Special Feature

Dr Michael Hammer, a recognized leader in the field of process reengineering, notes four principles of measurement: measure what matters, rather than what is convenient or traditional; measure what matters most, rather than everything; measure what can be controlled, rather than what can not be controlled; and measure what has impact on desired business goals, rather than ends in themselves.

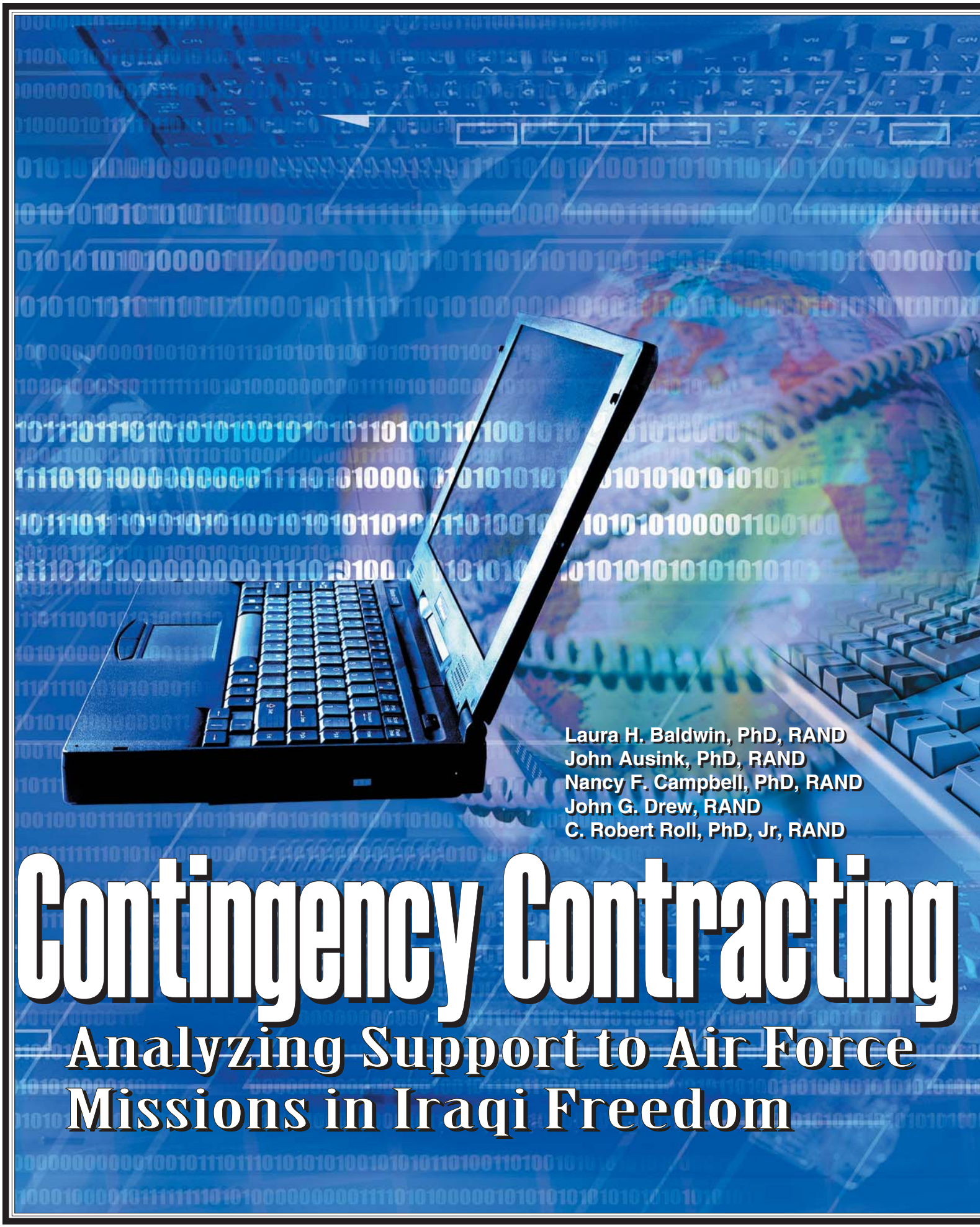
logistics Support Analysis

Contingency Contracting: Analyzing Support to Air Force Missions in Iraqi Freedom
Aligning Maintenance Metrics: Improving C-5 TNMCM

This edition of the Journal presents two featured articles: "Contingency Contracting: Analyzing Support to Air Force Missions in Iraqi Freedom" and "Aligning Maintenance Metrics: Improving C-5 TNMCM."

In "Contingency Contracting: Analyzing Support to Air Force Missions in Iraqi Freedom" the authors demonstrate how a database of contingency contracting officer (CCO) purchases can be a powerful analytic tool to inform and support policy decisions and initiatives for CCO staffing and training, combat support planning, and sharing lessons within the theater.

The second featured article is part two of a three-part series that examines total not mission capable maintenance (TNMCM) rates for the C-5 fleet. The research demonstrated that home station logistics departure reliability (HSLDR) is aligned with neither aircraft availability nor TNMCM. Maintainers at the wing level work to support operational effectiveness; however, higher levels of Air Force supervision appear more focused on improving strategic readiness. This disconnect in priorities was determined to be a root cause of the C-5 TNMCM rate being below Air Force standards.



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Contingency Contracting

Analyzing Support to Air Force Missions in Iraqi Freedom

This article is dedicated to the memory of C. Robert Roll, PhD, a great friend and a scholar.

Introduction[1]

Special Feature

Contractors have been an important part of US war efforts since they were hired to take care of cavalry horses for the Continental Army during the Revolutionary War. While the history of contracted support to US military operations is a long one, the role of that support has expanded rapidly and extensively, particularly since the end of the Cold War.[2,3,4] Today the US Air Force, as well as the other US military services, buys an enormous amount and variety of goods and services to support its contingency operations. These purchases are necessary for a wide range of activities, including feeding, housing, and protecting military personnel; repairing aircraft weapon systems; and transporting personnel and supplies. The outcomes of these purchases directly affect the Air Force's ability to succeed in a contingency environment.

Purchasing goods and services to support contingency operations can provide several types of benefits to the Air Force. As with most types of outsourcing, contract support frees up airmen to perform core military activities. Providers that specialize in the outsourced goods or services often can offer improved performance and cost outcomes, if managed effectively. Buying in-theater reduces requirements for scarce transportation resources, potentially shortening deployment timelines, and also garners host-nation support for US military presence. Additionally, having the capability to purchase as needed, rather than being forced to predict requirements in advance, helps commanders meet emerging demands and the often-changing requirements associated with the realities of war.

Since September 11, 2001, the Air Force has been involved in two significant contingency operations in the United States Central Command (USCENTCOM) area of responsibility (AOR): Operation Enduring Freedom (OEF) in Afghanistan, and Operation Iraqi Freedom (OIF) in Iraq. To take advantage of the depth of contingency contracting experience built during recent operations, the Deputy Assistant Secretary of the Air Force for Contracting asked RAND Project Air Force to gather and analyze data on goods and services purchased to support Air Force missions in OIF to determine the size and extent of contractor support for OIF and how plans for and the organization and execution of contingency contracting activities might be improved to better support the warfighter in future operations.

The motivation for this study was that insights from comprehensive data on recent multiyear contingency contracting experiences would help inform decisions about a number of important policy issues.

First, such data could be used to improve the Air Force's ability to plan for combat operations at contingency operating locations, particularly by linking purchases to supplemental information about the phases of operations (such as deployment, the building of a base, the sustainment of operations at a base, or the closing of a base) and mission activities supported by those purchases.

Article Highlights

While price information can be a powerful tool for contingency contracting officers (CCO), additional information about the relative performance of suppliers and other factors related to meeting requirements, such as the urgency, transportation needs, or security threats, would be helpful in interpreting such comparisons.

In "Contingency Contracting: Analyzing Support to Air Force Missions in Iraqi Freedom" the authors describe the construction of a database of CCO purchases supporting Air Force activities in Operation Iraqi Freedom during fiscal years 2003 and 2004. The results of their analysis demonstrate how this database can be a powerful analytic tool to inform and support policy decisions and initiatives for CCO staffing and training, combat support planning, and sharing lessons within the theater.

They recommend the Air Force (and the Department of Defense more broadly) establish a standardized methodology for collecting contingency contracting data on an ongoing basis to facilitate planning and policy decisions for future contingencies.

To facilitate the types of analyses required, the Air Force needs to systematically gather contingency contracting data on an ongoing basis. To be most useful, the CCO data system must make it possible to quickly access detailed

For example, the Air Force could make more informed trade-offs between purchasing required assets as needed during operations in-theater or purchasing them in advance and then using airlift or other transportation assets to move materials from the United States or regional storage locations to operating locations.

Second, purchasing data could be used to improve training for future contingency contracting officers (CCOs). Insights about how purchasing evolves with operational phases could be used to design more realistic training courses. Further, information about typical goods and services purchased, types of contracts used, and supply bases at specific locations could be used to better prepare CCOs before deployment.

Third, information about contracting workloads at different types of bases and other purchasing organizations during different phases of operations could be used to better align CCO organizations and personnel assignments (both CCO numbers and skill levels) with warfighter requirements.

Finally, descriptive data on individual transactions are important inputs in efforts to improve purchasing practices across the theater. For example, CCOs could achieve more effective price negotiations based on improved visibility of prices of similar goods or services, as well as identification of potential opportunities to improve the Air Force's leverage with key suppliers through contract consolidation across commodity groups or sites.

Defining Contingency Contracting for Operation Iraqi Freedom

The Air Force Federal Acquisition Regulation Supplement (AFFARS) provides the following relevant definitions:

- A contingency is "an emergency, involving military forces, caused by natural disasters, terrorists, subversives, or required military operations."
- CCOs are people with "delegated contracting authority to enter into, administer, and terminate contracts on behalf of the Government in support of contingency…operations."[5]

In this article, we use a broad definition of contingency contracting for OIF that includes war preparations in early fiscal year (FY) 2003, the major combat operations in mid-FY 2003, and postwar activities beginning in the latter part of FY 2003. Although United States Central Command Air Forces (USCENTAF) was the primary major command involved in Air Force operations, many other commands and organizations made purchases in support of this effort. For example, purchases were made to support US Air Forces at European bases, Air Force Special Operations Command forces, and Air Mobility Command operations.

Building the Database

To develop a baseline of Air Force contingency contracting for OIF and obtain insights relevant to the policy issues introduced above, we sought to develop a comprehensive database of Air Force OIF contingency purchases, which were made by a large number of organizations around the world. Our analyses are based on CCO purchases at 24 purchasing organizations located within the USCENTCOM AOR that supported OIF during FY 2003 and FY 2004. These data include more than 24,000 transactions obligating more than $300M.

We chose these data for several reasons. The current lack of visibility into the details of the forward transactions and the decentralized nature of the CCO purchases suggest that there could be opportunities to improve planning for and execution of these activities, for example, through preplanning for certain types of goods or services, more effective price negotiation, or contract consolidation with key suppliers to the AOR. In addition, the numbers of dollars and individual transactions for USCENTAF are much greater than equivalent data received from other commands and organizations that supported OIF.

In order to create a comprehensive Air Force contingency contracting database for OIF, the RAND team used transaction logs maintained by the office of the USCENTAF comptroller, headquartered at Shaw Air Force Base, South Carolina. These data on CCO purchases were tracked in Microsoft® Excel® spreadsheets, which included similar, but not identical, data fields and spreadsheet formats for contract and government purchase card (GPC) files across purchasing organizations in fiscal years 2003 and 2004.[6] As a result, it was necessary for RAND to develop a detailed process to merge these files into an aggregated master database that would enable our analyses.[7]

The Air Force spreadsheets contained data fields such as a text description of the goods and services purchased, the date the purchase was requested, the price paid, and the supplier. In addition, the RAND team created three new variables for our analyses. First, we created a variable for the purchasing organization (the base or other organization) with which the comptroller associated the transaction. Second, we used the text description for each transaction to categorize the purchase according to one or more types of goods or services. And third, we used several pieces of data from the spreadsheets to create a variable for the type of transaction to identify whether the purchase was made using a GPC or a contract vehicle. Contracts are further broken down into blanket purchase agreements[8] (BPAs) and *other* contracts.

Baseline of Contingency Contracting for Operation Iraqi Freedom

This section provides an overview of the results of our baseline analysis of purchases supporting Air Force OIF activities during FY 2003 and FY 2004 at Air Force operating locations in the USCENTCOM AOR. RAND's database allowed the team to analyze the USCENTAF CCO purchases in several important ways. After an overview of expenditures, we describe:

- Who (which organizations) made purchases
- What types of goods and services were purchased
- When the purchases were made (time periods)
- How the purchases were made (contracting tools used)
- From whom (suppliers) the purchases were made

Who

Figure 1 provides information on the time frames for purchasing activity for each of the OIF purchasing organizations during FY 2003 and FY 2004. (Purchasing activity corresponds to operations for each of these organizations.) Only five organizations had contracting activity throughout both years. Some were active for only a few months.

An analysis of spending by location indicates that the most spending by far occurred at Al Udeid. Two things may explain this:

Article Highlights

descriptions of individual transactions, as well as aggregate those transactions according to categories of purchases, types of contract vehicles used, locations of purchases, suppliers dealt with, and so forth.

The authors also recommend establishing a standardized automated system for transaction-specific data that could be either virtually connected to a master database or regularly downloaded into such a database as a means of recording and cataloging purchases. Such a system should also include an easy method both for categorizing purchases across a wide range of commodities and services and for identifying suppliers in a standardized way. Contingency contracting representatives and logistics planners should work in concert to develop the database, ensuring that one standardized system will satisfy the requirements of both organizations.

Article Acronyms

AFFARS – Air Force Federal Acquisition Regulation Supplement
AOR – Area of Responsibility
BPA – Blanket Purchase Agreement
CAOC – Combined Air Operations Center
CCO – Contingency Contracting Officer
USCENTAF – United States Central Command Air Forces
USCENTCOM – United States Central Command
DFAS – Defense Finance and Accounting Service
FY – Fiscal Year
GPC – Government Purchase Card
OEF – Operation Enduring Freedom
OIF – Operation Iraqi Freedom
PSAB – Prince Sultan Air Base
RED HORSE – Rapid Engineer Deployable Heavy Operational Repair Squadron Engineers

First, expenditures there include not only those for air base operations, but also for the Combined Air Operations Center (CAOC), which relocated from Prince Sultan Air Base (labeled *PSAB)* to Al Udeid during this period. Second, Al Udeid served as the forward headquarters of the Air Force in Southwest Asia during both OIF and OEF. Unfortunately, Al Udeid's and the CAOC's contract expenditures were captured only in a separate financial management system which lacks the necessary resolution to allow detailed analysis.[9]

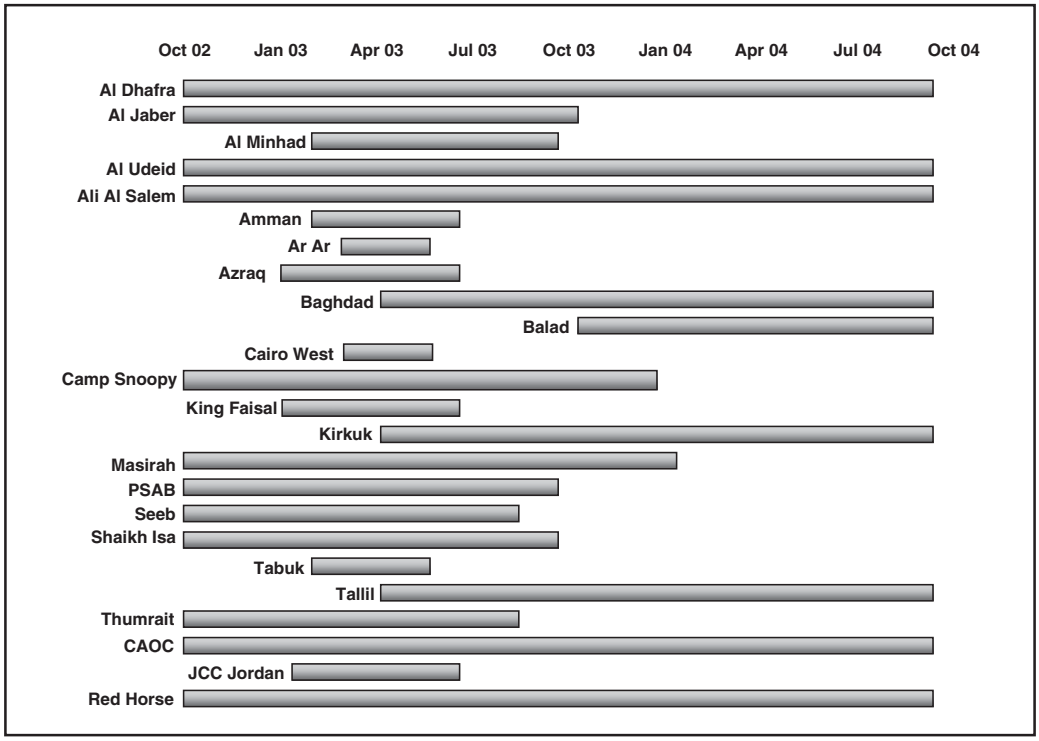

Figure 1. Timelines for Purchasing Activity, by Purchasing Organization

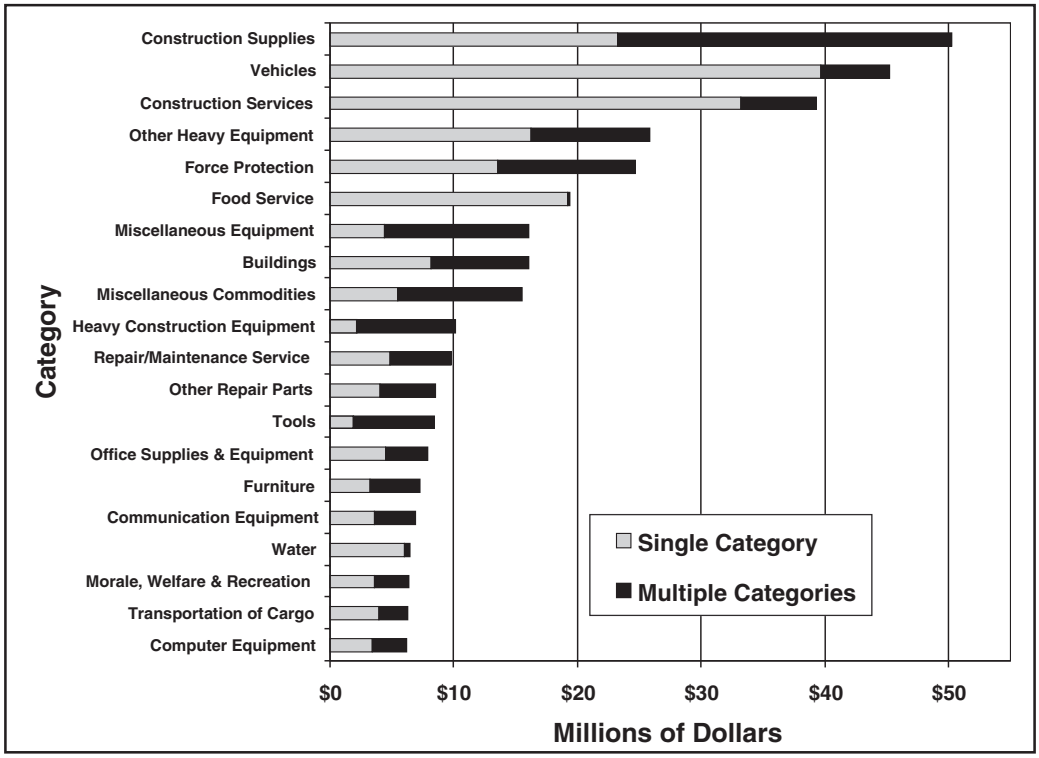

Figure 2. Obligations for the Top 20 Categories, FY 03 and FY 04

Note: the *single category* portion of the horizontal bars shows obligations that clearly belonged in only one category; the *multiple categories* portion shows obligations for transactions that could also be assigned to other categories.

What

Deployed CCOs purchased a variety of products to support OIF operations during FY 2003 and FY 2004. We created 45 categories of goods and services and used a computer program to assign transactions to these categories based on key words found in the text descriptions of the purchases. After categorizing the transactions as well as possible, we calculated both the total obligations per category as well as the number of transactions per category. The categories with the highest total obligations included construction supplies, vehicles, construction services, and other heavy equipment (see Figure 2).[10] Construction supplies, miscellaneous commodities, and office supplies and equipment represent the largest number of transactions.

When

Our database also allows analysis of purchases over time. Figure 3 shows that CCO purchases and transactions at these purchasing organizations were higher in FY 2003 than in FY 2004. This could be associated with the decline in the number of active bases or any number of other factors.

We can disaggregate these data to examine how the level of expenditures varied over time at individual bases. Such data can be used to make comparisons across locations according to characteristics such as base population, types of operational missions (for example, special operations, F-16s), existing base infrastructure, or permanency of the operating location.

While our database alone cannot address underlying causes for the observed differences in spending patterns across locations over time, an analyst with additional information about characteristics of locations such

as base population, numbers and types of aircraft, types of missions, types and maturity of base infrastructure, geographic dispersion of facilities, and Service branch responsible for base operating support, could perform more sophisticated evaluations to determine the correlation between these factors and spending patterns over time.[11] The results of such analyses could be used to make programming decisions about new bases, plan transportation requirements, match CCO resources with user requirements, and so forth.

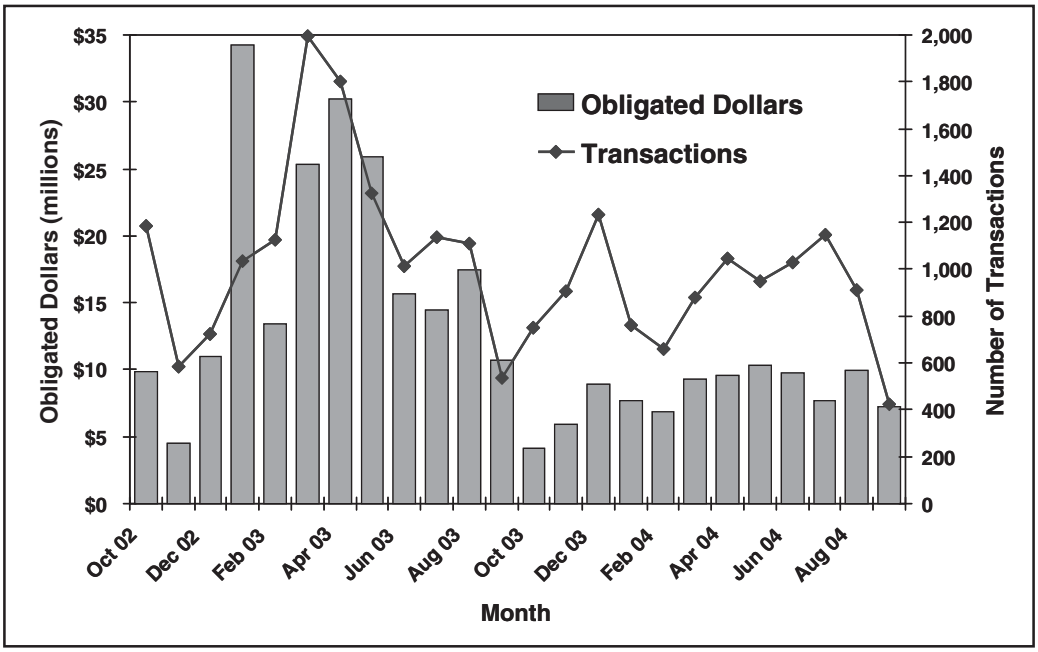

Figure 3. Obligations and Transactions by Month, FY 03 and FY 04.

How

CCOs have a variety of instruments with which to make purchase payments. Our data allow us to identify two particular types of instruments for further analysis: GPCs (essentially government-issued credit cards) and BPAs. Here, we compare purchases made using GPCs to purchases made through contract instruments that are recorded in USCENTAF comptroller files. As shown in Figure 4, GPC purchases represented more than one-third of the transactions made in fiscal years 2003 and 2004 , but they represented less than one-tenth of the dollars spent.

Since GPCs are designed for purchases of small items, such as office supplies—many of which can be made over the Internet—this is an understandable finding. The dollar amount for the average contract transaction was about 6 times larger than the amount for the average GPC transaction.

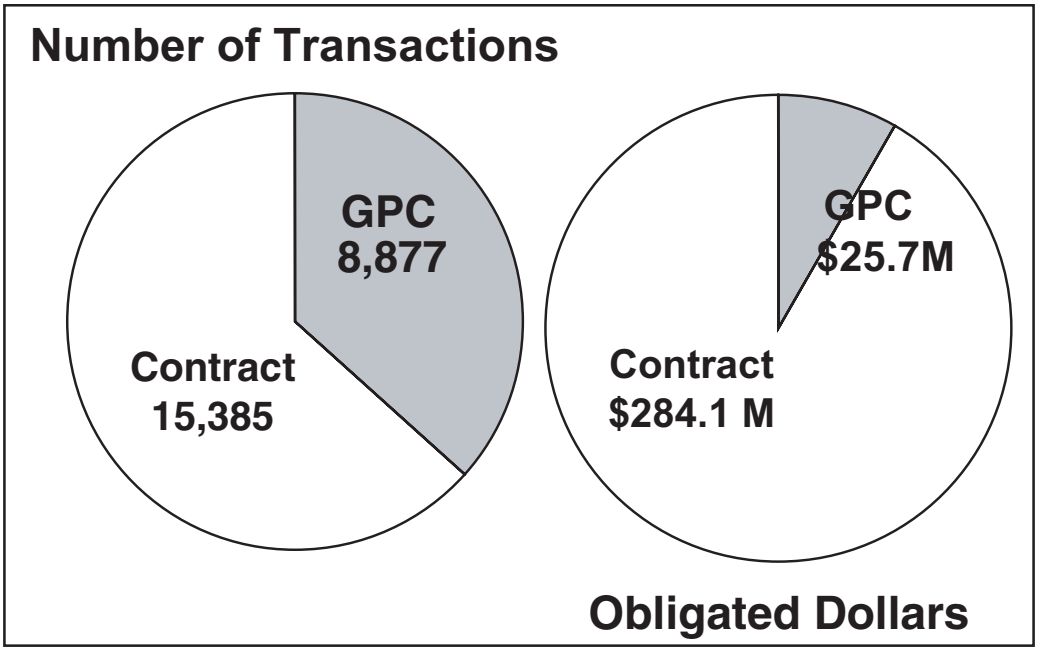

Figure 4. GPC versus Contract Purchases in FY 03 and FY 04.

Although GPCs are intended for the purchase of small items, it is interesting to note that construction supplies are the largest category for both GPC and contract transactions. Other contract transactions were concentrated in construction services and larger goods, including vehicles and heavy equipment, while GPC purchases included smaller equipment, tools, and office supplies.

From Whom

Having examined who made what purchases, and when and how the purchases were made, we now turn to the question of from whom goods and services were purchased. We examined the top 10 suppliers (in terms of dollars obligated) in fiscal years 2003 and 2004 by all obligations, for contract obligations alone, and for GPC obligations alone.[12]

Based on firm names, the top firms by contract expenditures appear to be regional firms primarily, whereas GPCs were often used to make purchases from US firms, presumably over the Internet. To get a better sense of what percentage of Air Force CCO purchases were with regional firms, we examined the top 100 firms used in fiscal years 2003 and 2004, which represented 78 percent of the obligations during this period. Of these, 55 were regional firms. Breaking this out by type of transaction, 59 of the top 100 firms for contract transactions were regional, while the number was much smaller for GPC purchases, where only 11 out of 100 were regional.

The top-ranked suppliers provided goods and services from a variety of categories. For each of the top five suppliers in fiscal years 2003 and 2004 (noted as Firms A through E), Figure 5

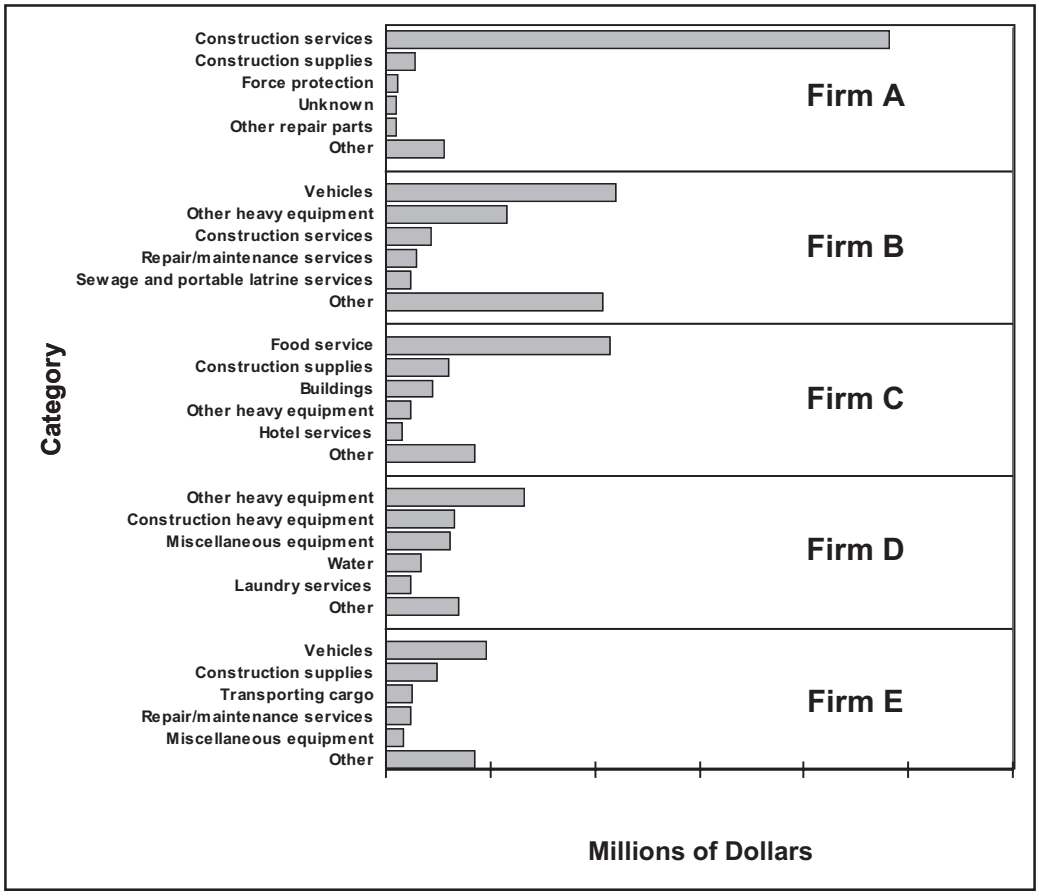

Figure 5. Top Five Purchase Categories for the Top Five Suppliers
Note: one of the top categories of purchases from firm A consisted of items that our computer program found difficult to categorize and so placed in the *unknown* category.

displays the top five categories of purchases made through the supplier (with all other purchases counted in the bar labeled *Other*).

