were congressionally controlled, this system provided few opportunities for the service to move funds where they were needed.

The Army Working Capital Fund (AWCF) is another funding process that has traditionally separated the acquisition and logistics communities.  Established in 1996 as a subset of the Defense Working Capital Fund (DWCF), the AWCF is a revolving fund that relies on the sales of parts for the Operational Army to generate revenue that in turn funds the Army's O&S programs.  Because this is a revolving fund, AWCF enables the Army to fully fund operations and support without fiscal year limitations inherent with congressionally appropriated OMA funds.  The fund

relies on surcharge fees for spare parts; thus well-funded acquisition programs like the Apache helicopter and Abrams tank have traditionally funded low-density products and spares programs sponsored by the logistics community.[9]  During the acquisition reforms of the 1990s; therefore, the "rice bowl" issues between acquisition leaders looking to reduce weapon system costs and logistics leaders that relied on AWCF would separate the two communities over how to sustain the Army.

These two "stovepipe" processes, one reorganizing the Army to support the acquisition process the other separating resources for the logistics or sustainment function only reinforced a climate of poor cooperation.  Consequently, acquisition PMs and logistics item managers were neither required nor encouraged to communicate with each other in planning their individual budgets for the different parts of the life cycle. Over the past 20 years Congressional authorization rules and the Army's own budget and planning procedures have only exacerbated this natural competition for resources and disunity of effort.

II. A Possible Solution – Life Cycle Management

To solve the challenges presented by the reorganization of acquisition and the bifurcated funding process, DoD developed, and The Army adopted, Life Cycle Management (LCM). LCM is a holistic approach to weapon system development and support where decisions are made based on the impact to the total life cycle costs and performance of the weapon system. The concept of LCM began in the 1990s after several acquisition studies revealed that previous acquisition reforms did not noticeably reduce the total cost of weapon systems.  The problem: optimized performance decisions made during weapon system development often resulted in weapon systems that were difficult and expensive to maintain.  In theory, LCM makes sense, but applied within the competing cultures of acquisition and logistics, LCM in action proved difficult prior to 9-11.

The Birth of Life Cycle Management Policy

Reforms in the 1990s began by making weapon system acquisitions better, faster and cheaper and ended by mandating LCM for both acquisition and logistics communities.  The previously discussed acquisition reforms (AR) of the 1980s focused on removing the fraud, waste, and abuse that had crept into defense acquisition during the Cold War, but in the process created a huge bureaucracy.  The Secretaries of Defense and Vice President Gore approached AR with zeal in the 1990s to reduce that bureaucracy and streamline acquisition (Figure 2: Acquisition Reform in the 1990s: "What, How, and Who").  A recent study of

the1990's AR identified 63 reforms and grouped them into 5 themes: Civil-Military Integration, Industrial Base, Waste/Fraud/Abuse, Streamlining, and Logistics.  The 1990s "Logistics" reforms focused on improving life cycle support and created the first LCM initiatives that included Contractor Total System Performance Responsibility (CTSPR), Prime Vendor Delivery, and Reduction in Total Ownership Cost (RTOC).   Beginning with the 1996 DoD Directive (DODD) 5000.1, Defense Acquisition, DoD incorporated many of the 63 reforms and required acquisition and logistics organizations to apply a total systems approach in managing acquisition programs to optimize total system performance and minimize the cost of ownership. The series of DoD and Army policy letters and documents that followed throughout the 1990s provided the foundation for total LCM.
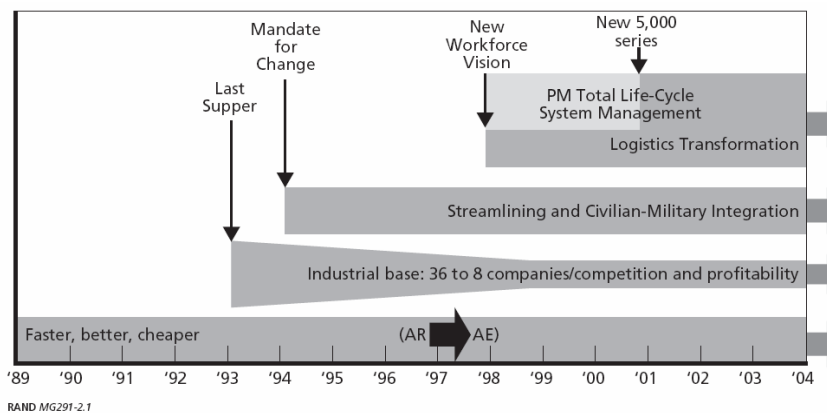


Figure 2: Acquisition Reform in the 1990s: "What, How, and Who"[10]

The critical policies and reforms were:

- February 1997:  SECDEF Cohen echoed the philosophy of the new defense acquisition directive in his testimony to Congress for the 1998 Defense Budget and introduced the cost benefits of modernizing existing systems as well as leveraging the commercial industry to reduce sustainment costs.  These initiatives resulted in the Modernization through Spares (MTS), Continuous Technology Refreshment (CTR) and later the Total Ownership Cost Reduction (TOCR) programs.  These programs broke down barriers to using OMA resources for modernization.[11] (Note – previously modernization could only be funded with PA resources.)
- 1997: Centers of Industrial and Technical Excellence (CITE) Statute[12] – this Title X addition enabled depots to partner with Industry for commercial and defense work. The statute also created incentives for Industry to utilize and invest in depots as a

- means to reduce production costs while improving the defense Industrial Base.  This would prove valuable to PM's meeting TLCSM objectives later.
- April 1997:  ASA(RDA) (predecessor to ASA(ALT)) issued a memorandum citing the new DODD 5000.1 mandate to manage total life cycle costs and directed that PEO and Major Commands (MACOM) responsible for Acquisition Category (ACAT) programs were responsible for management of total life cycle costs.[13]  PEOs and MACOMs were further directed to add O&S costs into acquisition documents; however, no reorganization of acquisition and logistics organizations occurred.
- May 1998:  ASA(RDA) clarified the 1997 memorandum with additional guidance stating that PMs were in charge of the total life cycle of their assigned systems.  The memo cautioned that "many organizations and procedures would be affected but that the concurrence to move sustainment funding to PMs would not be automatic."[14] Once again, no reorganization occurred, so no real changes at the PM-level organization followed this memorandum.
- 1998:  The Director of the Army Acquisition Corps (AAC), Lieutenant General (LTG) Paul Kern, testified before Congress about two Army programs that would encompass new DoD reforms in order to reduce the total ownership costs (TOC) of sustaining weapon systems.  These programs were the Apache Prime Vendor Support (PVS) and the M109 Paladin Family of Vehicle (FOV) Fleet Management (FM) programs.[15]

Peacetime LCM Failures

By 1998, DoD and Army policies and directives as well as Congressional statutes set the conditions for PMs to manage the total life cycles of their assigned programs; however, without a major shift in the different cultures within the acquisition and logistics communities, the Army's first program-level life cycle projects, Apache PVS and the M109 Howitzer FM, failed.

