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From Push to Pull: Barriers to MALSP Modernization

19 February 2013

by

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ABSTRACT

The Marine Aviation Logistics Support Program (MALSP) is the current concept that Marine aviation uses to sustain aircraft readiness through the maintenance of aircraft and the supply of aircraft parts. The MALSP is a push system that deploys a large footprint of parts, personnel, and supporting infrastructure. This large footprint, commonly referred to as the iron mountain, is expensive to deploy and maintain. In order to minimize cost, an initiative known as the MALSP II has evolved. Utilizing demand-based logistics response of the MALSP II, the Marine Corps will deploy a reduced aircraft maintenance and aviation supply footprint. Parts will be distributed through various nodes. As parts are requisitioned, demand triggers parts to be pulled from these nodes. Theoretically, the transition to a pull system would increase response time, minimize cost, and decrease wait time. The purpose of this thesis is to perform a qualitative analysis of the MALSP II to identify barriers to modernization and provide recommendations to mitigate risk. Areas of concern include information technology (IT), specifically, Marine Aviation Logistics Enterprise Information Technology (MAL-EIT); interoperability with Global Combat Support Systems–Marine Corps (GCSS–MC); funding, maturity, and supportability, as well as organizational barriers to MALSP modernization; and inventory management.



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We would like to thank Colonel Donald E. Davis, USMC (Ret.), for his historical knowledge and perspective on the creation of the MALS and the MALSP; Dave Campbell for sharing a candid evaluation of CPI and depot-level integration into the MALSP II; Tom Denevan for his insight on MAL-EIT; and our advisors for assisting us in the process after an unfortunate series of events derailed previous projects and threatened to preclude this one.



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Disclaimer: The views represented in this report are those of the author and do not reflect the official policy position of the Navy, the Department of Defense, or the federal government.



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LIST OF ACRONYMS AND ABBREVIATIONS

AAT	AIRSpeed Analysis Tool
ACE	Air Combat Element
ACR	Allowance Change Request
AE	Age Exploration
AMO	Aircraft Maintenance Officer
AOR	Area of Responsibility
APB	Acquisition Program Baseline
AVLOG	Aviation Logistics
BMT	Buffer Management Tool
CBA	Capabilities-Based Assessment
CCSP	Common Contingency Support Package
CDD	Capability Development Document
CEO	Chief Executive Officer
CJCS	Chairman of the Joint Chiefs of Staff
CJCSM	Chairman of the Joint Chiefs of Staff Manual Series
CNAF	Commander of the Naval Air Forces
CNO	Chief of Naval Operations
CO	Commanding Officer
CONUS	Continental United States
CPI	Continuous Process Improvement
CR	Current Readiness
CRA	Continuing Resolution Authority
CSP	Contingency Support Package



D-Level	Depot Level
DAU	Defense Acquisition University
DBR	Drum Buffer Rope
DCA	Deputy Commandant for Aviation
DoD	Department of Defense
E2E	End to End
EDS	Expeditionary Delivery System
ELAT	Enterprise Logistics Analysis Tool
EPS	Enhanced Production Systems
EPUK	Expeditionary Pack-Up Kit
ESB	En-route Support Base
FCA	Field Calibration Activity
FISP	Fly-In Support Package
FMC	Full-Mission Capable
FOB	Forward Operating Base
FOC	Full Operational Capability
FOSP	Follow-On Support Package
FRC	Fleet Readiness Center
FY	Fiscal Year
FYDP	Future Years Defense Program
GAO	Government Accountability Office
GCCS	Global Command and Control System
GCSS–MC	Global Combat Support Systems–Marine Corps
H&MS	Headquarters and Maintenance Squadron
HQMC	Headquarters, U.S. Marine Corps



I-Level	Intermediate Level
ICD	Initial Capabilities Document
ICRL	Individual Component Repair List
IMA	Intermediate Maintenance Activity
IOC	Initial Operational Capability
IT	Information Technology
JCD	Joint Capabilities Document
JCIDS	Joint Capabilities Integration and Development System
JCS	Joint Chiefs of Staff
JROC	Joint Requirements Oversight Council
KPP	Key Performance Parameter
LPT	Logistics Planning Tool
MAG	Marine Air Group
MAGTF	Marine Air-Ground Task Force
MAL-EIT	Marine Aviation Logistics Enterprise Information Technology
MALS	Marine Aviation Logistics Squadron
MALSC	Marine Aviation Logistics Support Concept
MALSP	Marine Aviation Logistics Support Program
MARFOR	Marine Corps Forces
MCASL	Marine Corps Aviation Supply Logistics
MCWP	Marine Corps War Fighting Publication
MDA	Milestone Decision Authority
MESM	Mission-Essential Subsystem Matrix
MF	Mobile Facility
MMCO	Maintenance Material Control Officer



MOB	Main Operating Base
MPS	Maritime Prepositioning Ship
MSA	Materiel Solution Analysis
NAE	Naval Aviation Enterprise
NALCOMIS	Naval Aviation Logistics Command Management Information System
NAMP	Naval Aviation Maintenance Program
NAVAIR	Naval Air Systems Command
NGEN-BMS	Next Generation Buffer Management System
NIIN	National Item Identification Number
NMC	Non-Mission Capable
OCO	Overseas Contingency Operations
O-Level	Organizational Level
OOMA	Optimized Organizational Maintenance Activity
OUSD(AT&L)	Office of the Under Secretary of Defense for Acquisition, Technology and Logistics
PCO	Production Control Officer
PCSP	Peculiar Contingency Support Package
PM	Program Manager
PMALS	Parent Marine Aviation Logistics Squadron
PMC	Partial-Mission Capable
PMW	Program Manager Warfare
POM	Program Objective Memorandum
RCM	Reliability-Centered Maintenance
RESP	Remote Expeditionary Support Package
RFI	Ready for Issue



RFID	Radio Frequency Identification
RIE	Rapid Improvement Event
RDT&E	Research, Development, Testing, and Evaluation
RMD-O	Repairable Management Division Officer
ROMO	Range of Military Operations
R-Supply	Relational Supply System
S&RL	Sense and Respond Logistics
SAMMS II	Stand-Alone Material Management System II
SAR	Selected Acquisition Report
SE	Support Equipment
SME	Subject-Matter Experts
SPAWAR	Space and Naval Warfare Systems Command
SSB	Single Supply Baseline
TD	Technical Directive
T-AVB	Aviation Logistics Support Ship
T/M/S	Type/Model/Series
TOC	Theory of Constraints
TPFDD	Time-Phased Force Deployment Data
TRR	Time to Reliably Replenish
UID	Unique Identification
UPL	Unauthorized Parts Locker
XO	Executive Officer



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I. INTRODUCTION

The Marine Aviation Logistics Support Program (MALSP) is the current concept that Marine aviation uses to sustain aircraft readiness through the maintenance of aircraft and the supply of aircraft parts. The MALSP is a push system that deploys a large footprint of parts, personnel, and supporting infrastructure. This large footprint, commonly referred to as the iron mountain, is expensive to deploy and maintain. Although the MALSP was proven effective during Operation Desert Storm/Desert Shield, its inefficiencies in addressing the full range of military operations (ROMO) spurred the need to adapt and modernize the program. In order to address these shortfalls and minimize cost and risk to personnel, the initiative known as the MALSP II has evolved. Using the demand-based logistics response of the MALSP II, the Marine Corps will deploy a much smaller aircraft maintenance and aviation supply footprint. Parts will be distributed through various hubs or nodes. As parts are requisitioned, demand triggers parts to be pulled from the nodes. Theoretically, the transition to a pull system such as the MALSP II would improve response time, minimize cost, and decrease the awaiting parts status at the squadron level.

In our combined 38 years of experience in the aviation maintenance community, we have witnessed several failed attempts at implementing new programs. From personal experience, we have observed the efforts of higher echelon leaders to implement programs, only to be weakened by misinformed subordinates who fail to grasp the critical concepts necessary to the program's future success. This "better way to do business" mentality by subordinates prevents the necessary evolution of programs and precludes successful adaptation. The purpose of this thesis is to perform a qualitative analysis of the MALSP II in order to identify barriers to modernization and provide recommendations to facilitate the transformation of the MALSP II and increase its prospects for success.

Ensuring that the modernization of the MALSP II is a success is vital because it is the responsibility of the Marine Corps to be "most ready when America is least ready" (Cavallaro, 2010, p. 1). In order to do be ready, the MALSP II must be able to provide



Marine aviation squadrons with the required aircraft parts in a reliable manner to meet and, if needed, exceed current readiness goals.

Through personal experience, research, and interviews with subject-matter experts (SMEs) at the MALSP II program office and at intermediate- and depot-level facilities, we have identified three predominant problem areas that must be addressed to facilitate the modernization efforts of the MALSP II. Areas of concern include the following: (1) information technology (IT; specifically, Marine Aviation Logistics Enterprise Information Technology [MAL-EIT]) and its lack of interoperability with Global Combat Support Systems-Marine Corps [GCSS-MC], funding, maturity, and supportability; (2) organizational barriers to MALSP modernization; and (3) inventory management.¹

A. INITIAL OPERATIONAL CAPABILITY

In April 2012, Deputy Commandant for Aviation (DCA; 2011a) Policy Letter 03-11 was updated to clearly delineate the requirements for the MALSP II initial operational capability (IOC) to be completed no later than September 30, 2014. (See Appendices A and B for DCA Policy Letter 03-11, as well as *Revision A to Policy Letter 03-11*.) With the latest revision of DCA Policy Letter 03-11, the requirements to reach IOC have become more difficult. DCA Policy Letter 03-11 (2011a) required “one [type/model/series] (T/M/S) detachment or squadron that is demand-pull logistics synchronized, maintains Current Readiness (CR) standards, and capable of performing all aviation logistics functions IAW MCWP 3-21.2.” *Revision A to Policy Letter 03-11* required an entire “T/M/S community of aircraft to a level that enables the community to achieve and sustain CR performance standards and goals.” In this paper, we analyze the new MALSP II requirements and show that the September 30, 2014, deadline is too aggressive and unachievable. We also identify barriers preventing the MALSP II from reaching IOC under the current mandated timeline and what must be addressed in order to facilitate the MALSP II transition and implementation.

The thesis is organized as follows:

¹ GCSS-MC is a critical enabling technology for Marine Corps Logistics Modernization strategy and provides logistics information to the Marine Air-Ground Task Force (MAGTF).



- In Chapter II, we provide necessary background and historical information on the MALS, MALSP I, MALSP II, continuous process improvement (CPI), and the Theory of Constraints (TOC) to facilitate understanding of the MALSP II system of systems.
- In Chapter III, we address IT shortfalls that could potentially hinder or prevent the transition to the MALSP II.
- In Chapter IV, we address organizational behavior barriers to MALSP II implementation.
- In Chapter V, we address inventory management and required CPI methodologies to successfully transition to the MALSP II.
- In Chapter VI, we summarize our findings and provide recommendations to enable MALSP II modernization.



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II. BACKGROUND

A. THE HEADQUARTERS AND MAINTENANCE SQUADRON

Prior to October 1988, and as far back as the 1960s, the primary Marine aviation logistics unit for each Marine Air Group (MAG) was the Headquarters and Maintenance Squadron (H&MS), affectionately referred to as “hamsters” (Hayn, 1989, p. 10). Each squadron operated uniquely. According to Hayes (1992),

the operational structure of the H&MS was not standardized throughout the Marine Corps. Some H&MS were operational squadrons with assigned aircraft, while other H&MS had no aircraft assigned and provided only IMA [Intermediate Maintenance Activity] support to the air groups. (p. 3)

The key billet holders (ordnance, supply, maintenance, and avionics) in the H&MS simultaneously held positions in the MAG as special staff directly responsible to the MAG commanding officer (CO). This command relationship presented subordinate officers with the conundrum of having to report to not only the H&MS CO but also the MAG CO, which is directly counter to one of Napoleon’s tenets: “Nothing in war is so important as an undivided command” (Headquarters, Marine Corps [HQMC], 2002b, p. 1-11).

Wade (2002) suggested that until the late 1980s, the aviation support system was “convoluted and disjointed” (p. 8.) Before the MALSP was introduced, there were no standardized operating procedures for organizing logistical needs for deployment. According to Wade (2002), “no standardized procedures to task organize aviation spare parts; support equipment (SE), mobile facilities (MFs), and aviation support personnel existed” (p. 8). The synergistic effect of a lack of a standardized means of tailoring, and deploying aviation logistics, without a unity of command² in the H&MS organizational structure resulted in a non-standardized, extremely time-intensive method of supporting the warfighter. For an expeditionary quick-reaction force, this was unacceptable. To adapt to a changing environment and correct flaws in the system, Marine Corps

²Unity of command is the vesting of a single commander with the requisite authority to direct and coordinate the actions of all forces employed toward a common objective.



logisticians pressed for the implementation of the Marine Aviation Logistics Squadron (MALS) and the Marine Aviation Logistics Support Concept (MALSC; D. Davis, personal communication, August 24, 2012).

B. THE MARINE AVIATION LOGISTICS SQUADRON

According to Hayn (1989), “as of October 1988, MAGs were reorganized” (p. 5). As a result of the reorganization, the MALS was created to correct the flaws of the H&MS command structure. The MALS eliminated the dual chains of command and brought all logistical responsibilities and functions under the MALS commander directly responsible to the MAG CO. The MALS is responsible for providing intermediate-level (I-Level) support capabilities to the MAG. According to Commander of the Naval Air Forces Instruction (COMNAVAIRFORINST) 4790.2B (2012), *Naval Aviation Maintenance Program (NAMF)*, the I-Level maintenance mission is as follows:

To enhance and sustain the combat readiness and mission capability of supported activities by providing quality and timely material support at the nearest location with the lowest practical resource expenditure.