Top suppliers worked across multiple locations as well. In particular, Firm E supplied goods and services not only in Iraq, but also in Qatar and Oman.

Such detailed information on suppliers' activities across the theater can assist CCOs in planning future acquisitions. While no contracts in our database encompassed more than one purchasing organization, there may be opportunities for the Air Force or the Department of Defense to increase leverage with providers by combining contracts across organizations and encouraging competition among providers. RAND's data analyses of suppliers point to more detailed analyses that could inform such strategic purchasing decisions.

Implications for Policy Issues

In this section, we use insights from the data and from interviews we conducted in the course of our research to address issues related to CCO staffing, CCO training, combat support planning, and the sharing of lessons within the theater.

CCO Staffing

Lacking hard data for detailed workload analyses, the Air Force traditionally has used general rules based on perceptions of past experience to determine how many contracting officers to allocate to deployed locations. This approach can lead to the need for adjustments after the fact to reflect real demands on CCOs' time.

One potentially important use of our database could be the systematic assessment of CCO workloads — measured in dollars obligated or transactions executed — across purchasing organizations. While neither measure is perfect (some small-dollar transactions may require more time and attention than do some big-dollar transactions), both measures are potentially important indicators of CCO time requirements. Having received supplemental data from USCENTAF on CCO staffing for selected purchasing organizations for FY 2004, we compared the workload of contracting officers in terms of the average number of transactions per CCO and the average number of dollars obligated per CCO.

Our analyses indicate that there were large differences in CCO activities across locations during fiscal year 2004. However, a better understanding of the nature of activities at individual locations is necessary to draw conclusions. With additional information on the nature of the work within these organizations—such as mission activities supported, types of goods and services purchased, and the number of transactions completed—statistical analyses such as regressions could be used to understand the factors associated with these differences.

CCO Training

Anecdotes from our interviews indicate that a number of factors make contracting in-theater challenging, including differences in the nature of contingency contracting duties as opposed to duties of a contracting officer at a nondeployed location, variation in the contracting environments among countries within the AOR, the short duration of most deployments for contracting personnel,[13] and differences in contracting culture among the military branches operating in a Joint environment.

At first glance, there appears to be abundant guidance available to CCOs to help mitigate any adverse effects associated with these challenges, including AFFARS Appendix CC for Air Force contingency contracting support;[14] Air Force Instruction 10-401, *Air Force Operations Planning and Execution*;[15] the 2003 Air Force Logistics Management Agency contingency contracting handbook;[16] as well as formal training through the Defense Acquisition University[17] and predeployment orientation programs (limited to office chiefs) provided by USCENTAF contracting.

However, one officer we interviewed likened learning CCO procedures from formal training to learning to play golf by reading the rulebook. In contrast, several people mentioned the

importance of providing deploying CCOs with opportunities to engage in training simulations (such as Silver Flag exercises[18]) which present them with scenarios they can expect to encounter when they go into the AOR.

A database of CCO purchases such as the one RAND developed (as described above), could supplement classroom and predeployment training by providing insights into ongoing activities in the theater. Information could be tailored to locations where trainees would be deploying. It also could assist in creating more realistic environments for exercises. In addition, a CCO who is getting ready to deploy could use the database to prepare by becoming familiar with the detailed contracting environment at his or her future location, including the types of purchases made, the predominant types of contracts used for these purchases, and the local supply base. Similar data on contracting for other military branches and coalition partners could be used to better prepare CCOs who will be operating in a Joint requirements environment.

Combat Support Planning

Combat support planners are responsible for making sure all of the resources the Air Force needs to go to war are in place in time to support contingency operations and associated personnel. After determining all the necessary resources, planners must make choices about where to obtain them and how to get them to the theater to shorten the deployment-to-employment timeline, make the best use of scarce airlift and other transportation resources, and reduce the military footprint in-theater.

Since one option that planners consider is the availability of resources in-theater, a motivation for the development of the OIF CCO database was that such data could be used to improve combat support planners' ability to make effective, efficient trade-offs between purchasing items in-theater and purchasing them elsewhere and then using scarce transportation resources to bring them to the theater. In addition, these data can be used to describe the local supply base for different types of purchases.

The purchase of bottled water in Iraq provides a simple case study of how a detailed database of CCO purchases can be used to help assess the trade-offs among options. The US military required a great deal of bottled water for personnel stationed in locations supporting OIF during fiscal years 2003 and 2004. Our database indicates that CCOs in 15 purchasing organizations in-theater purchased bottled water through 38 contracts with more than 30 suppliers. Alternatively, planners could have elected to set up contract vehicles for large quantities of water in advance (or purchase and store the water) and then ship the water to appropriate locations in-theater as needed. Presumably, such advance planning would result in a lower cost per liter than CCOs were able to negotiate in real time during contingency operations. However, shipments of water into the theater would either delay the transport of troops and other supplies or would require the purchase of additional transportation.[19]

A combat support planner could use RAND's database to determine the best way to meet water requirements in-theater during operations. The database would assist the planner by enabling the assessment of costs associated with purchasing water in-theater, an analysis of the amount of airlift required for an alternate approach, and the identification of any potential effects on the mission.

In addition, data on Joint contracting in-theater, similar to those analyzed in this article, could be used by the combatant commands to construct more realistic and detailed contract support plans. These plans are intended to outline personnel requirements, organizational structures, and so forth, which will be used for Joint contingency contracting to support operations executed by the combatant commands (for example, at what point contracting should transition from a decentralized, service-specific structure to Joint organizations).

Sharing Lessons

The nature of particular requirements and the local environment may limit the CCOs' ability to reduce costs. However, awareness of details of purchases made by other CCOs in the theater should assist in negotiating better prices where this is possible. For example, Table 1 shows the maximum, minimum, and average prices paid per liter of water in fiscal years 2003 and 2004 transactions in our database.

The purchase for Baghdad in Table 1 was for 64 pallets of bottled water, which under our assumptions, equates to 110,592 half-liter bottles, or 55,296 liters. If the Baghdad CCO had been able to obtain this water for the price paid at Al Jaber, he or she would have saved more than $53K. Of course, the majority of the cost for the Baghdad purchase may be attributable to the challenges of delivering into that location.

While price information can be a powerful tool for CCOs, additional information about the relative performance of suppliers and other factors related to meeting requirements, such as the urgency, transportation needs, or security threats, would be helpful in interpreting such comparisons.

Recommendations

In this article, we have described the construction of a database of CCO purchases supporting Air Force activities in OIF during fiscal years 2003 and 2004. We have demonstrated how this database can be a powerful analytic tool to inform and support policy decisions and initiatives for CCO staffing and training, combat support planning, and sharing lessons within the theater.

Based on our experience creating the database and analyzing the CCO data for OIF, we recommend the Air Force (and the Department of Defense more broadly) establish a standardized methodology for collecting contingency contracting data on an ongoing basis to facilitate planning and policy decisions for future contingencies.

To facilitate the types of analyses illustrated here in a timely way, the Air Force needs to systematically gather contingency contracting data on an ongoing basis. To be most useful, the CCO data system must make it possible to quickly access detailed descriptions of individual transactions, as well as aggregate those transactions according to categories of purchases, types of

Category	Maximum	Minimum	Average
Price per liter ($)	1.08	0.12	0.38
Date	March 2004	June 2003	
Location	Baghdad	Al Jaber	

Table 1. Range of Prices CCOs Paid per Liter of Drinking Water, FY 03 and FY 04

contract vehicles used, locations of purchases, suppliers dealt with, and so forth.

Table 2 contains our recommendations on the types of data that would be most useful to collect. These recommendations encompass data about the transactions themselves, as well as supplemental information about the activities supported by individual purchasing organizations and the relevant supply bases, that would enhance the types of analyses illustrated in this article and provide a basis for interpreting their results.

We understand the complex and austere conditions in which CCOs often operate. Additionally, we do not propose to overburden these hard-working individuals with new reporting requirements. We do suggest a standardized automated system for transaction-specific data that could be either virtually connected to a master database or regularly downloaded into such a database as a means of recording and cataloging purchases.[20] Such a system should also include an easy method both for categorizing purchases across a wide range of commodities and services and for identifying suppliers in a standardized way. For example, drop-down menus with category options and supplier name options from which to choose would make it easier for CCOs to identify these in a consistent manner. Contingency contracting representatives and logistics planners should work in concert to develop the database, ensuring that one standardized system will satisfy the requirements of both organizations.

The Air Force is in the process of reviewing current contracting organizations, including those overseas, to determine what future organizations should look like. In addition, the Air Force is actively engaged in discussions about how to improve the effectiveness and efficiency of contracting in a Joint contingency environment, in which forces from different military branches are collocated and are operating together. The analytic capabilities recommended in this article as well as the corresponding RAND monograph[21] can provide key inputs to these important organizational and operational decisions.

End Notes

1. This article is based on the RAND monograph *Contingency Contracting Purchases for Operation Iraqi Freedom (Unrestricted Version)*, MG-559/1-AF, 2008. We thank our RAND colleague Mike Neumann for his help creating this short article.
2. George A. Cahlink, "Send in the Contractors," *Air Force Magazine*, Vol 86, No 1, [Online] Available: http://www.afa.org/magazine/jan2003/0103contract.asp, January 2003.

TYPE OF DATA	EXPLANATION
Individual Transactions	**Data to be Entered by Purchasing CCO**
Purchasing organization	Organization that purchases the goods or services
CCO	Individual responsible for the transaction
Recipient	Organization or location that benefited from the purchase, if different from the purchasing organization (such as base that benefited from a RED HORSE repair project)
Text description	Description of full range of goods and services purchased through the transaction
Units	Number of goods purchased or period of time for which service is to be provided; break out according to types of goods or services covered within the transaction
Purchase category	General class(es) of goods or services purchased; break out according to types of goods or services covered within the transaction
Price	Price paid for the goods and services; when multiple goods and services are purchased within a single transaction, prices should be broken out by type
Supplier	Firm that provides the goods and services
Location of supplier	Identifies whether supplier is a local firm, regional firm, or other
Transaction ID	Unique identifier for the transaction, such as contract number
Payment mechanism	GPC or contract
Type of contract	For contracts, type of contract, such as BPA, Form SF44
Date of request	Date on which purchasing organization received the formal request for goods and services
Date of payment	Date on which supplier was paid
Date of delivery	Date on which goods were delivered or services began
Comments	Any explanatory comments CCO deems useful
Activities Supported by Purchasing Organizations	**Supplemental Data Needed to Explain Purchasing Trends (will vary over time)**
Population	Number of personnel supported by the purchasing organization
Mission activity	Description of mission activity supported by the purchasing organization's transactions (number and types of aircraft, special operations)
Responsibility for base operating support	Service branch responsible for providing base operating support for the location
Infrastructure	Number of buildings, acres supported by the purchasing organization
Condition of infrastructure	Condition of infrastructure supported by the purchasing organization, particularly for new locations
Outlook	Plans for the purchasing organization (temporary operating location)
Supply base	Supplemental data to facilitate improved purchasing over time
Supplier ratings	Performance ratings of suppliers (perhaps only key suppliers) based on, for example, the quality of goods and services, reliability, and ease of working relationship

Table 2. Recommended Data to Be Collected on an Ongoing Basis

3. Frank Camm and Victoria A. Greenfield, *How Should the Army Use Contractors on the Battlefield? Assessing Comparative Risk in Sourcing Decisions*, Santa Monica, CA: RAND Corporation, MG-296-A, 2005, [Online] Available: http://www.rand.org/pubs/monographs/MG296, as of 7 February 2008.
4. Congressional Budget Office, *Logistics Support for Deployed Military Forces*, Washington, DC, [Online] Available: http://www.cbo.gov/ftpdocs/67xx/doc6794/10-20-MilitaryLogisticsSupport.pdf, October 2005, as of 7 February 2008.
5. *Air Force Federal Acquisition Regulation Supplement*, Appendix CC, paragraph CC-102, 14 March 2007.
6. In most cases, these databases represent all available data on CCO purchases at the identified locations. However, seven of these purchasing organizations recorded some or all of their contract transactions during this period in a centralized electronic database called the BQ system, rather than in the financial management spreadsheets. (The BQ system is the US Air Force's standard base-level general accounting and finance system. Its structure and use are described in DFAS [2000].) Although we were given information about the dollar amount of purchases recorded in BQ, the BQ data do not provide detailed descriptions of these purchases. In addition, we do not know the number of transactions associated with the dollars in the BQ system. Because data for these locations are incomplete, encompassing only GPC expenditures in some cases, we are unable to include them in some of the analyses in this article.
7. As part of the process, we reviewed and corrected several variables, including dates associated with each purchase and information related to contractors.
8. BPA contracts are used to satisfy anticipated recurring requirements for goods or services. They are designed to reduce transaction costs and speed up the procurement process "by establishing *charge accounts* with qualified sources of supply" (Air Force Audit Agency, 2004). The contracts specify the range of goods and services covered by the agreement, price lists, total dollar limits, and time limits. Contracting officers (or other authorized and trained personnel) can then place *calls* against those agreements to meet specific user requirements that fall within the bounds of the agreements.
9. See Footnote 6. In many of the detailed analyses presented in this article, we exclude seven organizations for which we have only partial contracting information; those excluded are Al Dhafra, Al Jaber, Al Udeid, Ali Al Salem, CAOC, Prince Sultan Air Base, and Seeb.
10. In many cases, the description of a purchase clearly fits into only one category. Other transactions included purchases of more than one disparate item or items that were ambiguously described and might, because of the use of key words in the program, fit into more than one category. For example, the text description might include a laptop computer (computer equipment) and a printer (office supplies and equipment), or the purchase may be described as a *desk for chapel* which could be interpreted by the computer program as furniture (the desk) or MWR (the chapel). The *single category* portion of the horizontal bars in Figure 2 shows obligations that clearly belonged in only one category; the *multiple categories* portion shows obligations for transactions that could also be assigned to other categories.
11. Such information would need to be dynamic due to the fluid nature of wartime operations.
12. We cannot list firm names here due to operational security considerations.
13. Typical deployments increased from 3 months to 4 months during our data timeframe, fiscal years 2003 and 2004.
14. *Air Force Federal Acquisition Regulation Supplement*, Appendix CC, paragraph CC-102.
15. AFI 10-401, *Air Force Operations Planning and Execution*, 25 April 2005.
16. James Roloff, *Contingency Contracting: A Handbook for the Air Force CCO*, Maxwell AFB, AL: Air Force Logistics Management Agency, February 2003. [Online] Available: http://www.aflma.hq.af.mil/lgj/contingency%20Contracting%20Mar03_corrections.pdf. In 2007 the AFLMA released a new handbook entiled *Contingency Contracting: A Joint Handbook*.
17. Defense Acquisition University, *2006 Defense Acquisition University Catalog*, Ft Belvoir, VA: DAU Press, October 2005. The course CON 234 (Contingency Contracting) is designed to help develop "skills for contracting support provided to Joint Forces across the full spectrum of military operations" (DAU, 2005, 36). The Defense Acquisition University was updating its contingency contracting curriculum at the time of our research.
18. GlobalSecurity.org, *Silver Flag*, [Online] Available: http://www.globalsecurity.org/military/ops/silver-flag.htm., last updated August 21, 2005. The Silver Flag exercises provide civil engineers, services, and other support personnel training on building and maintaining bare bases in deployed locations.
19. One or more contracts with regional providers that could easily distribute water to multiple locations would reduce the need for airlift.
20. Since the beginning of our study, USCENTAF Contracting and the USCENTAF Comptroller have introduced tools to address some of the data difficulties encountered in our analyses.
21. Laura H.Baldwin, John A. Ausink, Nancy F. Campbell, John G. Drew, and Charles Robert Roll, Jr, *Contingency Contracting Purchases for Operation Iraqi Freedom* (Unrestricted Version), Santa Monica, CA: RAND Corporation, MG-559/1-AF, 2008.

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Special Feature

Aligning

Introduction

Metrics are often used as roadmaps to help us know where we have been, where we are going, and how or if we are going to get there.[1] Metrics should generally be used to gauge organizational effectiveness and efficiency and to identify trends, not as a pass or fail indicator. Individually, they are snapshots in time.[2] Metrics are a statement of what is important to your organization and embody a way of thinking about your business; when metrics change, so does people's point of view. But what exactly is a metric and what constitutes a good versus bad metric?

Air Force Instruction (AFI) 21-101, *Aircraft Equipment and Maintenance Management,* describes metrics, specifically maintenance management metrics, as a crucial form of information used by maintenance leaders to improve the performance of maintenance organizations, equipment, and people when compared with established goals and standards.[3] AFI 21-101 also lists four attributes for metrics including:

- Accurate and useful for decisionmaking
- Consistent and clearly linked to goals and standards
- Clearly understood and communicated
- Based on a measurable, well-defined process[4]

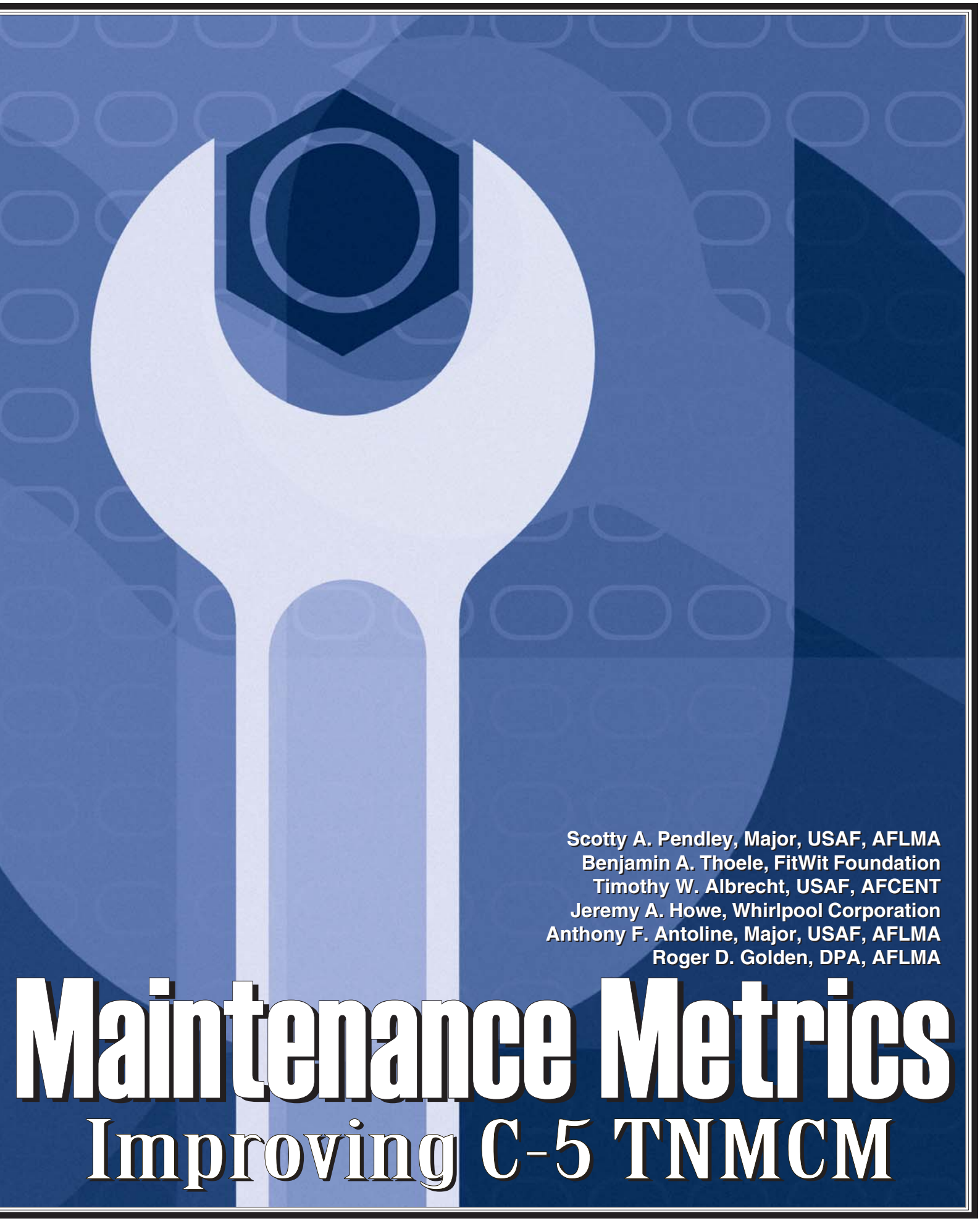
Dr Michael Hammer, a recognized leader in the field of process reengineering, also notes four principles of measurement.

- Measure what matters, rather than what is convenient or traditional
- Measure what matters most, rather than everything
- Measure what can be controlled, rather than what cannot be controlled
- Measure what has impact on desired business goals, rather than ends in themselves[5]

Hammer also points out several flaws with traditional metrics such as too many, fragmented, disorganized, internally focused, irrelevant to the customer, not used systematically, and not aligned with goals.[6] It is this last flaw (metrics not aligned with goals) which became a focus of examination during an Air Force Logistics Management Agency (AFLMA) study of rising Air Force total not mission capable maintenance (TNMCM) rates and potential root cause factors affecting these rates.

Background

This article is the second of a three-part series based on AFLMA project number LM200625500, the *C-5 TNMCM Study II*. At the request of the Air Force Materiel Command Director of Logistics (AFMC/A4), AFLMA conducted an analysis in 2006-2007 of TNMCM performance with the C-5 Galaxy aircraft as the focus. The *C-5 TNMCM Study II* included five objectives. One of those objectives was to determine root causes of increasing TNMCM rates for the C-5 fleet. To achieve that particular objective, an extensive, repeatable methodology was developed and utilized



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Maintenance Metrics

Improving C-5 TNMCM

Article Highlights

Realignment of metrics must start at the highest levels of the Mobility Air Force (MAF). The MAF should choose its value measure and create a set of metrics aligned with that measure.

At the request of the Air Force Materiel Command Director of Logistics, AFLMA conducted an analysis in 2006-2007 of total not mission capable maintenance (TNMCM) performance with the C-5 Galaxy aircraft as the focus. The *C-5 TNMCM Study II* included five objectives. One of those objectives was to determine root causes of increasing TNMCM rates for the C-5 fleet. To achieve that particular objective, an extensive, repeatable methodology was developed and utilized to scope an original list of 184 TNMCM factors down to two root causes for in-depth analysis. Those two factors were aligning maintenance capacity with demand and the logistics departure reliability versus the TNMCM paradigm. This article details the analysis of the second of these two factors.

This second factor was also described as a disconnect or misalignment between the C-5 maintenance group leadership's primary metric, home station logistics departure reliability (HSLDR), and one of the major command and Air Force senior leadership's primary metrics, aircraft availability. The remainder of this article describes how real-world and simulated data supported the early hypothesis that HSLDR and TNMCM were not aligned metrics. Finally, a brief discussion explains why the study team believed a disconnect existed between the base-level and command-level metrics.

The research demonstrated that HSLDR is aligned with neither aircraft availability nor TNMCM, as there is only a weak correlation between them. Maintainers at the wing level work to support operational effectiveness; however, higher levels of Air Force supervision appear more focused on improving strategic readiness. This disconnect in priorities was determined to be a root cause of the C-5 TNMCM rate being below Air Force standards.

If the Air Force's primary goal is to improve the C-5 fleet TNMCM rate, then priorities of the maintainers in the field must change. As the maintenance group (MXG) leadership focuses on HSLDR performance, not TNMCM, the MXP to scope an original list of 184 TNMCM factors down to two root causes for in-depth analysis. Those two factors were aligning maintenance capacity with demand and the logistics departure reliability (LDR) versus TNMCM paradigm. This article details the analysis of the second of these two factors.

This second factor was also described as a disconnect or misalignment between the C-5 maintenance group (MXG) leadership's primary metric, home station logistics departure reliability (HSLDR), and one of the major command (MAJCOM) and Air Force senior leadership's primary metrics, aircraft availability (AA). The remainder of this article describes how real-world and simulated data supported the early hypothesis that HSLDR and TNMCM were not aligned metrics. Finally, a brief discussion explains why the study team believed a disconnect existed between the base-level and command-level metrics.

Primary Metrics of C-5 Maintenance Leadership

The *C-5 TNMCM Study II* originated because the project sponsor placed significant importance on TNMCM rates. Based on site visits and feedback from all but one C-5 MXG commander (MXG/CC) or other MXG senior leaders, the study team determined that the primary metric of the MXG/CC was HSLDR. AA, which is directly related to the TNMCM rate, was a primary metric of higher level leadership. Major General McMahon, then AMC director of logistics (AMC/A4), spoke to the study team in December 2006 concerning aircraft availability as the future cornerstone maintenance metric [as opposed to mission capable (MC) rates].[7] Similarly, personnel from the AMC/A4M office stated that aircraft availability is the number one concern for AMC Headquarters as opposed to MC rates.[8]

During site visits to Dover Air Force Base (AFB), Stewart Air National Guard Base, and Westover Air Reserve Base, the study team received feedback from base-level maintenance leadership concerning maintenance metrics. Some of the comments included:

> "We don't manage by MC-Rate…we don't chase the numbers. We care about departure reliability, and [the Air Force] should be looking at en route reliability."[9]

> "We don't look at the TNMCM rate…numbers aren't the issue. We focus on the mission and the flying schedule."[10]

> "What's important? Anything that makes us fly. The metric for the base is departure reliability…Ops isn't happy with a 73 percent LDR."[11]

> "MC rate is way down on the list of things we pay attention to…We're currently scrambling to meet the flying schedule. Our priorities go to the scheduled aircraft."[12]

> "Our primary metric is LDR."[13]

Based on feedback from AFMC/A4 and AMC/A4 leadership, MXG/CCs at three C-5 bases, and telephone discussions with MXG leadership at other C-5 bases, the study team concluded that the primary metric of the MAJCOM A4 leadership was AA, which includes TNMCM, and that the primary metric of the MXG/CCs was HSLDR.

HSLDR, TNMCM, and AA Defined

AFI 21-101 defines the HSLDR, TNMCM, and AA metrics and their uses. Additional insight on the use of these metrics can be found in the *Metrics Handbook for Maintenance Leaders*.

Home-Station Logistics Departure Reliability (HSLDR) Rate. This is a leading metric used primarily by the Mobility Air Forces (MAF) for airlift aircraft. This delineates down to only first-leg departures of unit-owned aircraft departing home station.[14]

HSLDR Rate (%) = ((# of HS Departures – # of HS Logistics Delays)/# of HS Departures) x 100

Total Not Mission Capable Maintenance (TNMCM) Rate. TNMCM rate is the average percentage of possessed aircraft (calculated monthly or annually) that are unable to meet primary assigned missions for maintenance reasons…. Any aircraft that is unable to meet any of its wartime missions is considered not mission capable (NMC). The TNMCM is the amount of time aircraft are in NMCM [not mission capable maintenance] plus not mission capable both (NMCB) status.[15]

NMCB is mentioned in AFI 21-101 as the percentage of unit-possessed hours that aircraft are not mission capable due to both maintenance and supply.[16]

TNMCM (%) = ((NMCM Hrs + NMCB Hrs)/Unit Possessed Hrs) x 100

Aircraft Availability (AA) Rate. Aircraft availability is the percentage of a fleet that is in neither depot possessed status nor unit possessed NMC status.[17]

AA (%) = (MC Hours/Total Possessed Hrs) x 100

Note that TNMCM rate and AA rate are both part of the family of metrics that relate to aircraft status hours. Also important to remember is that unit possessed aircraft must be in one of four statuses:

- MC (to include partially mission capable for maintenance or supply)
- NMCM
- Not mission capable supply (NMCS)
- NCMB

Therefore, the percentage of MC hours must decrease as the percentage of NMCM, NMCS, and NMCB hours increase.

Metrics at Different Levels of the Organization

One might expect two different levels of an organization to have two different primary metrics. For the Air Force, the focus at the base maintenance level is expected to be on the tasks at hand to execute the mission on a daily basis. However, a strategic focus at the command A4 level is to be expected, looking across the availability of the entire fleet. Consider Dr Michael Hammer's presentation of this phenomenon in Table 1.