The Apache PVS program was the Army's first LCM initiative and the first victim of acquisition-logistic disunity.  After the 1996 DODD 5000.1 was published and Secretary Cohen had ushered in the call for government and Industry to work together, Boeing Company, the Original Equipment Manufacturer (OEM) of the Apache helicopter, and Lockheed Martin Corporation, submitted an unsolicited proposal to the Army for the fielded Apache helicopter. The proposal described Contractor Total System Performance Responsibility (CTSPR) and included transitioning government support functions for spare parts and repair over to the contractors.  The contractors' LCM concept proposed measuring contract performance in terms

of end-to-end support defined by flying hours per year. This type of contractor support was previously designated Contractor Logistics Support (CLS), but in 1998 CLS was only considered for low-density platforms. The Apache helicopter in 1998, however, was not considered low density and was the largest contributor to the AWCF.[16] Thus, if implemented, Apache PVS would reduce AWCF revenue and government jobs.

The Army rejected the original PVS proposal on the basis of a lack of data and ultimately rejected two more proposals for several other reasons. After the Army Audit Agency (AAA), Government Accounting Office (GAO), and the DOD Inspector General (IG) reviewed the program, the Army finally determined that PVS did not benefit the Army overall. [17] The Director of the Army Acquisition Corps (AAC), LTG Paul Kern, championed the Apache PVS, but, in 2000, admitted that even though the PVS program addressed depot concerns it had not adequately addressed AWCF issues.[18] At the same time that Aviation and Missile Command (AMCOM) began the Apache PVS program, a second program originated from the Tank Automotive and Armaments Command (TACOM) community.

TACOM's M109 Howitzer FOV FM initiative was similar to Apache PVS and met a similar fate in the late 1990s. The M109 Howitzer program was selected by both AMC and the ASA (RDA) to consolidate the management of the entire howitzer fleet, associated spare parts, and modernization under a single contractor. In 1996 the M109 Howitzer and its ammunition carrier were managed by multiple government agencies and supported by several contractors. The program would include the M109A2/A3, M109A4/A5, and the M109A6 Paladin 155mm howitzers as well as the M992A0/A1/A2 Field Artillery Ammunition Support Vehicles (FAASV). LTG Kern stated before Congress that the M109 program would validate the "significant performance improvements and cost savings through contractor logistics life cycle support."[19] Unfortunately no contractors showed interest in the overwhelming scope of the program, possibly because it was viewed as too risky in light of the problems associated with the Apache PVS program. The M109 FOV FM Lessons Learned document published during the cancellation of the program sited poor leadership commitment to the ideals of the program and the competing interests across acquisition and logistics communities as the primary reasons for failure.[20]

By the time the 2002 DOD IG had completed investigating allegations of improper government procedures during the Apache PVS source selection, the Army had retreated from any further attempts at consolidated LCM and instead had nominated Apache as one of 10 DOD programs in the 2000 Total Ownership Cost Reduction (TOCR) initiative. The Congressionally directed TOCR program was implemented to study centralized LCM under

PMs, but Army peacetime cultures were not ready for TLCSM and initiatives were only conducted at the component-level. Both Apache and M109 PMs sought to leverage existing acquisition reforms emplaced to improve LCM and reduce costs. Only two years later, a new SECDEF focused on transformation, and the simultaneous execution of the Global War on Terror (GWOT) would compel the Army's support communities to re-evaluate historic differences and combine efforts to achieve TLCSM.

III. Post 9-11 Direction for Change – Total Life Cycle System Management

The failures of the Army's LCM initiatives of the 1990s and the results of the 2001 QDR prompted a new SECDEF, Donald Rumsfeld, to set into motion widespread changes in defense policies that further enhanced conditions for LCM and the Army's 2004 LCMC initiative. Just one day before 9-11 Secretary Rumsfeld explained that these changes would demand "…agility – more than today's bureaucracy allows. And that means we must recognize another transformation: the revolution in management, technology and business practices."[21] The 2001 QDR established the necessity to improve business practices within the DOD by: 1) implementing Performance Based Logistics (PBL), 2) working with industrial partners for life cycle support of weapon systems, and 3) reducing acquisition cycle time by adopting commercial metrics.[22] This promted changes in DoD and Army acquisition and logistics policies.

New DoD acquisition and logistics policies were first outlined in the 2002 Future Logistics Enterprise (FLE). The FLE recommended six bold initiatives that required resource policy changes, and redefined the conditions for LCM that prompted organizational changes. The FLE initiatives were:

- Depot Maintenance. Depots and industry were encouraged to partner including commercial investment in depot facilities and processes (Public Private Partnership (P3)).[23] Later the 2004 Cooperative Activities Pilot Program achieved these objectives (see Abrams initiatives).[24] Previous resource policies limited Depot investments to OMA-funded repair programs, but with the 2004 pilot program, PA-funded production programs now also resource new partnerships that include the Depots.
- Condition-Based Maintenance + (CB+). Mandated new technologies for monitoring the near real-time health of weapon systems to improve operational availability and sustainment.

- Total Life Cycle Systems Management (TLCSM). Later adopted in the 2003 update of DODD 5000.1, the FLE was first to use this term and identify the PM as the responsible agent (Figure 3: Phases of Acquisition Within TLCSM). This prompted organizational challenges around TLCSM.

- End-to-End Distribution. Accelerated materiel deliveries to the warfighther through improved asset tracking. This initiative led to the use of bar codes on end items and spare parts.
- Enterprise Integration. A collaborative and knowledge-sharing network to solve problems real time for acquisition and logistics professionals.
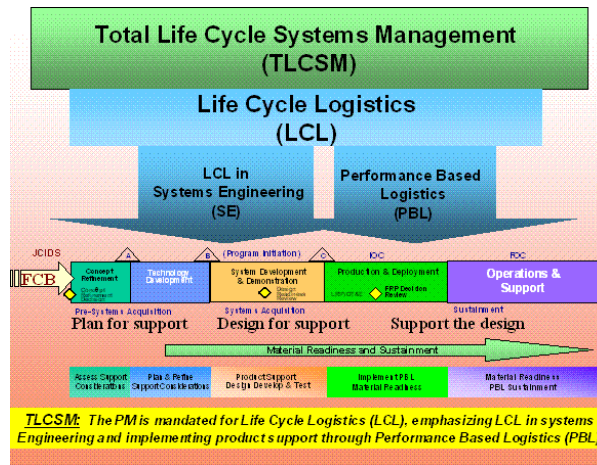


Figure 3: Phases of Acquisition Within TLCSM[25]

The FLE initiatives were later formalized in updates to the regulations governing defense acquisition policy, DoDD 5000.1 and DOD Instruction (DoDI) 5000.2, published in May 2003. While the merits of LCM to reduce ownership costs appeared in the 1990s, the 2003 DoDD 5000.1 was the first DoD policy to clearly state that the PM was the single responsible agent, for acquisition AND sustainment. The Army soon followed with a strategic plan and initiatives that adopted TLCSM as Army policy.