I-Level maintenance consists of on-and-off equipment material support and may be grouped as follows:

- Performance of maintenance on aeronautical components and related SE.
- FCAs (Field Calibration Activity) which perform I-Level calibration of designated equipment.
- Processing aircraft components from stricken aircraft.
- Providing technical assistance to supported units.
- Incorporation of Technical Directives (TDs).
- Manufacture of selected aeronautical components, liquids, and gases.
- Performance of on-aircraft maintenance when required.
- Age Exploration (AE) of aircraft and equipment under RCM [Reliability-Centered Maintenance].
(p. 3-2)

Each MALS provides a core group of Marines with expertise in various subject matters. When combining MALS Marines with organizational-level (O-Level) maintenance personnel, the result is I-Level maintenance capability, which enables the



MALS to support the Air Combat Element (ACE) aircraft readiness. Figure 1 shows the O-Level to I-Level relationship.

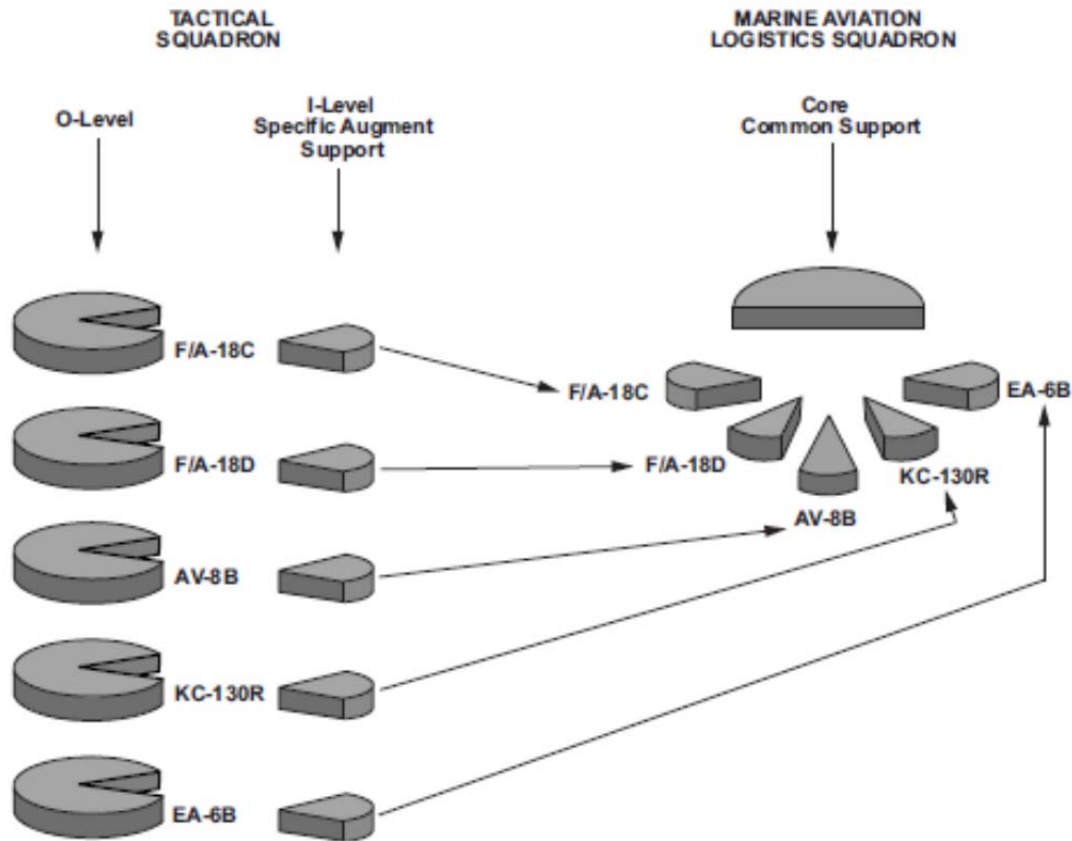


Figure 1. MALS Support Organization
(From HQMC, 2002a, p. 1-4)

The Naval Aviation Maintenance Program (NAMP) categorizes aircraft readiness into three main categories: full-mission capable (FMC), partial-mission capable (PMC), and non-mission capable (NMC). The ability to perform a specific mission and the impact of subsystem degradation determines an aircraft’s readiness status. The Commander of the Naval Air Forces (2012) stated, “The CNO establishes 73 percent MC and 56 percent FMC as the overall naval aviation enterprise (NAE) aircraft material readiness goal” (p. 17.2.1.1). Aircraft readiness for each T/M/S is dictated by the respective T/M/S Mission-Essential Subsystem Matrix (MESM). The MALS continuously supports the O-Level squadrons in their efforts to meet these readiness goals.



C. THE MALSP

In the early stages of development, the MALSP was referred to as the Marine Aviation Logistics Support Concept (MALSC). The MALSP began as an operational concept but has evolved over the years with the advancement of logistical support capabilities and information technologies. The MALSP concept was developed in the Cold War era for full-scale operations. The basic premise behind the MALSP was to enable planners to rapidly deploy tailored capabilities in order to effectively support the MAGTF ACE. Marine Corps Warfighting Publication (MCWP 3.21.2; HQMC, 2002a), *Aviation Logistics*, identified the multiple support packages that comprised the MALSP: contingency support packages (CSPs), fly-in support packages (FISPs), peculiar contingency support packages (PCSPs), common contingency support packages (CCSPs), and follow-on support packages (FOSPs), which, in combination with aviation logistics support ships (T-AVBs) and maritime prepositioning ships (MPSs), enable the MALSP to support a variety of aircraft platforms in the composite ACE (HQMC, 2002a, p. 1-9).

According to MCWP 3.21.2 (HQMC, 2002a), *Aviation Logistics*, CSPs are the basic building blocks of the MALSP and contain the four pillars of an IMA: people, parts, MFs, and SE. The FISP is a support package with all of the necessary O-Level parts and supplies needed to sustain a MAGTF ACE for 30 days in a combat environment or until follow-on I-Level support arrives in theater. PCSPs are packages that provide I-Level aviation supply support and SE to a specific T/M/S aircraft. CCSPs are packages that consist of equipment common to multiple T/M/S aircraft. FOSPs contain equipment vital to sustained operations and are specifically annotated in allowance lists for each MALSP (HQMC, 2002a, p. 1-9). Figure 2 depicts the support packages' composition.



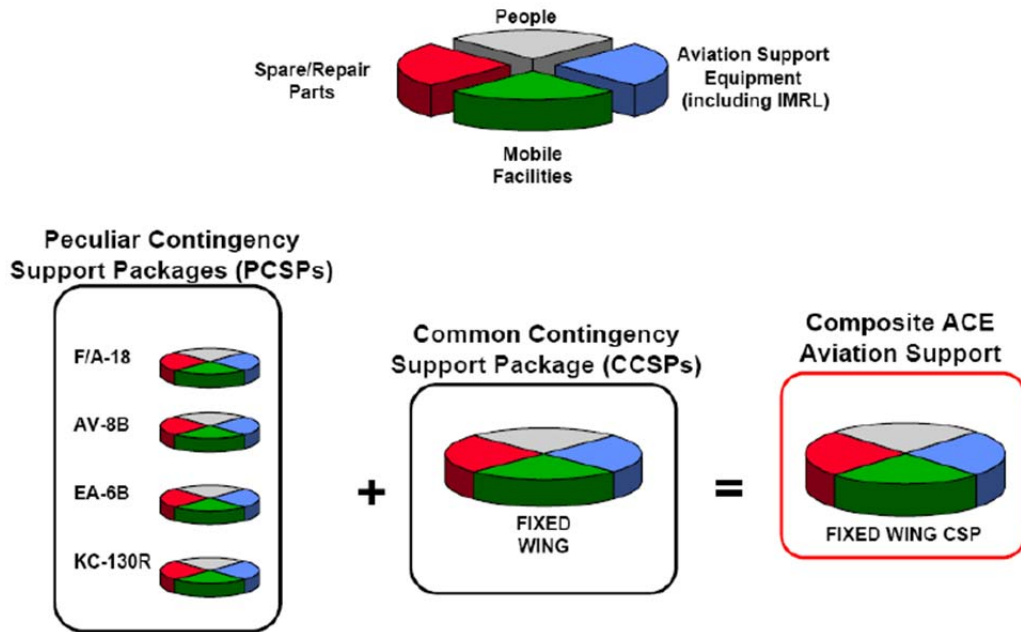


Figure 2. MALSP Support Packages and Composition
(From Clark, 2010)

Although the MALSP was revolutionary at the time of its implementation and has enjoyed nearly a quarter of a century of success, it has its limitations. Although proven effective in the past, the MALSP is now unresponsive and highly inefficient and has much room for improvement (Yasaki, 2010). According to Davis (2006), the

MALSP was developed in the cold war era, where major theater engagements were the strategic focus. The Cold War has now ended, but the doctrine used to support the MAGTF ACE has not. Since MALSP has been implemented, major theater engagements account for just 7% of MALSP utilization whereas 93% can be considered smaller scale contingencies. (p. 13)

The MALSP relies on the deployment of a large cache of parts informally referred to as the iron mountain. This iron mountain requires an excessive amount of manpower to be effectively maintained. Additionally, the deployment of the required personnel is not cost effective and unnecessarily places the personnel in harm's way. With the majority of operations having been small scale since the inception of the MALSP, we argue that, on several occasions, we have needlessly spent exorbitant amounts of time and money shipping and maintaining the iron mountain. Yasaki (2010) pointed out that "the vast

majority of items may never be used or required” (p. 4.). The time, money and manpower used in shipping and maintaining the vast majority of the iron mountain never used should be allocated more productively. Marine aviation logisticians envision a much leaner, more agile, and more responsive system scalable to fit limited contingency operations with improved performance at a reduced cost. Modernization of the MALSP through information technologies and CPI will enable aviation logistics to effectively support MAGTF operations through the 21st century and beyond.

D. THE MALSP II

MALSP modernization is commonly referred to as the MALSP II, or the Marine Aviation Logistics Support Program II. The MALSP II differs from the MALSP in that the MALSP was an operational concept designed to standardize logistics squadrons in order to rapidly deploy in support of MAGTF ACE operations. The MALSP II is a logistical concept. The *MALSP II Standard Operating Procedures* (Naval Air Systems Command [NAVAIR], 2011) stated, “MALSP II strives to reduce the forward deployed footprint and increase supply chain agility at the Forward Operating Base (FOB)” (p. 7). This concept transitions aviation logistical support from a “push” system to a “pull” system of sustaining readiness. The MALSP II transitions from a “days of usage” to a time buffer management system attempting to predict future use.

The MALSP II is a nodal lay-down broken down to four operating levels, as depicted in Figure 3.



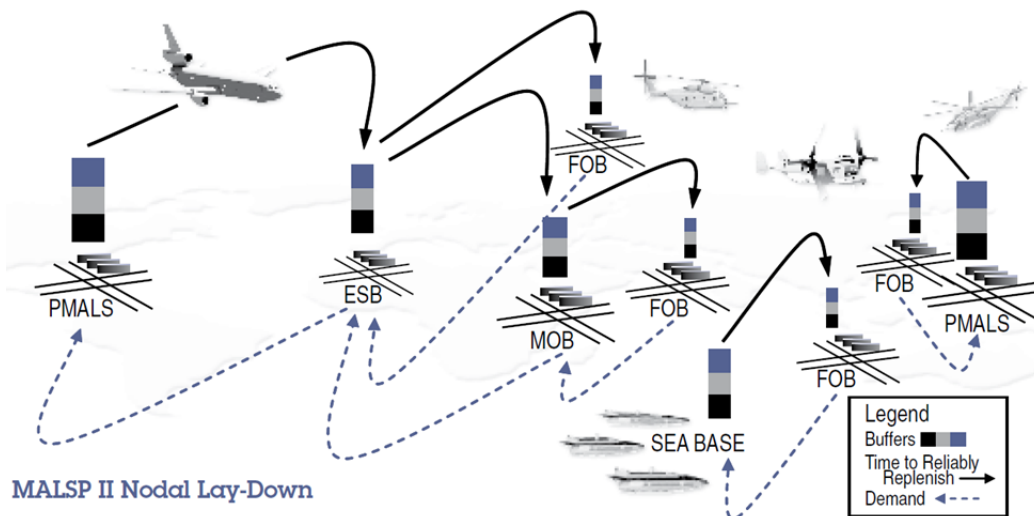


Figure 3. MALSP II Nodal Lay-Down
(From Steward, 2008)

The highest level is the Parent Marine Aviation Logistics Squadron (PMALS). The PMALS provides primary support to the various deployed nodes and is usually located within the continental United States (CONUS). The next node is the en-route support base (ESB). The ESB is designed to reduce the footprint size in the area of responsibility (AOR) by managing the inventory buffer for the forward deployed nodes. The ESB provides a buffer against uncertainty in the reliability of transshipment times between the PMALS and forward deployed nodes (Jabin, 2009, p. 6; NAVAIR, 2011, p. 8). The ESB’s goal is to minimize the time to reliably replenish (TRR) to the FOBs. The third level is the main operating base (MOB). The MOB is located in the AOR, has minimal maintenance repair capabilities, responds to local parts demand, and provides support to the various FOBs located within the AOR. The FOBs are parts nodes located with the deployed aircraft and provide direct support to the O-Level squadrons.