Article Highlights

simulation indicated that improving the TNMCM rate would require an increase in resources. Therefore, in order to improve the TNMCM rate without increased resources, the maintainers in the field must make TNMCM a priority. While it is impossible to model the current system perfectly, the results suggest that current maintenance policies do not ensure TNMCM improvement, but do improve HSLDR, which is the stated priority of the MXG leadership. Therefore, the study team recommended that MAJCOM leadership and MXG leadership decide on a set of metrics that are better aligned toward the same goal.

This is the second in a three-part series of articles that examine C-5 TNMCM rates.

Article Acronyms

AA – Aircraft Availability
AFB – Air Force Base
AFI – Air Force Instruction
AFLMA – Air Force Logistics Management Agency
AFMC – Air Force Materiel Command
AMC – Air Mobility Command
D&C – Delays and Cancellations
Est TNMCM – Estimated TNMCM
FIFO – First In First Out
FY – Fiscal Year
HS – Home Station
HSLDR – Home Station Logistics Departure Reliability
LDR – Logistics Departure Reliability
LIFO – Last In First Out
MAF – Mobility Air Force
MAJCOM – Major Command
MC – Mission Capable
MCO – Maintenance Carryovers
MCR – Mission Capable Rate
MDR – Maintenance Dispatch Reliability
MOS – Maintenance Operations Squadron
MX – Maintenance
MXG – Maintenance Group
MXP – Maintenance Priority
NMC – Not Mission Capable
NMCB – Not Mission Capable Both
NMCM – Not Mission Capable Maintenance
NMCS – Not Mission Capable Supply
REMIS – Reliability and Maintainability Information System
TDR – Technical Dispatch Reliability
TNMCM – Total Not Mission Capable Maintenance
UAOOS – Unscheduled Aircraft Out of Service

The first column in Table 1 lists the various categories across the spectrum of oversight for an organization, ranging from enterprise goals to local activities. The headings in the top row list the range of positions in the hierarchy of jobs within the organization. In general, senior leaders are primarily accountable for setting the vision and strategy across the entire business enterprise. Process owners are responsible for developing and executing operations and processes to support higher strategy, while professionals actually perform specific work tasks through various activities. Consider this same chart in terms of C-5 aircraft maintenance, shown in Table 2. The base-level focus on on-time departure reliability falls within the *operating objective* level, providing ready airplanes for the flying schedule. On the surface, this supports the strategic performance objectives of cargo and passenger delivery. These processes are, after all, at the core of the airlift mission. On-time departure reliability, as a measurement, only considers those airplanes scheduled to fly (departing).[19] TNMCM, on the other hand, is concerned with the categorization of aircraft status, and pertains to all possessed airplanes, regardless of whether or not there is an operational demand.[20] The takeaway here is that the study team's observations of the C-5 aircraft maintenance enterprise supported Dr Hammer's view presented in Table 1. The study team found that different levels of the C-5 maintenance hierarchy do in fact focus on different primary metrics.

Aligning Metrics

Although it may be common for different organizational levels to focus on different metrics, this split focus can be problematic for the enterprise when the pursuit of goals at the local level is not aligned to goals at the strategic level. That is, pursuit of better performance in one metric could result in suboptimal performance of higher level metrics. When this occurs, the metrics are not aligned. The study team utilized the following definition for aligned metrics:

> **Definition 1 - Aligned Metrics.** A set of metrics is said to be aligned if, with all other variables held constant, improvement in the lower level metric implies improvement of the higher level metrics.

For example, consider the priorities of a trucking company. The company is concerned with a higher level metric, known as a value measure, of increasing profit. The value measurement is in dollars. Shop managers at a truck maintenance facility use a lower level metric, known as a process measure, of reducing repair cycle time. By reducing the repair cycle time, the labor cost per truck is reduced, and each truck is returned to revenue-generating status sooner. All other variables held constant, reduced labor costs and greater numbers of operational trucks increase profit for the company. In this way, improving cycle time implies improvement in profit.[21] By Definition 1, these metrics are aligned.

Now consider the Air Force maintenance metrics of HSLDR rate and TNMCM rate. The base focus on departure reliability may have a direct effect on prioritizing unscheduled maintenance actions to best meet the flying schedule. This optimization can cause an airplane that is *hard broke* to be prioritized below another airplane in order to get the *less broke* airplane repaired more quickly and readied for the next flight. This decision, while supporting the objective of on-time departure reliability, may actually have a negative effect on the TNMCM rate. If, however, HSLDR and TNMCM were aligned, an improvement to HSLDR would imply an improvement to TNMCM. To investigate the alignment of the HSLDR, TNMCM, and AA metrics, the study team analyzed data from August 2004 through December 2006 for the 436 MXG at Dover Air Force Base (AFB). The 436 Maintenance Operations Squadron (MOS) analysis section provided the data for the HSLDR and TNMCM rates; the source for the AA rates was the Multi-Echelon Resource and Logistics Information Network.

Mathematically, metric alignment implies that two metrics are fairly strongly related. To test the correlation mathematically, the study team employed the correlation coefficient denoted by the symbol ρ (rho). The correlation coefficient is a number between -1 and 1 which measures the degree to which two variables are linearly related and is scaled such that $\rho > 0$ indicates a positive correlation between the variables. A value of $\rho = +1$ implies a perfect correlation with all ordered pairs (points) falling on a straight line with a positive slope. A value of $\rho = -1$ implies a perfect negative correlation with all points on a straight line with a negative slope.[22] For the purposes of this study, the study team partitioned the correlation coefficient values in the following manner:

- $|\rho| \leq 0.20$ implies a very weak correlation
- $0.20 < |\rho| \leq 0.50$ implies a weak correlation
- $0.50 < |\rho| \leq 0.80$ implies a moderate correlation
- $0.80 < |\rho| \leq 1.0$ implies a strong correlation

Figure 1 illustrates the relationship between the TNMCM rate and HSLDR rate.

	Leadership	Process Owner	Professionals
Enterprise Goals	High*	Low	Medium
Strategic Performance	High*	High	Medium
Operating Objectives	Medium	High*	Medium
Process Performance	Medium	High*	High
Activity Performance	Low		High*
* = primary accountability			

Table 1. Accountability and Attention[18]

	AMC/A4	MXG/CC	Technicians
Enterprise Goals – increase aircraft availability, reduce costs	High*	Medium	Low
Strategic Performance – deliver cargo and passengers accurately and on-time	High*	High	Medium
Operating Objectives – provide ready airplanes for the flying schedule	Medium	High*	Medium
Process Performance – isochronal inspections, unscheduled repair process	Medium	High*	High
Activity Performance – inspect and repair airplanes	Low	High	High*
* = primary accountability			

Table 2. Accountability and Attention for C-5 Aircraft Maintenance

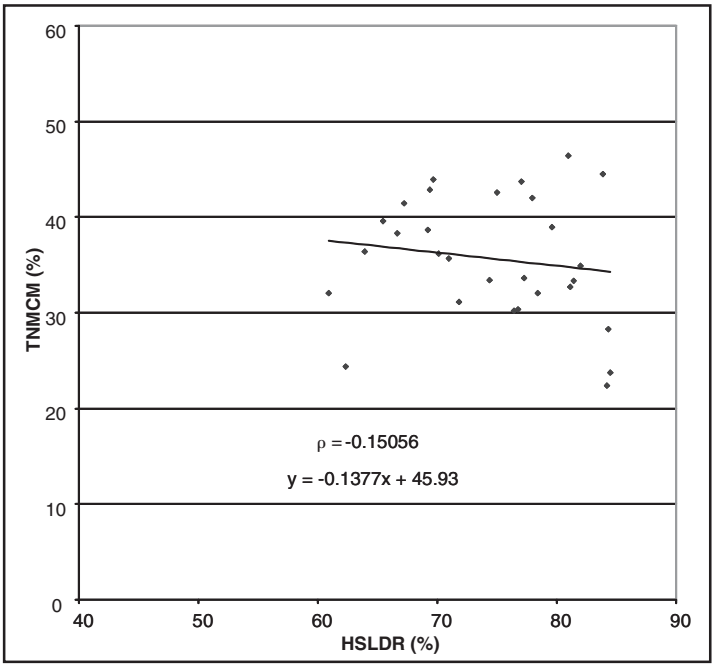

Figure 1. HSDLR and TNMCM Rates Scatter Plot for 436 MXG August 2004 to December 2006

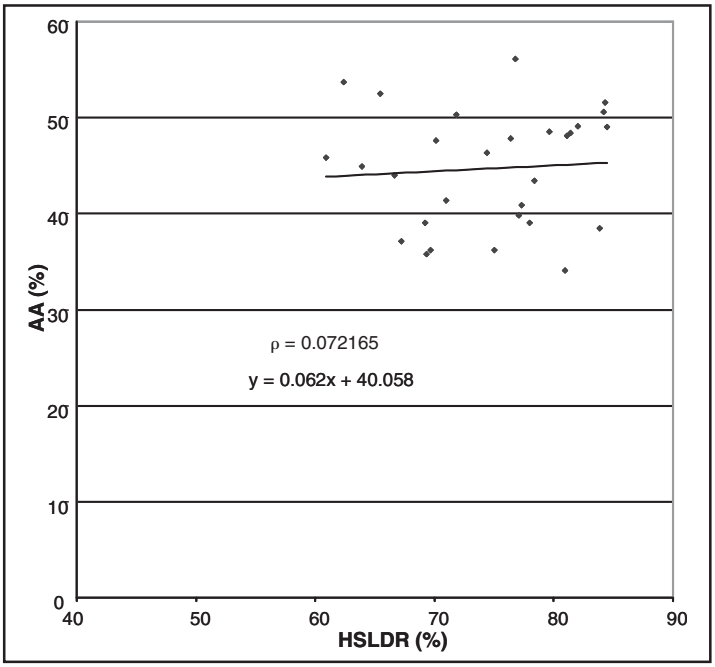

Figure 2. HSLDR and AA Rates Scatter Plot for 436 MXG August 2004 to December 2006

If the metrics were aligned, the graph should show evidence of a strong negative correlation. That is, as HSLDR increased, TNMCM would decrease and vice versa. In this case, the scatter plot reveals no definite relationship, appearing more like a *shotgun* spread. For comparison purposes, the least squares regression line for the data is drawn and the line equation is presented. A regression equation allows for the expression of a relationship between two or more variables algebraically. From Figure 1, the correlation coefficient between HSLDR and TNMCM is very weak, with ρ = -0.15056. Therefore, improvement of the HSLDR rate does not imply improvement of the TNMCM rate. By the study's definition, HSLDR and TNMCM were not aligned metrics.

Figure 2 illustrates the relationship between the HSLDR rate and AA rate, the primary metric at the MAJCOM A4 level. Again, the plot resembles a shotgun spread, and there is a very weak correlation coefficient with ρ = 0.072165. HSLDR and AA do not appear aligned according to the study's definition.

Figure 3 illustrates the relationship between the TNMCM and AA rates. Here, the scatter plot reveals a negative correlation. Likewise, the correlation coefficient indicates a moderate negative correlation with ρ = -0.77927. This evidence supports the idea that TNMCM and AA are aligned according to the study definition. As the TNMCM rate improves (decrease), the AA rate also tends to improve (increase). This result is not surprising since TNMCM and AA are a part of the same family of status-hour metrics.

In summary, Figures 1, 2, and 3 suggest that TNMCM and AA are aligned, and HSLDR is not aligned with either TNMCM or AA. As stated earlier, the MXG/CC's focus on HSLDR as their primary metric, not TNMCM and AA. Therefore, the MXG/CCs and their personnel make decisions about resources and day-to-day operations which impact HSLDR first. Since HSLDR is not aligned with TNMCM and AA, there is no guarantee that TNMCM or AA will improve as a result of the current operations.

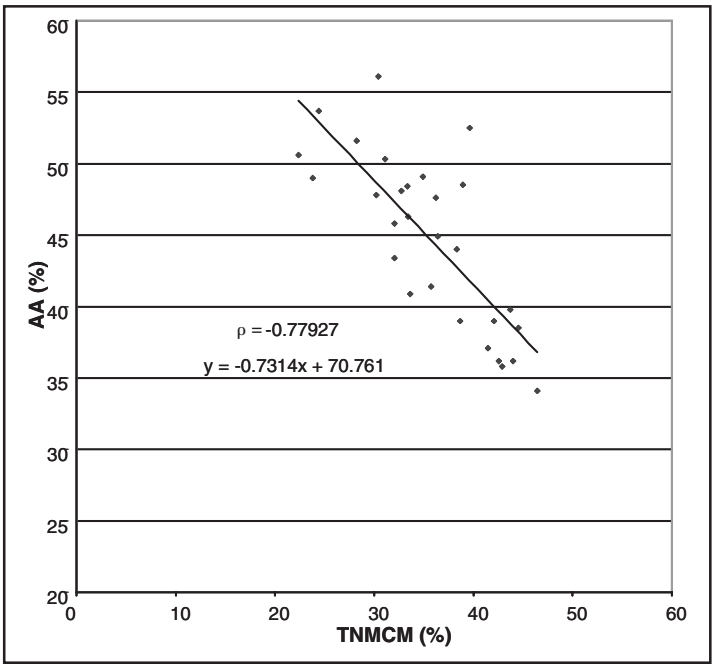

Figure 3. TNMCM and AA Rates Scatter Plot for 436th MXG August 2004 to December 2006

The MXG efforts, therefore, are not directly aimed at improving TNMCM rates when they are focusing on improving HSLDR rates.

Experimentation Using C-5 Maintenance Priority (MXP) Simulation

In order to test the impact to TNMCM rates of base-level HSLDR-centric maintenance decisionmaking, the AFLMA study team created a discrete event simulation using *Arena* simulation software. The simulation facilitated an analysis of how different maintenance operations could affect the HSLDR and TNMCM

rates in a controlled environment. This analysis would be impractical to do in the real world. The following sections summarize the development and results of the C-5 maintenance priority (MXP) simulation.

MXP Problem Formulation and Objectives

The MXP model was designed to study the employment of different queuing prioritization policies and their effect on key maintenance performance metrics in the support of C-5 aircraft. These policies determine the order in which aircraft awaiting maintenance are processed. Field interviews conducted by the study team revealed that in order to improve HSLDR, the maintenance commanders gave priority to those aircraft that "have the best chance of being returned to a [fully mission capable] status in minimum time."[23] These *recovery maintenance* practices were utilized at both Travis AFB and Dover AFB for C-5 maintenance.[24] The MXP model labels this as the least maintenance (Mx) policy and determines the priority of queued aircraft based on the remaining man-hours of repair. Thus, the aircraft with the fewest man-hours of repair remaining relative to other queued aircraft receives top priority when maintenance resources become available. Alternatively, the most Mx policy gives priority to the aircraft with the most man-hours of repair remaining. The two remaining policies are first-in-first-out (FIFO) and last-in-first-out (LIFO). These queuing policies order aircraft according to their arrival. With FIFO, a newly arrived aircraft goes to the back of the queue. In a LIFO policy environment, a newly arrived aircraft goes to the front of the queue.

MXP Data Collection

Data for the MXP came from multiple sources. Aircraft arrival data was provided by the 436 MOS at Dover AFB for the period from January 2006 through March 2007. Manpower data was provided by the 436th Aircraft Maintenance Squadron for March and April 2007. Data for the possessed aircraft inventory, HSLDR rates, and TNMCM rates were provided by the 436 MOS for the fourth quarter fiscal year (FY) 2006. Data for the maintenance processes were taken from the Reliability and Maintainability Information System (REMIS) for fourth quarter FY 2006. The study team determined that these data sets were the most suitable given the availability of data.

MXP Assumptions

Two important assumptions were made in the formulation of the MXP simulation:

- TNMCS time was assumed to have no impact on the maintenance operations or the TNMCM rate. The impact of supply operations was assumed to be accounted for in the repair time data. The MXP does not model any TNMCS time.
- Unit possessed time for all aircraft was assumed to be constant and equal for the four maintenance policies modeled in the MXP simulation.

MXP Model Conceptualization

The MXP simulation modeled C-5 maintenance operations at Dover AFB. The simulation modeled 18 aircraft (the average number of possessed aircraft for Dover AFB in the fourth quarter FY 2006) that arrive at the base according to a daily arrival schedule with a fixed number of breaks. To achieve the desired arrival stream attributes within the *Arena* simulation framework, the MXP model employed three separate processes.

The first process created 18 C-5 aircraft entities at time zero. The entities then entered an arrival queue at a gate which opens according to the aircraft arrival schedule. Once opened, the gate allowed a single aircraft to proceed to the maintenance process before closing until the next arrival signal was received. The same 18 aircraft entities flowed from arrival process to the maintenance process before being recycled back to the arrival process. In this way, the model never had more than 18 aircraft in the system at one time.

The second process tracked the day of the week. A clock entity was created at time zero and thereafter stepped through the days of the week at 24-hour intervals. The simulation employed two schedules that depend on the day of the week cycle. The first was related to the maintenance process and defined how many manpower resources were available to perform maintenance on a given day. The second schedule governed the aircraft arrival pattern.

The final process related to aircraft arrivals determined when the gate should be opened allowing an aircraft *to arrive* and proceed to the maintenance process. These triggers were created according to a schedule derived from 15 months of aircraft arrival data at Dover AFB. The data defined day-specific discrete probability distributions of the number of aircraft arrivals. These distributions are given in Table 3.

The manpower resources and repair times required to complete the repairs were drawn from distributions based on the real-world data. The aircraft wait in the maintenance queue until resources are available for repair. Repairs are then completed in three phases.

The values in each row of Table 3 represent the probability of the particular number of arrivals (represented as 0 through 8 in the column headings) on that day of the week. Each row sums to one. These daily arrival distributions are the building blocks for a random aircraft arrival stream based on historic observations at Dover AFB. When all repairs are complete, the manpower resources are released to perform other repairs and the aircraft departs the base.

REMIS data was used to derive a discrete distribution of the number of personnel on a work crew associated with a repair action. Each repair action is assigned a randomly sized crew. Table 4 shows the crew size probability distribution used in the simulation. For example, there is a 0.519 probability that a repair action requires two maintenance personnel. When all repairs are complete, the manpower resources are released to perform other repairs and the aircraft departs the base. The data did not indicate any instances of crew sizes of seven or eight people during the timeframe of the data.

Figure 4 illustrates the overall view of the basic maintenance processes modeled in the MXP.

C-5 arrivals are triggered according to an arrival schedule. After arrival, aircraft require (seize) maintenance resources, maintenance actions are performed, and then manpower resources are released. This cycle is accomplished three times before returning the aircraft to the arrival queue.

In order to model the parallel and serial nature of aircraft maintenance actions, the study team adopted the repair bin methodology used by Balaban et al., in their mission capable

rate (MCR) simulation model, which they demonstrated using the C-5 fleet.[25] In reality, certain repair actions are accomplished simultaneously with other repair actions. However, by regulation, some actions cannot be performed simultaneously with certain other maintenance actions. Balaban et al., modeled this parallel and serial operation by grouping repair actions for a given aircraft into three bins or buckets. Repairs within a given bin are performed simultaneously, but the bins are repaired serially. Thus, all repairs in bin one are completed before beginning bin two repairs. The repair time for each bin is the longest of the repair times contained in the bin.[26] The MXP model also used three bins. The first bin contained 65 percent of the total number of repair actions, the second bin contained 25 percent, and the third bin contained 10 percent. This is very similar to the probabilities used in the MCR model—60, 30, and 10 percent, respectively.[27]

MXP Model Validation

As previously stated, the least Mx priority system most closely matched the recovery maintenance practices in place at both Dover AFB and Travis AFB. Therefore, the study team deemed the least Mx model the best representation of the current, real-world process and considered this model the as-is model. The study team used the HSLDR rate in order to validate the MXP simulation with the real-world maintenance processes. After calibrating the MXP, the least Mx model achieved an HSLDR rate of 0.821 with a 95 percent confidence interval that included the real-world HSLDR rate of 0.833 for the timeframe of the data. It is important to note that the model's intended use was not as a predictive model (given C-5 break rates, how many maintenance resources are required to satisfy a given AA rate?), but only to make a relative comparison between the four given prioritization policies. The model was not designed to determine HSLDR/TNMCM/Mx backlog or to determine maintenance manning levels.

MXP Results and Conclusions

Table 5 summarizes the MXP simulation results for the four policies examined with respect to three metrics: HSLDR, estimated TNMCM (Est TNMCM), and Sum of Mx in the queue (Mx backlog). Mx backlog covers the middle ground between the other two metrics—the prioritization policy determines which aircraft the maintenance group returns to mission capable status soonest while the remaining aircraft accrue TNMCM time. Mx backlog is a measure of the ability of the maintenance system to generate all possessed aircraft if called upon to do so. An ideal policy is one that would produce a high LDR rate, a low TNMCM rate, and a low Mx backlog. Table 5 summarizes the results for each policy with regard to these three metrics.

- Least Mx. The least Mx model was the baseline for comparison to the other Mx prioritization policies. It most closely resembled the *as-is* process of recovery maintenance. The HSLDR achieved in the model was representative of the real-world HSLDR rate and was used to validate the model. Likewise, the Est TNMCM rate achieved matched the real-world value for the timeframe of the data. Mx backlog for the least Mx model was the largest for the four policies considered. The Mx backlog measured the ability to improve the steady-state TNMCM rate. The higher the backlog, the harder it was for the Mx system to improve from their steady state TNMCM. Higher backlog means longer aircraft generation time.
- Most Mx. The most Mx prioritization policy had the same LDR (statistically speaking, within a 95 percent confidence

Arrivals (AC)	0	1	2	3	4	5	6	7	8
Sunday	0.231	0.461	0.2	0.093	0.015	-	-	-	-
Monday	0.092	0.139	0.292	0.215	0.108	0.092	0.047	-	0.015
Tuesday	0.015	0.047	0.2	0.261	0.185	0.154	0.107	0.031	-
Wednesday	0.015	0.077	0.093	0.307	0.308	0.138	0.062	-	-
Thursday	-	0.062	0.107	0.216	0.338	0.185	0.092	-	-
Friday	0.077	0.077	0.138	0.293	0.184	0.185	0.031	0.015	-
Saturday	0.169	0.416	0.246	0.061	0.062	0.046	-	-	-

Table 3. Probability of Number of Aircraft Arrivals by Day of the Week

Crew Size (CS)	1	2	3	4	5	6	9
P(CS)	0.323	0.519	0.123	0.022	0.003	0.001	0.009

Table 4. Crew Size Probability

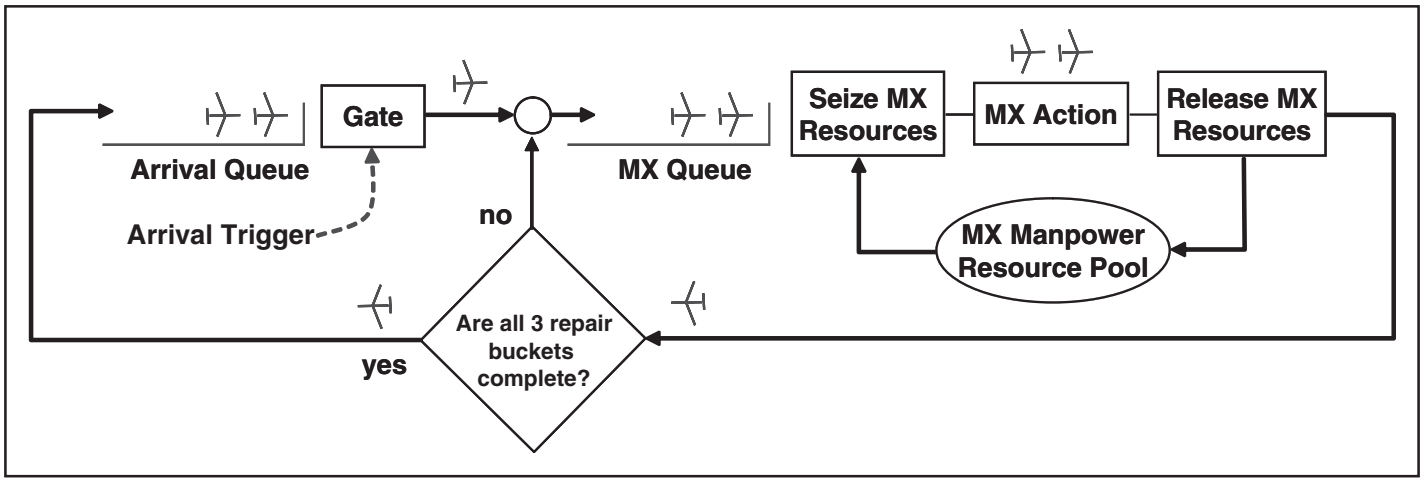

Figure 4. Maintenance Process as Modeled in the C-5 MXP Simulation

Policy	HSLDR	Est TNMCM	Mx Backlog
Least Mx	0.821	0.322	45K
Most Mx	0.816	0.305	23K
FIFO	0.764	0.307	20K
LIFO	0.735	0.393	30K

Table 5. Summary of MXP Results for Study Metrics

interval) as the least Mx policy. Both the Est TNMCM and Mx backlog improved over the least Mx policy. This is intuitive because the most Mx policy actively applies resources to the biggest maintenance jobs first. However, the variability from day to day increased significantly with this policy. This means that the predictability and stability for scheduling purposes suffered greatly.

- FIFO. The FIFO policy had a reduced LDR when compared to the least Mx policy. However, the Est TNMCM improved, and was statistically the same as the Est TNMCM for the most Mx policy (within 95 percent confidence intervals). The Mx backlog was lower than the least Mx policy as well.
- LIFO. The LIFO policy appeared to be the least attractive with regard to the key metrics. As compared to the least Mx policy, it had a reduced LDR and increased Est TNMCM. It also had a reduced Mx backlog when compared to the least Mx policy but was the second worst of all the policies examined.

These results reveal several things about the prioritization policies and their impact to the LDR and TNMCM rates. First, LDR and TNMCM react differently depending on maintenance policy. The current policy in place (least Mx) achieves a high LDR but has a mediocre estimated TNMCM when compared to the other policies, and the worst Mx backlog, which indicates that it is very difficult to improve the TNMCM rate. It is possible to improve the TNMCM rate by changing the prioritization policy. However, the improved TNMCM would come at the cost of predictability and stability in day-to-day operations (as with most Mx policy) and LDR, as is the case with the FIFO policy. The results of the simulation added support to the original hypothesis that HSLDR and TNMCM are not aligned metrics, but did not completely confirm it. While the current system can not be modeled perfectly, the simulation results did suggest that current maintenance policies do not ensure TNMCM improvement, but do improve LDR. It is safe to conclude that TNMCM and LDR are not necessarily aligned, complementary metrics.

Several personnel interviewed during the study team's site visits suggested that awareness exists of the just-described disconnect between enterprise goals (aircraft availability) and operating objectives. "There is a huge disconnect between AMC's focus on the availability of tails (airplanes) and our focus on on-time departure reliability."[28]

Consequently, while process owners are diligently focused on supporting the strategic performance objectives of delivering cargo and passengers, they are unable to simultaneously align their performance with the enterprise goal of increased aircraft availability.[29]

Maintenance Metrics at Delta Airlines

As a means of comparing business practices, the study team elected to compare Air Force maintenance metrics with those of a leading commercial organization, Delta Airlines. The team interviewed representatives from Delta Airlines' reliability program office. The study team was told the focus of Delta's reliability program is driven by what is termed as Delays and Cancellations (D&C).[30] These are unscheduled events that have an operational impact and require a mechanical dispatch. For each delay or cancellation, there is a direct, net consequence to Delta's revenue, so there is a high priority placed on diagnosing the cause.

Delta personnel identified nine main aircraft maintenance metrics used by Delta. These metrics are summarized in Table 6.[31] Note that technical dispatch reliability (TDR) includes all maintenance related to primary delays and cancellations, whereas mechanical dispatch reliability (MDR) includes only those primary events for which the reliability program is responsible. Repairs due to damage, *cannot duplicate* actions, maintenance carryovers, and maintenance errors (such as over-servicing) are not included in MDR. Dispatches are the term used for all of Delta's revenue flights.[32] Although there is not an explicit hierarchy, the first two metrics, TDR and MDR, are directly linked to the daily revenue-producing flights on Delta's schedule. These metrics track the volume of, and reasons behind, delays and cancellations for a revenue flight.

Maintenance carryovers are Delta Airlines' equivalent to delayed discrepancies in the Air Force. Maintenance carryovers are repairs that may be delayed (or carried over) to a more opportune time. Unscheduled aircraft out of service (UAOOS) measures the number of aircraft out of service due to an unscheduled event (such as a broken component). Delta measures UAOOS by counting the number of aircraft in this category three times per day (0900 hours, 1200 hours, and 1800 hours), and averaging that count over specified intervals.[33] Prioritization of repair is often given to aircraft that can be returned to service quickly, but the level of impact to fleet operations may be the driving factor.[34] As an example, a broken B-777 has a much bigger impact than a broken MD-88; the MD-88 fleet has many spares, while the B-777 does not.[35] The UAOOS metric is analogous to the Air Force TNMCM rate, though it is only focused on the unscheduled aircraft and is counted in whole aircraft rather than hours. Delta's primary metrics (those driven by delays and cancellations) are not measured to an objective standard (*met* or *not met*), instead, they *alert* when they exceed a control limit for 2 consecutive months.[36] Additionally, Delta personnel interviewed suggested that the metrics are driving desired behavior; this is supported by measured performance, as TDR averaged 97 percent fleet-wide at the time of the original study's publication.[37]

Delta has a very clear enterprise-level value measure—profit. This clear value measure lends itself well to metric definition at the operational level, which is why Delta focuses on the D&Cs. The D&Cs have a direct net effect on the revenue producing flights, which in turn has a direct impact on profit.