> The Office of the Assistant Secretary of the Army for Acquisition, Logistics and Technology (OASA(ALT)) plays a vital role in efforts to reduce and respond to national security threats to the United States. The organization must address not only the traditional acquisition and logistics management concerns related to capabilities, development, operations safety, and equipment and process failures, but also the new challenges posed by terrorism. As we continue to wage the War Against Terrorism, it is imperative that we continually take stock of

how we can reduce the risk to our Soldiers and, at the same time, eliminate obstacles to mission accomplishment.[26]

The Army acknowledged DoD policy changes by redefining the responsibilities of the ASA(RDA) and updating Army regulations and policies to adopt TLCSM.  The ASA(RDA) was renamed the ASA(ALT) with expanded responsibilities that included logistics and further designated the Deputy Chief of Staff for Logistics (DCS LOG), G-4, as the ASA(ALT)'s Responsible Official for Sustainment (ROS).[27]  The 2003 Army Regulation (AR) 70-1, Army Acquisition Policy, and the 2004 OASA(ALT) Strategic Plan 2004-2009 specified how the Army would implement TLCSM and other policies to "equip and sustain the world's most capable Army."[28] These documents removed many of the organizational and resource obstacles that defeated earlier attempts at LCM and enabled acquisition and logistics communities to unify under the LCMC initiative.  Several of the policies and events that followed were:

- 2003: AR 70-1 states that PMs are responsible and accountable for the complete life cycle of their assigned programs; therefore, programs will not transition away from a PM (as they previously were moved from ASA(ALT) to AMC management after production and fielding).[29]

- 2004: AMC and ASA(ALT) issue a Memorandum of Agreement (MOA) creating the LCMC initiative (described below). The OASA(ALT) Strategic Plan included the MOA along with additional guidance on LCMC transition.

- 2005: Redesign of the PEG process to incorporate LCM results in the Weapon Systems Review (WSR).  This new process precedes the annual budget build and requires designated PMs to present their programs to all six PEG representatives in a consolidated review to demonstrate life cycle impacts across resources. Additionally in 2006 the Equipping (EE) and Sustaining (SS) PEGs were co-chaired by the same representatives.

The Army's Life Cycle Management Command (LCMC) Initiative

Recognizing that new LCM policies alone were not meeting the demands GWOT placed on the support communities, AMC and ASA(ALT) established the 2004 LCMC initiative MOA  to "get products to the Soldier faster, make good products even better, minimize life cycle cost, and enhance the synergy and effectiveness of the Army Acquisition, Logistics, and Technology (ALT) communities." [30] The "Life Cycle" in LCMC refers to the phases of equipment acquisition (Figure 3: Phases of Acquisition Within TLCSM): technology development, system development and demonstration (SDD), production, operations and sustainment (O&S), and disposal.  The

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Army's LCMC initiative did not reorganize acquisition and logistic organizations but, instead, established community teams organized around common products and led by existing AMC commodity commanders (Figure 4: The LCMC and Functional Relationships over the Acquisition Life Cycle).

The Tank Automotive and Armaments Command (TACOM) LCMC is one of four original LCMCs and demonstrates how it is organized to achieve TLCSM.  The TACOM LCMC is responsible for the Army's soldier and ground combat systems and includes the original TACOM commodity command, PEO Ground Combat Systems (PEO GCS), PEO Combat Support Combat Service Support (PEO CS/CSS), PEO Soldier (PEO Soldier), as well as the TACOM Research and Development Center (TARDEC).  The Commanding General (CG) of TACOM leads the TACOM LCMC but does not have command responsibilities for each of the organizations.  The PEOs continue to report directly to ASA(ALT) and the Director of TARDEC reports directly to the Commander, Research, Development and Evaluation Command (RDECOM).  The other three LCMCs are organized similarly and designated: the Aviation/Missile LCMC (formerly Aviation and Missile Command (AMCOM)), the Communications/Electronics LCMC (formerly Communications Electronics Command (CECOM)), and the Joint Ammunition LCMC (formerly Joint Munitions Command (JMC) in Army Field Sustainment Command (AFSC)).  The Chemical Materiels Agency (CMA) manages development and destruction of chemical munitions and has become the fifth LCMC.
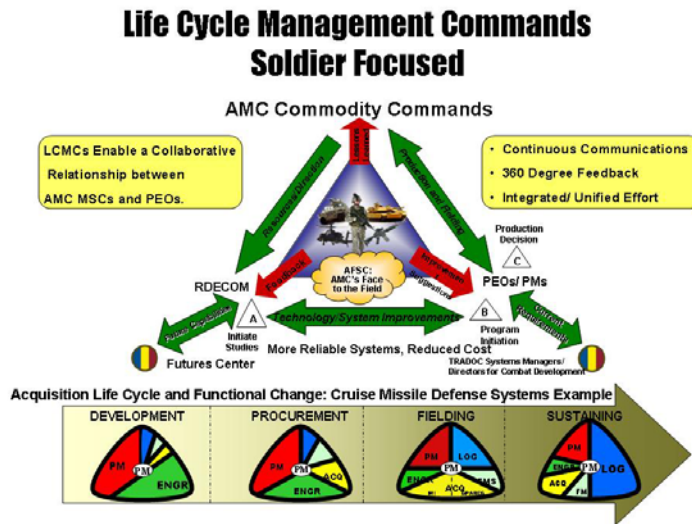


Figure 4: The LCMC and Functional Relationships over the Acquisition Life Cycle[31]

A subsequent memorandum published by AMC 18 months after the 2004 MOA highlighted the inherent challenges of the LCMCs. The July 2006 memorandum, titled "Collaboration among Organizations is key to Life Cycle Management Success," lauded the Army's implementation of TLCSM with the creation of the LCMCs, the AFSBs and the ALT Futures office at CASCOM. [32]    However, most of the two-page memorandum encouraged the acquisition, logistics and technology communities to work together and transcend traditional boundaries. "It's not about who is in charge, it is about how we can work together to provide more value to the war fight."[33] The mention of duplication and disconnects from similar taskers is only one of numerous problems that the LCMC initiative has not resolved. The LCMC initiative did not reallocate all weapon system specific funding to PMs, but retained the separate chains of command for funding. The LCMC also did not reorganize weapon systems logisticians within commodity commands to PM organizations, leaving some personnel to adopt a status quo mentality. An outdated Department of the Army Pamphlet on Army Acquisition Procedures (DA PAM 70-3) doesn't include TLCSM policy and further confuses the fence sitters in both communities. Finally, the LCMC initiative did not effect the transition of consumable spare part management away from the Services and to the Defense Logistics Agency (DLA), thus breaking the principle of TLCSM.

Despite the obvious gaps in TLCSM, the LCMC initiative has achieved remarkable results during the current wartime environment that previous LCM policies alone could not achieve. Two the Army's largest sustainment programs demonstrate how the LCMC initiative has overcome traditional obstacles to improve weapon system support to the Army.