The MALSP II leverages recent advances in technology, communications, and inventory management practices to rapidly respond to demands placed on the supply system. Additionally, the MALSP II transitions from being reactive to proactive, increasing responsiveness and significantly decreasing the number of personnel, parts, and equipment deployed under the current MALSP design. By utilizing information technology to present real-time demand data and inventory levels available to logisticians, the MALSP II will provide greater “situational awareness” to deployed units.

E. INFORMATION TECHNOLOGY

The *MALSP II Communications Toolkit* (HQMC, 2012b) identified *information technology* as one of two critical enabling capabilities required for the MALSP II nodal laydown to function. Steward (2008) described the system:

Buffers in the logistics chain are assigned to nodes, each with its own value stream, and arranged in a system called a “nodal lay-down,” [...] In a nodal lay-down, each upstream “parent” node buffers a downstream “child” node as demands are placed on the system. For example, when a part is issued to the flight line, the resulting transaction creates a signal that triggers a series of replenishments downstream until each hole at each node is filled. (p. 41)

Using the Enterprise Logistics Analysis Tool (ELAT) software, the PMALS can determine the range and depth of buffers at the various nodes in the supply chain. These buffers are not sized individually but as a whole system. Parts of limited availability are placed at nodes that provide optimal support to the warfighter.

The MALSP II concept currently utilizes the Stand-Alone Material Management System II (SAMMS II) and Expeditionary Pack-Up Kit (EPUK) software to manage the detachment inventories and as the deployable host database. These deployable systems have web interface capability that allows for global visibility. The *MALSP II Squadron Operating Procedures* stipulates that SAMMS II “passes Issue and Refer docs via email, tracks Retrograde and has World-wide visibility” (NAVAIR, 2011, p. 90). Additionally, SAMMS II provides reports for inventory management and a web portal for parts ordering by O-Level squadrons.

The EPUK was designed to improve the ability of aviation logisticians to operate supply buffers in the deployed environment (NAVAIR, 2011, p. 3). The EPUK also connects to the EPUK gateway server. The gateway server provides decision support and routes messages and data sets between EPUK sites (NAVAIR, 2011, p. 4).

The SAMMS II software is a limitation to the development of the MALSP II. SAMMS II is traditionally used for small detachments of aircraft and requires significant data entry and processing. Larger detachments require a more robust database system that provides greater logistics management support capabilities. This increase in



capabilities necessitates significant infrastructure support. To address this shortfall, the Marine Corps is developing MAL-EIT. MAL-EIT will enable increased support capabilities for larger detachments of aircraft and not require the increases in infrastructure. Additionally, MAL-EIT will be integrated with Navy and Marine Corps information technologies such as the Optimized Organizational Maintenance Activity (OOMA) and GCSS-MC (T. Denevan, personal communication, August 26, 2012). The entire MALSP II system of systems relies on CPI to ensure that a steady flow of parts moves through the system.

F. CONTINUOUS PROCESS IMPROVEMENT

The DCA (2011b) directed that “Continuous Process Improvement (CPI) be utilized and integrated along with best practices throughout units to gain efficiencies and/or effectiveness in the MALSP II processes” (p. 1). *CPI* is the English term for the Japanese business model Kaizen. According to Hudgik (n.d.), “Kaizen was created in Japan following World War II. The word Kaizen means ‘continuous improvement.’ It comes from the Japanese words 改 (‘kai’), which means ‘change’ or ‘to correct,’ and 善 (‘zen’) which means ‘good.’” The Kaizen business model seeks to maximize efficiencies of the manufacturer or company and challenge personnel to identify ways to increase productivity and cut waste. MALSPs across the Marine Corps, in an effort to reduce TRR, implemented the CPI process titled AIRSpeed. “Enterprise AIRSpeed consists of an integrated blend of commercial practices that includes Theory of Constraints (TOC), Lean and Six Sigma. TOC is the overarching architecture for Enterprise AIRSpeed” (AGI Goldratt Institute, n.d., p. 21).

1. The Theory of Constraints

The Theory of Constraints (TOC) is based on the premise that a constraint or limitation affects a system and prohibits the system from reaching its maximum potential or goal. One overview of the TOC (Pinnacle Strategies, n.d.) identified these three underlying assumptions of the TOC:



- Convergence. Inherent simplicity; the more complex a system is to describe, the simpler it is to manage.
- Consistency. There are no conflicts in nature; if two interpretations of a natural phenomenon are in conflict, one or possibly both must be wrong.
- Respect. People are not stupid; even when people do things that seem stupid; they have a reason for that behavior. (p. 1)

2. **Lean**

There is a negative correlation between the efficiency of a system and the amount of inventory necessary to operate it. Lean attempts to analyze the movement of parts or material through a system in order to maximize efficiency. The Lean Enterprise Institute (n.d.) defines *Lean* as “creating more value for customers with fewer resources.” Maximizing the leanness of a system reduces the amount of inventory required to operate the system and decreases inventory costs.

3. **Six Sigma**

Six Sigma is a method of statistical process control. It analyzes the variation in defects within a system. The goal of Six Sigma is to effectively eliminate defects in the system. A system is considered free of defects when there are fewer than 3.4 defects per one million items produced. “Six Sigma provides a disciplined model that yields statistical analysis of variation to focus improvement efforts” (Bethmann, 2004, p. 6.).

4. **AIRSpeed**

AIRSpeed is the overarching program that combines the TOC, Lean, and Six Sigma into a CPI program. AIRSpeed uses rapid improvement events (RIEs) to analyze maintenance and supply systems in order to identify and eliminate bottlenecks, identify optimal inventory levels, and minimize defects. *The Enterprise AIRSpeed Journey* (AGI Goldratt Institute, n.d.) described how effective implementation of AIRSpeed processes can significantly reduce TRR (p. 3.).



III. SOFTWARE ACQUISITION: A CRITICAL ENABLER

In order to appreciate the barriers associated with the aggressive timeline constraint placed on MAL-EIT development, further information is required. We provide a brief description of the Joint Capabilities Integration and Development System (JCIDS) process to give the reader an understanding of the complexity of the system and the time associated with developing, engineering, manufacturing, producing, and supporting a program. Next, we discuss the difficulties associated with developing software as well as the related cost, schedule, and performance trade-offs. Finally, we discuss the issues with MAL-EIT and the difficulties with software integration and interoperability.

A. THE ACQUISITION PROCESS

Over the past two decades, major acquisition reform has made an attempt at eliminating redundancy from the acquisition process. Additionally, reforms have provided increased oversight, reduced mismanagement by an untrained workforce, and attempted to minimize uncertain planning as well as reduce the number of poorly defined capability requirements (Snider, 2008). Several enterprises have improved areas of the defense acquisition process, such as cost estimation and certification in requirements, management, and configuration steering boards, but as Snider (2008) pointed out, “the fact that reform efforts continue is evidence that lasting reform has been elusive” (p. 20).

Joint Capabilities Integration and Development System (CJCSM 3710.01H; Joint Chiefs of Staff [JCS] 2012) provided guidance to the Department of Defense (DoD) in the JCIDS process depicted in Figure 4. This manual included guidance in the development of key performance parameters (KPPs), joint capabilities documents (JCDs), and capability development documents (CDDs). CJCSM 3710.01H assisted in the development of training and education for acquisition and further explained the capabilities-based assessment (CBA) process and its legitimacy.



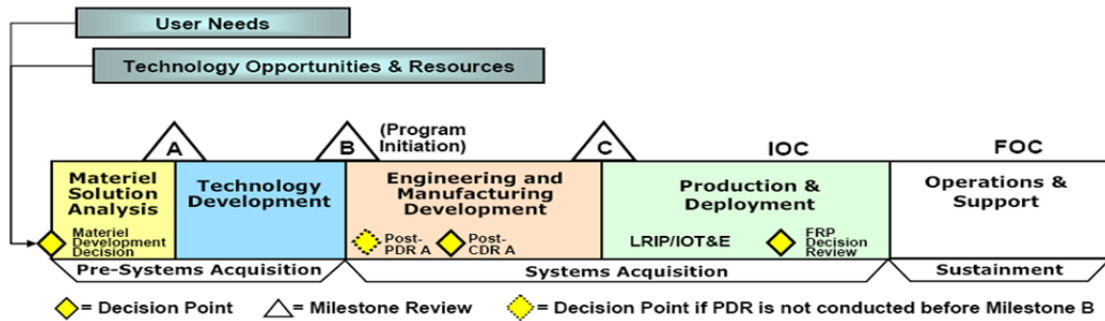


Figure 4. Joint Capabilities Integration and Development System
(After DoD, 2009)

1. The Joint Capabilities Integration and Development System

The Defense Acquisition University (DAU) described the JCIDS process in the *Defense Acquisition Guidebook* as follows:

The JCIDS process exists to support Joint Requirements Oversight Council (JROC) and Chairman of the Joint Chiefs of Staff (CJCS) responsibilities in identifying, assessing, validating, and prioritizing joint military capability requirements. JCIDS provides a transparent process that allows the JROC to balance joint equities and make informed decisions on validation and prioritization of capability requirements. (DoD, n.d., p. 1)

The DoD created the Defense Acquisition Management System to effectively manage the development of new technologies from the initial capabilities document (ICD), which identifies the users' needs, through the sustainment of the program. This standardized management system provides for various gates in the development of a technology to ensure effective oversight of the program. The management system is imperative because programs may take decades to develop and produce. DoD Directive 5000.01 (Office of the Under Secretary of Defense of Acquisition, Technology, and Logistics [OUSD(AT&L)], 2007) provided governance for military acquisitions and should be referenced for any additional guidance of the defense acquisition process.

2. Problems With Software Development

Developing information technologies is critical to successfully transitioning to the MALSP II modernization effort. However, as Osmundson (2008) pointed out,



historically software development has not been the most successfully developed acquisition:

SPAWAR [Space and Naval Warfare Systems Command] indicates that DoD software developments are still experiencing poor results: 53% of all software projects cost nearly 90% over the original estimates, 42% of original proposed features and functions are implemented in the final product, and 31% of all software projects are cancelled prior to final delivery. (p. 64)

These numbers are less than desirable, but more disturbing is that the necessary information technologies needed to reach IOC have yet to reach “program-of-record” status. The *DAU Glossary* defines a program of record as

1) Program as recorded in the current Future Years Defense Program (FYDP) or as updated from the last FYDP by approved program documentation (e.g., Acquisition Program Baseline (APB), acquisition strategy, or Selected Acquisition Report (SAR)). If program documentation conflicts with latest FYDP, the FYDP takes priority. 2) May also refer to a program having successfully achieved formal program initiation, normally Milestone B. (“Program of Record,” 2011)

The MALSP II Program Office has allocated funding for development of MAL-EIT through overseas contingency operations (OCO). Due to continuing resolution authority and not having been previously funded through the JCIDS process, the MALSP II Program Office is unable to allocate funds under the Program Objective Memorandum (POM) until a program-of-record status is reached. This inability to allocate funds has resulted in developmental delays in the MAL-EIT software and may prevent the MALSP program office from reaching the DCA goals for IOC and full operational capability (FOC; T. Denevan, personal communication, August 26, 2012). This lack of available funding has had a negative effect on the project and can be further explained using the Triple Constraint Theory.



B. TRIPLE CONSTRAINT THEORY

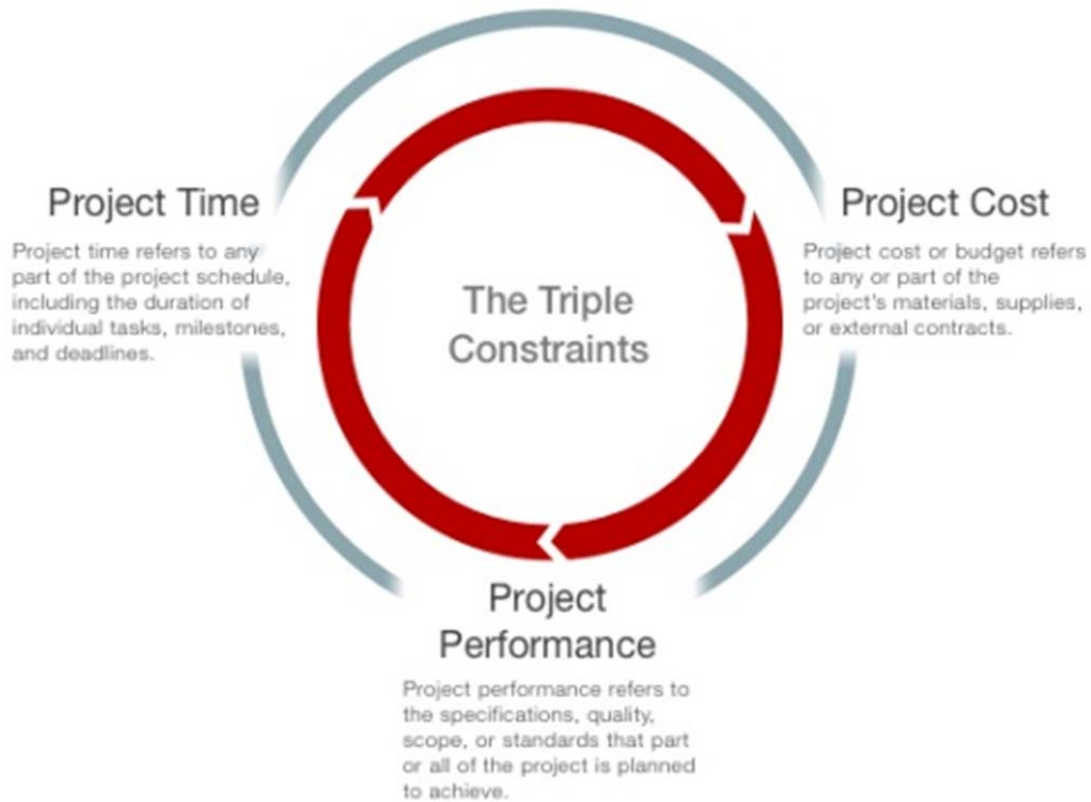


Figure 5. Triple Constraint Theory
(Melissa-s, 2011)

The Triple Constraint Theory is based on interdependencies between cost, schedule, and performance in a program or project. A change in one of these constraints has an effect on the other two. Reductions in time increase cost or decrease performance requirements to reach the time constraint.