Value Metrics in the Mobility Air Forces

The MAF on the other hand, seems to have two competing enterprise-level value metrics.

- Strategic Readiness. AA and TNMCM rates measure the ability of the fleet to be fully mobilized at any given time

- Operational Effectiveness. HSLDR rates measure the ability of the fleet to meet the daily mission requirements.

Conventional wisdom argues that increased strategic readiness facilitates operational effectiveness—increased AA and decreased TNMCM should lead to increased HSLDR. However, as previously shown, there is a weak correlation between HSLDR and both AA and TNMCM. Again, these metrics are not aligned.

Conclusions

This article discussed the focus on different metrics to include HSLDR, TNMCM, and AA at varying levels of the Air Force maintenance enterprise. It also demonstrated that HSLDR is aligned with neither AA nor TNMCM, as there is only a weak correlation between them. Maintainers at the wing level work to support operational effectiveness; however, higher levels of Air Force supervision appear more focused on improving strategic readiness. This disconnect in priorities was determined to be a root cause of the C-5 TNMCM rate being below Air Force standards. This article does not advocate one metric over another. That choice is left for Air Force leadership to make. This article illustrates that, in this case, the primary metrics at varying levels of aircraft maintenance are not aligned and not complementary to one another.

If the Air Force's primary goal is to improve the C-5 fleet TNMCM rate, then priorities of the maintainers in the field must change. As the MXG leadership focuses on HSLDR performance, not TNMCM, the MXP simulation indicated that improving the TNMCM rate would require an increase in resources. Therefore, in order to improve the TNMCM rate without increased resources, the maintainers in the field must make TNMCM a priority. While it is impossible to model the current system perfectly, the results suggest that current maintenance policies do not ensure TNMCM improvement, but do improve HSLDR, which is the stated priority of the MXG leadership. Therefore, the study team recommended that MAJCOM A4 leadership and MXG leadership decide on a set of metrics that are better aligned toward the same goal.

This realignment of metrics must start at the highest levels of the MAF. The MAF should choose its value measure and create a set of metrics aligned with that measure. For example, if the MAF directs that operational effectiveness is its primary value, then metrics such as Tons of Cargo Moved or Million Ton Miles Moved over a given time period could be used as the value metric. Then it must be determined whether or not metrics at lower levels are aligned with the value metric. Once that is determined, all levels of maintenance leadership will have the same overarching priorities. Dr Hammer describes the entire view as *pulling it together* and lists three things to consider:

- Deciding what to measure is a science
- Deciding how to measure is an art
- Using measures is a process

Recommendations

- If improving C-5 TNMCM rates is the goal, all levels of maintenance leadership must make improving TNMCM rates a priority.
- AMC should determine its priorities between operational effectiveness and strategic readiness, and determine metrics aligned with these priorities.
- Conduct a study to determine whether or not increased AA is correlated with increased operational effectiveness in million ton miles or another pertinent metric. The answer to this

Metric	Formula
Mechanical Dispatch Reliability (MDR)	$100 - \left(\left(\frac{Delays + Cancellations}{Revenue\ Departures} \right) \times 100 \right)$
Technical Dispatch Reliability (TDR)	$100 - \left(\left(\frac{Technical\ Issues}{Revenue\ Departures} \right) \times 100 \right)$ Where technical issues include dispatches for mechanical, process, policy, and paperwork issues associated with delays and cancellations.
Unscheduled Aircraft Out of Service (UAOOS) Count	Number of Unscheduled Aircraft Out of Service
In-Flight Shutdown Rate (IFSDR)	$\frac{(Total\ Inflight\ Shutdowns\ x\ 1{,}000)}{Total\ Engine\ Hours}$
Maintenance Carryovers (MCO) Count	Number of Maintenance Carryovers
MEL Count	Number of Restricted Items
Unscheduled Removal Rate (Used for the Engines and APUs)	$\frac{(Total\ Unscheduled\ Removals\ x\ 1{,}000)}{Total\ Hours}$
Pilot Reports (PIREPS)	$\left(\frac{Pilot\ Reports\ x\ 1{,}000}{Total\ Flying\ Hours} \right)$
Flight Exception Rate	Number of Diversions, Air Turn Backs and Rejected Takeoffs for Mechanical Reasons

Table 6. Delta Airlines Maintenance Metrics

question will help determine the applicability of AA towards measuring operational effectiveness.

- AMC/A4 develop simpler, more concrete maintenance metrics that are easily countable and give an indication that operational effectiveness and or strategic readiness is going to be affected.

As previously mentioned, the metrics analysis, modeling, and simulation described in this article was developed as part of the larger *C-5 TNMCM Study II*. This is the second in a series of articles related to that study. The entire study can be found at the Defense Technical Information Center (DTIC) Private Scientific and Technical Information Network (STINET) website at https://dtic-stinet.dtic.mil/.

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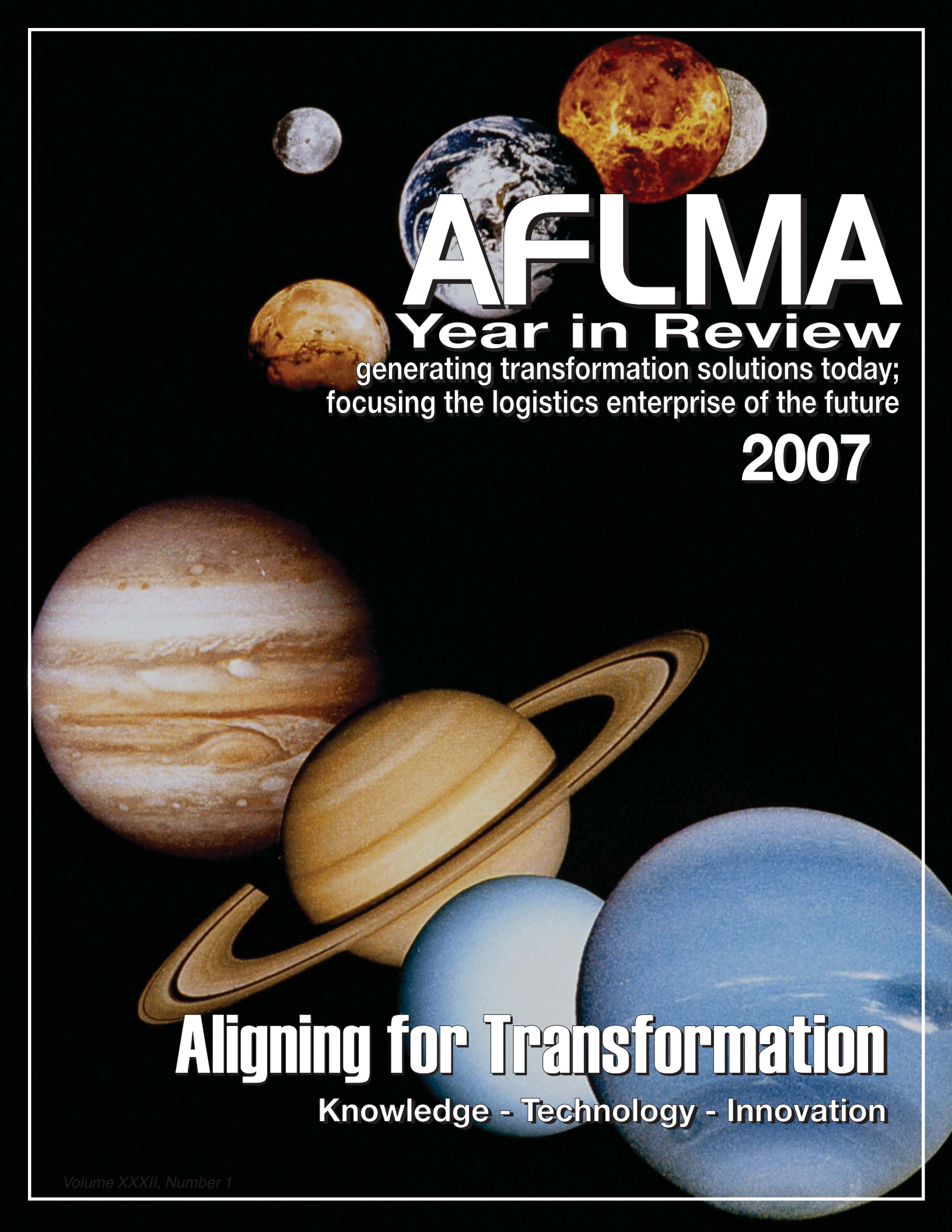
Logistics...embraces not merely the traditional functions of supply and transportation in the field, but also war finance, ship construction, munitions manufacture, and other aspects of war economy.

—Lieutenant Colonel George C. Thorpe, USMC

Logistics comprises the means and arrangements which work out the plans of strategy and tactics. Strategy decides where to act, logistics brings the troops to that point.

—General Antoine Henri Jomini



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You won't find lots of fancy words in the pages that follow. As you'll soon notice, this review gets right to the point. That's part of our commitment to you—the most demanding customers in the world need to know what we're doing to solve their problems, and they need to know now.

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Our

Generating transformation solutions today; focusing the logistics enterprise of the future is what the Air Force Logistics Management Agency is all about. It conveys our strength and energy.

Our track record puts us in the lead in delivering robust, tailored answers to the most difficult and complex Air Force logistics problems. This can be seen in our efforts and partnerships that are turning expeditionary airpower support concepts into real-world capability. It also can be seen in our work in making dramatic improvements to the Air Force supply system and developing high-impact logistics publications as well as our leadership in planning and making logistics play in wargames, simulations, and exercises truly meaningful. It's also the reason the Agency is a key player in Air Force logistics transformation and will become the enterprise architect and analytical checkpoint for the supply chain sustainment process. The message is also loud—we work the important projects that shape tomorrow's Air Force, and we deliver what our customers need today!

The Agency continues to aggressively reach out to its customers. Also, we're not just attending conferences and meetings—in many cases, we're leading them. We have enhanced our World Wide Web (WWW)

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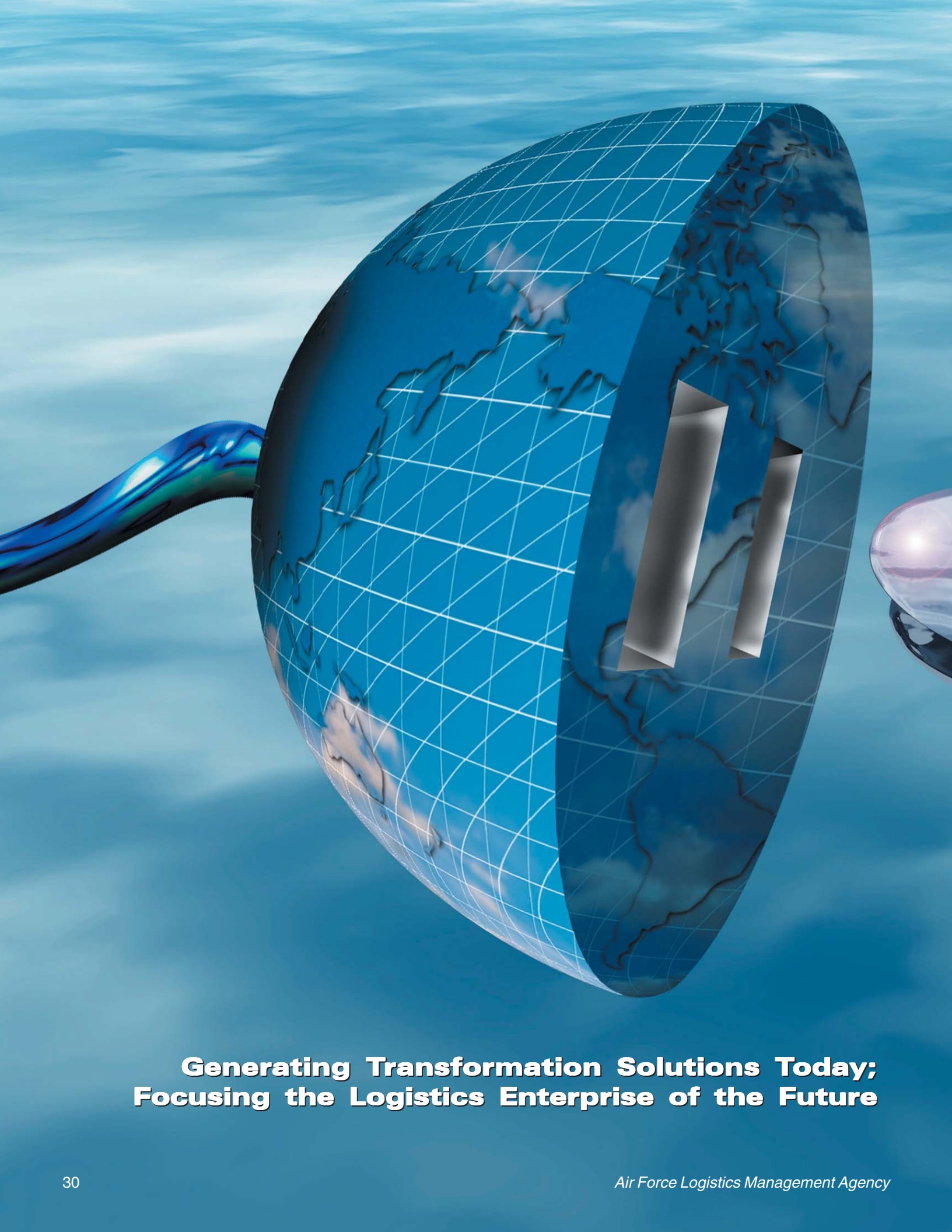
site to improve customer support, and we've made many of our products available on other WWW sites. At the same time, we've expanded our role in blueprinting efforts associated with Expeditionary Logistics for the 21st Century and provided critical support to the Logistics Transformation Office

In addition, many of the logistics education publications created by the *Air Force Journal of Logistics* staff have become best sellers Department of Defense (DoD)-wide. Of particular note is *Contingency Contracting: A Joint Handbook*, which has become the standard contingency contracting handbook across the DoD. Other AFLMA publications are used as course materials in professional education settings. We have even had requests from several of our allies to use some of these materials in their professional military education programs. We've expanded our work with RAND in developing expeditionary airpower support concepts and solutions to *show-stopper* issues. Finally, in the future, we'll be playing an ever increasing role in shaping and implementing transformation within the Air Force Logistics community.

We've delivered on commitments to our customers, we've partnered with academia and industry, we've had an impact in shaping the support concepts of tomorrow, and the Air Force is benefiting from the synergy of our efforts. We've been on target—you can count on that continuing.

Lieutenant Colonel Jennifer A. Cushion, Commander



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Since its inception, the Air Force Logistics Management Agency has grown to be recognized for its excellence—excellence in providing answers to the toughest logistics problems. And that's our focus today—tackling and solving the toughest logistics problems and questions facing the Air Force. It's also our focus for the future.
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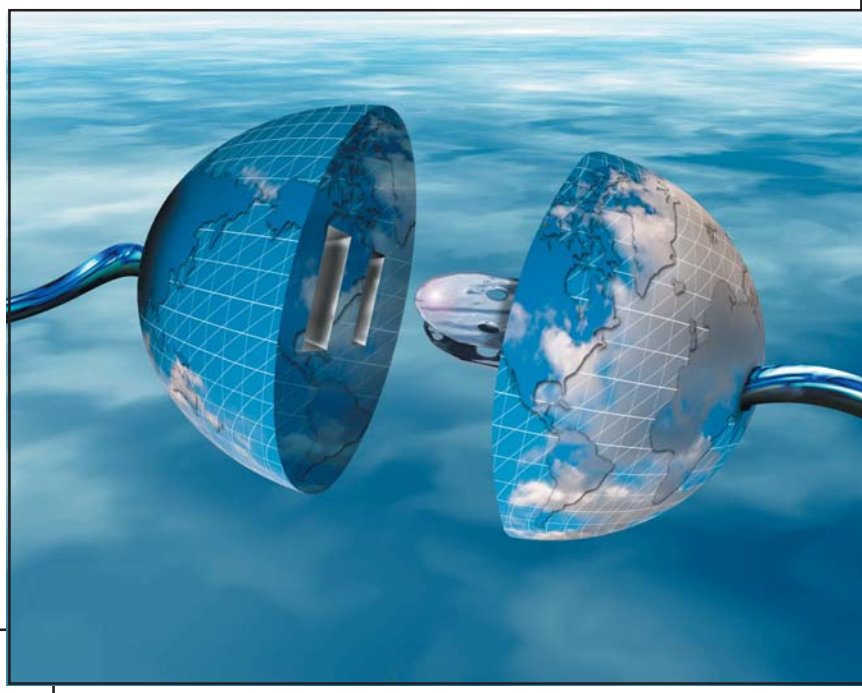

Mission

To sharpen agile combat support (ACS) capabilities by generating enterprise supply chain solutions, supporting logistics transformation through research, wargames, and publication of ACS literature.

The mission of the AFLMA flows directly from the Air Force mission "to deliver sovereign options for the defense of the United States of America and its global interests—to fly and fight in air, space, and cyberspace." While supporting all Air Force goals, the AFLMA mission will contribute specifically to the *Air Force Strategic Plan* goals 2) "sustain air, space, and cyberspace capabilities" and 7) "foster Air Force Smart Operations across the Total Air Force."

The AFLMA mission is also a direct reflection of the AF A4/7P mission, "to resource, integrate, support, and enable the delivery and sustainment of agile combat support capabilities for the Air Force mission—to fly and fight in air, space, and cyberspace." While supporting all A4/7P goals, the AFLMA mission will contribute specifically to A4/7P goals 4) "support customers with relevant, accurate, and timely information to facilitate the advocacy of ACS capabilities," and 5) "enable sharpened processes to continuously improve the delivery of ACS capabilities."

In accomplishing the AFLMA mission stated above, the AFLMA will fulfill *Air Force Mission Directive 33* (13 November 2002) which states:

> The mission of the AFLMA is to consult, conduct studies, manage Air Force logistics wargaming

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participation, and develop DoD [Department of Defense] and civilian partnerships to support the development of policy and identify the resources needed to deliver ACS across the full spectrum of operations. The AFLMA produces solutions to logistics problems and designs new and improved concepts, methods, and systems to improve overall logistics and combat capability. Also, the AFLMA publishes the *Air Force Journal of Logistics* and other publications on logistics issues.

In order to meet the logistics needs of a transforming Air Force, AFLMA's mission has expanded beyond the mission stated in MD 33 in 2002. The Air Force Logistics Board of Advisors (LBOA) has directed that, while continuing to perform the core functions described in MD 33, AFLMA will also become the owner of the Logistics Enterprise Architecture (LogEA). As the Air Force implements various initiatives under Expeditionary Logistics for the 21st Century (eLog21), the AFLMA will ensure compliance of those initiatives with the overarching LogEA. A change to MD 33 is currently being drafted to include this expanded mission of AFLMA.

The expanded mission of the AFLMA incorporates four focus areas: 1) supporting Air Force enterprise logistics transformation (as owner of the LogEA), 2) studies and analyses which generate logistics solutions, 3) support for wargames, and 4) publishing ACS literature. As the Expeditionary Combat Support System is developed and implemented, AFLMA will

Our goal to tackle tough Air Force logistics issues remains the cornerstone of the AFLMA. Generating transformation solutions today; focusing the logistics enterprise of the future conveys our strength and our commitment.

Lieutenant Colonel Jennifer A. Cushion, Commander

continue to transform toward its primary future mission of supporting Air Force enterprise logistics transformation as the owner of the Air Force supply chain processes—LogEA. During this period of development, the AFLMA will perform studies and analyses, with the primary focus being on eLog21 processes. AFLMA will generate high-quality studies, reports, and analyses designed to enhance Air Force enterprise logistics efficiency and effectiveness. Through the research mission, the AFLMA will design concepts, methods, and systems to improve Air Force-wide logistics and thus increase worldwide readiness and overall combat capability. To accomplish this portion of the mission, the AFLMA will provide decision-quality recommendations which will sharpen ACS capabilities and shape future Air Force logistics policies and processes. At the same time, through enterprise-focused research experience and specialized training, AFLMA team members will develop and hone the competencies needed to skillfully execute the mission of LogEA ownership.

The AFLMA will continue to provide logistics support for wargames. It has been the AF A4/7's logistics executive agent for Air Force Title X wargames since 1997. In this portion of the mission, the AFLMA's primary role will be to improve logistics play and to develop and execute DCS, Logistics, Installations, and Mission Support (AF A4) objectives in Air Force Title X wargames. More specifically, the mission of the Wargames Division will include: 1) assist AF A4 and the Wargame Action Agency to ensure logistics capabilities are accurately portrayed in wargames, 2) provide game design and modeling or simulation assistance, 3) ensure use of relevant logistics information and data in wargames, 4) observe and participate in Title X and other major wargames, and 5) provide pre- and post-wargame assessment, and assistance in adjudication of Title X and other major wargame events as required. Wargames will be fully integrated with the other aspects of the AFLMA mission. AFLMA's wargame activities will serve as an instrument for testing and honing Air Force enterprise logistics concepts and processes toward eLog21 transformation. Similarly, logistics issues revealed during wargames will be considered as potential subjects for further research through AFLMA's studies mission.

The AFLMA will also continue to publish ACS literature. It will develop, prepare, produce, and publish the *Air Force Journal of Logistics*—the professional logistics publication of the Air Force. The Journal provides an open forum for presenting research, innovative thinking, and ideas and issues of interest to the Air Force and civilian logistics communities. In addition to the primary Air Force audience, the Journal will serve a secondary audience throughout the DoD and US government and a tertiary audience in industry, academia, and foreign nations. The AFLMA will also develop, prepare, produce, and publish books, monographs, and handbooks or guides to meet the needs of the Air Force logistics community at large, professional military education programs, continuing education programs, and mentoring. The secondary audience for these publications will be the DoD and US government. As with all AFLMA activities, the publishing mission will support Air Force accomplishment of eLog21 initiatives. AFLMA publications will serve the change management role of communicating eLog21 transformation to the entire Air Force logistics community.

The AFLMA serves a variety of Air Force customers. From the highest echelons of the Air Staff's senior decisionmakers and the Air Force LBOA, to the warfighting major command headquarters, to the logisticians in the field implementing policy decisions, the AFLMA serves each as a consumer or user of the Agency's outputs. The products and services

provided to these customers come in many forms, which include but are not limited to studies and analyses, guidebooks, policy and procedural recommendations, wargaming support, model or simulation creation and updates, and publications. Every product and service of the Agency will be focused on sharpening ACS capabilities as AFLMA transforms along with the Air Force enterprise.

Vision

Generating transformation solutions today; focusing the logistics enterprise of the future

The AFLMA vision encapsulates the ultimate goal of being an agent of change, generating Air Force enterprise solutions in order to transform and sharpen ACS for the warfighter now and in the future. The Agency vision is to be the owner of LogEA, with this role enabling the Agency to focus the entire Air Force logistics enterprise. Throughout its transformation, the Agency expects to be the primary provider of solutions to the complex problems facing Air Force logisticians who are engaged in vital combat support. The AFLMA will be successful to the degree its recommended solutions result in leaner, more effective and efficient logistics processes, improved delivery of resources to the warfighters, and more economical sustainment of Air Force systems—in sum, sharpened ACS. The AFLMA will concentrate on transforming itself to provide the skill sets, competencies, capability, and capacity to execute the future mission of sustaining the Air Force supply chain process architecture.

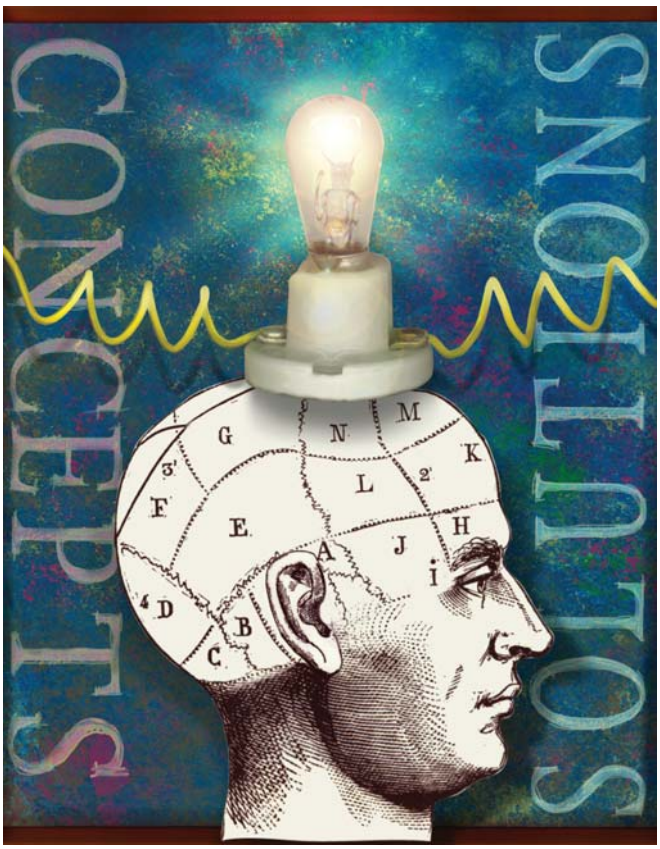
In order to accomplish the vision, the AFLMA will capitalize on the core competencies of its members. These competencies include: 1) a highly qualified, educated, experienced, cross-functional workforce, 2) objective, in-depth, relevant analysis, 3) a rigorous internal process yielding high quality products at no cost to the customer, and 4) strong strategic partnerships. The Agency serves a crucial and unique service to the Air Force logistics community by objectively scrutinizing and analyzing information in order to develop solutions which will continue to shape Air Force logistics. Offering an enterprise-wide view maximizes the impact of each recommendation.

A vital element of attaining the AFLMA vision with dwindling resources will be the application of AFSO21 principles to the internal processes of the Agency. All resources must be focused on the mission, eliminating nonvalue added efforts and executing the mission efficiently and effectively. At the same time, AFSO21 principles will be incorporated in the recommendations developed by the AFLMA, so that decisions based on those recommendations will yield efficient and effective processes throughout the logistics community, ultimately resulting in sharpened ACS.

AFLMA Goals for 2008

- Target activities to improve ACS capabilities
- Develop our total force core values, professional skills, and quality of life
- Streamline internal processes and sharpen external logistics capabilities through the application of continuous process improvement principles
- Promote AFLMA as a world-class studies and analysis support center
- Develop AFLMA to accomplish supply chain process sustainment

There are many ways to measure mission success. One of them is the *count*—how much did we do, how much got done, what did we complete? A second way to measure success is *meeting our customers' needs*. That means three things: first, understanding what the problem really is; second, giving our customers a great, workable solution; and third, meeting Air Force study priorities and needs.



Introduction

The Air Force Logistics Management Agency (AFLMA) is a field operating agency of Headquarters Air Force (AF) located at Maxwell AFB, Gunter Annex, Alabama. We serve under the direction of the Director of Resource Integration, Deputy Chief of Staff, Logistics, Installations and Mission Support (AF/A4/7P). In accordance with *Air Force Mission Directive 33*, we focus on three principal missions: 1) studies and analyses which generate logistics solutions, 2) support for wargames, and 3) publishing literature related to agile combat support (ACS). However, as mentioned earlier, our mission will be expanding and AFLMA will become the owner of the Logistics Enterprise Architecture (LogEA). As the Air Force implements various initiatives under Expeditionary Logistics for the 21st Century (eLog21), the AFLMA will ensure compliance of those initiatives with the overarching LogEA.

We have approximately 41 logistics researchers, analysts, other specialists, and support staffers on hand whose sole purpose is to deliver to you—our customer—the best possible analyses of logistics issues and challenges in order to improve ACS for the warfighter. This *Year in Review* will give you a summary of our activities over the past year.