IV. Wartime Life Cycle Management – Abrams and Apache Examples

Enabled by acquisition reforms and a desire for unity of effort when it comes to supporting our troops at the lowest possible cost and at its most efficient, the LCMC initiative has achieved the unity of effort required for life cycle management that peace time efforts failed to achieve. Both the Abrams and Apache programs provide examples of how the LCMC initiative has enabled organizational and resource changes to achieve TLCSM. Both programs are the preeminent weapon systems of their respective communities and face similar challenges in life cycle management during today's combat operations.

Abrams Tank Program Background

The Army's premier ground combat system, the M1 Abrams Tank, has far exceeded its original 20-year life cycle and presents the Army with the combined challenges of sustainment

and modernization alongside the Future Combat System (FCS) (Figure 5: Abrams Fleet Management Strategy (2006-2014)).  The M1 Abrams tank was first fielded in 1979 as one of the Army's "Big 5" weapon system programs emerging from the hollow Army of the 1970s.[34]  By the end of new tank production in 1994, the Abrams tank fleet reached almost 9,000 tanks produced for the U.S. Army.[35]  The tank model variants include the M1A1 (1987), the M1A2 (1994), the M1A2 System Enhancement Package version 1 (SEPv1, 1999), to the M1A2 SEPv2 (2006).  By 2008 the U.S. Army Abrams fleet will reduce to approximately 3,000 tanks and begin integrating FCS technologies beginning in 2010 (see Figure 5: Abrams Fleet Management Strategy (2006-2014)).  The Abrams Program Management Office (PMO) also manages four foreign military sales (FMS) programs totaling approximately 1,500 M1A1 and M1A2 Abrams tanks.
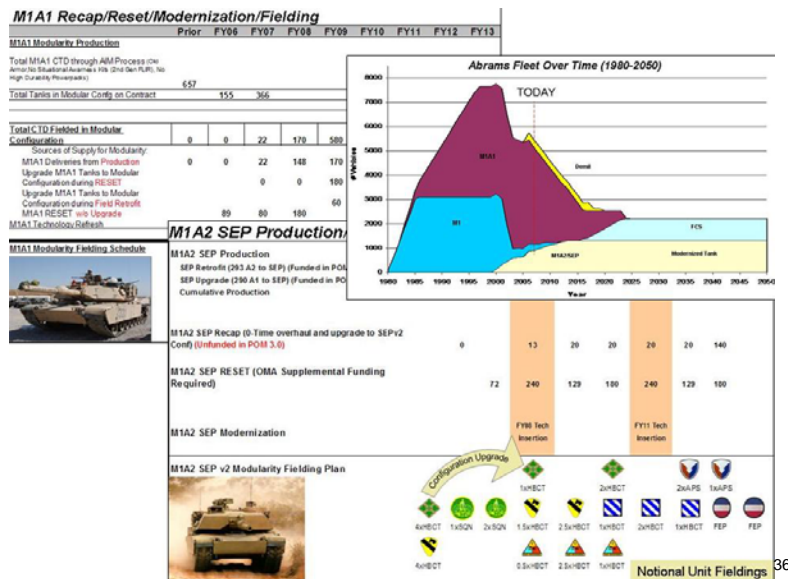
Figure 5: Abrams Fleet Management Strategy (2006-2014)

Abrams TLCSM Initiatives

The LCMC initiative together with new DOD policies has significantly enhanced the efficiency and effectiveness of PM Abrams to harmonize life cycle support of the Army's tank fleet.  Before LCMC, well-meaning organizations within the acquisition and logistics communities duplicated efforts in an attempt to meet the growing requirements from GWOT.  The LCMC initiative provided PM Abrams the policies and leadership support to apply LCM concepts that had been discussed in the 1990s but not fully realized.  Under the leadership of

the TACOM LCMC, PM Abrams reorganized as a subordinate program within the newly designated Project Manager for the Heavy Brigade Combat Team (PM HBCT). PM Abrams also leveraged 1990s RTOC programs such as the M1A1 Abrams Integrated Management (AIM) and the Abrams AGT-1500 Partnership to Reduce O&S Engine (PROSE) to achieve new ARFORGEN requirements. A review of organizational changes and two new partnership programs within PM Abrams demonstrates the benefits of unity of effort that the LCMC can provide.

Since the 2004 LCMC initiative, PM Abrams reorganized to achieve life cycle support and realign itself with the newly formed HBCTs within the Operational Army. But first, a March 2003 notification to terminate the Abrams and Bradley programs complicated reorganization by combining the Abrams and Bradley program offices under Project Manager Combat Systems (PM CS). PM CS was established in May 2003 as an O6/Colonel-level command with three 05/Lieutenant Colonel Product Managers for Abrams, Bradley, and Fire Support. Following the 2004 LCMC MOA, the TACOM LCMC established a transformation IPT to recommend LCMC procedures that ultimately delegated reorganization plans to PEOs and their assigned PMs. Based upon this guidance and PEO GCS input, PM CS reorganized for TLCSM by establishing Directors for Sustainment and Technology, dual-hatted with their originating commands and PM CS to enable planning and coordination. Additionally, PM CS established Assistant Product Managers (APM) for Sustainment in each of the Program Management Offices (PMO) to facilitate product-level sustainment coordination for spares and depot-level maintenance. PM CS was renamed PM HBCT in 2006 to reflect the organization's alignment with its operational customer, the modular HBCT. Along with the name change, PM HBCT accepted responsibility for the Army's M-88A1 and M-88-A2 heavy recovery vehicle fleets and assigned them to PM Abrams to improve the operational and sustainment life cycle support of Abrams tanks.[37] With the exception of adding liaisons and fleet responsibility for the M-88A1/2 vehicles, PM Abrams placed the greatest emphasis for achieving TLCSM on expanding 1990s RTOC initiatives to meet TLCSM objectives in 2005 and 2006.

Wartime necessity and TLCSM policies enabled PMO Abrams to evolve from traditional acquisition-only management to fleet management within the LCMC. Prior to LCMC, wartime support within PMO Abrams was focused on monitoring combat performance, managing new variant fieldings and applying existing tanks with safety and performance modifications. During this same period, Abrams logistics managers within the then-separate commodity command addressed combat parts shortages and scheduled depot-level repairs for battle damaged tanks. The LCMC initiative and the newly developed Army Forces Generation (ARFORGEN) model

(schedule for rotating operational units through one year phases of Available, Ready, and Reconstitution) compelled PMs to apply TLCSM across a fleet of fielded and newly-produced systems.  As a fleet manager, PM Abrams could leverage sustainment and procurement resources (RDTE, PA, OMA) to simultaneously sustain multiple system variants, support the Army's transformation to modularity, and modernization; all while supporting systems in combat rotating through the ARFORGEN model.

During 2005 and 2006, PM Abrams updated several component-level and system-level RTOCs by creating new partnerships between Industry and the Anniston Army Depot (ANAD) to meet wartime requirements.  Two examples of updated RTOC programs are the component-level AGT-1500 engine program and the system-level Abrams Reset program.