The Triple Constraint Theory is highly relevant to the MAL-EIT software initiative. Currently, IOC has been identified as fourth quarter fiscal year (FY) 2014. The IT solutions necessary to meet this requirement have not reached maturity and, in some cases, have yet to be initiated. As a result, a compression of the time schedule has begun that will either increase overall cost or decrease performance of the IT solutions.

Our recommendation is to extend the delivery date of the software, which will prevent successfully reaching the DCA goals in the allotted time period. However, if



MAL-EIT reaches program-of-record status, the program will have a fully funded budget through the POM allocations. Additionally, the program manager (PM) has more oversight of the acquisition process because constraints are more effectively balanced through the use of milestones and the various gates of the JCIDS process.

Traditionally, with a compressed time schedule, an addition of capital to the program enables the research, development, testing, and evaluation (RDT&E) to be completed within the time allotted. However, because (1) MAL-EIT is software acquisitions, and (2) development is based on a creative process “less able to be known as a well-understood process,” increasing funding and manpower will have a negligible effect on software development (Osmundson, 2008, p. 76). As a result, we hypothesize that the MAL-EIT software requirements will be reduced, or the current modernization efforts will not be fully implemented for an additional five to seven years. Therefore, we recommend a review of the current schedule for IOC implementation.

C. MARINE AVIATION LOGISTICS ENTERPRISE INFORMATION TECHNOLOGY

Revision A to Policy Letter 03-11 lists the following required IT capabilities of MAL-EIT:

In accordance with ref (c), the following MAL-EIT requirements and capabilities are fielded and sustained within the scope of established Information Technology (IT) systems:

- (1) Expeditionary requisition capability with near real time visibility of demand across the NLL.
- (2) Physical buffer sizing and TRR analysis.
- (3) Dynamic buffer management capability across the NLL. (Deputy Commandant for Aviation [DCA], 2011a, p. 1)

The MAL-EIT software suites that address the physical buffer sizing, TRR analysis, and dynamic buffer management are the Next Generation Buffer Management System (NGEN-BMS) and the AIRSpeed Analysis Tool (AAT). The fact that these enablers have yet to be developed presents a barrier to reaching IOC requirements. MALSP modernization is an initiative that is instrumental in maintaining effective readiness rates—while simultaneously minimizing costs—and mitigating risk to



personnel. *Response A to Policy Letter 03-11* identified IT as the critical enabler for IOC implementation. MAL-EIT is a “crucial and distinct component of MALSP II” that will enable the paradigm shift required to modernize Marine Aviation Logistics Support Doctrine (Clark, 2010, p. 4). Figure 6 displays the five software suites that encompass MAL-EIT.

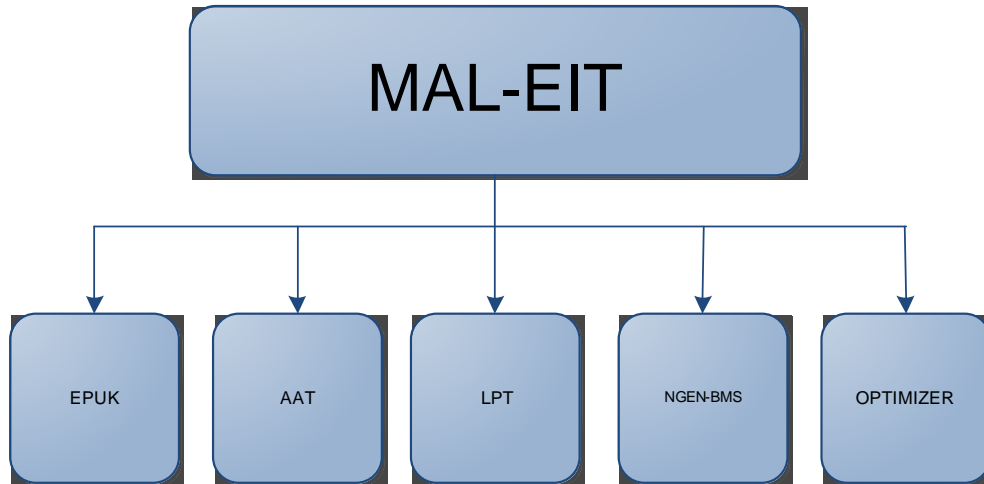


Figure 6. The MAL-EIT Software Suite

The *MALSP II Communications Toolkit* (HQMC, 2012b) defined these software suites as described in the following sections.

1. Expeditionary Pack-Up Kit

The EPUK is the pilot-detached and -deployed IT expeditionary requisitioning capability. It provides issue/stow/receipt, automated data entry into the Naval Aviation Logistics Command Management Information System (NALCOMIS), and near-real-time data exchange with up-line tiered repositories via gateway servers. The EPUK hardware suite includes site servers, mobile computing capability, and organic wireless communications (e.g., local area network and satellite communications). When fully developed, MAL-EIT will integrate with the naval logistics solution for IT, sense and respond logistics (S&RL) closely linked to GCCS–MC, Global Command and Control System (GCCS) efforts, and other IT tools. MAL-EIT will provide total asset visibility of ACE and MAGTF logistics consumption demands, inventory levels, materials in transit, and retrograde shipments.

2. The Next Generation Buffer Management System

From our experience, the NGEN-BMS replaces an access-based buffer management tool (BMT) that is currently beset with problems. The system is an integrated web-based tool developed to establish, manage, and monitor both physical and time buffers in near real-time across the MALSP II demand-pull nodal logistics chains.

3. The AIRSpeed Analysis Tool

The AAT is a software program currently in development to replace the ELAT and will be able to interface with the Relational Supply System (R-Supply), the EPUK, and the NGEN-BMS. The interface of these solutions gives users the ability to analyze planned versus actual time and physical buffers in near real-time across the MALSP II demand-pull nodal logistics chain. This includes analyzing multiple transportation patterns to understand how they are performing, conveying buffer health status information between nodes and the P-MALS, and providing the P-MALS with alerts when there are vulnerabilities in designed time and physical buffers due to insufficiencies.

4. The Logistics Planning Tool

The Logistics Planning Tool (LPT) identifies initial outfitting of material for deployments, automates container and pallet configuration entries for time-phased force deployment data (TPFDD), as well as automates the development, planning, and execution of remote expeditionary support packages (RESPs) and CSPs.

5. Optimizer

The optimizer is a modeling solution to determine initial MALSP II demand-pull nodes for optimal distribution and buffering based on a demand history by national item identification number (NIIN) and determines the starting list of parts per contingency scenario.



D. DEVELOPING THE EXPEDITIONARY PACK-UP KIT

Currently, the EPUK, the AAT, and the NGEN-BMS are the only IT solutions in development. The EPUK was developed at the SPAWAR as a prototype. As such, it is a nontraditional acquisition and has never been a program of record. Production of the EPUK as a prototype has been beneficial. Prototyping has enabled SMEs to provide inputs to software engineering during the RDT&E phase. This nontraditional approach has enabled users of the EPUK to address specific and evolving needs of the aviation logistics community. Unfortunately, users of the EPUK must address several challenges in order to successfully reach maturity.

The first and largest issue facing the EPUK is the lack of funding. The Naval Air Systems Command (NAVAIR), in coordination with the SPAWAR, has funded the EPUK program through OCOs funding due to the EPUK's expeditionary relevance and field testing in Djibouti. Since the end of combat operations in Iraq and the planned withdrawal from Afghanistan in the near future, OCO funding is rapidly decreasing. As funding disappears, so does the critically essential knowledge of software-developing SMEs that have been working on the EPUK since its inception.

Captain Tom Denevan, the SPAWAR Marine liaison, highlighted the difficulties of holding his team together:

We started off this year, beginning for FY12, with sixteen people on our EPUK team; the developers, business analysts, all the people you need in a team, ... [developers] that have worked on the EPUK for five years and know it really well. Now we are down to four due to [a lack of] funding. (Personal communication, August 26, 2012)

The EPUK team is in jeopardy of losing all of its experienced developers if the funding issues continue to plague the program. This program is designated as a "key capability to ensure MALSP II achieves its goal of providing a responsive, agile and sustainable logistics solution" (DCA, 2011b, p. 14-6) in the *FY2011 Marine Aviation Plan* as well as other high-level documents, such as DCA policy letters and the *MALSP II Communications Toolbox*.

Reliable funding is required in order to maintain the EPUK initiative. Congress' inability to successfully pass a budget has resulted in a continuing resolution authority



(CRA). This is a problem for EPUK because the CRA limits budgetary funding for all programs to 80% of the previous year's budget. Because MAL-EIT has not reached program-of-record status, funding for the EPUK IT solution is zero. If the EPUK does not receive funding allocations in the near future, it will become part of the 31% of all software programs that are cancelled prior to incorporation.

Captain Denevan has identified funding as the largest barrier to EPUK implementation. It is essential to the life of the EPUK initiative for MAL-EIT to attain program-of-record status and receive the dedicated budgetary allocations. Table 1 identifies the current funding for MAL-EIT, the required budget for development, and the cost delta.

Table 1. Current MAL-EIT Funding
(From HQMC, 2012a)

RDT&E PE: 0605013N, LI: 3167

TY\$M	FY12	FY13	FY14	FY15	FY16	FY17	FYDP Total
Funded	2.79	6.34	3.88	3.75	3.42	3.79	\$ 23.97
Required	6.39	6.42	3.97	3.84	3.50	1.59	\$ 25.71
Delta	(3.60)	(0.08)	(0.09)	(0.09)	(0.08)	2.20	\$ (1.74)

OPN PE: 0204261N, LI: 4265

TY\$M	FY12	FY13	FY14	FY15	FY16	FY17	FYDP Total
Funded	0.35	0.91	0.29	0.48	0.28	2.19	\$ 4.50
Required	0.40	0.93	0.30	0.50	0.30	0.40	\$ 2.83
Delta	(0.05)	(0.02)	(0.01)	(0.02)	(0.02)	1.79	\$ 1.67

O&M,N PE: 0708012N, LI: 1A4N (OCO)

TY\$M	FY12	FY13	FY14	FY15	FY16	FY17	FYDP Total
Funded	2.00	0.50	-	-	-	-	\$ 2.50
Required	5.12	0.50	-	-	-	-	\$ 5.62
Delta	(3.12)	-	-	-	-	-	\$ (3.12)

Because the EPUK is so vital to the MALSP modernization efforts, the Marine Corps Aviation Supply Logistics (MCASL) is attempting to attach the EPUK to the Navy Single Supply Baseline (SSB). However, SPAWAR's Program Manager Warfare (PMW)-150 is hesitant to make the EPUK a program of record due to compatibility issues between the EPUK and the SSB. The SSB software initiative is a program of



record that will encompass all classes of supply for the U.S. Navy and is written in a Java-based programming language. The EPUK is written in Dot-Net, a software framework developed by Microsoft that runs primarily on Microsoft Windows. MCASL attempted to nest the MAL-EIT software under PMW-150; however, the PM was hesitant to accept responsibility due to concerns about the viability of the EPUK program (T. Denevan, personal communication, August 26, 2012).

Finally, interoperability between the EPUK and the other IT solutions that make up the MAL-EIT software suite is essential. The Marine aviation community cannot afford another stop-gap IT solution. As Captain Seipel (2008) pointed out in his work,

the number one requirement for an effective logistics information system is that it must be integrated. Data formats must be standardized, and data must be shared easily between different modules of the system. During desert storm, one of the many lessons learned regarding logistics systems was the “lack of communications and interface between multiple logistics IT systems.” The information system of the future cannot allow communications to be an impediment. (p. 6)

Captain Robert Davis (2006), an experienced logistics officer, further highlighted the problems with the current system as well as the need to avoid compromising IT requirements and to ensure that the community fields a robust interoperable IT solution:

The lack of interoperability of currently fielded systems creates enormous challenges for the tactical-level aviation logistics planner and sustainer. Querying multiple systems to source a single operation or contingency is laborious, time consuming and inefficient. Decision support for sustaining deployed forces is also plagued by numerous manual processes, which increases the probability of information redundancy, errors, and ineffectiveness. Aviation logistics support is vital to the combat readiness of the MAGTF ACE. The current “flat-file” technology used to mitigate the lack of system interoperability is not the 21st century solution for the Marine Aviation Logistics community. It is imperative that aviation logistics planners and sustainers at the tactical-level have a robust decision support application to accomplish their mission, an IT enabler that has the capability to interface with existing fielded systems. (p. 7)

MALSP II modernization efforts are not achievable without the critically enabling software. Much of the software is not currently in development and has yet to receive adequate funding. These constraints, along with the inherent difficulties of software development and the complexities of the JCIDS’s process, severely reduce the potential



for reaching the current IOC schedule of fourth quarter FY2014. Therefore, we recommend an immediate reevaluation of the IOC date and award the MAL-EIT suite a program-of-record status.