Lieutenant Colonel Jennifer A. Cushion, Commander

THE RESULTS

Generating Transformation Solutions Today; Focusing the Logistics Enterprise of the Future

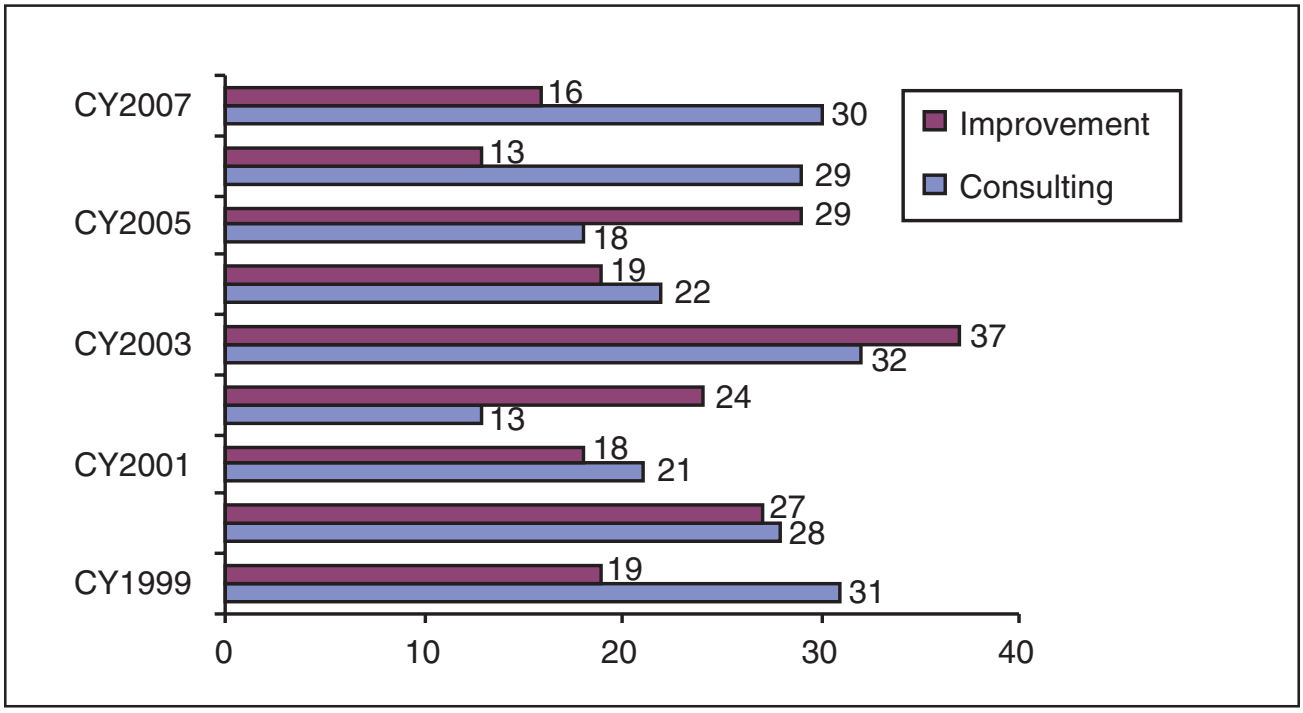


Figure 1. Completed AFLMA Studies 1999-2007

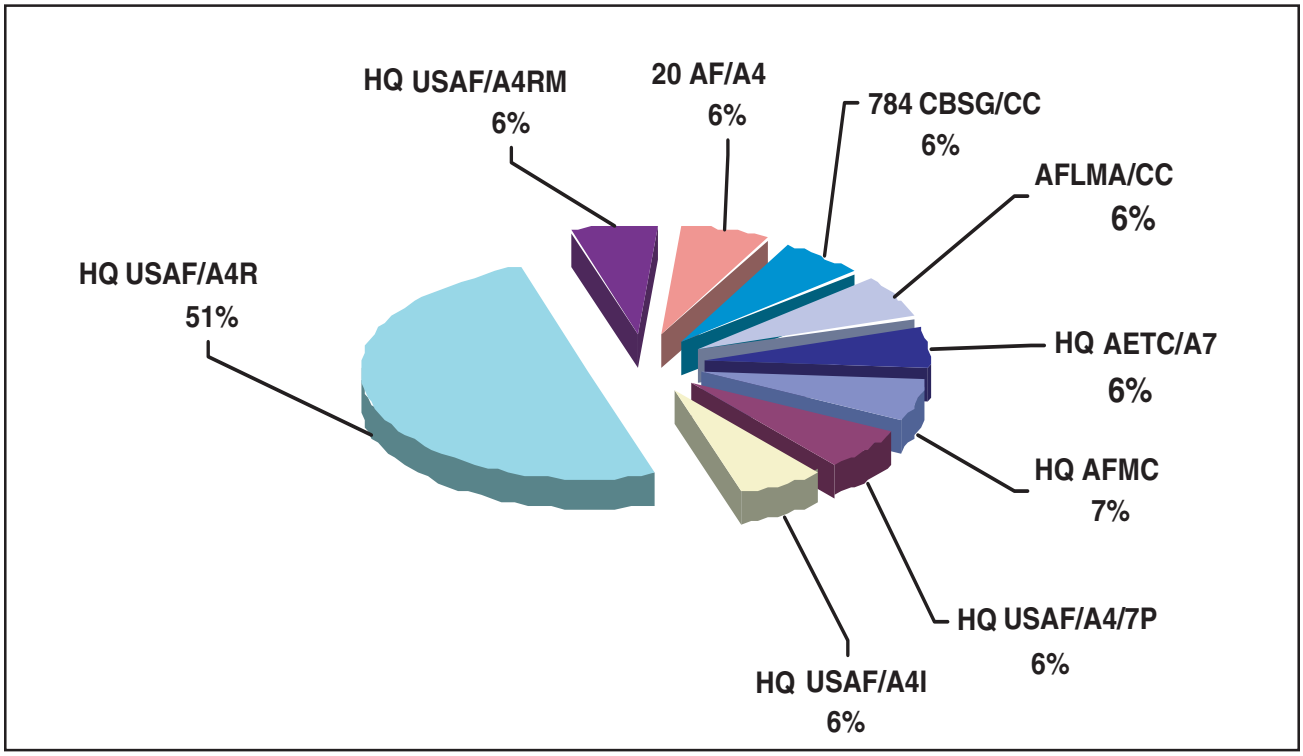


Figure 2. Completed Improvement and Wargames Studies 2007

The AFLMA is uniquely positioned to be the logistics *go to* problem solver for the US Air Force. If we get a request for assistance that we can't handle, then we will refer the requester to one of our strategic partners. Simply stated, we want to be the *first responders* when Air Force organizations have logistics problems. We also want to make Air Force Smart Operations (AFSO21) principles a way of life both internally and externally for all of our research activities.

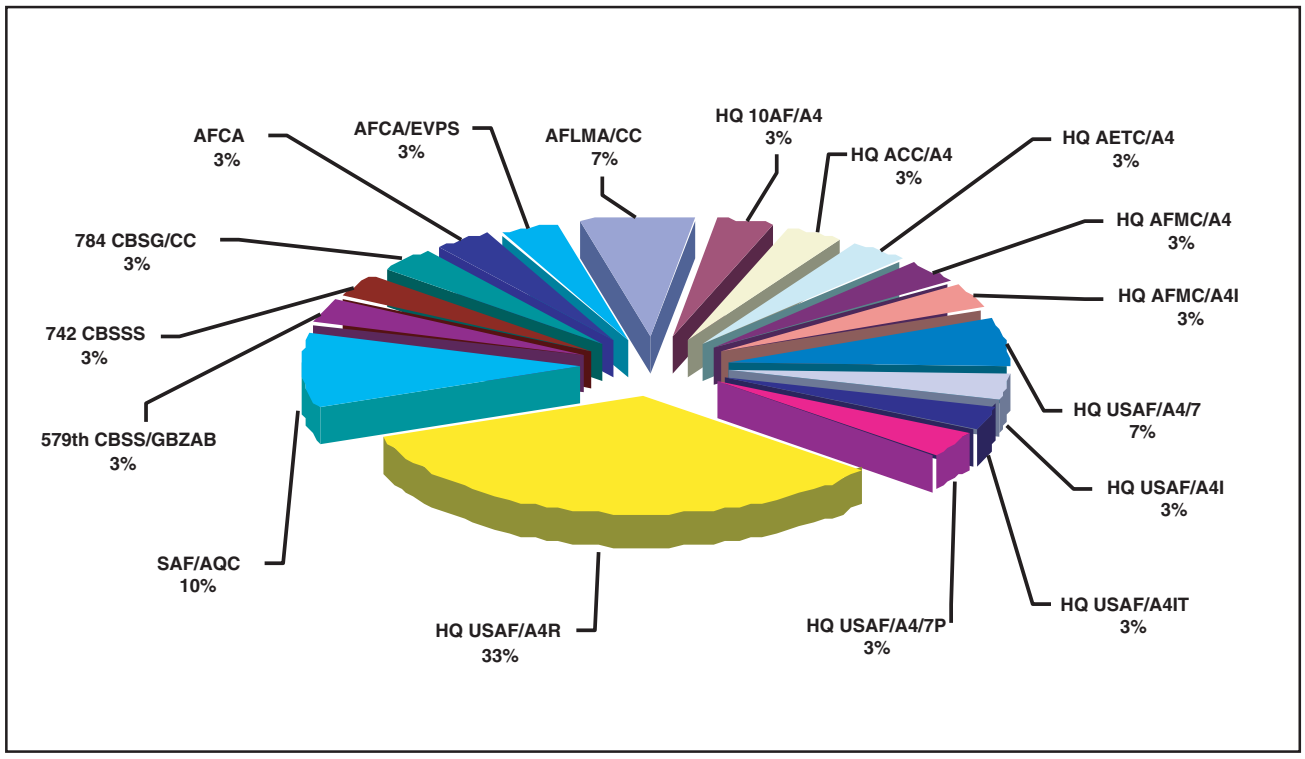


Figure 3. Completed Consulting Studies 2007

A Brief Overview of AFLMA Activities in 2007

Studies and Analyses. The foremost charge of the AFLMA is to study and analyze Air Force logistical processes. This is accomplished through the generation of high-quality studies, reports, and analyses that are designed to enhance logistics efficiency and effectiveness. Through these reports, the AFLMA designs concepts, methods, and systems to improve Air Force logistics and thus increase readiness and overall combat capability. To accomplish this portion of the mission, the AFLMA provides decision-quality recommendations which sharpen ACS capabilities and shape Air Force logistics policies. In 2007, the Air Force Logistics Management Agency completed 16 improvement studies and 30 consulting studies. This continued our practice of completing between 40 and 50 projects each year (Figure 1). Figure 2 stratifies our improvement and wargames studies by project sponsor. Figure 3 provides the same information for consulting studies.

Our improvement studies included analyses of maintenance, contracting, and supply chain issues. For example, our investigation of the increase in the C-5's total not mission capable for maintenance rates resulted in two large scale improvement efforts. One of these was the development of a revolutionary and exportable measure of maintenance capacity—net effective personnel (NEP). NEP goes beyond the limited, traditional measures of maintenance capacity by accounting for the abilities and skill levels of the maintenance personnel as well as their availability on a day-to-day basis. We provided analysis and support for transitioning from maintenance *back shops* to consolidated repair facilities and increased visibility and accountability of intransit assets. Both of these efforts support the Air Force vision of centralized maintenance and improved intransit visibility.

In terms of consulting, we provided decision support for a number of AFSO21 initiatives, information technology development and data management projects, and cost studies.

Wargames. The AFLMA has been the AF/A4/7's logistics executive agent for Air Force Title X wargames since 1997. The AFLMA's primary role is to improve logistics play and to develop and execute DCS, Logistics, Installations, and Mission Support objectives in Air Force Title X wargames. More specifically, the mission of the Wargames Division includes: 1) assisting AF/A4/7 and other wargame action agencies to ensure logistics capabilities are accurately portrayed in wargames, 2) providing game design and modeling and simulation assistance, 3) ensuring use of relevant logistics information and data in wargames, 4) observing and participating in Title X and other major wargames, and 5) providing pre- and post-wargame assessment, and assistance in adjudication of Title X and other major wargame events as required. In 2007, we supported two major activities: 1. Exercises, Wargames, and Experiments and 2. Future Capabilities Game 07.

Publications. The third mission focus area for the AFLMA is publishing ACS-related literature. The AFLMA develops, prepares, produces, and publishes four times per year the *Air Force Journal of Logistics*—the professional logistics publication of the Air Force. This peer-reviewed journal provides an open forum for presenting research, innovative thinking, and ideas and issues of interest to the Air Force and civilian logistics communities. In addition to the primary Air Force audience, the Journal serves a secondary audience throughout the DoD and US Government, and a tertiary audience in industry, academia, and foreign nations. The AFLMA also develops, prepares, produces, and publishes books, monographs, and handbooks and guides to meet the needs of the Air Force logistics community at large, professional military education programs, continuing education programs, and mentoring. The secondary audience for these publications is the DoD and US Government. In 2007, without question, the most significant publication was *Contingency Contracting: A Joint Handbook.* This pocket-sized handbook and its accompanying DVD directly facilitates the training and support of 3,100 acquisition professionals from all branches of service averaging over $5B a year in contingency spending to support the warfighter. It contains Joint contingency contracting doctrine and describes the military's capabilities, best practices, and fundamental principles that guide the employment of US contracting forces in a Joint-service environment. The team who put the book together were recognized in the 2007 Contracting Awards in the Special Recognition Award category.

Special Mention

- Nine AFLMA personnel were deployed during 2007 to Iraq and Afghanistan: six logistics readiness officers (LROs), one fuels specialist, and two analysts. For most of the LROs, these AEF rotations and 365-day TDYs included 8 weeks of training with the US Army.
- All Agency personnel received AFSO21 training and several of our most experienced researchers were leaders and participants in numerous AFSO21 events dedicated to improving logistics processes.
- We collaborated with faculty and students at a number of DoD schools including Defense Acquisition University-South, Air War College, Air Command and Staff College, the Air Force Institute of Technology (AFIT) School of Systems and Logistics, the AFIT School of Engineering and Management, the

Advanced Logistics Readiness Officer Course, and the USAF Maintenance Group Commanders' Course.
- We strengthened ongoing strategic partnerships with the Logistics Management Institute, ICF International, and RAND.

Conclusion

If you can't find the logistics knowledge you need in our publications or on our website, let us know. We'll work with you to find that knowledge.

AFLMA 2007 Goals

- Target activities to improve ACS capabilities
- Develop our total force core values, professional skills, and quality of life
- Streamline internal processes and sharpen external logistics capabilities through the application of continuous process improvement principles
- Promote AFLMA as a world-class studies and analysis support center

2007/2008 Completed Projects[1]

2007 Projects

- CC200630401, AFLMA Standardized Training Plans, Improvement Study
- LC200620900, Measuring the Effect of Collective Bargaining Agreements on A-76 Costs, Improvement Study
- LC200626201, Upgrade for Contingency Contracting Tools, Consulting
- LC200630400, Standardization of Contingency Contracting After Action Reports, Consulting
- LC200630500, Analysis of Contingency Contracting Warranting Process, Consulting
- LC200631100, Standardization of Contracting Officer Representative Training Template, Consulting
- LC200730400, Procure to Payment Data Request, Consulting
- LL200718300, Positioning Base Expeditionary Resources with Afloat Prepositioned Fleet Assets, Consulting
- LM200622100, Intercontinental Ballistic Missile Maintenance Air Force Specialty Code Efficiency Feasibility, Improvement Study
- LM200625500, C-5 Total Not Mission Capable Maintenance-II Study, Improvement Study
- LM200636300, United States Air Force Afloat Prepositioned Fleet International Shipping Organization Containerization, Improvement Study
- LM200709200, Supply Chain Process Maintenance—White Paper, Consulting
- LM200713604, United States Air Force Afloat Prepositioned Fleet Value Stream Mapping Event, Consulting
- LM200731100, Agile Combat Support Concept of Operations Rapid Improvement Event, Consulting
- LO200713600, Quality Assurance Tracking and Trend Analysis System Update 5.0, Consulting
- LR200618601, Transitioning to Sustainment Operations at Ali Al Salem, Balad, and Bagram, Consulting
- LR200619100, Enterprise Assessments for Support Equipment, Consulting
- LR200625601, Logistics Readiness Squadron Implementation Test, Consulting

- LR200629800, Requirements/Execution Availability Logistics Module versus Non-Airborne Mobility Readiness Spares Package, Consulting
- LR200700502, Transportation Data Requirements for Expeditionary Combat Support System, Improvement Study
- LR200700503, Expeditionary Combat Support System Analysis: Spares Support for Surge (Contingency) Operations at a Consolidated Intermediate Repair Facility, Consulting
- LR200700504, Expeditionary Combat Support System Analysis: The Need for Safety Levels—Part I, Consulting
- LR200700704, Air Force Customer Wait Time Metrics Monthly Data Feed (2007), Consulting
- LR200700705, Air Force Spares Budget Analysis Quarterly Data Feed 2007, Consulting
- LR200700802, Readiness Spares Package Evolution: Determining Whether or Not to Retain the Readiness Spares Package at the Contingency Base after Transitioning to Sustainment, Consulting
- LR200702200, Analysis of Defense Automatic Addressing System Center Rejecting Air Force Requisitions, Consulting
- LR200703100, Creating Air Force Business Rules for Consumable Readiness Spares Packages, Improvement Study
- LR200708100, Readiness Spares Package Kit Review Process - Rapid Improvement Event, Consulting
- LR200708500, Analysis of Tracer Action Required Process, Improvement Study
- LR200712200, Updating the In-Place Readiness Spares Packages, Peacetime Operating Spares Offsets, Consulting
- LR200721500, Demand Threshold in Readiness-Based Level for Communications-Electronic Items, Consulting
- LR200723500, Contingency High Priority Mission Support Kit Analysis, Improvement Study
- LR200727801, Determining In-Place Readiness Spares Packages Offsets, Consulting
- LR200731000, Contingency High Priority Mission Support Kit Plus Analysis for the A-10 and F-16, Consulting
- LX200520702, Unified Engagement 2006 After Action Report, Wargames Study
- LX200520703, Global Mobility 2006 After Action Report, Wargames Study
- LX200702300, Aerospace Expeditionary Force Fuels Management Pocket Guide Revision 2.0, Consulting
- LX200709400, Fuels Mobility Support Equipment and Mission Ready Spares Packages, Consulting
- LY200600900, Virtual Afloat: A Vision for Global versus Theater Response Capability, Improvement Study
- LY200611400, Retrograde Supply Chain Analysis, Improvement Study
- LY200618101, Consumable Readiness Spares Packages: Constructing Business Rules for Computing Kits, Improvement Study
- LY200624000, Defense Logistics Agency Forward Stocking, Improvement Study
- LY200625501, Automatic Test Systems Data Collection and Weapon System Availability Project, Consulting
- LY200633300, Capability Based Resourcing for Depot Purchased Equipment Maintenance, Improvement Study
- LY200726200, Presidential Aircraft Replacement Analysis of Alternatives, Consulting

- LZ200700800, Readiness Spares Package Evolution: Follow-On Spares Support, Consulting

2008 Projects

- LC200626200, Standardize Contingency Contracting Training Plan at Unit Level, Consulting
- LC200631101, Joint Contingency Contracting Handbook, Improvement Study
- LR200623000, Adjusting Supply Chain Data to Support Repair Enterprise for the 21st Century Operations—Part 1 Air Force Managed Items, Consulting
- LR200700701, Air Force Total Ownership Cost Data Feed (2007), Consulting
- LR200700702, National Stock Number Level Issue and Stockage Effectiveness Data Feed - IE/SE (2007), Consulting
- LR200715100, Equipment Retention Analysis, Improvement Study
- LR200724902, Supply Chain Operations Design Team Support 2007, Consulting
- LR200725000, Supply Chain Process Sustainment Entity White Paper, Consulting
- LR200729700, Forward Stocking of Air Force Managed Items at DDKS, Consulting
- LR200733100, Logistics Enterprise Architecture Compliance Support 2007, Consulting
- LR200733409, Transportation Requirements for Area of Responsibility Assets, Consulting
- LR200803900, Initial Implementation for Forward Stocking Air Force Managed Items at Defense Distribution Depot Kuwait/ Southwest Asia, Consulting
- LX200713500, Futures Capabilities 2007, Wargames Study
- LY200605800, Bench Stock Implementation Support, Improvement Study

Notes

1. Includes projects from 1 January 2007 to 30 April 2008

results at a glance

2007 Completed Projects

16 Improvement Studies
30 Consulting Studies

Completed Expeditionary Airpower and Agile Combat Support Studies and Research

2007 Completed Projects

- LC200626201, Upgrade for Contingency Contracting Tools, Consulting
- LC200630400, Standardization of Contingency Contracting After Action Reports, Consulting
- LC200630500, Analysis of Contingency Contracting Warranting Process, Consulting
- LC200631100, Standardization of Contracting Officer Representative Training Template, Consulting
- LL200718300, Positioning Base Expeditionary Resources with Afloat Prepositioned Fleet Assets, Consulting
- LM200625500, C-5 Total Not Mission Capable Maintenance-II Study, Improvement Study
- LM200636300, United States Air Force Afloat Prepositioned Fleet ISO Containerization, Improvement Study
- LM200713604, United States Air Force Afloat Prepositioned Fleet Value Stream Mapping Event, Consulting
- LM200731100, Agile Combat Support Concept of Operations Rapid Improvement Event, Consulting
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- LR200700504, Expeditionary Combat Support System Analysis: The Need for Safety Levels—Part I, Consulting
- LR200700802, Readiness Spares Package (RSP) Evolution: Determining Whether or Not to Retain the RSP at the Contingency Base after Transitioning to Sustainment, Consulting
- LR200702200, Analysis of Defense Distribution Depot Kuwait/Southwest Asia Rejecting Air Force Requisitions, Consulting
- LR200708100, Readiness Spares Package Kit Review Process - Rapid Improvement Event, Consulting
- LR200708500, Analysis of Tracer Action Required Process, Improvement Study
- LR200712200, Updating the In-Place Readiness Spares Packages, Peacetime Operating Spares Offsets, Consulting
- LR200721500, Demand Threshold in Readiness Base Level for Communications-Electronic Items, Consulting
- LR200723500, Contingency High Priority Mission Support Kit Analysis, Improvement Study
- LR200727801, Determining In-Place Readiness Spares Packages Offsets, Consulting
- LX200520702, Unified Engagement 2006 After Action Report, Wargames Study
- LX200520703, Global Mobility 2006 After Action Report, Wargames Study
- LX200702300, Aerospace Expeditionary Force Fuels Management Pocket Guide Revision 2.0, Consulting
- LY200600900, Virtual Afloat: A Vision for Global versus Theater Response Capability, Improvement Study
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2008 Completed Projects

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- LR200733409, Transportation Requirements for Area of Responsibility Assets, Consulting
- LX200713500, Futures Capabilities 2007, Wargames Study
- LY200605800, Bench Stock Implementation Support, Improvement Study

Major Publishing Projects

Contingency Contracting: A Joint Handbook

AEF Fuels Management Pocket Guide

Cumulative Index: Air Force Journal of Logistics, Seventh Edition

Information for Contributors: Air Force Journal of Logistics

Information Book: Air Force Journal of Logistics

AFLMA Advertising Material

Air Force Journal of Logistics—four editions

Agency folder and brochure

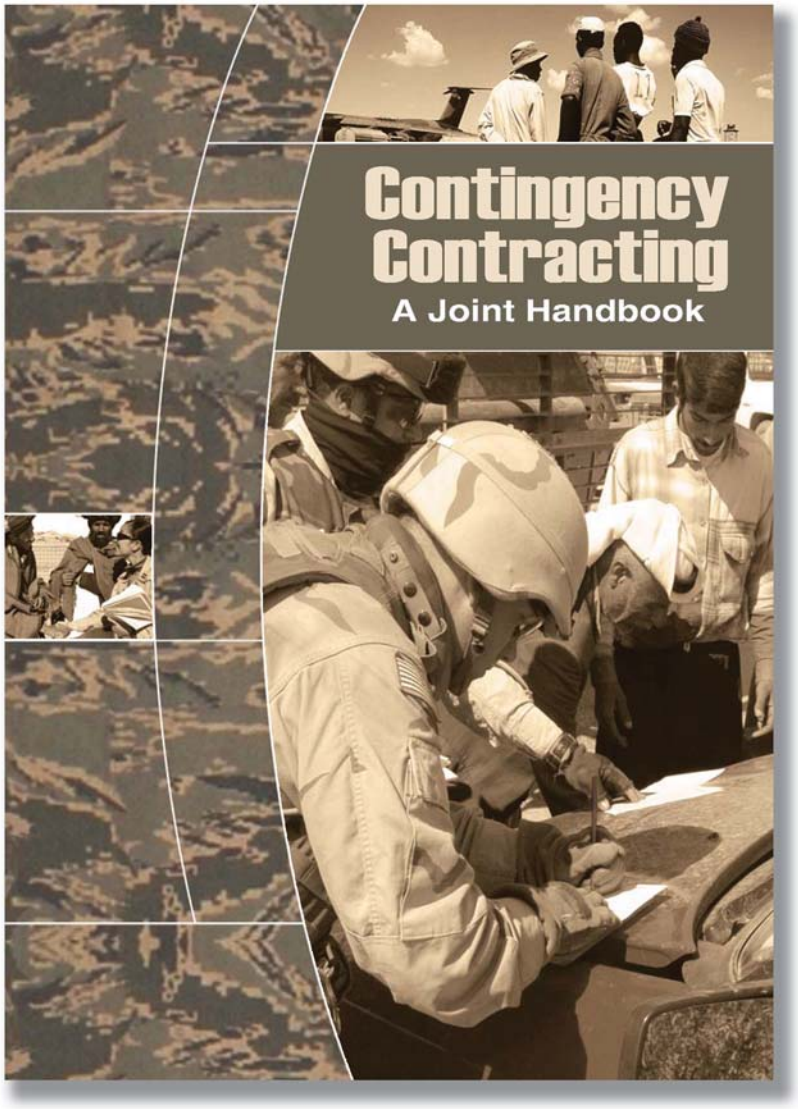
Project Managers Handbook

Strategic Plan: AFLMA

AFLMA Year in Review 2006

Available Now

Guidebooks:
What You Need, When You Need It!

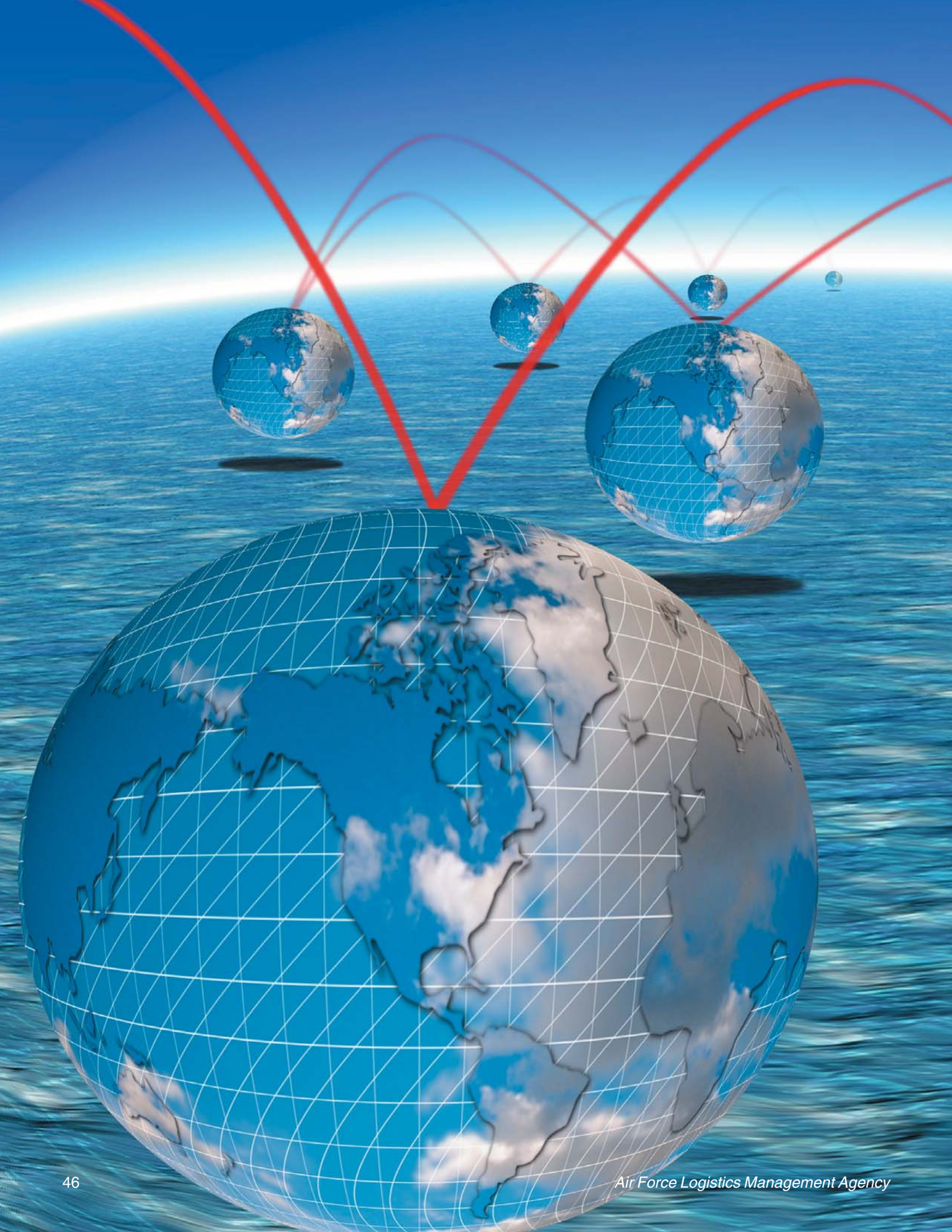


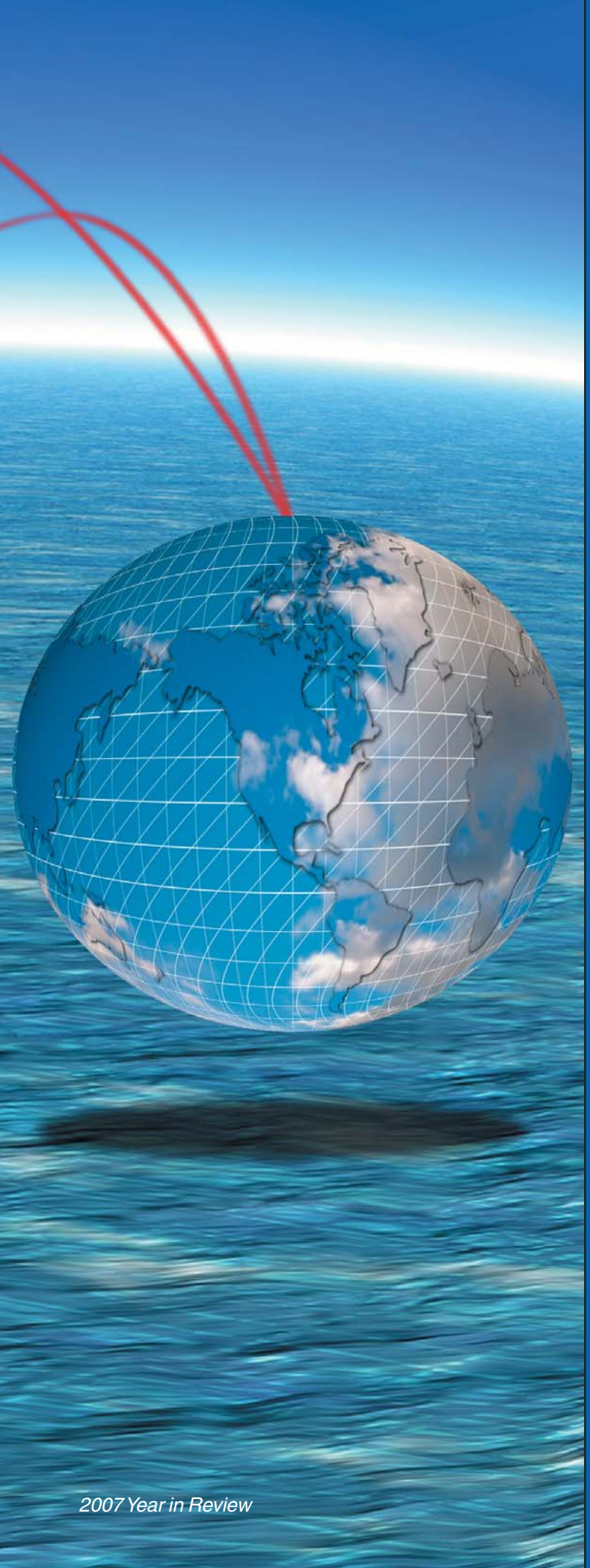
Contingency contracting support has evolved from purchases under the simplified acquisition threshold to major defense procurement and interagency support of commodities, services, and construction for military operations and other emergency relief. Today, this support includes unprecedented reliance on support contractors in both traditional and new roles. Keeping up with these dramatic changes, while fighting a global war on terror, is an ongoing challenge.