The AGT-1500 engine accounts for nearly 50 percent of the O&S costs of sustaining the Abrams fleet and has been the target of competing RTOC programs within the acquisition (PA funded PROSE) and logistics (OMA funded Service Life Extension (SLE)) communities since 1997.  These competing programs, to include funding, were consolidated after the LCMC initiative into the Total Integrated Engine Revitalization Program (TIGER).  TIGER is resourced from OMA funds for engine repairs and PA funds for new engine production.  The P3 initiative, created by the 2002 FLE, and subsequent changes to laws governing depot-contractor arrangements, enabled PM Abrams to create a performance based logistics (PBL) contract with the engine's OEM, Honeywell International, for Contractor Total System Performance Responsibility (CTSPR) similar to the failed Apache PVS.  Under the 2005 TIGER contract, Honeywell was incentivized to partner with ANAD to implement commercial repair practices and improve the readiness of the tank engine fleet.  Prior to the TIGER program, the Army's existing repair process was unable to keep up with wartime demands and forced the system to draw on War Reserves; however since implementing TIGER, the combined efforts of the P3 program and the PM under TLCSM have exceeded wartime demands and improved repair standards.[38] PM Abrams leveraged the benefits and experience gained from the TIGER P3 to expand the system-level partnership between General Dynamics Land Systems (GDLS) and ANAD for reconstitution efforts, termed National Level Reset (NLR) (aka Reset).

The 2007 Abrams Reset program originated from TIGER lessons learned and a very successful system-level RTOC program begun in 1998 designated the M1A1 Abrams Integrated Management (AIM) program.  The M1A1 AIM program was one of 13 Army Recapitialization programs designed to refresh old M1A1 Abrams tanks to "like new" condition as an affordable alternative to new tank production.  The first Abrams NLR program began as an OEM-only, unique, repair activity in 2004.  It was clear after the 2004 Reset of 113 M1A2 SEPv1 tanks

through the Government Owned/Contractor Operated (GOCO) Joint Service Manufacturing Center (JSMC) at Lima, Ohio, that future requirements would quickly overcome the first Reset process (FY07 projected NLR for 240 tanks within 180 days). In 2005 PM Abrams met overwhelming Reset requirements with a combination of previously funded production tanks and a similar Reset process with the OEM; however, the projected long-term Reset requirements also quickly overcame the 2005 Reset model. In lieu of splitting complete tank Reset requirements between the repair activity at ANAD and the GOCO facility, PM Abrams established a P3 with GDLS and ANAD to streamline the existing M1A1 AIM recapitalization process for Reset. Unlike the M1A1 AIM program which primarily split work 50/50 between the OEM and the depot, under the P3 both partners helped optimize processes within each facility and divided work based upon core competencies. The P3 developed an improved Reset process that decreased turn around time (TAT) from 270 to 180 days and increased the level of repair under the Army's Reset budget for tanks. Additionally, PMO Abrams has been able to combine pre-planned product improvements (P3I) and safety modifications during Reset with the combined effect of delaying a required full production step at a per tank savings of $3.5M ($210M per 60 tank HBCT). PM Abrams credits several changes in laws governing depots/arsenals coupled with the changes in culture brought about by the LCMC initiative in meeting Reset requirements that were unachievable prior to LCMC.[39]

The greatest benefits of the LCMC initiative are realized in the improved capability of PMOs to sustain aging weapon system fleets amidst the high OPTEMPO of the long war. The same regulatory changes that facilitated P3 arrangements in the Abrams Reset also allow PMOs to combine parts repair with supply chain management in PBL contracts with OEMs. PM Apache had experienced, first hand, the challenges of life cycle management and has applied Apache PVS lessons learned to achieve TLCSM.

Apache Helicopter Program Background

The Apache helicopter, like the tank, has a rich history and future role within the U.S. Army. The program has retained its O6/Colonel level Project Manager and much of the supporting staff. The AH-64A Apache helicopter was first fielded in 1986, followed by the AH-64D in 1998. Significant upgrades were made to the Apache helicopter, designated Block I (the first Longbow Apache) and Block II in 1996 and 2000 respectively. Additional upgrades, designated Block III are planned for fielding in 2012. With the decision to cancel the Comanche helicopter program in 2004, the Apache is also planned to be the Army's future force, heavy attack, multi-role helicopter beyond 2040. The U.S. Apache fleet is approximately 800

helicopters today with an objective fleet size of 634 by 2015 (see Figure 6: Apache Fleet Modernization Plan (2007-2022)).  The Apache PMO also supports 10 international programs with a combined fleet of more than 281 helicopters (Direct Contract Sales (DCS) and FMS).  Unlike the Abrams program, the Apache PMO along with PEO Aviation moved from its original headquarters in St. Louis, Missouri, to Redstone Arsenal, Huntsville, Alabama, in 1998.  The commodity command (AMCOM) for the Apache program has always resided in Huntsville at Redstone Arsenal.  Because of the approved Longbow Apache Block III program, PMO Apache has remained an O6-level command and, therefore, has implemented the LCMC initiatives at the PMO Apache level.
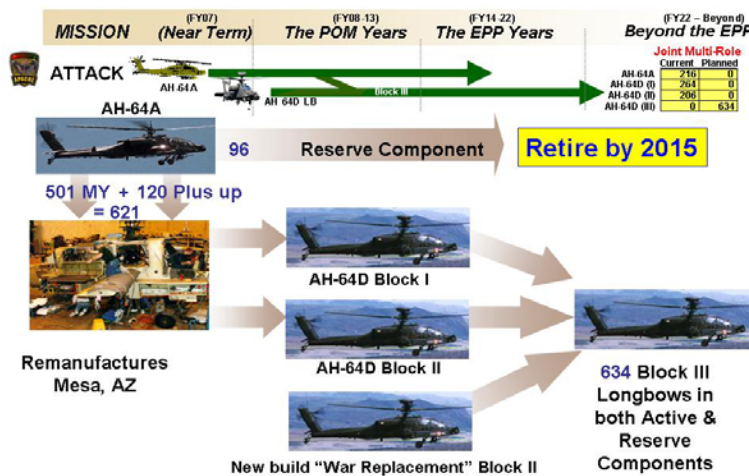
Figure 6: Apache Fleet Modernization Plan (2007-2022)[40]

Apache TLCSM Initiatives

The Aviation/Missile LCMC and PMO Apache also implemented changes under the LCMC initiative that removed many of the traditional barriers to life cycle management to achieve the principles of TLCSM.  Most noticeable was Apache's reorganization, but the AMCOM community also has a long history of partnering with industry that predates TLCSM policies and has been the benchmark for Army P3.  Apache has benefited from the Army's first P3, the T700 Engine program at Corpus Christi Army Depot (CCAD), and created its own version of Reset, both of which have been critical to supporting the ARFORGEN cycle.  The

Apache PMO's reorganization and P3 programs have achieved TLCSM and stand in stark contrast to the failed Apache PVS of the 1990s.

First, the Aviation/Missile LCMC allowed PMs to select the most effective organization model to meet their LCMC mission. PM Apache chose a combination of direct support and matrix support for its new organization. Previously there was some duplication between the logistics responsibilities of the PMO and AMCOM, so PM Apache chose to consolidate all Apache logisticians within the PM Apache Logistics Division. This move included changing over the rating schemes of AMC personnel. PM Apache, however, maintained matrix support for acquisition and engineering functions, since they shared that support with other PMOs. PMO Apache completed the consolidation of the sustainment personnel under the Apache Logistics Division in July 2006. Second, the Aviation/Missile LCMC expanded an already successful P3 program to other platforms and components.