Once MAL-EIT achieves program-of-record status, the multiple issues facing the software suite can be effectively addressed. The PM will have the necessary tools to control the interdependencies between cost, schedule, and performance, which comprise the triple constraint. Additionally, interoperability issues between the EPUK, AAT, LPT, NGEN-BMS, and Optimizer will be more successfully controlled. If MAL-EIT attains program-of-record status by second quarter FY2013, we estimate that IOC will be achieved by second quarter FY2018.



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IV. ORGANIZATIONAL BARRIERS TO MALSP II MODERNIZATION

A. STRATEGY IMPLEMENTATION

As with many business organizations, the Marine Corps faces the difficult task of developing and implementing strategic initiatives—only failure for Marines has much higher stakes and could result in catastrophic consequences such as failure to meet wartime strategic, operational, and tactical objectives. Over the past few decades, conduct of war has changed to small-scale contingency operation, and the Marine Corps' logistics system must adapt to that change. The Marines operate in a range of military operations that requires flexibility and scalability of its logistics chain. Although the current MALSP is effective, it is inefficient and lacks the speed, cost effectiveness, flexibility, and tailoring capability required in today's environment (Yasaki, 2010). The Marine Corps proposes that the solution to the problem is the MALSP II and has developed the system of tools for MALSP modernization. The follow-on challenges come in the implementation process. Some of the greatest challenges that the Marine Corps will face in implementing the MALSP modernization strategy will involve overcoming organizational behavior barriers. In this chapter, we address organizational barriers that may hinder the successful modernization of the MALSP II.

B. ORGANIZATIONAL BEHAVIOR BARRIERS TO MALSP II IMPLEMENTATION

Many organizational behavior factors come into play when attempting to implement a new transformative organizational strategy. Organizations, as well as humans in general, resist change. They want to continue to travel in the same direction, propelled by inertia. Giovanni Gavetti (2005), a well-known Harvard Business School scholar, argued that organizational inertia is a major factor in the success or failure of developing and implementing an organizational strategy. We borrow from Gavetti's model as we analyze the possible organizational behavior barriers to MALSP II



implementation. Gavetti (2005) pointed out three critical friction points in implementing strategy:

- sticky routines,
- ingrained culture, and
- leadership failures. (p. 8)

1. Sticky Routines

When asking why a particular process is the way it is, almost all Marines at one time or another have heard the reply, “That’s the way we have always done it.” This is a perfect example of the inertia of sticky routines. Although there may be a better way of doing it, the status quo remains (because the complex system is not understood) until a period of revolutionary change occurs. Banach and Ryan (2009) wrote, “Institutions have strong motivation to reflect and reframe following failure, but they tend to naturally resist change when recent actions have been successful” (p. 108). Because the MALSP has worked in the past and its processes are familiar, it will be difficult to change to the new MALSP II.

Gavetti (2005) explained that “performance of activities rests on complex and highly automated routine processes” (sticky routines), and managers may not have the intimate knowledge of these ongoing, intricate processes that they believe they have when introducing change (p. 8). He then explained further that when changing an individual routine, there can be unexpected ramifications on the whole: “Once [processes] are interwoven into a highly interconnected system, it is difficult to determine cause-effect relationships among components of the system” (Gavetti, 2005, p. 8). This lack of intimate knowledge of routine processes compels leaders to overestimate the probability of a successful transformation. Senior policy-making leaders lacking vital operational knowledge can make change decisions that may seem, to the tactical operator, to go against common sense. Realizing that the changes make little sense, low-level workers continue to stick to the complex routines that were successful in the past. To avoid making uninformed decisions that workers will undermine, it is imperative that low-level operators are included in the decision-making process. Failure to include these



tactical operators in the decision-making process adds another barrier to implementing a successful change. Wisner (2009) wrote,

The complexity of the problems facing naval aviation become apparent when one examines the enormous military industrial complex that supports Marine Corps and Naval Aviation. The collection of commands, military organizations, government agencies, and commercial activities required to support Naval Aviation is known collectively as the Naval Aviation Enterprise (NAE). These disparate entities operate in a complex system that is stove piped, sometimes redundant, and occasionally pits elements of NAE at cross purposes with each other. The system has grown more complex over time and in some cases, ad hoc solutions and work arounds have become institutionalized processes. There is no single voice of authority or unifying goal to link all the elements of the NAE together. (p. 10)

The Marine Corps logistics system is composed of many complex automated supply and maintenance procedures (sticky routines) and publications that will all be affected in one way (some unintentionally) by the strategic shift from the MALSP to the MALSP II. These unintentional effects must be minimized and addressed in order to receive buy-in from workers and help workers avoid relying on past routines. We address how the effects can be minimized later in this chapter.

2. Ingrained Culture

Although the Marine Corps has developed a set of systems and procedures required for the strategic shift from the MALSP to the MALSP II, Gavetti (2005) argued that an organization's "culture can inhibit action" (p. 9). The Marine Corps has a proud history of "doing more with less." As Smith (2007) observed, "[A]t the end of World War II, Marine salvage teams had looked around the Pacific islands for abandoned equipment. Then they brought it back to Barstow, re-painted it 'Marine green,' stenciled 'USMC' on it, and 'mothballed' it for future" (p. 15). Chesty Puller, an iconic Marine, was well known for having ordered Marines to gather all abandoned Army equipment of withdrawing Soldiers and put it to good use. Kelly Crigger (2010) highlighted an example of Chesty Puller exemplifying the resourceful Marine culture by scavenging Army gear left on the battlefield: "Puller allegedly told an Army colonel who demanded return of the equipment: *'It all has USMC markings on it now and if you want it back,*



kick my ass' [emphasis added]. No challenge was made thereafter" (p. 80). In an atmosphere of tightening budgets and downsizing and a pervasive culture of "do more with less," it is not surprising that Marines feel pressured to bend the rules and "do whatever it takes" to get the job done.

Doing whatever it takes has sometimes come in the form of unauthorized parts lockers (UPLs).³ UPLs are typically unauthorized stockpiles of high-cost repairable parts⁴ but can include any unauthorized part. Historically, maintenance material control officers (MMCOs), maintenance control chiefs, and other maintenance Marines stockpiled these unauthorized parts with the hopes of quickly repairing an aircraft that became PMC or NMC. We suggest that this subculture of doing whatever it takes, however well intentioned, would undermine the MALSP II initiative. Although this particular cultural trait of Marine resourcefulness may have paid dividends in the past, it has no place in the current operating environment. UPLs are counterproductive to the doctrinal shift from the MALSP to the MALSP II. As Robbins and Judge (2012) pointed out, "Culture is a liability when the shared values are not in agreement with those that further the organization's effectiveness" (p. 222). This subculture's shared values of maintaining UPLs are inconsistent with Marine values and have the potential to negatively impact overall readiness.

Aircraft readiness is a metric by which MMCOs and maintenance control chiefs are measured. The perception is that higher echelon commands compare squadrons and commanding officers based on readiness. Although the term *readiness* is universally understood in Marine Corps aviation, it is relative. The Chief of Naval Operations (CNO) looks at readiness across the fleet as a whole and as a platform average.

Although MMCOs and maintenance control chiefs try to meet the CNO's goals, their number one priority is their individual squadron's readiness. They are under continuous pressure from senior leaders to produce aircraft for the flight schedule and

³*Unauthorized parts locker* is a term we coined in this thesis in order to limit confusion between authorized pre-expended bins (PEBs) and unauthorized parts lockers (UPLs).

⁴ Repairable parts can be repaired or overhauled when they break or reach the end of their life cycle.



usually bear the responsibility for an unresponsive supply system. For this and many other reasons, MMCOs and maintenance control chiefs will go to great lengths to ensure that their unit is the squadron with the best readiness. A culture of high competition, high operational tempo, and a lack of confidence in the supply system leads Marines to maintain UPLs.

a. When Subculture Dominates Organizational Culture

Effects of Unauthorized Parts Lockers on the MALSP II:

In COMNAVAIRFORINST 4790.2B, the Commander of the Naval Air Forces (2012) stated, “Navy stock is generally replenished on a system basis as a direct result of recorded usage and demand data” (p. 9.1.1.1). When a part is lost or rerouted to a UPL, the part is surveyed.⁵ This part has to be replaced in order for the supply system to continue to provide the same level of support to the fleet. Lost or stolen parts place an extra cost burden on the supply system. If Marines pull parts from UPLs, then the potential exists to show no demand data for the item with either the MALSP II or the supply system for which ordering and resupply purchases are based on. This lack of data results in inadequately stocked buffers and fewer parts available for the Marines in the future. Additionally, this practice could result in a lack of parts in the system when implementing the MALSP II on a platform-wide scale. If squadrons hoard parts in UPLs, other squadrons around the world have no visibility of these assets. Subsequently, any single NMC discrepancy on aircraft that could use parts from these UPLs would translate to a direct decrease in aviation readiness and an increased cost burden.

b. Potential Monetary Costs of the Use of Unauthorized Parts Lockers in Marine Aviation

In an attempt to quantify the potential cost of UPLs on Marine aviation, we calculate the cost estimates based on historical data. Table 2 shows the calculated costs associated with UPLs used in the past. We monetize each UPL by looking up each

⁵ A survey is the procedure required when Navy property (except incoming shipments) is lost, damaged, or destroyed. The purpose of a survey is to determine (1) the responsibility for the lost, damaged, or destroyed property; and (2) the actual loss to the government.



part in WebFLIS to determine a cost. For each UPL that had items with no cost data, we determined the average cost of the missing items using the following equations:

$$\text{total cost of UPL} \div \text{total line items} = \text{average cost of UPL line item},$$

and

$$\text{average cost of UPL line item} \times \text{number of missing items} = \text{estimated cost of missing items in that UPL}.$$

We used this procedure for each UPL and produced two costs: the actual UPL cost (the sum cost of all items we looked up in WebFLIS) and the estimated UPL cost, including the estimated cost of line items with missing data. Next, based on 78⁶ squadrons in the Marine Corps, we conducted a sensitivity analysis, ranging from 10% to 80%, to estimate the potential costs associated with a UPL percentage usage in the aviation community. Based on the UPL data we received, we determined the two costs mentioned previously. The data represent an actual 7.6% use, equating to an actual cost of \$17.6 million and an estimated cost of \$20.08 million (based on an estimate of the line items with missing data). Table 2 shows our cost data for each UPL.

⁶ This number fluctuates due to multiple squadrons being decommissioned to meet downsizing requirements.



Table 2. Cost of Unauthorized Parts Locker Sample

	Individual UPL Value	Total Items	Items With No Data
	3,784,713.91	345	63
	1,575,927.70	143	0
	4,221,842.70	228	95
	2,029,655.74	126	0
	3,989,724.96	1,745*	221
	1,971,274.42	108	6
Totals	17,573,139.43	2,695	385
Average UPL Cost			
	Average UPL Line Items	Average Cost per Line Item	
2,928,856.57	449	6,520.65	
Total Items With No Data			
	Estimated Cost of No-Data Items	Estimated Cost Including Missing Data	
385	2,510,448.49	20,083,587.92	
<p>The estimated cost of missing items for each UPL is based on the average cost per line item of that UPL. The total estimated worth of all missing items is based on the average cost per line item spread over <i>all</i> UPLs and multiplied by the number of missing data items for all UPLs.</p> <p>*Denotes consumable parts mixed in with repairable parts.</p>			

Figure 7 is a sensitivity analysis chart showing what the estimated costs would be based on the percentage of squadrons using UPLs. Because we did not have actual overall usage data, at most, we provide a “what if” analysis. If a survey of the fleet were conducted, the extent of UPL usage could be determined and a more accurate number could be established to determine the associated costs.