This pocket-sized handbook and its accompanying DVD provide the essential information, tools, and training for contracting officers to meet the challenges they will face, regardless of the mission or environment.

AFLMA

Generating Transformation Solutions Today; Shaping the Logistics Enterprise of the Future





Lieutenant Colonel Jennifer A. Cushion, AFLMA

AFLMA's Transformation

As a major user of the Air Force's materiel and personnel resources, the logistics community bears a large part of the responsibility for finding better and less costly ways of doing business....an urgent need exists for an organization which could provide continuity to Air Force innovations designed to improve logistics support as well as develop less costly ways of doing business. [1]

Fast forward 30 years, change functional alignment a couple of times and rename the "Center" to "Agency"…this statement is still as relevant today as it was on 15 May 1975 when Lieutenant General William W. Snavely, the deputy chief of staff for systems and logistics petitioned the Air Force Vice Chief of Staff to establish the Air Force Logistics Management Center (AFLMC). He goes on to state "*…the establishment of an Air Force Logistics Management Center would provide the means for realizing greater logistics systems improvements and attendant savings….*"[2]

Same Game, Bigger Field

Past and Future States

Lieutenant General Snavely's sentiment was re-emphasized when, in 2004, the AFLMA was tapped by the Air Force Directorate of Innovation and Transformation to help lead the way in transforming the Expeditionary Logistics for the 21st Century (eLog21) vision into a strategic map of future logistics business processes, systems, and organizations.[3] This transformation effort is revolutionizing how the Air Force provides supply chain support from

reactionary and functionally stovepiped to one that is anticipatory (planning based) and integrated. The overall goal of eLog21 is to create an efficient, integrated logistics enterprise system that allows for a seamless transition from peace to war.[4]

With a history replete with tackling and solving the toughest logistics challenges, the Air Force Logistics Management Agency's (AFLMA) primary focus has always been base-level, retail issues. With the advent of an enterprise resource planning system, the need for a logistics research agency devoted to base-level issues diminishes, but the requirement for an enterprise view becomes much more relevant. Therefore, in conjunction with the Air Force logistics transformation, the AFLMA is transforming to support the new logistics construct that will be based on an enterprise architecture. While we will still maintain our core competencies of in-depth studies and analysis (S&A), wargames, and publications, our unique cadre of cross-functional researchers is broadening from a predominantly base-level focus to an enterprise view of logistics research. Our end-state role is to be the logistics enterprise architect and analytical checkpoint for the supply chain sustainment process.

The Logistics Enterprise Architecture (LogEA) translates the eLog21 vision into a strategic map of future logistics business processes, systems and organizations. LogEA, like all architectures, will improve communications across the Department of Defense by employing a standardized, structured, and integrated framework. This provides a repeatable method for investment evaluation and increased effectiveness of organizational change, new system creation, and new technology implementation.[5] It will drive planning and decisionmaking from an enterprise perspective. This change management tool is designed to guide enterprise decisions, targeting more effective combat capabilities.

By being *the* single authoritative source of process and systems models for Air Force logistics,[6] LogEA will define the high level future state processes and ensure that the Air Force invests in programs that are in line with those processes. LogEA will employ the Supply Chain Operations Reference (SCOR) model and Design Chain Operations model as its core framework to describe this very complex system using a common set of definitions.[7] These models provide a framework that links business process, metrics, best practices, and technology features into a unified structure to support communication among supply chain partners and improves the effectiveness of supply chain management and related supply chain improvement activities.[8] This description and resulting ability to link with various and diverse supply chains will position the Air Force logistics community for success in future initiatives to improve enterprise and locale-specific processes.[9]

As the analytical checkpoint for the logistics enterprise architecture, AFLMA will provide Air Force decision or policy makers with analysis of actual and potential effects of proposed changes to enterprise supply chain policies, processes, or systems. This analysis may include conducting supply chain or logistics studies, simulations, or war game *what-if* scenarios and analysis. As the LogEA architect, the AFLMA will also be responsible for the LogEA evaluation process, maintain a master list of compliant programs, elevate unresolved compliance issues, and communicate evaluation results with program managers.[10] AFLMA LogEA personnel will assist in evaluating program architecture artifacts and the high level mapping of the program to the business enterprise architecture.

While our S&A competency is taking a more expansive focus, conceptually the future-view venue of Title X wargames is better served by this transformation of AFLMA. Just as our new role is to vet proposed enterprise initiatives to ensure an efficient and effective supply chain for the warfighter, the primary purpose of wargames is to explore and assess new and alternative plans using a range of wargame scenarios and objectives to understand future challenges and potential responses. The results of these games are used to guide follow-on studies, analyses, modeling and simulation to aid in leadership investment decisionmaking.[11] Having both these competencies under the AFLMA roof forms a symbiotic relationship. The research done via the S&A process can be used to prepare for wargames—the recommendations from S&As can be vetted through wargame objectives—and, on the retrograde side, results of wargames can be the generators of additional S&A.

The heart of AFLMA's publishing core competency, the *Air Force Journal of Logistics,* has always been published as a professional and technical forum for presenting logistics research, innovative thought, and issues of concern throughout the community. In the past, it has often reflected the retail theme of AFLMA studies. Inherently the major themes of the Journal will continue to, in part, reflect the scope of AFLMA studies. However, while the themes may also change to the enterprise view of S&A and wargames, the foundational goal of the Journal will remain the same—to be a source of relevant articles, studies, and thought for today and tomorrow's logistician.

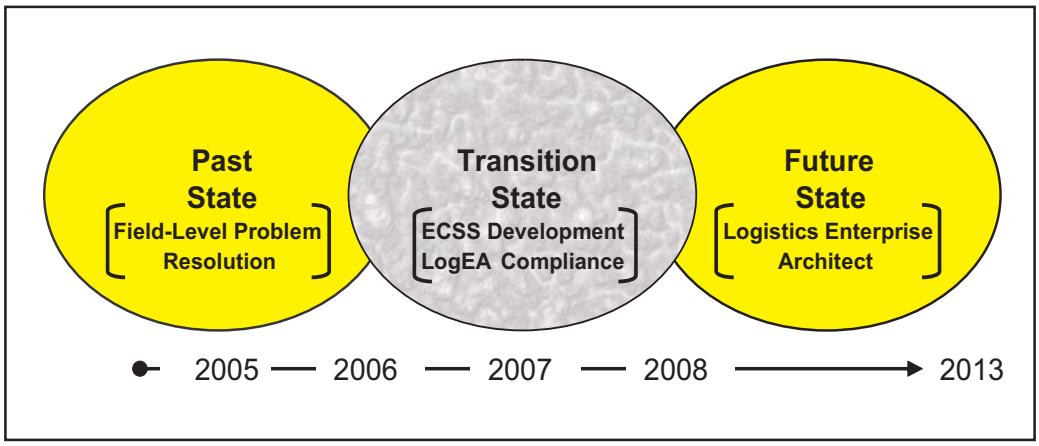


Figure 1. Organizational Change
Source: Timothy M. Mojonnier, "Top Management's Role in Fostering and Managing Positive Organizational Change," APICS Strategic Management Reprints, 2000. (Modified for AFLMA applicability)

Navigating the Transition State

In any organizational transformation, the transition state (the *getting-from here-to-there*) is the most challenging—knowing where you want to be, does not always explicitly define a path to

take or warn you of all the obstacles that may occur. This is particularly true when the details of end-state (the *to-be* state) are still being developed. But while it is challenging, it also brings with it the excitement of having a role in designing the future logistics environment—a chance to bring an Air Force lifetime of experiences (positive and negative) to ensure we logisticians get the right stuff, to the right place, at the right time. Such is the case with the Air Force's logistics transformation and AFLMA's transformation.

Simultaneously assisting in the eLog21 initiative and *reculturalizing* the AFLMA to take on enterprise architect role are synergistic tasks (albeit resource and priority challenging at times) on the transition path. Being involved in key programs from the beginning has provided a sound foundation of understanding for our future role. This was a win-win option as AFLMA has provided a cadre of certified process, academically rated, cross-logistics disciplined experts to the logistics transformation office (LTO). Our eLog21 involvement began in early 2005 with the Expeditionary Combat Support System (ECSS) initiative—specifically, AFLMA members were part of the source selection team for the hardware, software, and a system integrator. Upon completion of the acquisition stage, AFLMA supported the capture of current logistics requirements during the development of the operational and system architectures (pre-blueprinting). This rolled into the high- and process-level blueprinting efforts through 2007. Most recently, as members of the Business Intelligence Team, the AFLMA is helping the team develop management reporting processes and tools to improve the logistics enterprise process performance. These advanced reporting tools, capabilities, and metrics will support leadership decisions via a single point information source.[12] This support is critical to ensuring a more proactive business management approach and continuous process improvement of the enterprise. In addition to our onsite support to the LTO, AFLMA has provided reachback capability to in-depth study support on the major foundational issues. Issues such as cleaning up the bills of materials and establishing data integrity are essential to the success of this new enterprise approach to managing the supply chain.[13] Accessing *The Air Force Journal of Logistics* readership, a special edition was published this past year to inform the community of the vision, the implementation, and the way ahead for ECSS—without doubt, a best seller. A key to change management, special editions of the Journal will continue to spotlight the eLog21 transformation initiatives.

Throughout 2007, while our support of ECSS continued, we also expanded our role to further prepare for our end-state. Specifically, AFLMA increased involvement in the LogEA compliance process in preparation for the takeover of the LogEA architect role set for March 2008. This piece of our new role charts new territory for AFLMA personnel as the systems architecture has its founding in the communications community. While not a 100 percent translation, the application of this information technology tool and concept on a logistics process brings with it a configuration discipline. This discipline enables long term sustainment and program communication efficiencies by having a defined reference model and blueprint to make decisions from. While, the technical aspects of SCOR, operations views, systems views, technical views, and other architectural concepts can be taught in a classroom, the in-depth understanding necessary to validate compliance can only come with hands-on experience and guidance from architecture subject matter experts. With the timeline for the standup of AFLMA as LogEA architect accelerated to March 2008, the team has gone into full afterburner attending workshops, reviewing contractor data requirements lists, and solidifying their expertise on architectural compliance requirements.

The Internal Dynamics of Keeping the Planets Aligned

Balancing this new mission on top of ongoing studies, wargames, and publishing with a 30 percent reduced workforce and a 20 percent rate of deployment, requires that the Agency rethink how it does business. *Keeping the planets aligned* has been the mantra as we target our end-state as the architect of LogEA. Our strategic plan targeted Air Force Smart Operations for the 21st Century (AFSO21) as a vital element of our business performance success—in particular, identifying new ways to do our old business that allows room for our new business.

Focusing resources on this purpose, the Agency attained foundational level training opportunities for AFSO21 techniques with a contingent of Level I and II certified members. Using this tool, we looked to our research process for efficiencies first. A rapid improvement event (RIE) was held to streamline the study process while retaining the same high quality and rigor. The RIE spotlighted a classic problem found on production lines—inspections at the end of the process which lead to expensive and time-consuming rework or in our case, the final draft report requiring methodology or objective rework. To integrate quality throughout the study process, project documentation (chapters covering the literature review, methodology, analysis, and summary) are now completed as the study goes along and constitute milestones to metric progress. These milestones are also critical review points with the sponsor to maintain vector, validate objectives, and highlight any issues that may arise. In the past, academic rigor was attained through a larger pool of vetted researchers mentoring the project manager throughout the study. The new process adopted the postgraduate thesis approach in the form of study advisors (PhDs) to maintain academic rigor. The keystone to this new process is the study assessment team. This team ensures that AFLMA resources are being directed to those projects with the highest return on AFIT investments for the logistics enterprise. Utilizing a prioritization tool, Agency leadership reviews proposed projects for alignment with annual vectors that are vetted through a colonel-level functional review board and approved by the Logistics Board of Advisors. The Agency will continue to use an annual call for topics process to facilitate the identification of major areas of emphasis each year.

As with the S&A core competency, efforts have been taken to streamline the footprint required to support logistics play in Title X Wargames. AFLMA's role in wargames has steadily increased since taking on management of logistics wargaming participation in the mid-1990's. Historically, the AFLMA Wargames Division has been the focal point for preparation of both the strategic and local future (C+12-20 year) agile combat support (ACS) inputs, impacts, and drivers in the game play area. With the advent of the Unified Engagement (UE) game being taken to the warfighter in 2006, the games enjoyed the expertise and tactical level scenario dynamics supported by theater game players. This enabled the AFLMA team to focus on the strategic

aspects and wargame objectives while leveraging the warfighter's theater *ground truth* to interject ACS realism in game play. The path to UE is an 18-month process and while gearing up for the 2008 game, the new and smaller cadre of AFLMA gamers' skills and knowledge were honed at multiple smaller events throughout the year. Engaging in near- and mid-term games, division members prepared the logistics playing field and recommended areas for improvement in game play via modeling and simulation requirements. Not only does AFLMA support today's logistics leaders with their expertise, but the gamers also direct that knowledge toward tomorrow's leaders via the military education channels. Members brought Air Force ACS relevance to both the Aircraft Maintenance and Munitions Officer School's employment and the Army War College's Strategic Decision Makers exercises.

The Vision to Get Us There

As the AFLMA completes its journey through the transition state, we keep in mind how similar the end state role is to our beginnings in 1975-—"to provide the means of realizing greater logistics improvements.[14]" But as we glance in the rear view mirror of our past to maintain our core research identity, we keep primary focus on the future to align our efforts with the needs of the logistics community of tomorrow. Our S&A, wargame, and publishing efforts must align with the path connecting the two as we transform the vision of our past, *generating today's solutions, shaping tomorrow's logistics,* into the needs of the Air Force today and tomorrow—g*enerating transformation solutions today; focusing the logistics enterprise of the future.*

Notes

1. Lt General William W. Snavely, Deputy Chief of Staff Systems and Logistics, 15 May 1975 memorandum to AF/CV, "Request for Approval to Establish an Air Force Logistics Management Center (LMC)," contained in *History of the Air Force Logistics Management Center*, 30 September 1975 – 31 December 1975, Major Anthony F. Geiser, USAF Historical Division, 12 January 1976, 22.
2. Lt General William W. Snavely, 23.
3. Sean P. Cassidy and Kevin Gaudette, "The AFLMA Roadmap for Supporting Transformation," *AFLMA Year in Review 2004*, 25.
4. *Expeditionary Logistics for the 21st Century (eLog21) Fact Sheet*, [Online] Available: AF Portal, AF/A4/7, as of 13 March 2007.
5. *DoD Architecture Framework Version 1.5*, "DoDAF Volume I Definitions and Guidelines," 23 April, 2007, iii.
6. AF/A4I Deputy Chief of Staff for Installations and Logistics Directorate of Transformation, *US Air Force Logistics Enterprise Architecture (LogEA) Concept of Operations*, 16 May 2007, 7.
7. *US Air Force Logistics Enterprise Architecture (LogEA) Concept of Operations*,12-14.
8. Supply Chain Council, *Supply Chain Operations Reference Model Handbook*, Version 8.0, 2006, 5.
9. *US Air Force Logistics Enterprise Architecture (LogEA) Concept of Operations*, 42.
10. HQ US Air Force Directorate of Transformation (A4I), *Air Force Logistics Enterprise Architecture (LogEA) Compliance Plan Version 2.0*, 7.
11. *US Air Force Logistics Enterprise Architecture (LogEA) Concept of Operations*, 24.
12. *US Air Force Logistics Enterprise Architecture (LogEA) Concept of Operations*, 27.
13. *Ibid.*
14. Lt General William W. Snavely, 23.

Deliver

items you need

Supporting Transformation, Analysis, and Deployments

Here, There, and More

So how did AFLMA maintain, and in fact increase, its level of performance while deploying half the staff? It turns out the staff at AFLMA practice what they preach. Part of what AFLMA *brings to the fight* is the ability to understand and, more importantly, apply AFSO21 and other LEAN practices along with the ability to critically analyze data to make informed decisions. One of the Agency's first targets focused on its core—the process of how studies are accomplished. By conducting numerous efforts focused on fine-tuning the study process, from project acceptance to completion, Agency members streamlined the management overhead and introduced procedures to ensure each project stayed on course.

Captain Wesley B. Eagle

As I returned from the past year in Afghanistan I wondered what the rest of Air Force Logistics Management Agency (AFLMA) was doing while I was chewing dirt with the Army and Marines. Surely, those of us deployed to Iraq and Afghanistan had far fuller plates than those who remained home. Expecting to hear stories about burger burns and the strain of final reports, officer and enlisted performance reports, deadlines, and so forth, I was amazed at what the crew *back home* at Gunter Annex accomplished. Oftentimes we deploy and think nothing else is happening while forgetting someone is still back keeping the home fires burning, and in this case, burning brightly.

When I arrived at the AFLMA in 2005 we were exempt from deployments in order to meet our assigned mission of delivering robust, tailored answers to the most difficult and complex logistics problems. We are a think-tank leveraging a broad range of functional, analytical, and scientific expertise to produce innovative solutions to problems. We also design new or improved concepts, methods, systems, or policies that improve peacetime readiness and build war-winning logistics capabilities. Supporting those efforts are people across the spectrum of Air Force specialties. Armed with a broad range of education and skills, they dig into and solve difficult logistics questions and

present executable solutions. In my 23 years of wearing an Air Force uniform, I'm not sure I've ever been in a position anywhere else where I have the time, resident expertise, and resources to do the homework required to tackle these critical questions and provide professional analysis and workable solutions.

In 2005, AFLMA completed 14 improvement studies, 29 consulting projects, 3 Requirements Team studies, and 1 operational guide for our customers. Not represented in these numbers are the various inputs we provide on documents, sister Service efforts concerning agile combat support (ACS) and the then emerging effort to support the Expeditionary Combat Support System (ECSS). We did all this with a manpower pool of 40 military, 10 civilians, and a talented group of contractors. Except for the standard temporary duty (TDY) assignments and a smattering of support TDY's, we were not tasked for deployments until the late fall of 2005.

In 2007 AFLMA completed 16 improvement studies (includes 2 wargames studies) and 30 consulting projects. Of the 46 studies and projects, 7 focused on Air Force Smart Operations for the 21st Century (AFSO21) and 5 on ECSS. These additional focus areas added to the education and expertise requirements each AFLMA member must have to be effective. To meet these challenges, AFLMA initiated aggressive training in LEAN, AFSO21, and the latest process transformation courses. Looking at the results, it was obvious the workload had increased along with expectations of performance. As is common across the Air Force, many of the logistics readiness officers assigned to AFLMA were tasked with 6-month or 365-day TDYs keeping roughly 50 percent of our 21Rs on the road.

The additional challenges of maintaining continuity on detailed studies and specialized expertise were added with the continuous manpower changes. In fact, I was surprised at the number of AFLMA members who joined me in just Afghanistan alone, much less those who were sent to Iraq and other areas. Those of us in Afghanistan jokingly referred to ourselves as *AFLMA DET 1 Forward* until it seemed that it was no longer a joke. In addition to the numerous deployments, force reductions under *Program Budget Decision* 720 were taking hold and many critical subject matter expert positions were eliminated. In fact, several divisions were reduced to single digits during this time. Ingenuity became the watchword for the Agency as it worked to sustain several key missions such as wargames support.

So how did AFLMA maintain, and in fact increase, its level of performance while deploying half the staff? Was the truth the half of us who deployed contributed so little to the mission while we were at Gunter Annex that business improved when we left?

It turns out the staff at AFLMA practice what they preach. Part of what AFLMA *brings to the fight* is the ability to understand and, more importantly, apply AFSO21 and other LEAN practices along with the ability to critically analyze data to make informed decisions. One of the Agency's first targets focused on its core—the process of how studies are accomplished. By conducting numerous efforts focused on fine-tuning the study process, from project acceptance to completion, Agency members streamlined the management overhead and introduced procedures to ensure each project stayed on course.

Additionally, AFLMA has successfully partnered or collaborated with RAND, ICF International, the Logistics Management Institute, sister Services, and other organizations exploring cutting-edge logistics processes to bring great minds together and foster team efforts. These teams combine the best of real-world expertise with organizations specializing in specific analysis to produce first-class studies and the ability to define and attain airpower capabilities for the future. Knowing education is the foundation required to move ahead, courses await anyone walking through our doors to educate them on the latest AFSO21, LEAN, Logistics Enterprise Architecture (LogEA), and ACS concepts.

The mission of AFLMA is to "sharpen agile combat support capabilities by generating enterprise supply chain solutions, supporting logistics transformation through research, wargames, and publication of ACS literature." Added to the core logistics experience to meet this mission is expertise in LEAN, AFSO21 execution, LogEA, ECSS migration, and a host of emerging technologies and concepts. Couple the heavy subject matter expertise demands with a growing deployment requirement one finds there are many barriers to attain and develop the skills required to execute the AFLMA mission and emerging study and support requirements. For example, the research AFLMA does often takes teams accomplishing hundreds, if not thousands, of hours of study and analysis. Each time an individual rotates out, his or her expertise gap is filled by someone trying to *catchup* on the research where the last person left off. Many approaches are underway to mitigate the issues caused by things affecting every other Air Force unit—operating tempo, permanent change of station of trained personnel, separations and retirements, and the increasing need for people with ever-increasing knowledge. Creating logisticians and building teams with expertise at evaluating everything from base-level supply functions to Department of Defense enterprise concepts, including the full spectrum of military planning levels, is not an overnight event.

Looking back at the last year, I can say my deployed team was successful at training the Afghan National Police the basics of supply, namely the simple things such as writing down the stuff you requested so you can track it. Looking at what the home folks accomplished while the rest of us deployed leaves no doubt someone is taking care of business at home. No workload at home can compare to what you experience while deployed, but I can just imagine what the group at home station would have accomplished with the whole crew around.

No form of transportation ever really dies out. Every new form is an addition to, and not a substitution for, an old form of transportation.

—Air Marshal Viscount Hugh M. Trenchard, RAF

AFLMA

- Quick responses for *high-value* studies and analyses
- Broad range of skills—can develop new specialized skills
- Enterprise-wide perspective
- Workforce with recent field experience
- Cross functional point of view
- Always high-quality work

Our Competitive Advantages!

Your Logistics Studies and Analysis Connection!

AFLMA 2007

Partnerships

The Right Team

Partnering, partnerships, strategic partnerships—those are some interesting words. You've probably heard them bantered about frequently during the last few years. Likewise, you've probably seen a variety of briefs, books, pamphlets, or handouts where organizations told you about their partnerships.

Have you ever found yourself thinking *yeah, right*? Or saying *all eyewash*? Simply renaming a traditional relationship with another organization does not make a strategic partnership. Merely identifying our daily efforts with another Air Force organization as *teaming up* is not our approach. Rather, we recognize partnerships as a needed tool to make things such as agile combat support (ACS) and expeditionary airpower a reality.

We use partnerships to give us the capabilities we don't have, and we use them to be able to do—or do better—some of the things listed below.

- Finding those private sector practices that benefit Air Force logistics
- Finding ways to improve resource management
- Integrating new or emerging technology
- Making Air Force logistics streamlined and more responsive
- Improving Air Force logistics modeling and simulation

Our strategic partnerships include three of the most well-known research corporations: RAND, ICF International, and the Logistics Management Institute (LMI). These partnerships are well-established and growing. We're working with RAND on a variety of ACS expeditionary airpower issues and problems. Our efforts with LMI are making Air Force supply systems leaner and more responsive. Our partnership with ICF International will improve logistics modeling and simulation support. This partnership was essential to our support of Global Engagement, Unified Engagement, and Joint Expeditionary Force Experiment. It will be just as valuable as we design the logistics play for future exercises and wargames.

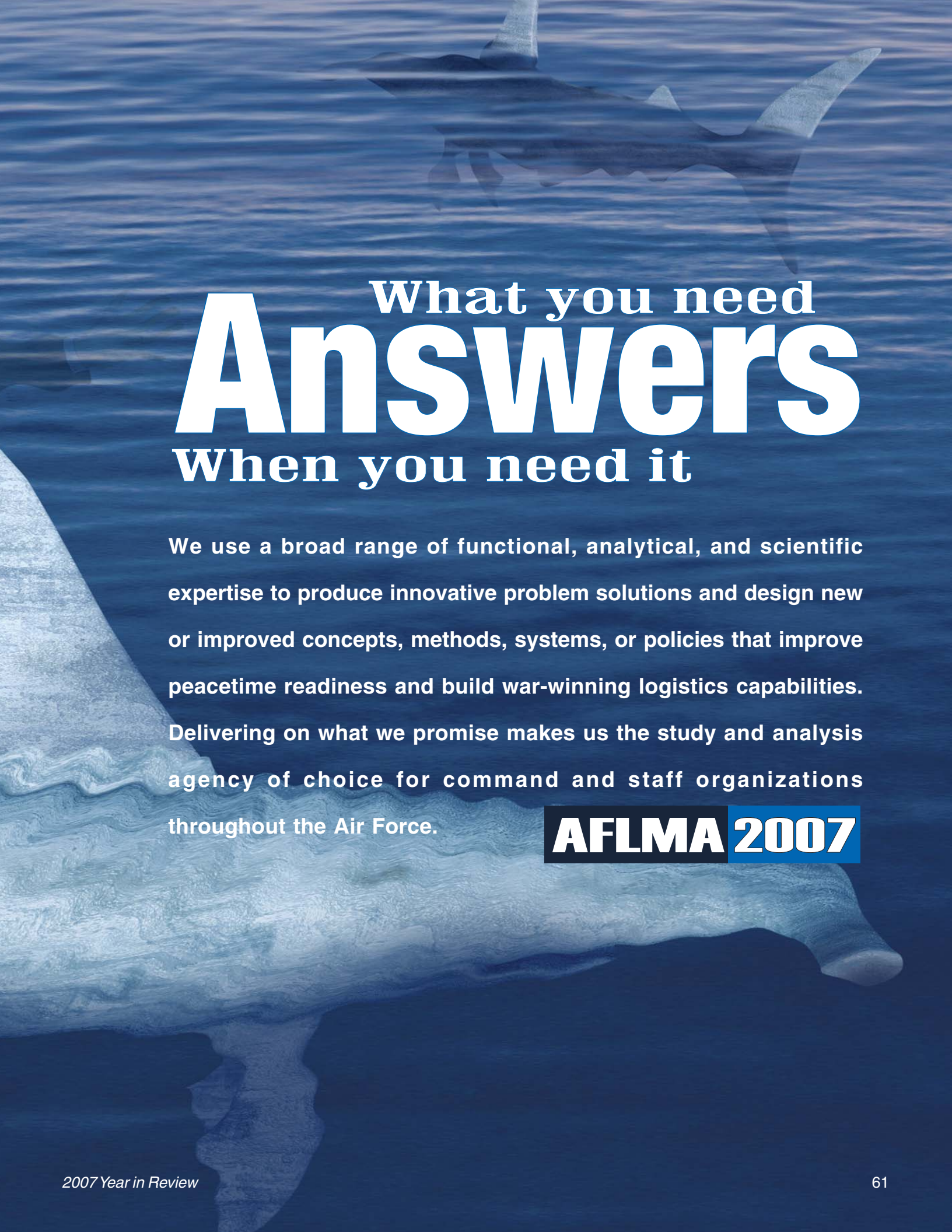
Look into your crystal ball. What do you see? Do you see change? We think we do. We think we see the kind of change we've seen the last 10 years: the Secretary of Defense-directed sweeping program to reform the business of the Department of Defense; defense reform initiatives that mandated adoption of business practices used by American industry to become leaner, more flexible, and more competitive; the National Military Strategy; Global Engagement; *Joint Vision 2010 and 2020*; agile combat support; and transformation. Our partnerships help us respond to change, and perhaps more important, they help us anticipate change.