PM Apache and the AMCOM community are the recognized leaders within the Army for P3 programs started after the demise of Apache PVS. There are currently five well-established P3 programs to sustain Army rotary-wing platforms. Two of these P3 programs along with the Apache Reset program illustrate PM Apache's unique approaches to TLCSM that began in 2000.

PM Apache benefits from two P3 programs that originated from the previously assigned commodity managers that now belong to the PMO. PM Apache's and the Army's first P3, is for the common T700 engine used in the Apache and Chinook helicopters. The T700 engine Technical Engineering and Logistics Services and Supplies (TELSS) contract began in 2001 between General Electric and CCAD. Designated the GE-CCAD P3, the TELSS contract incentivised GE to invest in upgrading the engine repair facilities and processes at CCAD to repair T-700 engines. While CCAD initiated this program in a proactive measure to prevent closure under the Base Realignment and Closure (BRAC), the significant improvements in engine performance and repair TAT jump started the Army's P3 policies and led to other programs within the Aviation/Missile community.[41] The Aviation/Missile LCMC created four other P3 programs to include Apache's Boeing-CCAD contract for Apache-unique repair parts. The initial Boeing-CCAD contract was signed in November 2004 for only 44 components, but in 2007 this contract will be extended to 111 additional components. The GE-CCAD T700 TELSS and the Boeing-CCAD parts repair contract has maintained 100% parts availability for the Apache Reset line and the supply system, which has been critical in support of the ARFORGEN.[42] PM Apache has also leveraged their PBL experience in component-level P3 programs in developing an equally successful Apache Reset program.

The Apache Reset has integrated PBL metrics with an OEM-only contract to meet previously unachievable results.  Similar to the Abrams program, Apache had previously only executed full production programs (PA funded) or small quantities of damage repairs (OMA funded) through the depot.  The Apache Reset requirements were to induct, inspect, repair, and modify 40-160 aircraft within 180 days of redeployment (IAW ARFORGEN).  The objective is to return AH-64A Apaches and AH-64D Apache Longbow helicopters to pre-deployment conditions within 60 days.  Reset tasks include intense cleaning and repair of all major subcomponents, repairs for crash and battle damage, materiel management of replacement/repaired parts, and flight testing upon completion.  Boeing Logistics Support Systems (LSS) conducts the Reset at their Mesa, Arizona, site.  Prior to the LCMC initiative, helicopter repairs were limited to an average of 5 Apaches per year through the depot, but through the Apache Reset program, the PM has been able to combine OMA funding and OEM resources with great results.  The average Apache Reset TAT from OIF-I to OIF-II was reduced from 105 days to 72 days, and the PM/OEM team is working to meet it's 60 day objective for future Reset programs.  While the current Apache Reset is purely OMA-funded, Apache may combine PA-funded upgrades in the future for safety and survivability fixes in order to accelerate high-priority improvements across the Apache fleet.

Common Benefits/Challenges for PMs Abrams and Apache under the LCMC Initiative

The combination of war time necessity and TLSCM policies has enabled LCMCs to overcome most of the traditional obstacles to unity of effort in LCM.  Both PM Abrams and Apache have identified common benefits along with olds and new challenges that are present within the LCMC initiative.  Some common benefits/challenges are:

- Unity of effort – within the LCMCs, both PM Abrams and Apache report that the initiative has achieved unity of effort. Whether logistics personnel are collocated or participate in PM-led integrated product teams (IPT), acquisition and logistics personnel are working together to support an integrated fleet strategy .  However, above the LCMC, leaders in both PMOs report that AMC and ASA(ALT) frequently send down identical taskings and initiate duplicate efforts in response to Army sustainment issues.
- Fleet management – with visibility and configuration control of the entire fleet, PMs can work with Army G-3/G-8 throughout the ARFORGEN to leverage the full range of PM capabilities for depot repair, full production, Reset, and field modifications to meet modularity, modernization, and warfighting support.

- Simultaneous modernization and sustainment – now that national-level repairs and production activities are not mutually exclusive, both PMs can leverage resources for sustainment and modernization simultaneously to accelerate critical improvements without waiting on long term upgrade/fielding schedules.  Additionally, PBL contracts for repair parts provide an opportunity for improved durability and reduced costs.

- Partnerships – because PMs now have the responsibility to apportion work across depots and Industry, both PM Abrams and Apache have leveraged P3 to motivate depots and industry to partner in lieu of building duplicative capabilities and competing for scarce resources.  However, as long as weapon system-specific funding remains split between AMC and ASA(ALT), both PMs are concerned that significant reductions in program requirements may negatively effect the climate that has created successful P3 contracts to date.

- Management of system-unique consumables – since the 2005 BRAC mandated the management of all consumables to DLA, both PMOs have experienced significant program shortfalls when DLA failed to maintain adequate quantities to support their assigned fleets.  While supporting DLA organizations are working to better serve customer PMs, the PMOs argue that they are best resourced to manage system-unique parts that are low-density compared to the nuts and bolts that DLA manages so well.[43]

These common benefits and challenges to LCM since the LCMC initiative demonstrate the Army's significant strides towards TLCSM since 2001; however, the Army and DoD continue to be criticized for its acquisition processes.  A review of several studies released in 2006 and examples from Abrams and Apache provide a "short list" of recommendations that, if implemented, would transition the LCMC initiative from another wartime ad hoc organization to a long term process improvement for Army acquisition and logistics support.

V. Recommendations to Finalize TLCSM Transformation

Since the creation of the Department of Defense in 1947 there have been over 125 defense reform studies that have shaped our modern defense acquisition policies, most notably the commercial industry's concept of total life cycle management.  Despite the acquisition reforms described by TLCSM and implemented in DoD and Army policies, some traditional inefficiencies in acquisition law and organizations remain. Left unchanged, these old problems will prevent the LCMC initiative from supporting the Army once wartime necessity is replaced with the old bureaucracy and disunity of effort between the acquisition and logistics

communities. Both the 2006 QDR and the 2006 Defense Acquisition Process Assessment (DAPA) identified unstable funding and complex command relationships as critical flaws in the defense procurement industry.[44] Unstable funding rests with Congress and is problematic across the services. Complex command relationships also exist across the services but is most pronounced in the Army, even with the creation of the ad hoc LCMC organizations. Other helpful reports released include a 2005 Center for Naval Analysis (CAN) Study, *Dual-Hatting Army PEOs: PEO/LCMC Assessment*, and a 2006 RAND study, *Reexamining Military Acquisition Reform*.[45] The recommendations from these recent reports as well as other initiatives in the Abrams and Apache PMOs provide a short list for transforming the LCMC initiative to survive through peacetime and wartime conditions.