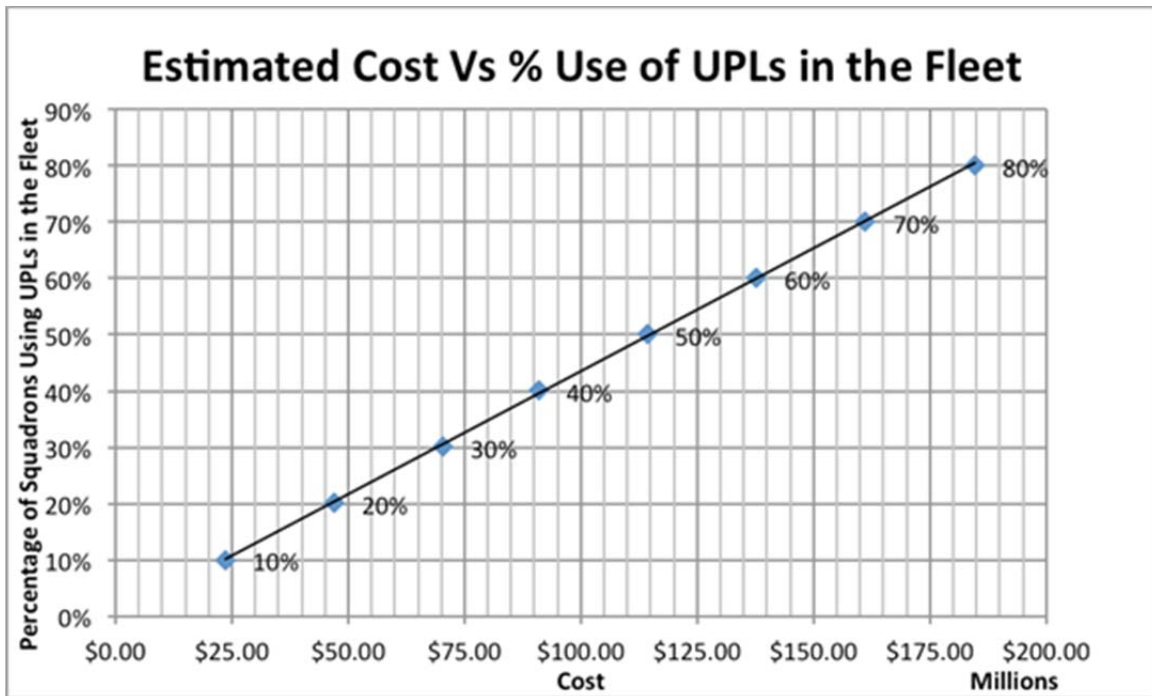


Figure 7. Estimated Cost vs. Percentage of Squadrons in the Fleet Using UPLs

An interview with an MALSP II PM revealed that HQMC initially wanted to use the entire CH-53E helicopter platform as a test bed for the MALSP II program; however, there were not enough CH-53E parts available in the system to stock the buffers needed to implement the MALSP II platform-wide. Instead, the MALSP II was piloted by MALS-26 on a reduced scale in Al Asad, Iraq, in 2005. According to the *MALSP II Communications Toolkit* (HQMC, 2012b), “During the prototype, the availability of selected materials essential to forward-deployed operations increased from 44 percent to 98 percent” (p. 20). The MALSP II initiative was implemented again in 2008 with a small four-plane detachment in the Horn of Africa and continues to provide successful results.

Many platforms across the Marine Corps are experiencing parts shortages. For example, according to the Government Accountability Office (GAO; 2005), “the Marine Corps’ CH-53E helicopter received a red rating (indicates significant concern) for its near-term program strategy and funding plan because the service may be unable to meet its near-term requirements due to potential aircraft and repair shortages” (p. 136). Although UPLs may not be the cause of the red rating, we suggest that the use of UPLs



could be a contributing factor and could also contribute to higher costs and lower overall readiness throughout the fleet.

Maintaining UPLs in the fleet could also cause strained relations and create mistrust between supply and maintenance. One effect of maintaining UPLs is the hindering of the free flow of information and supplies between maintenance and supply. Maintainers, acting under old paradigms of a slow and unresponsive paper supply system, attempt to maintain UPLs to give themselves an advantage in readiness, not realizing that they cause more harm than good. At the same time, supply Marines attempt to recover lost assets and catch maintainers in the act. We suggest that the MALSP II program will not function as it was intended under the umbrella of UPLs. Not only does UPL maintenance degrade the supply system, but it is also inconsistent with Marine values. To fully stock its buffers and enable the supply system to accurately stock its shelves—thereby ensuring that squadrons have the parts required to achieve CNO-mandated readiness goals—UPLs must be eliminated where they exist.

3. Leadership Failure

For the purposes of MALSP II implementation, we use Gavetti's (2005) narrow definition of *leadership*: “guidance toward a strategy implementation goal” (p. 10). Gavetti proposed that one of the major causes of leadership's failure to successfully implement strategy is an attachment to the status quo. The Marine Corps has used the MALSP for nearly a quarter of a century. MALSP practices and procedures are embedded in the rank and file of Marine aviation logisticians, MAG and wing commanding officers, as well as other key stakeholders. Yasaki (2010) highlighted the difficulties with senior leaders:

Senior enlisted and officers who have been in the Marine Corps for at least a decade and who have seen other initiatives introduced and eventually die off—rings a cliché about old dogs and new tricks. Applying the concepts associated with TRR is just as important to the lieutenant colonel and master sergeant as it is to the lance corporal. One level leads and enforces; the other executes. Getting everyone to understand, accept, and adopt these concepts will take a little time. (p. 4)



Leaders must overcome this strong inertia in order for the new MALSP II to be successfully implemented. Regarding an attachment to the status quo, Gavetti (2005) listed numerous factors that can ultimately cause leadership to fail at implementing strategy. Such factors include lack of incentives to implement change, fear of the unknown, and lack of skills to carry out new strategies (Gavetti, 2005, p. 10). A continuing theme surrounding the implementation of the MALSP II is that the program is a leap of faith for the stakeholders. This does not have to be the case. A transparent process with educated stakeholders will eliminate the need for a “leap of faith.” Thus far, many of the upper echelon key stakeholders have been educated in the MALSP II transition through initiatives like the *MALSP II Communication Toolkit* (2012). These stakeholders understand the MALSP II transition on the strategic level. Unfortunately, the mid- to lower-level managers and operators are almost entirely uninformed of the process.

C. ADDRESSING ORGANIZATIONAL BEHAVIOR BARRIERS TO IMPLEMENTING THE MALSP II

1. Addressing Sticky Routines

Sticky routines can be addressed by building commitment to organization change, such as the change from the MALSP to the MALSP II, early in the process. Leaders, such as MALS COs, aircraft maintenance officers (AMOs), production control officers (PCOs), AIRSpeed officers, and MMCOs, need to transmit a clear vision between the past (the MALSP) and the future (the MALSP II). For changes to a system as complex as the Marine logistics system, there are bound to be unforeseen consequences to change. Robbins and Judge (2012) listed education and communication as the first tactics in overcoming resistance to change. Educating not only the policy-makers but also the tactical subordinates in the trenches will dramatically increase the chances for a successful MALSP II implementation. As mentioned previously, senior policy-making leaders often overestimate their knowledge of the intricate workings of a system and create many unintended consequences by formulating and implementing a strategy that does not anticipate these unforeseen effects. When discussing the NAE strategic plan,



Lieutenant General Robling (2011) stated, “One of our goals ... was to stimulate collaboration and transparency” (Naval Aviation Enterprise [NAE] Public Affairs, 2011, p. 1). Many unintended consequences created by a lack of knowledge of strategic managers can be corrected by increasing the transparency of MALSP II implementation, educating the logistics community stakeholders, and soliciting collaboration from tactical logisticians. Receiving inputs from tactical operators can solve potential problems *before* they become an issue. Educating stakeholders, communicating strategic goals, and soliciting collaboration from the lowest levels will ensure a successful transition from the MALSP to the MALSP II.

Leaders should not underestimate the inertia of sticky routines and ingrained culture. Implementing change in a system as complex as the Navy and Marine Corps logistics system takes a long period of time. As we mentioned previously, it is common knowledge that people and organizations resist change. Change as dramatic and potentially lengthy as the proposed MALSP II change needs to be done in chunks, with clearly identified periods of transition. All stakeholders from top to bottom need to be committed, involved, and educated on the strategic vision. Figure 8 depicts the inertia that will initially prevent the logistics community from easily changing from the MALSP to the MALSP II and what is needed to overcome the inertia. After a quarter of a century of ingrained procedures and practices, a combination of initiatives that specifically address that inertia will be required in order to overcome it and foster a successful change.



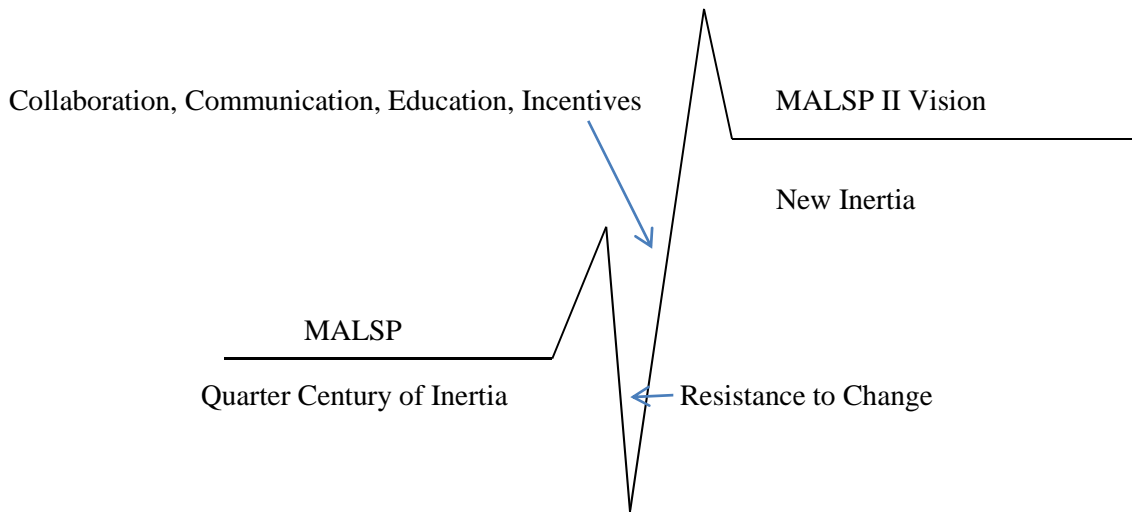


Figure 8. Revolutionary Change in an Organization⁷

2. Addressing Ingrained Culture

The Marine Corps has a proud history of a strong culture that has knit Marines together toward a common cause. Over time, this culture has created strong group inertia, preventing individuals from changing even if they choose to do so. This development of strong culture also appears in subgroups such as particular military occupational specialties. In order to overcome strong cultures or subcultures that facilitate practical drift (such as one that justifies and allows UPLs), Sorensen (2002) recommended that change be done incrementally because studies have shown that organizations with strong cultures excel at incremental change but will typically fail in implementing radical change (pp. 70–91). Merck’s CEO, Dick Clark, is often quoted for his statement,

The fact is, culture eats strategy for lunch. You can have a good strategy in place, but if you do not have the culture and enabling systems that allow you to successfully implement that strategy, the culture of the organization will defeat the strategy. (Jones, 2007, p. 3)

⁷ We adapted the idea presented in this figure from notes taken in Professor Nick Dew’s spring 2012 class for the Strategic Management (GB4014) course at the Naval Postgraduate School in Monterey, CA.



It is imperative to manage the stakeholders that have a vested interest for the strategy to succeed or to fail. Not everyone involved will want to change. In order to increase the probability for success under the MALSP II, behaviors that undermine the ability of the MALSP II to function, or to be proven effective, must be eliminated.

3. Addressing Leadership Failures

The factors that lead to leadership failure, such as a fear of the unknown and a lack of skills to carry out the change, can be mitigated through Robbins and Judge's (2012) first tactics in addressing organizational change: education and communication. By educating the stakeholders on the process—where it is, where it is going, how we are going to get there, and why it is in their best interests—as well as keeping an open “two-way” dialogue between policy-makers, implementers, and tactical logisticians, leaders can overcome an attachment to the status quo. Brooks (2008) pointed out that as with AIRSpeed before it, MALSP II education needs to be

extensive. [I]t must also be effective. Effective training must be specific, militarily focused, and taught by Marines. Training needs to be at appropriate level. Work center supervisors need a different level of proficiency and skills than do technicians. Training needs to be tailored to the military, specifically to the squadron level. Courses should avoid corporate jargon and examples and rely on military application. If possible, the curriculum should focus on individual specialties, or classes should integrated examples from all specialties to emphasize global applicability. Training needs to be given by Marines, not civilian contractors. Marine instructors have inherent understanding of improvement challenges, immediate credibility, and knowledge to answer military-centric questions. (p. 9)

Incentives are another huge part of implementing change and innovation that will allow leaders to overcome an attachment to the status quo. Brooks (2008) asserted, “Commanders must publicly identify individuals, work centers, and event teams that have improved the squadron's ability to perform its mission” (p. 10). Recognizing individuals who have incorporated MALSP II modernization efforts and improved the squadron's capability to accomplish the mission will not only reward those who have made a significant contribution to the modernization effort and mission accomplishment but also send a clear message that the chain of command supports the vision of the



MALSP II. Equally important to recognizing those who make a concrete, significant contribution to the MALSP II modernization and mission accomplishment is avoiding recognition of those who have not earned the right to be recognized through hard work and effort. It is severely demoralizing for Marines to see other Marines receive undeserved recognition, and this approach to recognition can derail any effort aimed at organizational change.

Read and Dew's forthcoming study of 16,605 business organizations showed that three vital factors facilitate innovation and change: autonomy (30%), incentives (22%), and organizational support (36%; p. 6). Read and Dew's research suggested that for a wide-scale change to occur successfully, clear incentives and organizational support need to be in place. Experienced and educated leaders that support the initiative can make this happen.

Leaders of future MALSs who are charged with MALSP II modernization need to be highly educated on the MALSP II vision and support subordinate implementation. Because organizational support is shown to have the largest effect on innovation and change, it is imperative that leadership of the MALSs show avid support through action rather than indifference through inaction. Harry and Linsenmann (2006) argued the necessity of leadership in assisting with "developing vision, empowering change agents, mobilizing commitment, installing support systems, auditing change and controlling the change process" (p. 20). Command leadership will be the linchpin in educating subordinates on the MALSP II modernization effort, communicating the program's importance to the warfighter, and providing appropriate incentives for MALSP II implementation.