Major Strategic Partners

Expeditionary Airpower Studies
RAND

Wargames and Exercises
ICF International

Inventory and Supply Chain Management
Logistics Management Institute


What you need
Answers
When you need it
We use a broad range of functional, analytical, and scientific expertise to produce innovative problem solutions and design new or improved concepts, methods, systems, or policies that improve peacetime readiness and build war-winning logistics capabilities. Delivering on what we promise makes us the study and analysis agency of choice for command and staff organizations throughout the Air Force.
AFLMA 2007

Anyone can submit a proposed project, problem, or area for study to the AFLMA, but it must be channeled through the appropriate command Director of Logistics (A4) or one of the Air Staff directors. Before a study or research effort can be started, it must be sponsored by a command A4 or Air Staff director.

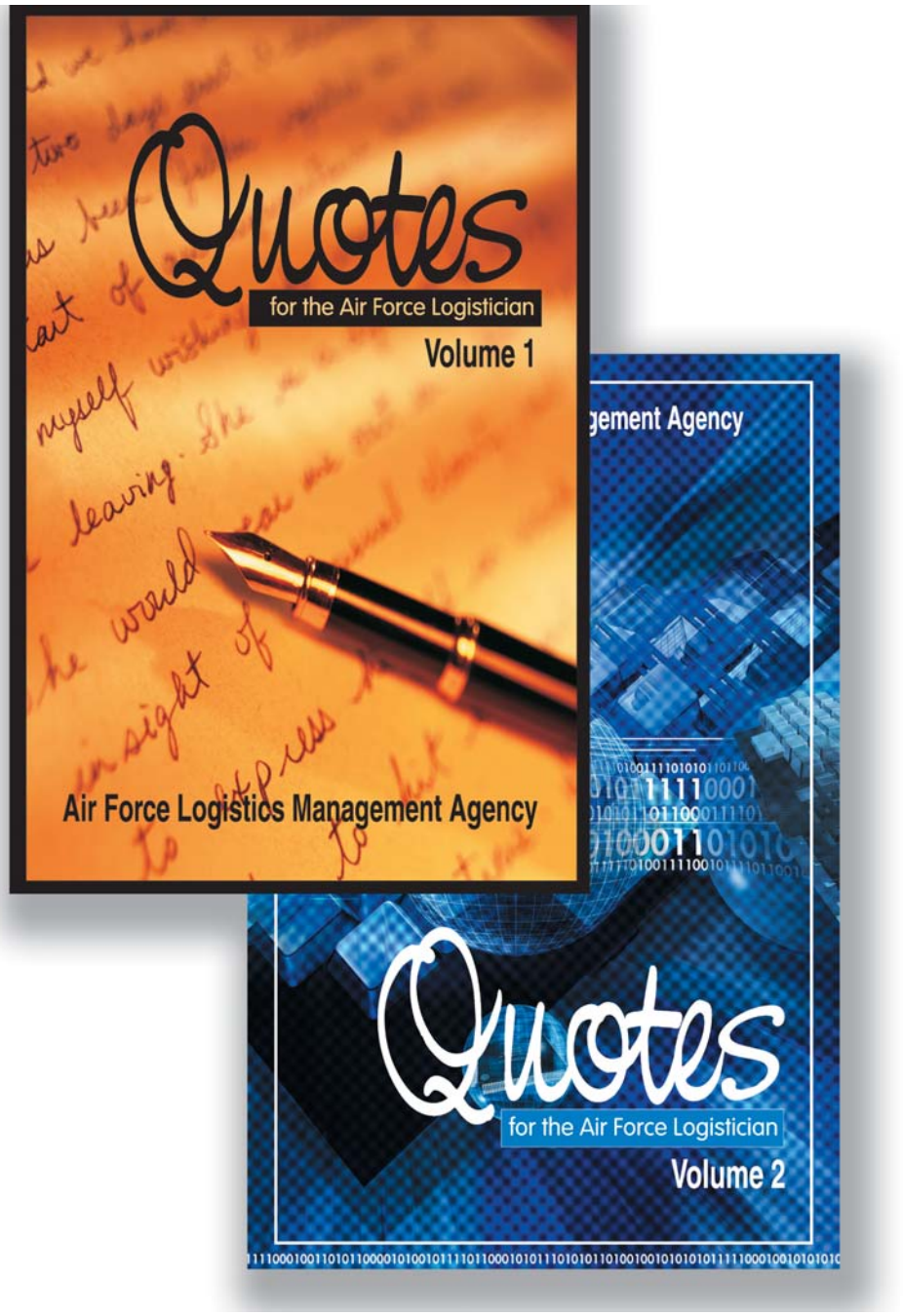
You've just had your fifth call in the last month about why the wings can't get spare parts for the *zamboni loader* (the zamboni loader is used to move *hardened phasetrons,* and phasetrons are no good if you can't move them). Your boss is screaming, his boss is screaming, the wing commanders are screaming, the major command commander now *knows you personally*, and to make matters worse, your dog even gives you dirty looks when you come home. You've checked with your operational analysis folks and some of the operational analysis folks in the wings, and no one has any answers. During your last call, the chief of analysis mentioned something called the AFLMA. After you hang up, you find yourself wondering: What's an AFLMA? How do I get the AFLMA to take on this problem? How much will it cost? How long will they take? What do they produce?

First of all, the AFLMA—Air Force Logistics Management Agency—is located at Maxwell AFB, Gunter Annex, Alabama. We're a logistics problem-solving agency. Within the Agency, we have two product divisions: Logistics Innovation Studies, and Logistics Wargames, along with the Business Operations and Logistics Analysis divisions. The Logistics Analysis Division provides state-of-the-art and leading-edge analysis and modeling and simulation capabilities.

Anyone can submit a proposed project, problem, or area for study to the AFLMA, but it must be channeled through the appropriate command director of logistics A4 or Air Staff director. Before a study or research effort can be started, it must be sponsored by a command A4 or Air Staff director. Upon receipt, the proposed study undergoes an extensive preliminary analysis and is submitted to the AFLMA Commander for approval. If we can't accomplish the project, we'll suggest other agencies that may be better suited for the task. When a project is accepted for study, one of our project managers assembles a cross-functional team to study the problem. Together, the functional experts and analysts ensure project results are sound, logical, and practical. Additionally, a multidisciplined approach helps prevent functional suboptimization. We don't want a proposed solution to a maintenance problem to create supply or transportation problems. As part of the project effort, we regularly update the organization or activity that proposed the study, along with the project sponsor. When the project is completed, the Agency provides the project sponsor with a detailed report that outlines the problem, provides a solution or solutions, and makes specific recommendations. Many of our projects are completed in 9 months. However, when necessary, we can complete an effort in less than 9 months. The sponsor is responsible for implementing the solution or recommendations. All our services are free to Air Force organizations.

We produce a variety of products, including process improvement studies, consulting studies, software prototypes, computer models, policy evaluations, handbooks or guides, and CD-ROM-based materials. Study length varies with each project.

Quotes Boxed Set:
What You Need, When You Need It!



Why a set of quotations for Air Force Logisticians? An obvious answer is there isn't one. But that's not the only reason, and it's certainly not the most important reason. The primary reason for producing this set was to provide a teaching resource that can be used in classrooms, education, training, and mentoring programs for Air Force logisticians. It is a tool that can be used by instructors, teachers, managers, leaders, and students. It is also a tool that can be used in research settings and a resource that should stimulate comment and criticism within educational and mentoring settings. Copies of the set are provided free of charge to any Air Force logistician, educational institution, teacher, instructor, commander, or manager.

AFLMA

Generating Transformation Solutions Today; Shaping the Logistics Enterprise of the Future

Active Projects

LR200725700 - Consulting

Readiness-Based Leveling (RBL) Version Testing and Validation

1. Review and update RBL code twice a year.
2. Ensure that the RBL code changes meet the intended changes to RBL functionality and are correctly coded so that no unintended changes occur in program products.
3. Independently review, test, and validate RBL code twice per year.

LR200801600 - Consulting

Air Force Spares Budget Analysis Quarterly Data Feed (2008)

1. Document actions taken by AFLMA, in concert with 754th Electronic Systems Group (ELSG) and the Logistics Management Institute, to collect and stratify aircraft spares failure data by major command and weapon system.
2. Provide stopgap support until the 754th ELSG reprograms the SBSS to collect failure data by major command and weapon system.

LR200801701 - Consulting

Air Force Total Ownership Cost (AFTOC) Data Feed (2008)

1. Send Standard Base Supply System transaction history records to the AFTOC Management Information System on a monthly basis in order to assist in providing monetary information to the Air Force stock fund's Material Support Division and General Support Division.
2. Better quantify statistics for consumable and reparable items.

LR200801703 - Consulting

Information Requests 2008

Support customers with one-time, unique data requests. The only known system that contains 7 years of standard base supply system historical data is the AFLMA logistics studies workshop database.

LR200700703 - Consulting

Alternative Demand Data Sources for Readiness-Spares Packages (RSP) (2007)

Develop and test a near-term solution to implement the use of transactional data in RSP computations.

LR200700706 - Consulting

Customer Oriented Leveling Technique (COLT) Metrics: Defense Logistics Agency (DLA) Demand Data, Monthly Data Feed (2007)

1. Retrieve demand data and calculate the number of line items back ordered, number of back ordered units and total customer wait time for DLA items.
2. Support and augment an ongoing Air Force Materiel Command study of COLT metrics in order to better determine and calculate Air Force base stock levels for DLA.

LR200700707 - Consulting

Global Logistics Support Center (GLSC) Support (2007).

Provide recommendations to assist the GLSC provisional team in developing a concept of operations, program action directives, and program plans.

LR200725703 - Consulting

Contingency High Priority Mission Support (CHPMSK) Kit Review 2007

Analyze, annually, requests to include Air Force-managed items in CHPMSK to determine the expected impact (in terms of expected back orders).

LR200725706 - Consulting

Normalization of Contingency Supply Support 2007

1. Review, annually, locations using contingency high priority mission support kits (CHPMSK) to determine when the location can transition to normal supply support.
2. Analyze existing CHPMSKs to determine if demand-based levels can be used to replace the CHPMSK levels.

LR200801700 - Consulting

Air Force Customer Wait Time Metrics (CWT) Monthly Data Feed (2008)

Provide CWT transactions on a monthly basis to Air Force Materiel Command and the Logistics Management Institute (LMI) to ensure the Air Force meets the requirement to feed the Department of Defense CWT system until 754th Electronic Systems Group can field the necessary program changes.

LR200801702 - Consulting

National Stock Number Level Issue Effectiveness and Stockage Effectiveness (IE/SE) Data Feed (2008)

1. Provide IE/SE data feed. IE/SE are two key indicators used by Air Force Materiel Command to measure support provided to retail supply accounts.

2. Support the initiative to create a system providing IE/SE at the national stock number level.

LR200733407 - Consulting

Logistics Support Center (LSC) Workload Statistics

1. Determine an equitable way to allocate existing LSC manpower levels between the two LSCs.

2. Identify and collect workload statistics to determine how many manpower positions are needed to accomplish the assigned tasks.

3. Develop, using the workload measures, an allocation of the existing manpower positions to each of the two LSCs.

LR200733401 - Consulting

Adjusting Supply Chain Data to Support Repair Enterprise for the 21st Century (RE21)—Part 2 Consumable Items for F100 Consolidated Intermediate Repair Facilities (CIRFs)

1. Determine CIRF stockage levels based on jet engine intermediate maintenance demand and storage limitations.

2. Generate phased transactions to transfer demand data.

LR200729600 - Consulting

Review of F-22 Spares Forecasting Techniques—Part 1 Peacetime Spares Cost

1. The F-22 program is currently in a performance based logistics arrangement with Lockheed Martin for sustainment support. The largest logistics cost driver is spare parts procurement and repair, and the F-22 program has struggled in recent years with the credibility of spares forecasts.

2. Provide a third-party perspective on current forecast techniques, and investigate alternative techniques.

LR200733403 - Consulting

Review of F-22 Spares Forecasting Techniques Part 2 - Consumable Cost per Flying Hour

1. Determine why the consumable items cost per flying hour is increasing for the F-22.

2. Identify, at the national stock number level, items that are causing an increase in the cost per flying hour.

LR200733413 - Consulting

Review of F-22 Spares Forecasting Techniques—Part 3 Readiness Spares Package (RSP) Usage Comparison to Levels

Compare the Lockheed Martin RSP to actual demands at the deployment location to determine if the RSP forecasted demands match expectations.

LR200733412 - Consulting

Review of F-22 Spares Forecasting Techniques—Part 4 Repair Requirements Models

1. Compare the various requirement models available today and indicate if and how they can be used to forecast, budget, and execute F-22 spares repair requirements.

2. Existing equipment models include the aircraft availability model, aircraft sustainability model, and the Execution and Prioritization of Repair Support System.

LR200810200 - Consulting

Item Accountability—Part 1

1. The Department of Defense mistakenly shipped four nonnuclear nose cones from a ballistic missile to Taiwan in the fall of 2006.

2. Support research into accounting policies and procedures of the Air Force and sister Services to ensure complete accountability of all assets.

The Agency conducts two kinds of major study and analysis efforts:

1. Improvement Studies. Target specific problems, issues, or questions; improve existing processes; develop new processes or programs; develop prototype software; and develop and create training and job aids (handbooks, users' manuals, or guides).

2. Consulting Studies. Focus on monitoring an activity or acting in an advisory capacity to another organization.

LR200725701 - Consulting

Readiness-Based Leveling (RBL) Quarterly Computation Support 2007

1. Ensures the validity of data used in quarterly RBL computations and confirm resulting computed RBL levels.

2. Work with wholesale and retail supply chain managers to identify and resolve RBL related problems.

LR200727802 - Consulting

Measuring the Effectiveness of the Air Expeditionary Force (AEF) 5/6 Consumable Readiness-Spares Packages (CRSP)

1. Collect performance statistics on the CRSPs fielded as part the AEF 5/6 rotation that used the new Air Force CRSP policy.

2. Determine if the CRSP met expectations, and if any improvements can or should be made to the new Air Force-approved CRSP policy.

LR200727803 - Consulting

Measuring the Effectiveness of the Contingency High-Priority Mission Support Kit Plus (CHPMSK +)

1. Collect performance statistics for the two currently fielded CHPMSK plus for the F-15 and HH-60.

2. Measure the impact at the contingency base, the home base that left its RSP spares in the area of responsibility, and the rest of the Air Force.

LR200804300 - Consulting

Review of Defense Automated Addressing System (DAAS) Edits for Suspected Force Activity Designator (FAD) 1 Priority Abuse

Examine suspected FAD 1 priority abuse and determine whether to establish DAAS edits to downgrade FAD 1 requisitions.

LR200808700 - Consulting

Transportation Requirements for the Area of Responsibility (AOR) for Support Equipment

1. Support US Army request to determine what kind of transportation would be needed at selected AOR sites if Army forces had to evacuate quickly.

2. Query SBSS and develop an equipment list for those items that could be left behind, items that must be taken, and number of pallets required. Use weight and cube tables to determine items that could be combined on pallets. Determine the number of pallet positions required.

LR200809400 - Consulting

Review of the Criteria for Using the Heuristic in RBL

1. RBL uses a special algorithm, a heuristic, to allocate levels in certain cases when the need exceeds the number of available resources. The heuristic allocates to both demand-based need and special levels on an equal footing, rather than allocating to special levels first. The heuristic is not used when worldwide resources exceed the total need by a small amount.

2. Evaluate whether or not there is a better approach for determining when to use the heuristic approach.

LM200803100 - Consulting

Maintenance Metric Handbook

Update the 2001 version of the maintenance metrics handbook. The update will include the addition of an aircraft availability metric.

LM200731001 - Consulting

RAND Air Force Smart Operations for the 21st Century (AFSO21) Consulting Partnership

1. Partner with RAND to define the impact of lower-level AFSO21 events compared to adopting an enterprise view.

2. Evaluate current AFSO training policies and recommend improvements.

LR200725300 - Improvement Study

Using COLT for General Support Division (GSD) Management

1. Currently the Air Force budgets for GSD using past expenditure data. There is no way to link the funds needed to some measure of supply support.

2. Work with the GLSC to identify and develop ways for COLT to assist with the management of GSD, including optimal consumables purchases.

LR200618801 - Improvement Study

Mission Capable (MICAP) Cause Code Analysis

1. Identify factors that result in cause code A or B MICAP conditions (mean time between demands, aging aircraft, weapon system density, and increase in flying hours).

2. Recommend actions to decrease the number of cause code A and B MICAP conditions, and identify a relationship between MICAP and total not mission capable supply rates.

LR200729000 - Improvement Study

Supply Data Integrity - Reportable Asset Management Process (RAMP) versus Standard Base Supply System (SBSS)

1. Air logistics center item managers identified data disparities between RAMP (formerly DO35C) and SBSS. Item managers also consistently reported differences between reported asset availability in supply management analysis reporting tool (SMART) and actual quantities on hand in SBSS.

2. Analyze and compare SMART, SBSS, and RAMP data to identify data disparities, measure the degree of disparity, assess risks and implications, determine possible causes, and propose solutions.

LL200727800 - Improvement Study

Bill of Material (BOM) Initiative for Incorporation into the Expeditionary Combat Support System

1. Evaluate aspects of Air Force BOMs to include building the BOM standard to be entered into ECSS and listing the minimum requirements for BOMs (such as what the requirements must be for migration into ECSS).

2. Expected benefit is to have BOMs loaded into ECSS that will be accurate and accessible in support of Global Logistics Support Center and Logistics Enterprise Architecture.

LM200712100 - Improvement Study

Maintenance Data Integrity Study

1. Initiate and coordinate data quality efforts for legacy systems data that will be included in the Expeditionary Combat Support System.

2. Evaluate the quality of prospective data, correct quality issues, and ensure there is a process to minimize future data quality issues.

LM200724906 - Improvement Study

Aircrew/Aircraft Tasking System (AATS) Maintenance Capability Study

Suggest a modification to the current AATS process to include a unit's maintenance capability in order to account for maintenance personnel availability, experience, and skill level.

LR200723400 - Improvement Study

Developing a Standard Methodology to Forecast Second Destination Transportation (SDT) Requirements for Equipment

1. Develop a standard methodology to forecast equipment SDT budgets.

2. Develop a way to track and manage how much SDT funding is actually spent for equipment.

LR200725301 - Improvement Study

Enterprise Assessments for Spares

1. The Air Force needs to assess its overall readiness and have a tool to reallocate spares to optimally meet its wartime and peacetime requirement.

2. Develop a working process for the Air Force to assess its ability to meet contingency taskings based on Air Force-wide availability of Air Force-managed reparable spares.

LR200725304 - Improvement Study

Enterprise Assessments for Equipment

1. The Air Force needs a capability to assess readiness using all available resources, and a tool to optimally allocate available resources to meet contingency needs.

2. Develop a working process to assess the Air Force's capability to determine its readiness to meet contingency taskings based on Air Force-wide equipment, rather than just equipment possessed by the squadron being assessed.

LY200719000 - Improvement Study

Pacific Air Forces (PACAF) War Reserve Material (WRM) Fuel Tanks, Racks, and Pylons (TRAP)

Investigate alternative ways to manage WRM TRAP maintenance.

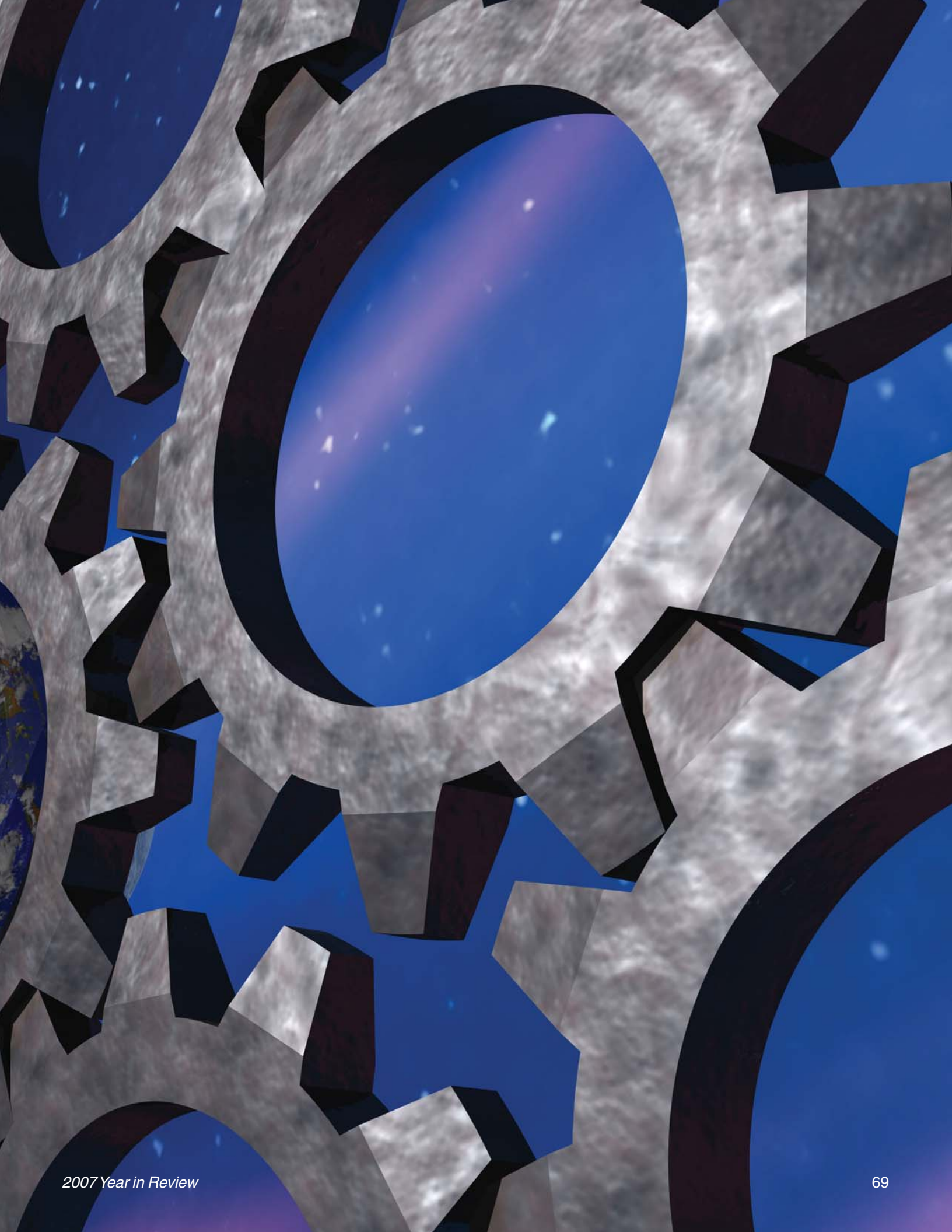
Featured Division

Major Christopher H. Boone

Transforming Logistics

Someone once said that if you change the way you look at things, the things you look at will change. This is an apt depiction of the Logistics Innovation Studies (LGL) Division in 2007. Historically, LGL focused on *retail* supply chain issues. Though many of the studies did consider and influence wholesale policy, the focus was most often on *downstream* issues. This perspective served LGL well as it was consistent with how the Air Force has historically executed its supply chain activities.

The Expeditionary Logistics for the 21st Century (eLog21) campaign is changing the way the Air Force views and executes its supply chain activities. Through the many eLog21 initiatives, the Air Force supply chain will change from being reactionary and functionally stove-piped to one based on planning and integration. LGL has adopted this same perspective.



Logistics Innovation Studies

This change in perspective is evidenced by both a shift in research focus and the division's support of key eLog21 initiatives. One eLog21 effort in particular, Logistics Enterprise Architecture (LogEA), has become a primary focus of the LGL division. To guide the monumental transformation of one of the world's largest and most complex supply chains, the Air Force adopted a single enterprise-wide strategy and architecture. According to the LogEA Concept of Operations (CONOPS), LogEA is the single authoritative source of process and systems models for Air Force logistics, and clearly defines the Air Force's future state (to-be) supply chain.

The Expeditionary Combat Support System (ECSS) is a critical enabler of the to-be supply chain because it represents transformed business processes, software applications, and data. To support the development and implementation of ECSS, division personnel worked hand-in-hand with Computer Sciences Corporation, the ECSS integrator, during both enterprise level and process level blueprinting. The blueprinting efforts are critical to the success of ECSS as they provide a map from supply chain requirements to ECSS functionality. This mapping is where the transformational supply chain processes of tomorrow are being created.

In support of these transformational processes, the Air Force has also undertaken several other large scale initiatives. Again, division personnel supported the development and implementation of several of these initiatives including automatic identification technology, and Repair Network Management (formerly Repair Enterprise for the 21st Century). The level of support varied from participation in an integrated process team, facilitation of an Air Force Smart Operations for the 21st Century event, or completion of an improvement or consulting study. The shifting of LGL research and analysis resources to these types of enterprise level issues reflects the change in the Air Force Logistics Management Agency's (AFLMA's) approach to research.

Today, requests for AFLMA research are examined to ensure any resulting research or analysis will aid the Air Force in meeting its eLog21 goals. This examination ensures that the Agency is addressing enterprise level supply chain issues or challenges identified by senior Air Force logistics leaders. This *change in what we look at* is reflected in the articles included in this review.

The division's investigation of the increase in the C-5's total not mission capable for maintenance rates resulted in two large scale improvement efforts. In his article, "C-5 TNMCM Study II: Realistic Metrics to Drive Operational Decisions," Major Pendley details one of the most

significant results of those two studies; the development of a revolutionary and exportable measure of maintenance capacity. Net effective personnel goes beyond the limited, traditional measures of maintenance capacity by accounting for the abilities and skill levels of the maintenance personnel as well as their availability on a day-to-day basis.

Contingency Contracting: A Joint Handbook, developed by LGL contracting personnel, quickly climbed to the top of the AFLMA's greatest hits list. The handbook was developed in response to an Under Secretary of Defense for Acquisition, Technology, and Logistics, Defense Procurement and Acquisition Policy search for a tool to assist the growing number of contingency contracting officers supporting both Operations Iraqi Freedom and Enduring Freedom. As Captain Clements points out in his article *Contingency Contracting, the Joint Environment*, the handbook was quickly recognized as a much needed *integrated solution* and was cited by the Gansler Commission.

Terms like *architecture, blueprinting,* and *walking the diamond* were all added to the division's vocabulary this year. As Captain Morris highlights in his article, several members of the division not only expanded their vocabulary, they played a major role in the enterprise and process level blueprinting teams tasked with developing the process models to be supported by the ECSS. The knowledge gained during blueprinting was invaluable as the division continues to support the development and fielding of ECSS.

The remaining two articles in this year's review, "Modifying the Supply Chain: Repair Network Transformation" and "Intransit Management: Its Time Has Come" reflect the Agency's commitment to transforming the Air Force supply chain. The supply chain article highlights the division's support of the Air Force transition from maintenance *back shops* to consolidated repair facilities while the intransit article highlights the Air Force push for increased visibility and accountability of intransit assets. Both of these efforts support the Air Force vision of centralized maintenance and improved intransit visibility.

As the division looks forward to the rest of 2008 and into 2009, the *enterprise* perspective will continue to expand. Beginning in March 2008, the AFLMA assumed responsibility for LogEA. With this added responsibility comes an entirely new role for the division and the Agency.

The ownership of LogEA represents both a near- and long-term obligation for the AFLMA. In the near-term, the division will focus on ensuring enterprise level initiatives are compliant with the future state supply chain attributes put forth in the LogEA CONOPS. Once the LogEA is completed, the Agency and the division's role will evolve to one of sustainment and analysis. As the analytical checkpoint for all future enterprise level initiatives affecting Air Force supply chain processes and business practices, the AFLMA will conduct studies, perform what-if scenarios and analysis, or conduct simulations and wargames to assess the impact of the changes and make recommendations to support the continuous improvement of the Air Force supply chain.

Though the AFLMA and the Logistics Innovation Studies Division have changed the way we look at things as well as the things we look at, one thing remains unchanged and that is a commitment to improving logistical support for Air Force warfighters around the world today and into the 21st century.

2007

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Its Time Has Come

Intransit Management

If you've ever wondered why the system is doing dumb things such as trying to ship an asset from your base that you need, then you'll agree the time has come for the Air Force to do a better job in managing its intransit assets.

The need for improving the management of the requisition and intransit (both retrograde from a base to the depot, and the depot shipping to the base) processes is becoming more important as the Air Force implements Repair Network Transformation (RNT) (formerly Repair Enterprise for the 21st Century). As part of RNT, the Air Force is increasing the amount of reparable spare parts in the intransit pipeline from 487K to 980K units a year. At any one time, the average amount of reparable spares in the pipeline will increase from $232M to $438M.[1] Today's intransit system data is so inaccurate that the Air Force repair prioritization system does not use the data to determine what to repair. After all, if the system shows an asset intransit, the base will not need another asset, especially if the base already received the asset and the repair

system still shows it as intransit. The current Air Force repair and distribution prioritization system might not only forgo repair of an asset for that base, it may redistribute the asset from that base, since the data in the system indicates the base has more assets than it needs (one on-hand and one due-in).