- Resources: Responsibility AND Authority: The term "authority" implies management of the funding for all aspects of a weapon system. Even with LCMC, OMA funding raised from the AWCF or appropriated for vehicle repairs are routed through AMC to commodity offices within the LCMC. This method of controlling sustainment funding is a legacy that pre-dates LCMC and removes the PM from directly managing the resources he requires to sustain his fleet.[46] PMs commonly refer to this practice as "responsibility without authority", since the PM is responsible for executing sustainment but doesn't control the resources.[47] Recommendations: All system-specific funding should be routed through ASA(ALT) to the designated PM.[48] While the Army still requires a viable AWCF system, PMs should be required to consider the existing spare parts system so that low-density programs are not severely impacted. The Abrams TIGER program did this by requiring operational units to purchase overhauled engines through the existing spares system, thus maintaining the integrity of the AWCF.

- Unity of Command: While the Army established ASA(ALT) as the lead for acquisition, logistics, and technology, the Army has retained dual reporting and chains of command up through AMC and ASA(ALT). The LCMC initiative and AR 70-1 establish roles and responsibilities, but the dual nature of the relationships has resulted in duplication across the AMC and ASA(ALT) staffs and multiple formal and informal "bosses" that PMs must answer.[49] The study recommendations range from establishing a single Four-Star Acquisition Systems Command responsible for LCMC to dual-hatting the Military Deputy to ASA(ALT) as the Deputy CG, AMC. Recommendations: A single Four-Star command for acquisition and logistics would be the best means to achieve unity of effort and command; however, it appears that

such a command is not politically feasible within the Army. An alternative to a single Four-Star command would be dual-hatting the acquisition MILDEP to empower a single officer with responsibilities and authorities to deconflict and focus the two staffs. At the LCMC level, align sustainment personnel and resources under PM control. PM Apache reorganized commodity logisticians without any insurmountable issues.[50] PM Abrams and the rest of PM HBCT have not reorganized all logisticians managing the assigned programs, resulting in periodic disconnects and disagreements over sustainment efforts.[51]

- Line Item Number (LIN) management: Currently there are approximately 1,800 products, designated LINs (listed in SB 700-20), managed within AMC (600 in CECOM, 380 in TACOM, and the balance elsewhere) that do not benefit from the resources and LCM of a designated PM and PMO.[52] Recommendation: Consolidate all LINs within ASA(ALT) and assign to PMs. This may require a small number of additional PMs, but most of the LINs are already associated with existing programs and would only necessitate reassignment to PM management.[53] This realignment should include the personnel currently managing those LINs.

- Product-unique consumables: one outcome of the 2005 Base Realignment and Closure Commission (BRAC) was the consolidation of all consumables under the Defense Logistics Agency (DLA). While this makes sense for common items like nuts and bolts, this policy contradicts the LCM responsibilities of PMs.[54] Recommendations: Reconsider moving all unique consumables to DLA so that PM can incorporate modernization and configuration issues seamlessly.

- TLCSM guidance: The Defense Acquisition University's online guide provides excellent joint guidance and even recommended procedures for PMs to implement TLCSM. However, Department of the Army Pamphlet (DA PAM) 70-3, Army Acquisition Procedures, was last published in July 1999 and does not reflect TLCSM nor any lessons learned from supporting GWOT. Consequently there is some confusion amongst acquisition and logistic professionals in how to implement TLCSM. Recommendation: Issue a revised DA PAM 70-3 that incorporates TLCSM and integrates lessons learned from successful acquisition experiences supporting GWOT.[55]

<u>VII. Conclusions</u>

The LCMC initiative has been a significant enabler for the Army's Institutional acquisition and logistics communities to meet the simultaneous demands of modernization and wartime support, but further changes are needed to meet the Army's long term requirements.  The combination of increased program budgets and wartime necessity have helped the LCMC initiative achieve LCM objectives that failed during peacetime.  Two of the Army's largest sustainment programs, the Abrams tank and Apache helicopter, have leveraged the LCMC initiative and recent TLCSM policies to meet ARFORGEN requirements while continuing to modernize their fleets.  Both programs have transformed their PMOs from weapon system development and production to fleet management.  As fleet managers, PMs Abrams and Apache have been able to respond to emerging Army requirements with a combination of OMA and PA resourced programs across a fleet in various stages of the life cycle.  Wartime demands have demonstrated the efficiency and effectiveness of centralizing LCM responsibility with the PM.  However, traditional sources of competition and conflict between the acquisition and logistics communities remain and could threaten unity of effort without continued reorganization and policy changes.  In order for PMs to be responsible and authorized to manage the life cycle of their weapon systems, organization and resource reforms are necessary.  LCMCs should facilitate reorganizing system-unique organizations under designated PMs using the Apache model.   System-specific resources should be under the control of the designated PM, in stead of the traditional split-funding between AMC and ASA(ALT).  Other changes above the PM would be helpful but aren't imperative for LCMC success.  Despite the "short list" of recommendations, the LCMC initiative, more than any other single initiative, has significantly enhanced the Army's life cycle management of weapon systems by focusing disparate organizations on the common goal of getting requirements into the hands of soldiers efficiently and effectively.  The conditions of unity of effort and increased resources provide the opportunity to make lasting improvements to TLSCM that will withstand the inevitable interwar period that must follow the current resource-rich conflict.

<u>Endnotes</u>

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[2] Institute of Land Warfare, Association of the United States Army, *Fiscal Year 2007 Army Budget: An Analysis* (Washington, D.C.: Institute of Land Warfare, Association of the United States Army, 2006), 61. The Apache and Abrams programs are the 2nd and 8th largest programs

respectively in terms of RDTE and PA funding ($918M Apache, $549M Abrams). These figures do not include Congressional supplemental funding for Operations Enduring Freedom or Iraqi Freedom (OEF/OIF) for the U.S. Army.

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[4] President's Blue Ribbon Commission on Defense Management, "Quest for Excellence: Final Report to the President," (Packard Commission, Washington, D.C.: June 1986).

[5] Ronald Reagan, *Implementation of Recommendations of President's Commission on Defense Management, National Security Defense Directive (NSDD) 219* (accessed at http://www.fas.org/irp/offdocs/nsdd/index.html, 16 October 2006), 7 pages. Note that even though NSDD 219 preceded the 1986 DARA, the document was written in anticipation of the 1986 DARA and established additional reforms that were later adopted in the first DODD 5000 series. NSDD 219 background also attributed to Richard Sylvester, during a phone interview regarding Lifecycle Management initiatives, U.S. Army War College, September 2006. Mr. Sylvester is a Senior Executive Service civilian working within OSD on acquisition policy. He stated that President Reagan's National Security Defense Directive 219 formalized the Packard recommendations that established the Acquisition Executives. These initiatives were formalized further with the 1991 Defense Acquisition Workforce Improvement Act (DAWIA) and the 1997 Defense Reform Initiative (DRI).

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[14] ASA(RDA), "Total Ownership Cost Reduction," memorandum for Assistant Secretaries and MACOMs, Washington, D.C., 4 May 1998.