Key leaders in the MALSP II modernization effort include the MALS CO, the MALS AIRSpeed officer, PCO, and repairables management division officer (RMD-O), and O-Level MMCOs. These officers are capable of overcoming the old supply-maintenance rivalry and working together to implement the doctrinal change to the MALSP II. A good example of competent leadership necessary to promote organizational change was the AIRSpeed implementation effort at MALS-11 in 2008. Under the leadership of then-Commanding Officer Lieutenant Colonel Chipman, the



AIRSpeed process was implemented. This initiative was a huge shift in the business practices for the Marines. All levels of leadership at MALS-11 aggressively supported the incorporation of TOC, Lean, and CPI practices, which ensured successful implementation. Alternatively, some commands have not fully embraced the AIRSpeed process. As a result, CPI efforts have plateaued. In order to successfully transition to the MALSP II as a Marine Corps, AIRSpeed programs must be the focus of effort for the MALS commander because these processes are essential prerequisites to MALSP II implementation.

In order to successfully overcome organizational barriers and facilitate the transition to the MALSP II, the MALSP II program office should seek buy-in from key leaders. Educated leaders capable of communicating a clear vision of the transition from the MALSP to the MALSP II to subordinates are essential in overcoming sticky routines. UPLs, as well as the subculture that enables them, must be addressed at all levels of Marine Corps aviation. Organizational COs, AMOs, MMCOs, and maintenance control chiefs must be educated on the negative effects that maintaining UPLs have on aviation funding and readiness and shown that maintaining UPLs will not be tolerated. Finally, incentives need to be created to deter the use of UPLs now and in the future.



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V. INVENTORY

The MALSP is the current concept that Marine aviation uses to sustain aircraft readiness through the maintenance of aircraft and the supply of aircraft parts. Sustainment of aircraft readiness is achieved by having the right parts, personnel, and equipment on hand to repair the weapon system and return the aircraft to operational capability as rapidly as possible.

A. ON-HAND AVAILABILITY

Aviation assets play a key role in how the Marine Corps successfully fights and wins battles. As a result, FMC aircraft are necessary to ensure that Marines are able to fight and win wars. The degradation of aircraft parts and the availability of replacements are constant challenges for the aviation logistics community. In an effort to maximize the available on-hand inventory and aircraft readiness, the MALSP program office has made efforts to realign all processes with the end goal of increased aircraft readiness in mind.

End-to-end (E2E) alignment is an integrated application of many CPI processes aimed at improving processes and increasing parts availability to the fleet. E2E is a global view of the entire Marine aviation logistics chain. As such, it focuses on not only the O-Level and I-Level squadrons but also the depot-level (D-Level) and NAE logistics providers. Ready-for-issue (RFI) inventory is an important part of the MALSP II initiative. DCA Policy Letter 03-11 (DCA, 2011a) specifically addressed E2E:

- (3) Utilize and integrate E2E designs and AIRSpeed Continuous Process Improvement (CPI) methodologies and best practices to gain efficiencies and/or effectiveness in order to align the availability of both aircraft and replacement parts to CR deployed standards. (p. 1)

We identify two barriers with this requirement:

- From our experience, CPI methodologies are not uniformly implemented throughout the aviation community, and AIRSpeed has yet to be implemented at the O-Level fleet-wide.



- According to the *MALSP II & Marine Aviation Logistics Enterprise Information Technology* report (Clark, 2010), the IMA can repair only approximately 33% of all repairable items (p. 7).⁸ In order to effectively implement E2E design, a focused depot-level (D-Level) maintenance integration under the MALSP II is essential. The current requirements for IOC do not specifically address depot integration; only the need to synchronize with a parts' designated overhaul point.

Although there has been less focus on the O-Level with respect to CPI and E2E, the MALSP II team has been working closely with the D-Level maintenance facility in Cherry Point, NC. During the past year, the MALSP II team has employed several initiatives to implement E2E, reduce TRR, and ensure that a steady supply of RFI repair parts is available to the fleet. Figure 9 depicts the E2E synchronization effort across all levels of maintenance, in garrison as well as in an expeditionary environment.

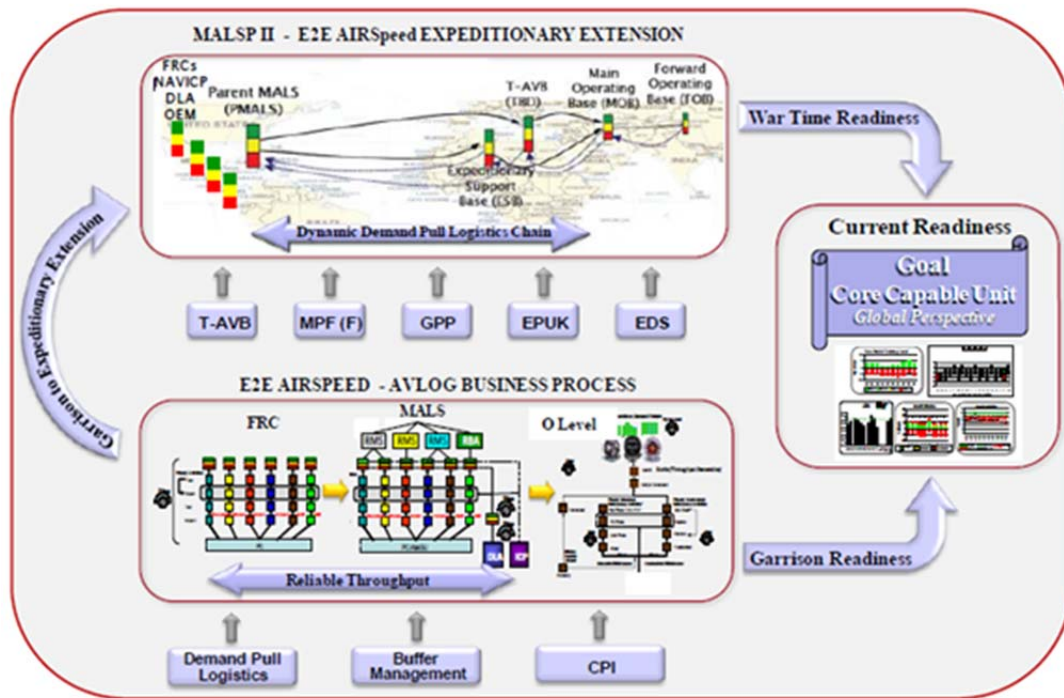


Figure 9. E2E: Synchronizing the Logistics Chain
 (DCA, 2011b)

⁸ These are individual component repair list (ICRL) capability codes. *CI* refers to full repair, and *C3* refers to limited repair.

Fleet readiness centers (FRCs) have a considerable effect on inventory available to the fleet. If processes are not synchronized toward a common goal (e.g., reducing TRR), then non-RFI parts can quickly accumulate at depots, reducing the parts availability and readiness rates of the fleet. As such, FRC East has made considerable efforts toward improving its TRR; unfortunately, the effort has yielded little fruit in the past. According to FRC East MALSP II coordinator David Campbell, in 2002, contractors were paid approximately \$5 million to bring the TOC and drum buffer rope (DBR; a CPI solution derived from TOC) into the depot and received various sums of money for continued support thereafter. Around 2007, FRC East received approximately \$8 million from HQMC to implement CPI programs with the expected return on investment of 6:1. According to David Campbell, the improvements never materialized. He discussed the recent reorganization of FRC East and the roughly \$4.5 million paid to contractors hired to assist in developing a new CPI strategy. The new system was coined the Enhanced Production Systems (EPS). Campbell recently learned that the metrics the contractors were paid to develop are being discontinued and the whole effort is being reconsidered. So the question many may have is, what part of nearly \$20 million was used to reduce TRR?

In the business sector, companies such as General Electric have CPI teams that report directly to the chief executive officer (CEO). These individuals are the critical enablers. With the direct support of the CEO, they are empowered to overcome many of the organizational barriers discussed in the previous chapter and make considerable improvements that relate directly to the bottom line. We surmise that part of the reason the improved results never materialized was that (1) there was no direct link from the AIRSpeed office to the CO, and (2) incentives were not tied directly to the end goal—reduction in TRR.

FRC East disbanded its AIRSpeed office sometime between 2011 and 2012 (D. Campbell, personal communication, August 27, 2012). As previously discussed, *AIRSpeed* is a specific term used in naval aviation to represent CPI. DoD Directive



5010.42 (DoD, 2008) mandated that all DoD components⁹ and activities are to have a CPI program. We were concerned that the lack of an AIRSpeed office could have negative effects on aircraft parts inventory available for fleet consumption.

We asked Campbell whether he thought that the FRC East needed an AIRSpeed office and whether the lack of an AIRSpeed office would have a negative effect on aircraft parts availability in the fleet. Campbell provided the following response:

The question about the need for an AIRSpeed office could be clearly answered by saying ‘no,’ but to make that statement, there must absolutely be some system in place that will focus on improving our ability to provide quality products to the customer at the rate at which they need them. In a depot with strong leadership principals at all levels of management with the full understanding of what goes on at Forward Operating Bases, a CPI team may be unnecessary, but until such time occurs, there has to be some number of folks that do understand and are aggressively trying to drive down TRR. (D. Campbell, personal communication, August 27, 2012)

Driving down TRR is exactly where Campbell and the MALSP II team are currently aggressively focused. According to Campbell, the FRC East MALSP II coordinator,

Since working with the MALSP team for about a year now with an investment of only time spent in meetings, the FRC has not spent a dime on this initiative. If the MALSP effort rolls out as planned, the FRC will experience gains far beyond what any contractor could have given us in the next twenty years and all at a cost of \$0. Why is this? Because we will align our organization in a way that makes folks accountable. We will put the metrics in place that will not filter truth from the XO and CO. It is very hard to fix what you don’t know is wrong. Rewarding people, helping them understand and making them a part of the solution is how you change a culture. (D. Campbell, personal communication, August 27, 2012)

Through communication, education, and developing a set of metrics that ties incentives to the end goal of reducing TRR, the collaborative effort of FRC East and the

⁹ DoD components are defined as the Office of the Secretary of Defense, the military departments, the Office of the Chairman of the Joint Chiefs of Staff and the Joint Staff, the combatant commands, the Office of the Inspector General of the Department of Defense, the defense agencies, the DoD field activities, and all other organizational entities in the DoD.



MALSP II team should yield substantial results in reducing TRR by increasing material availability.

Regardless of whether they are called AIRSpeed or CPI teams, it is imperative that production organizations have a CPI team that has a direct link to the CO or executive officer (XO) and is empowered to shatter organizational barriers that can hinder real, positive change. Although it is critical that these teams have the power to implement change, changes that do not directly relate to the end goal of reducing TRR should not be entertained.

B. ADDRESSING SHRINK

When I- and D-Level repair facilities lack the necessary parts (inventory levels) to repair assemblies, their TRR is negatively affected. There are numerous variables that affect inventory levels. Shrink (loss of inventory), whether at the D-Level or system wide, is one aspect of inventory that can seriously degrade combat readiness and present a hard barrier to the implementation of the MALSP II. Shrink can occur through the use of UPLs, parts lost in shipment, improper storage and tracking, or a myriad of other ways. Addressing shrink could have a positive impact on TRR by ensuring that I-Level and D-Level repair facilities have the parts needed to repair assemblies. Additionally, addressing shrink will increase material availability, aircraft readiness, and increase the likelihood of successful operations under the MALSP II. Regardless of operating under the MALSP or the MALSP II, appropriate inventory levels need to be available in the naval supply system, or readily available in the private sector to support the warfighter with an acceptable TRR. Master Sergeant Nicholson, senior enlisted SME on the MALSP team, pointed out that a barrier we have to implementing the MALSP II is a lack of inventory; however, he qualified this idea with the following:

A barrier for us is how we populate the buffers parts-wise. A huge initiative—and I'll say this on record and you're going to hear me say it several times—MALSP modernization is *not* fixing the local pack ups to date. If there's a problem supporting local pack ups—and let me give you an example. So, CH53, PCSP, CCSP, there's a problem with them today. The amount of money it's going to take to fix those allowances today is not MALSP II, it's not MALSP modernization. It is fixing the allowances today in support of MALSP. MALSP modernization is something



different. We did this two years ago with the buffers for Bahrain and Horn of Africa (HOA). There were some Allowance Change Requests (ACRs) that needed to be submitted. It was not for supporting the buffers [under MALSP II]; it was ACRs that needed to be submitted for the support what they need today [under MALSP]. (Nicholson, personal communication, August 27, 2012)

Inventory shortages could potentially reduce the probability of success under the MALSP II or prevent the MALSP II from being proven effective. However, any inventory barriers that exist are due to shortages in inventory levels required under the current MALSP program. Addressing these shortfalls will assist in a smoother transition to the MALSP II. One way to combat these inventory shortfalls is to have an accurate real-time account of inventory in the system.

There are many technologies in the commercial sector that are focusing on reducing shrink and increasing inventory accountability. Promising technologies currently in use are radio frequency identification (RFID) and unique identification (UID). The use of these technologies would produce tangible benefits in the form of cost, time, better maintenance planning through parts tracking, reduction in UPL usage through location tracking, and life cycle tracking. These technologies would also add greater visibility and traceability to parts in the system in route to delivery points and address carcass retrograde issues, achieving the real-time visibility mentioned in DCA Policy Letter 03-11 (DCA, 2011a). Apte and Ferrer (2010) succinctly pointed out the many benefits of jointly using UID and RFID in tracking high-value aviation parts (see Figure 10), all of which lead to a decrease in TRR (p. 24).



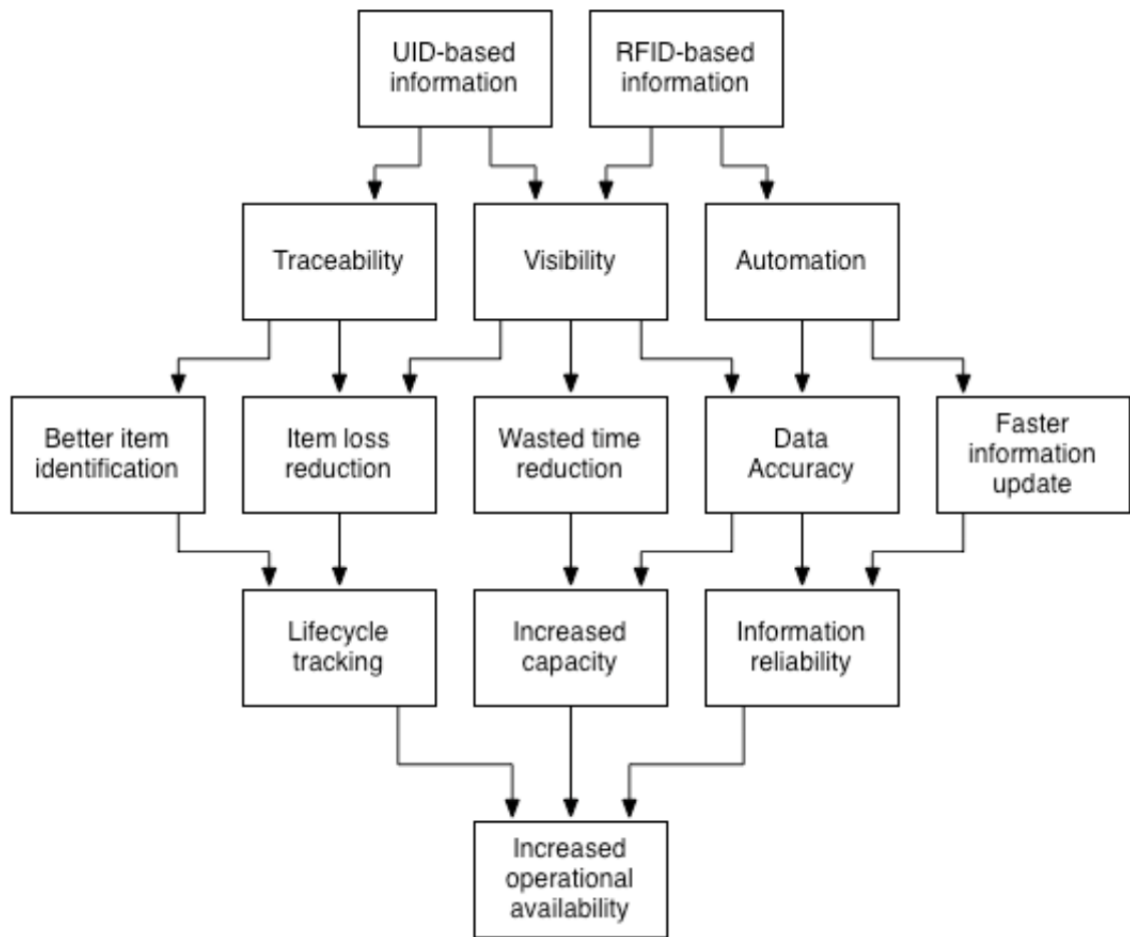


Figure 10. Benefits From Jointly Using RFID and UID Life Cycle Tracking
 (From Apte & Ferrer, 2010)

Figure 10 illustrates the benefits associated with using UID and RFID technologies concurrently. Doing so provides increased inventory accountability by providing traceability, real-time visibility, automation, item loss reduction, waste reduction, life cycle tracking of high-value parts, increased capacity, and information reliability. All of these benefits translate to increased operational availability.

Inventory will play a key role in the success of the MALSP II modernization effort, as parts availability is critical to demonstrate the effectiveness of the program. In order to facilitate the transition to the MALSP II, Marine aviation must acquire greater accountability of its aircraft parts inventory and more efficient depot processes that will ensure a steady stream of RFI parts to the fleet. Complete E2E alignment from the O-Level to the D-Level and CPI teams at depot facilities with direct liaison to the CO will

facilitate this accountability and efficiency. Finally, UID and RFID technology must be used concurrently in order to gain greater inventory accountability and drastically reduce inefficiency.



VI. SUMMARY

The United States Marine Corps has been the country's preeminent force in readiness for over 237 years. This has been possible through constant reevaluation of mission requirements and the ability to tailor the force to meet the mission. Since the end of the Cold War, the United States has faced a myriad of challenges, from humanitarian relief efforts in Japan and Haiti to counterinsurgency operations in Iraq and Afghanistan. Throughout this period, the Marine Corps has successfully met these challenges, which span the ROMO. However, the increasing need to support multiple small-scale contingency operations simultaneously is stretching the limits of the current MALSP.

In order to address current shortfalls with the MALSP, modernization of MALSP II will require a paradigm shift from a “push system,” commonly referred to as the “iron mountain,” to a “pull system.” A combination of IT, CPI, E2E, demand pattern analysis, education and training, and increased inventory accountability and visibility will facilitate a successful transition and achieve one of the primary end goals; a decrease of TRR. The important piece that ties modernization efforts together is IT.

IT is identified in *Revision A to Policy Letter 03-11* (DCA, 2012) as a critical enabler for modernization efforts. Currently, the software required to implement the shift from “push” to “pull” is either not in development, lacks funding, or both. The five software applications that comprise the MAL-EIT software suite have not been designated as programs of record and lack the oversight that the JCIDS process provides. Based on the current status of software development and the current IOC schedule identified in *Revision A to Policy Letter 3-11* (DCA, 2012)—fourth quarter FY2014—we recommend a reevaluation of the current IOC schedule and a designation of MAL-EIT as a program of record. Although this will increase the probability of a successful MALSP II modernization, aviation logisticians must also address organizational behaviors that are counterproductive to modernization efforts.

Organizational behavior dominates Marine aviation. Marines are accustomed to routines and are naturally resistant to change. In order for MALSP II modernization to be successful, overcoming this resistance to change is essential. The MALSP II



modernization efforts are all interrelated. For example, implementation of AIRSpeed initiatives and CPI efforts are critical to a reduction in the TRR. TRR minimization is essential to reducing the variation in parts availability. Therefore, changing the way that Marines conceptualize their role in logistical support is vital to the paradigm shift. Education on E2E integration is required for all personnel, Marines and civilians, from the O-Level to the D-Level. Furthermore, any culture that allows deviation from Marine Corps Aviation Desktop procedures, such as the use of UPLs, should be discouraged because it can negatively affect inventory visibility and increase costs.

In order to decrease costs and increase parts availability, Marine aviation must acquire greater accountability of its aircraft parts inventory and more efficient depot processes that will ensure a steady stream of RFI parts to the fleet. The limited repair capabilities of the O- and I-Levels demand that D-Level maintenance processes are efficient, responsive, and reliable. In order to achieve these goals, we have identified three key initiatives that will increase the probability of effective modernization efforts. First, the CPI team must have a direct line of communication to the CO of the depot. This direct line will empower the CPI team to shatter current organizational barriers that inhibit change. Second, incentives at the D-Level need to be linked to TRR reduction. These incentives will encourage a unity of effort among all D-Level personnel. Finally, the ability to increase asset visibility will assist in reducing inventory shortages throughout the supply system and increase the prospects for success under the MALSP II. We further recommend the implementation of UID and RFID technologies in tracking high-value aviation assets. This implementation will enable real-time visibility, traceability, item loss reduction, and ultimately, increased operational availability.

MALSP II modernization is essential for the success of the ACE in support of the MAGTF. The determination and will of senior leadership to implement this change is likely. However, the modernization effort may not achieve desired effects and could cost time and money and result in a less reliable and responsive system if leaders act on sheer determination alone. By reevaluating the current IOC requirements, properly developing a funded MAL-EIT as a program of record, confronting problematic organizational behaviors, ensuring that CPI and E2E are effectively implemented at the O-Level to D-



Level, and increasing asset visibility throughout the supply system, leaders will increase the probability of a more responsive and reliable system that supports the warfighter.



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APPENDIX A: POLICY LETTER 03-11

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APPENDIX B: REVISION A TO POLICY LETTER 03-11



DEPARTMENT OF THE NAVY
HEADQUARTERS UNITED STATES MARINE CORPS
3000 MARINE CORPS PENTAGON
WASHINGTON, DC 20350-3000

IN REPLY REFER TO:
1000
ASL-40
10 Apr 12

Revision A to Policy Letter 03-11

From: Deputy Commandant for Aviation
To: Distribution List

Subj: REVISION A TO MARINE AVIATION LOGISTICS SUPPORT PROGRAM II
(MALSP II) INITIAL OPERATIONAL CAPABILITY (IOC) REQUIREMENTS

Ref: (a) DCA Policy Letter 03-11 dated 10 June 2011
(b) Marine Corps Warfighting Publication 3-21.2 - Aviation Logistics
(c) Draft Marine Aviation Logistics Enterprise Information Technology (MAL-EIT) Operational Concept Description (OCD)
(d) Expeditionary Delivery System Performance Specification dated 11 Feb 2011

1. MALSP II is Marine Aviation's modernization of Aviation Logistics (AVLOG) and is the deployed logistics sustainment solution to meet the demanding and changing requirements of the Aviation Combat Element (ACE).

a. MALSP II replaces a legacy support concept that can no longer provide adequate support for missions of today and those in the future. MALSP II is a task-organized logistics support system, capable of supporting the full Range of Military Operations (ROMO). It capitalizes on advances in technology, transportation and supply chain processes. MALSP II supports Marine Corps *Vision and Strategy 2025* by transforming deployed aviation logistics into a responsive and agile capability with a properly sized, forward operational footprint.

b. MALSP II maintains an interdependent relationship with Current Readiness (CR) and End to End (E2E)/AIRSpeed; each element improves the effectiveness of the others. In order to further define the MALSP II capabilities that integrated Product Support Element (PSE) must deliver by 4th Quarter FY2014, clarification of the IOC requirements defined in Ref(a) follow:

2. The MALSP II IOC requirements are:

a. Parent Marine Aviation Logistics Squadron(s) (PMALS) support of one Type/Model/Series (T/M/S) community of aircraft to a level that enables that community to achieve and sustain CR performance standards and goals. In addition to performing all AVLOG



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functions identified in ref(b), the Parent Marine Aviation Logistics Squadron(PMALS) is able to:

(1) Operate under a demand-pull logistics methodology, managed within established Time to Reliably Replenish (TRR) metrics and synchronized from the Organizational Level to a designated overhaul point.

(2) Develop, source, deploy, and sustain tailored Remote Expeditionary Support Packages (RESPs) in support of ACE operations.

(3) Utilize and integrate E2E designs and AIRSpeed Continuous Process Improvement (CPI) methodologies and best practices to gain efficiencies and/or effectiveness in order to align the availability of both aircraft and replacement parts to CR deployed standards.

(4) Develop, source, deploy, and sustain Nodal Logistics Laydown (NLL) manpower, facilities, and material requirements and mitigate risks/shortfalls by taking one or more of the below actions:

(a) Leverage supply resources and lateral support within internal maintenance and supply.

(b) Negotiate retail allowances/submit Allowance Change Request (ACR) adds and deletes as required.

(c) Establish Intermediate Level maintenance capability forward of the PMALS where logistics gaps exist.

(d) Take action to align NLL TRRs with available resources.

(e) Execute MALSP II distribution guidance.

b. In accordance with ref (c), the following MAL-EIT requirements and capabilities are fielded and sustained within the scope of established Information Technology (IT) systems:

(1) Expeditionary requisition capability with near real time visibility of demand across the NLL.

(2) Physical buffer sizing and TRR analysis.

(3) Dynamic buffer management capability across the NLL.

c. Designated PMALS Aviation logistics personnel are able to:

(1) Use the MAL-EIT systems (hardware and software) that support MALSP II doctrine to design, analyze, and manage physical buffers and TRRs across the NLL.

(2) Utilize the Defense Transportation System (DTS) and existing commercial and organic transportation networks, systems, and



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assets to sustain consistent TRR as established by the PMALS NLL requirements which includes Ready For Issue (RFI) and retrograde pipelines.

d. MALSP II doctrine, policy, education, and training is approved by Headquarters Marine Corps (HQMC), Naval Air Systems Command (NAVAIR), Commander Naval Air Forces (CNAF) East, and the Marine Corps Forces (MARFORs) and delivered to the IOC target audience.

e. The Expeditionary Delivery System (EDS) for the designated PMALS is fielded in accordance with ref (d).

3. All specified and implied tasks are to be completed or have agreed to work around in place (requires Fleet concurrence) in order to achieve MALSP II IOC.

4. MALSP II IOC is to be achieved NLT 30 September 2014.

5. Deviations from the above require HQMC approval.

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