[15] U.S. Congress, Senate, Committee on Armed Services, Subcommittee on Airland Forces, *Statement by Lieutenant General Paul J. Kern, Military Deputy to the Assistant Secretary of the Army for Research, Development, and Technology, and Lieutenant General John N. Abrams, Deputy Commanding General, United States Army Training and Doctrine Command: Hearings before the Subcommittee on Airland Forces on Land Force Modernization,* 105th Cong., 2d sess., 11 March 1998, 12-13.

[16] Colin Clark, "DoD Picks 10 Weapons for Maintenance Test," *Defense News*, 5 April 1999, 46. The pilot program was established by the Strom Thurmond National Defense Authorization Act (NDAA) for Fiscal Year 1999. The 1999 NDAA required DOD to designate 10 pilot programs to test PM performance of life cycle acquisition responsibilities.

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[18] Joan H. Langston, "Army Lt. Gen. Paul Kern Leading Sweeping Change in AAC Education and Training System," Program Manager, May-June 2000, 8.

[19] U.S. Congress, 13.

[20] Tank Automotive and Armaments Command, Picatinny (TACOM-Pica), "M109 Family of Vehicles Fleet Management Program Lessons Learned," memorandum published for TACOM leadership, Picatinny Arsenal, N.J., 21 April 1999, 2.

[21] Department of Defense, *Quadrennial Defense Review Report* (Washington, D.C.: Department of Defense, 6 February 2006), 63.

[22] Ibid., 67-72.

[23] The National Defense Authorization Act for Fiscal Year 2002 amended laws governing depot support that made this initiative possible. First, depot-industry partnerships, called public-private partnerships (P3), are exempted from the 50 percent rule for organic sustainment support. Second, several "hold harmless" provisions to cost, schedule, and performance were amended so that depots could be held responsible as partners with industry. For more see "The Army's Organic Industrial Base: What is the Future for Depots and Arsenals," (Lexington Institute, Land Warfare Working Group, www.lexingtoninstitute.org February 2005).

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[33] Ibid.

[34] Orr Kelly, *King of the Killing Zone: The Story of the M-1, America's Super Tank* (W. W. Norton & Company, New York: 1989), i.

[35] Lieutenant Colonel Scott Flynn, Product Manager Abrams Tank, "Weapon Systems Review: Abrams Tank FY2008-2013," slides provided to author 15 January 2007, This information came from slide 4 from this presentation.

[36] Flynn, figure was created using slides 4, 31, and 33 from this presentation.

[37] In addition to the M-88 Armored Recovery Vehicle, PM Abrams had also been assigned the Wolverine Heavy Assault Bridge (HAB) prior to the LCMC initiative because the HAB is mounted on an M1A2 SEP chassis.

[38] The performance metrics on TIGER were based on four general categories, each with annual objectives: improved durability (mean time between depot repair (MTBDR)), supply chain management, first pass yield (FPY) of overhauled engines, and field support.  The emerging results after the first year have surpassed all predicted objectives: it is too early to measure engine durability, but the increase in FPY from 62% in 2005 to 86% by December

2006 is ahead of projections; parts availability is at 76% while the original government furnished materiel (GFM) is still being replaced; and 10 field sites have been established in CONUS and OCONUS to provide engine repair and training to local units.  In addition to the initial scope of the TIGER contract, the PMO has expanded the field support concept to the Iraqi area of operations (AOR) with a TIGER support cell in Kuwait in March 2006.  Previously engines were sent back to CONUS for triage and repair.  Since March 2006, the TIGER site in Kuwait has processed over 180 engines and repaired more than 90 engines for direct delivery to tank units in Iraq.

[39] New laws created in 2004 initiated by the 2002 FLE include 10 U.S. Code 2474 which established the Industrial Centers of Industrial and Technical Excellence (CITE) that permitted partnerships with industry (P3) where Depots could enter into direct sales contracts.  For more see "The Army's Organic Industrial Base: What is the Future for Depots and Arsenals," (Lexington Institute, Land Warfare Working Group, www.lexingtoninstitute.org February 2005).

[40] Colonel Derek Paquette, Project Manager Apache Attack Helicopter, "Apache Weapon Systems Review," slides provided to author 15 January 2007. This information came from slide 2 from this presentation and was altered for public release.

[41] Data collected from AMCOM's 1 Jan 2005 Partnership brochure and CCAD's website (http://www.ccad.army.mil/default1.htm).

[42] Gary Doty, email message to COL Anthony Potts, former Product Manager for Apache Reset,13 December 2006. Email stated that improvements in the PBL metrics from 2001 to 2006 include 70% reduction in overhaul cycle time, 100% parts availability, 100% improvement of shaft horsepower margin (SHM), increased first time test yield at the depot from 40% to 90% (2004 data), and $11.6M projected savings for newly developed repairs.

[43] Colonel Anthony Potts, former PM Apache Reset, interviewed by author on 22 September 2006 at the U.S. Army War College., and Lieutenant Colonel Scott Flynn, Product Manager Abrams Tank, telephone interview on 24 October 2006.

[44] Defense Acquisition Performance Assessment (DAPA) Project For the Deputy Secretary of Defense, Defense Acquisition Performance Assessment Report January 2006, 1-16.

[45] Christle, 62 pages

[46] Joseph Ferara, Professor for Policy and Program Management at Georgetown University, Washington D.C., phone interview on 8 November 2006.  Mr. Ferara was an advisor and CNA researcher on several studies on defense acquisition through the 1980s and stated that the recent study came up with similar results.  He emphasized that real change in any government organization requires more than just policy letters and new line diagrams.  He stated that you must change how the money (authorization) flows and how processes are conducted.  In his opinion, because this hasn't taken, real change will take longer or fail to occur.

[47] Hanks, xix.

[48] This recommendation appeared in several studies and during interviews with senior acquisition officials within DoD and ASA(ALT).  For more information refer to the following

studies: RAND *Reexamining Military Acquisition Reform: Are We There Yet?,* 2005; CNA "Dual-Hatting Army" PEOs: PEO/LCMC Assessment," January 2006; and DAPA 2006.

[49] Hanks, 5.

[50] Richard Ordway, Deputy Project Manager Apache Helicopter, phone interview on 21 September 2006.  Alvin Hopkins, Logistics Division Chief, Apache Helicopter, and Mary Marcucci, Apache Logistician, phone interview on 1 December 2006.

[51] Lieutenant Colonel Scott Flynn, Product Manager Abrams Tank, telephone interview on 24 October 2006.

[52] Nancy Moulton, Deputy for Life Cycle Integration, ASA(ALT) , telephone interview by author, 10 January 2007.

[53] Moulton phone interview.  Ms. Moulton described this recommendation in an unpublished white paper she authored, "The Evolution of Life Cycle Management: An Adaptive Learning Organization," 6 January 2007.

[54] Note - DLA supply availability for both Abrams and Apache is over 90%, but when a unique item becomes unavailable due to vendor or quality issues, the impacts are felt across the fleet.

[55] Moulton phone interview.  Ms. Moulton described this recommendation in an unpublished white paper she authored, "The Evolution of Life Cycle Management: An Adaptive Learning Organization," 6 January 2007.