What We Found

Requisitioning. In our analyses[2] of requisition data, we found over 28K requisitions loaded in SBSS accounts that did not have a matching requisition in the wholesale systems (24K at DLA and 4K at AFMC). Either the requisition was never received at the depot, the depot rejected the requisition and the base never received the rejection, or the depot shipped the asset and the base never received it. On the other hand, we found 30K requisitions at the depot (28K at DLA and 2K at AFMC), for which the bases no longer had any record and no longer had a need.

Retrograde. There were four major findings.

First, the Air Force is retrograding reparable parts from bases to the depot repair facility that do not need to use premium transportation. A total of 34 percent of the items being retrograded used premium transportation only to sit at the depot repair line because there were plenty of carcasses already in the queue for repair. The Air Force could reduce its (second destination) transportation cost by $2.4M per year by using routine transportation for items with a backlog of carcasses for repair.

Second, the retrograde times being reported to the Air Force Secondary Item Requirements System (D200A) are not accurate. There were stock numbers (for example, 5841001233011) that had 615 retrograde occurrences with a median time of 7 days, and an average time of 9 days, where the requirements computation was using 2 days. In this case, the computation was significantly underestimating the pipeline time and the resulting computed requirement was insufficient to meet the targeted aircraft availability.

Third, there is not enough management attention paid to the retrograde pipeline. The retrograde pipeline involves maintenance, supply, and transportation at both the base and depot levels. The Air Force does not have a system to measure the pipeline and provide performance measures to ensure prompt handling and movement of property. For example, the base process takes an average of 8 to 9 days[3] to evacuate an item for which the base has no repair capability. One day's reduction in the *base pipeline* reduces the Air Force gross spares requirement by $35M.[4] The Air Force needs to collect pipeline performance measures and, where appropriate, take action to reduce pipeline times.

Finally, there is no automated system to manage the retrograde movement of property from the base to the depot. Items could be delayed or lost and there is no automated system to identify overdue retrograde shipments for management action. Bases have a tracer action required (TAR) process that identifies overdue inbound shipments; but when shipments come from bases, the depot has no similar system to identify and take management action on overdue shipments.

Tracer Action Required. There were three major findings.

As mentioned in the previous section, perhaps the biggest finding is that there is no TAR process for base shipments *to the depot*. The Air Force needs to manage intransits regardless of their shipment origin or destination. The same process, and if possible the same system, should be used to track all intransit assets—not one system for bases and a separate system for depots.

The TAR program is disjointed—there are too many different offices involved and no central oversight. With the creation of the logistics readiness squadron and the merger of supply and transportation functions, it is time to relook at the TAR process and integrate it. Plus, as FedEx has proven with its online tracking system, one does not have to be a transporter by trade to access transportation data systems and determine the location of a shipment.

The current TAR business rules need to be updated. The current rules create followup actions too soon (the shipment is received without any action), do not identify some items that need followup (the depot shipped the item, but the supply system does not have ship status), and many requisitions remain in the TAR program for extended periods of time, which delays positive supply action.

Solutions

The AFLMA studies showed that the Air Force needs an enterprise requisition and intransit management system. This system would interface with all of the various data systems (base and depot supply and transportation) and ensure consistent data across all systems. It would also integrate the data from the various systems and apply business rules to take the appropriate action as part of the existing automated systems. For example, the enterprise system would determine when there is a need to move property fast or slow based on repair capacity. It would make sure that data from the ship-to location matched the data at the ship-from location, and if there is an inconsistency, it would create legacy system transactions based upon data from the *source of truth* to reconcile the data across systems. The enterprise system would collect intransit performance data and identify outliers for management action. It would also provide a standard set of business rules for intransit management for the base and the depot. The depot would have the same process as the base has for following up on overdue shipments.

Well, help is on the way. The Air Force has approved many of the recommendations of our studies and is in the process of implementing them as part of two Enterprise Solution—Supply (ES-S) initiatives. Figure 1 depicts how ES-S works.

ES-S extracts data from various data systems, applies business rules to the data, and then generates transactions to feed back to the systems. ES-S will also import and transform data from Air Force legacy and commercial-off-the-shelf applications, and integrate the data to produce enterprise management reports.

The first ES-S initiative is requisition reconciliation capability, scheduled for implementation in June 2008. Table 1 summarizes the business rules that ES-S will implement. Basically, ES-S compares requisition data from the base to the depot, identifies any inconsistencies, determines the source of truth, and then generates legacy transactions to the right systems to update the systems with source of truth data.

The second ES-S initiative is to replicate and improve the SBSS TAR process, but not just for bases. The improved TAR process (scheduled to be implemented in January 2009) will ensure timely base outbound (serviceable and retrograde) shipments, manage late retrograde shipment deliveries across the enterprise, and create reports, metrics, and analysis products. The

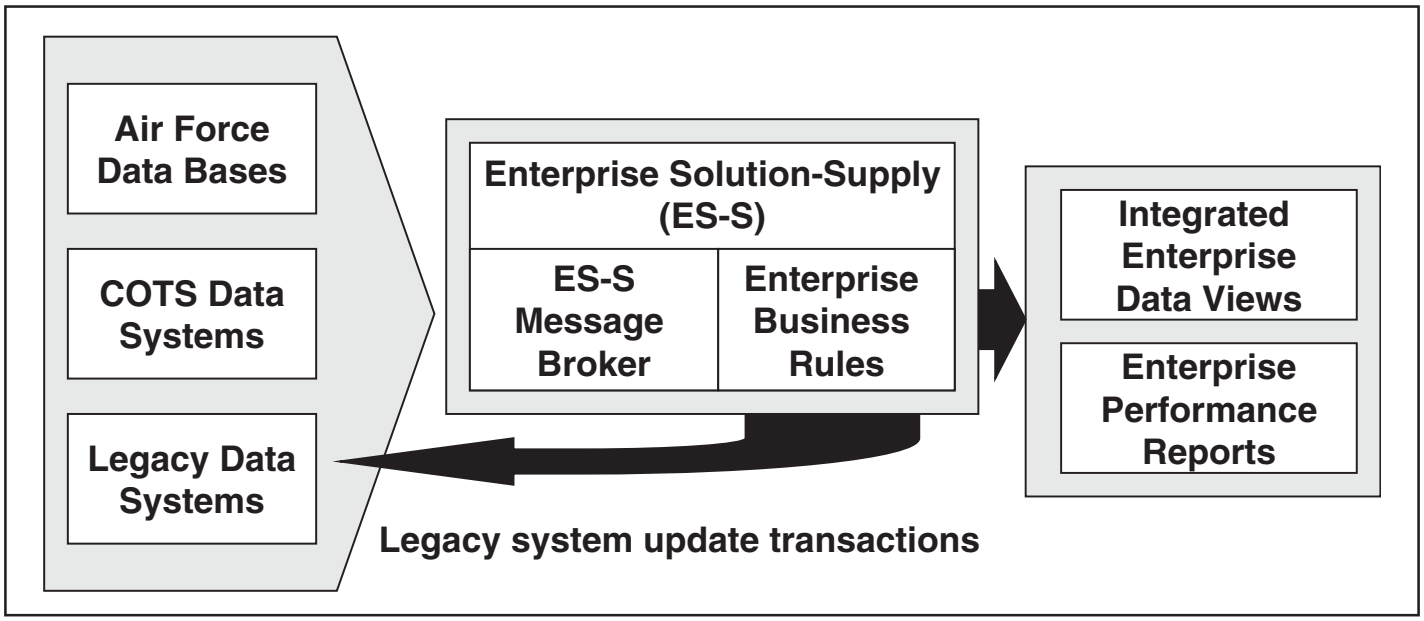

Figure 1. Basic ES-S Operation

Requisition Mismatch Condition		ES-S Reconciliation Action
Requisition in SBSS, but not in wholesale data system	Cancellation previously requested	Send cancellation to the SBSS
	Status is not released or not shipped	Send follow-up requisition to the wholesale system
Requisition in wholesale data system, but not in SBSS	SBSS receipt transaction is found	Send receipt notification to the wholesale system
	Previous SBSS cancellation transaction is found	Send cancellation request to the wholesale system
Requisition in SBSS and wholesale data system	Wholesale status indicates cancellation	Send cancellation code to the SBSS
	Requisition attributes (priority, project code, RDD, advice code, supplementary address, supply status, shipment status) differ	Produce report of requisition attribute differences for management action

Table 1. ES-S Requisition Reconciliation Business Rules Summary

SBSS is in a sustainment mode where few logic changes can be made, but ES-S can easily implement TAR policy changes (such as cost and followup time thresholds). ES-S will automate and integrate the currently disjointed, paper-based TAR process. It will initiate shipment tracer actions without delay; that is, there will be no waiting for biweekly outputs. ES-S will also provide integrated, near real time Global Transportation Network (GTN) shipment information to assist the shipment research process. It will programmatically generate and process SBSS transactions as needed to implement TAR actions, create electronic ES-S shipment records, and alert transportation managers when action is required. Finally, the completed ES-S shipment records will provide a data source (stored in Air Force Data Services) that can be used to:

- Calculate average pipeline times by stock number, location, or carrier
- Identify and analyze potential serviceable and retrograde item shipping time problems
- Produce other reports and metrics

Summary

If you've ever wondered why the system is doing dumb things such as trying to ship an asset from your base that you need, then you'll agree the time has come for the Air Force to do a better job in managing its intransit assets. AFLMA studies identified the cause of some of the problems you've been seeing for years, and with the help of the Global Logistics Support Center, the Electronic Systems Group, and the Air Force Materiel Command Logistics Systems Office, help is on the way. Soon, Air Force supply chain managers can trust the intransit data and make informed, smarter decisions.

Notes

1. Based on readiness-based leveling data as of March 2007.
2. Woodrow Parrish, Doug Blazer, Gale Bowman, Ralph Kindler, and Merita Briggs, *Reconciliation of Standard Base Supply System Due-Ins for Air Force Managed Consumable and Reparable Items*, AFLMA Final Report LS200420201, Air Force Logistics Management Agency, Maxwell Air Force Base, Gunter Annex, Alabama, 20 May 2005. Also see, Dennis Stuart, *DLA/SBSS Back Order Data Accuracy*, AFLMA Final Report LS200417600, Air Force Logistics Management Agency, Maxwell Air Force Base, Gunter Annex, Alabama, January 2005.
3. Beau Nunnally, Ben Thoele, Doug Blazer, *Retrograde Supply Chain Analysis*, AFLMA Final Report LY200611400, Air Force Logistics Management Agency, Maxwell Air Force Base, Gunter Annex, Alabama, August 2007. Also see LY200611400, showing the average base repair time using January to November 2006 Standard Base Supply system data.
4. Data computed from January 2008 readiness-based leveling data.

Repair Network Transformation

Modifying the Supply Chain

Repair Network Transformation will allow the Air Force to reduce base level maintenance manpower while still providing high quality repair of Air Force equipment and spares. To ensure the Air Force supply system computes accurate buy and repair requirements and provides the right levels to the right bases and depots, AFLMA has centrally managed the update to the affected Air Force supply systems. These actions should contribute to a smooth transition to Repair Network Transformation without any decrease in mission capability.

Tony Parrish, LMI
Douglas J. Blazer, PhD, LMI

The Air Force is facing a significant challenge: Continue to provide expeditionary, agile combat support in an era of significant reduction in forces. In the last 10 years, the Air Force supply community has reduced the number of supply personnel by nearly 40 percent by consolidating *back shop* supply functions into regional supply centers. These regional supply squadrons consolidated supply functions and achieved economies of scale. Perhaps more importantly, it opened the Air Force to the myriad of opportunities of enterprise management—the management of items across a weapon system or across the entire Air Force instead of account by account. Over time, the five regional supply centers evolved into two logistics support centers (LSC)—one for the Combat Air Forces and one for the Mobility Air Forces.

Once the LSCs were formed, it soon became apparent that consolidation should not stop at just management across multiple accounts, but should also encompass the entire supply chain. Thus, the Global Logistics Support Center (GLSC) was implemented in early 2008. The GLSC will manage an item from sourcing (either from buy or repair), to determining where to stock and repair, to the final disposition and disposal. When Program Budget Decision (PBD) 720 mandated significant maintenance manpower reductions, one of the initiatives the Air Force maintenance community looked at was centralizing maintenance back shops at consolidated repair facilities (CRF) and at the depot. PBD 720 reduced over 35K active manpower authorizations over the 5-year defense period and over 20K Guard and Reserve authorizations.

Repair Network Transformation (RNT) (formerly Repair Enterprise for the 21st Century [RE21]) is the initiative to transfer base level repair responsibilities to CRFs or depots (direct to depot [D2D]). RNT under its former name, RE21, is described in the C-130 PPLAN draft dated 1 March 2007 as:

> A lean logistics initiative and an integral part of the GLSC concept of providing global logistics support to the Air Force. RE21 leverages global visibility of all repair assets, centralized funds management, strategic sourcing, and partnerships with industry to provide the Air Force highly technical logistical support of equipment and reparable spares. RE21 accomplishes this by using the GLSC command and control network that ensures all data collected is immediately captured and available for use in a central database. The GLSC will provide oversight throughout the entire end-to-end repair processes, offer the ability to make timely and informed decisions, and better plan Air Force repair priorities.

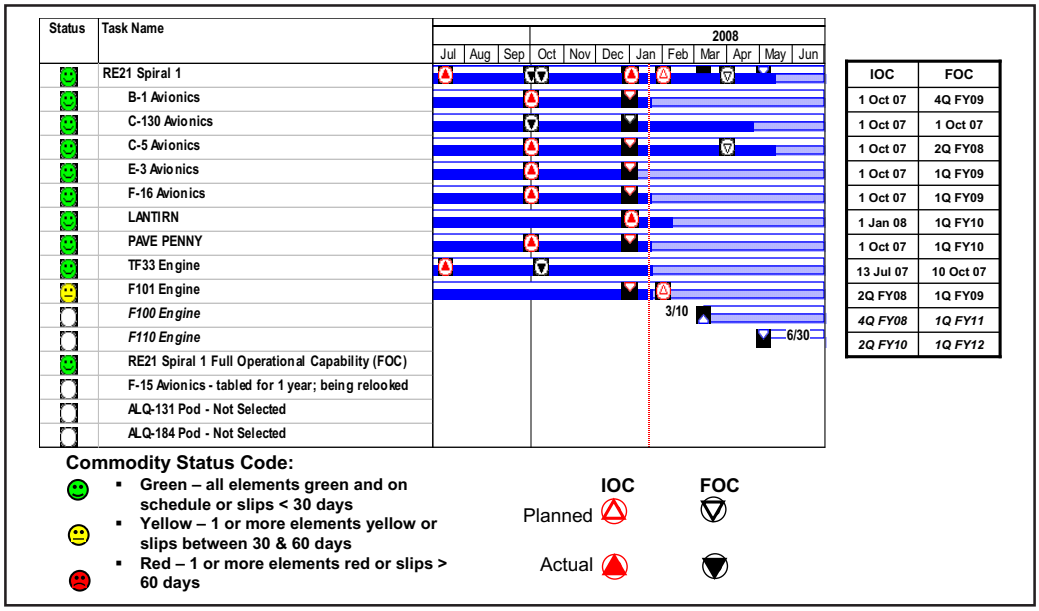

Figure 1. Commodity Master Schedule

The Air Force established a process to nominate various commodities for approval by a general officer steering committee for consolidation under the RNT initiative. Figure 1 provides a summary of the nine RNT commodities currently approved for implementation.

The avionics commodities (F-16, E-3, C-130, B-1 and C-5) will transition to direct to depot (D2D) with initial operating capability in the first quarter of fiscal year 2008 (October 2007). The engines (TF33, F101, F100, F110) and pods (Pave Penny and LANTIRN) will transition to CRFs at various times.

Supply Chain Data Update

Transitioning to RNT will require adjustments to computed spares requirements and level allocations. This paper describes the process to modify the supply data. It is divided into two parts

- Changes to the worldwide requirements computation
- Changes to the readiness-based leveling (RBL) computation

The worldwide requirements computation uses the *number* of historical enterprise reparable generations (REPGEN[1]), not *where* REPGENs occurred, to determine the enterprise need. Conversely, RBL uses the number of historical REPGENs at each base (the *number* and the *where*) in determining how best to allocate the computed worldwide requirement to the depot and applicable bases.

RNT - Modified Impact to the Worldwide Requirements Computation

D2D and CRF Changes to the Requirements Computation for Line Replaceable Units (LRU)

Transferring from base-level maintenance to a D2D or CRF maintenance concept requires changes to the number of not repaired this station (NRTS) and repaired this station (RTS) actions reported by the Standard Base Supply System (SBSS) to the Secondary Item Requirements System (D200A) for use in computing the worldwide requirement. To forecast depot repair requirements, D200A needs to see the items that will now be repaired at the depot that were previously repaired at the base. Additionally, the overall number of REPGENs in D200A needs to be increased to account for previous failures that were not reported by SBSS. Items that appear to fail on a weapon system, but whose failure cannot be duplicated (CND) on a test stand (or bench) are not recorded as failures in SBSS and are not reported to D200A. These items are recorded in SBSS as serviceable items whose failure cannot be duplicated.

Bases will no longer have resources (manpower and test stations) to repair or test LRUs; therefore, items will be removed from the weapon system and shipped as NRTS directly to the depot or to the applicable CRF. As a result, LRUs previously tested and bench checked as serviceable CND will no longer be checked at the base, but will instead get shipped as NRTS to the depot or CRF. Thus, the number of REPGENs, and therefore the requirement, should be increased by the sum of the CND actions.

Therefore the Air Force Logistics Management Agency (AFLMA) modified the (7SC) transactions that report base level REPGENs to the D200A by changing the RTS to NRTS and including CNDs as NRTS. The AFLMA provided these modified transactions 6 months prior to the actual conversion to RNT to ensure a more accurate repair and buy requirement upon implementation.

D2D and CRF - Changes to D200A for Shop Replaceable Units (SRU)

Demands for SRUs will shift from base level to the applicable depot or CRF. As a result, the number of enterprise demands for SRUs will remain the same. That is, demands for SRUs at depots and CRFs will increase by the amount of the decrease in demands for SRUs at base level. Because D200A does not consider where demands occur, there is no need to change SRU related REPGEN actions reported by SBSS (via 7SC transactions) to D200A.

Impact on the Readiness-Based Leveling Computation

D2D - Changes to SBSS, and thus RBL, for LRUs

Prior to converting to D2D, the AFLMA will generate SBSS transactions at the applicable bases to change SBSS repair cycle record data and item record demand data. These transactions will increase the number of NRTS actions by the sum of the RTS and CND actions and change the number of RTS actions to 0. Doing so will result in SBSS reporting NRTS actions to RBL, allowing RBL to allocate levels consistent with expected RNT demand and repair actions.

D2D - Changes to SBSS, and thus RBL, for SRUs

Prior to converting to D2D, the AFLMA will generate (FCL and FRR) transactions at applicable bases to delete SRU demands. This will cause SBSS to report zero REPGEN actions to RBL. As

a result, D2D bases will correctly receive demand-based RBL levels of zero for SRUs. To ensure bases do not receive an RBL level greater than zero, AFLMA will provide bases adjusted stock level (ASL) load transactions (1F3L) to load a maximum ASL of zero to applicable NSNs.

CRF - Changes to SBSS, and thus RBL, for LRUs

- Bases transferring repair capability to CRFs will follow the same actions as D2D bases.
- Stock record account numbers (SRANs) gaining repair capability, that is CRF SRANs should not stock LRUs. Therefore, no adjustments to LRU repair cycle records at the CRF SRAN are required. The *Centralized Intermediate Repair Facility Logistics Readiness Concept of Operations* (AFLMA Report LS200316700) states the CRF should have its own SRAN. A separate SRAN for the CRF provides a method of distinguishing CRF-related repair actions from repair actions performed by personnel at the same base (location). CRF SRANs use an activity code *C* that prevents the CRF repair actions from being recorded in SBSS as demands (item failures). Instead, the LRU failures are recorded as demands at the forward (CRF-supported) SRAN. RBL then uses the forward SRAN demand data in determining level allocations; that is, LRU levels are allocated to CRF-supported SRANs and not to CRF SRANs.
- To protect against demand data errors created by CRF repair actions being processed incorrectly (without activity code 'C'), CRF SRANs should load maximum ASLs of zero for applicable LRU NSNs. Doing so would ensure CRF SRANs receive an RBL level of zero for LRU NSNs.
- To date, pods and engines are the only commodities transitioning to CRFs. Pods and engines are not included in D200A and RBL; therefore, computing and reporting CRF repair cycle times and CRF base repair percentages are not required. However, when additional commodities are identified for CRF maintenance that result in LRUs being repaired at the CRF, a method will be needed to compute and report these values.

CRF - Changes to SBSS, and thus RBL, for SRUs

- Bases losing capability to repair LRUs will no longer have a need for LRU component parts (the SRUs). Therefore, bases will process transactions to change the number of RTS and NRTS actions on SRUs to zero. Doing so will result in RBL levels of zero. To ensure bases do not receive an RBL level greater than 0, AFLMA will provide (1F3) transactions to load a maximum adjusted stock level (ASL) of zero to applicable SRUs.
- Bases gaining repair capability, that is CRF bases, will process transactions to populate record REPGEN data from all bases the CRF will support. The sum of all supported bases' RTS actions will be added to the existing RTS quantity at the CRF base.

Actions Taken

Requirements Data

The AFLMA provided (and AFMC loaded) 8 quarters of adjusted (7SC) data for the nine weapon systems (749 stock numbers and 4,588 7SC transactions) into D200A for the March and September 2007 requirements computation. The transactions increased NRTS actions by 16,718 (13,508 RTS actions were converted to NRTS and 3,210 CND actions were converted to NRTS).

Leveling Data

The AFLMA provided [and the bases or logistics support centers (LSC) loaded] transactions for 1,045 stock numbers consisting of 5,602 stock number or base cases to the October 2007 RBL run. There were 6,095 (FRR) transactions to update base repair cycle time, 6,088 transactions to update repair actions (change CND to NRTS), 6,081 SBSS transactions to force a report to RBL, and 1,089 SBSS transactions to load maximum levels of zero to prevent a level for SRU NSNs at the bases.

There are SBSS code changes needed to accurately reflect CRF pipelines. With AFLMA's help, Headquarters 754th Electronic Systems Group personnel have identified coding changes needed to accurately compute CRF pipeline times and report those times to RBL (and eventually to D200A). The CRF pipeline times must include forward base processing times, transit time to the CRF, and CRF repair times.

Future Actions

Requirements Data

AFLMA will continue to provide 2 years of historical 7SC transactions to HQ AFMC for use in D200A computations. AFLMA will provide HQ AFMC the data approximately 6 months before the base scheduled conversion date. For bases that have not yet converted, but already have had 2 years of modified 7SC data reported (those bases scheduled to convert in the near future), the AFLMA will provide the current quarter's (7SC) data, modified for RNT. For bases that have converted, modified (7SC) transactions are no longer necessary because bases will be reporting based on RNT maintenance. Thus, for bases that have already converted to RNT, AFLMA will provide quarterly (7SC) transactions without any modifications (all items should be NRTSed).

Leveling Data

As new bases convert to RNT, the AFLMA will continue to create transactions (during the quarter that the base is scheduled to convert) to modify the SBSS data and report the accurate RNT data to RBL. The AFLMA will work with the GLSC to process the transactions whether through the LSCs to the major commands or directly to the bases. Once the bases convert to the RNT concept, no further action will be needed.

Summary

RNT will allow the Air Force to reduce base level maintenance manpower while still providing high quality repair of Air Force equipment and spares. To ensure the Air Force supply system computes accurate buy and repair requirements and provides the right levels to the right bases and depots, AFLMA has centrally managed the update to the affected Air Force supply systems. These actions should contribute to a smooth transition to RNT without any decrease in mission capability.

Notes

1. REPGENs are the sum of the number of failed items—both repaired or not repaired this station.

C-5 TNMCM Study II

Realistic Metrics to Drive Operational Decisions

In order to blueprint an exportable methodology, the study team developed and utilized the Hierarchical Holographic Model and a ranking and filtering process. This overall process is suitable for complex problem modeling and is exportable to other weapon systems.

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Introduction

Aircraft maintenance has been and continues to be a challenging, complex task involving a delicate balance of resources to include personnel, equipment, and facilities. Adding to this challenge is the fact that the balancing act occurs in a very hectic environment where the United States Air Force flies 430 sorties per day in support of Operation Iraqi Freedom and Enduring Freedom. And somewhere in world, a mobility aircraft takes off approximately every 90 seconds.[1] At the same time, the number of airmen supporting our aircraft is declining. "Since 2001 the active duty Air Force has reduced its end-strength by almost 6 percent but our deployments have increased by at least 30 percent, primarily in support of the Global War on Terror."[2] This reduction in personnel is part of the Air Force process of drawing down the total force by approximately 40,000 people, with many of these cuts in aircraft maintenance career fields. Also adding to the growing maintenance workload is an aircraft fleet which now averages almost 24 years old, with the average still increasing.[3]

Background

When it comes to aircraft maintenance, the Air Force depends on metrics to gauge whether or not we are measuring up to the standard and succeeding in our maintenance efforts. One of the most recognized metrics is the total not mission capable maintenance (TNMCM) rate. Air Force Instruction (AFI) 21-101 describes TNMCM as "perhaps the most common and useful metric for determining if maintenance is being performed quickly and accurately."[4] Although a lagging type indicator, it is one of several key metrics followed closely at multiple levels of the Air Force. Over the last few years, the Air Force TNMCM rate increased across many platforms. TNMCM discussions by Air Force leadership ultimately resulted in the Air Force Materiel Command Director of Logistics (AFMC/A4) requesting the Air Force Logistics Management Agency (AFLMA) to conduct an analysis of TNMCM performance with the C-5 Galaxy aircraft as the focus. AFLMA was commissioned to conduct an analysis of C-5 TNMCM performance to identify root causes, indicators, and potential corrective actions to bring TNMCM within standard, the intent being to export the methodology and any lessons learned to other weapon systems.

Considering the numerous potential factors which impact TNMCM rates, as well as the C-5's historical challenges in the areas of availability and achieving established performance standards, it was obvious that this project's scope was broad and a smart way to eat such a *big elephant* was needed. Our team just had to figure out a way to consume the beast one piece at a time and not become overwhelmed during the process. AFLMA eventually conducted two studies in support of the original study request. This article focuses on the second of those studies, the C-5 TNMCM Study II, and the methodology used to accomplish this daunting task.


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Problem Statement

The Air Force C-5 fleet TNMCM rate steadily increased from 25 percent to 38 percent from 2004 to 2006. In addition, the current methodology for establishing aircraft metric standards is insufficient at communicating the overall health of the fleet. Finally, a better understanding of the return on investment (ROI) of previous improvement initiatives will enable leadership to more efficiently direct resources.

The study included five overall objectives:

- Identify root causes and indicators of increasing C-5 TNMCM rates
- Identify potential corrective actions necessary to bring the C-5 TNMCM rate within standards
- Develop a standardized analytical approach which is exportable to other Air Force aircraft
- Analyze the process for calculating and establishing aircraft TNMCM standards
- Review historical C-5 modifications and reliability initiatives for return on ROI

The scope of this research was limited to the various models within the C-5 fleet and no other mission design series (MDS). The scope included previous work related to Air Force aircraft maintenance, historical aircraft modifications, metrics and factors which potentially impact those metrics, and previous and ongoing C-5 issues and challenges. The study team also examined commercial aviation maintenance practices and metrics for applicability. The bulk of the research focused on disaggregated data and analysis, that is, comparisons between C-5 aircraft models and between the total force component (active duty, Guard, or Reserve) in order to examine potential root causes in greater detail.

Research and Analysis

This project involved two main phases: data collection and data analysis. The data collection phase involved a thorough review of existing literature and resources related to aircraft maintenance, particularly C-5 aircraft, and also literature which could assist with scoping and organizing a project of this magnitude. In addition, current commercial aircraft maintenance philosophy and practices were examined as well as applicable Department of Defense (DoD) and Air Force regulations and instructions.

The data collection phase included numerous discussions with C-5 aircraft program managers and aircraft maintenance subject matter experts (SME). Points of contact were established from various phases of the C-5 support, sustainment, and policy arenas including representatives from Air Mobility Command (AMC), Air Force Materiel Command (AFMC), the C-5 Depot at Warner-Robins Air Logistics Center (WR-ALC), and Headquarters (HQ) Air Force Air Staff. In addition, personnel from the RAND Corporation and the Logistics Management Institute (LMI) were consulted.

The project's first phase also included preliminary analysis of data from the system of record, the Reliability and Maintainability Information System (REMIS), as well as some basic trending and historical data from the Multi-Echelon Resource and Logistics Information Network (MERLIN) database. In conjunction with this preliminary analysis, our team conducted site visits at the C-5 Aircraft Sustainment Group at Wright-Patterson Air Force Base (AFB), C-5 Sustainment Wing and Depot facilities at Robins AFB, Westover Air Reserve Base (ARB), Dover AFB, and Stewart Air National Guard Base (ANGB). These site visits were invaluable in understanding C-5 maintenance and data collection processes across the total force, the complexity of the airframe itself, facilities and equipment, ongoing modernization efforts, and the day-to-day processes required to maintain the C-5.

Question sets were developed for each of the different areas of a maintenance complex to include the squadrons and flights within a typical maintenance group (MXG). These question sets were utilized to gather data during the site visits and were refined as the project continued in an effort to develop a standardized questioning protocol which was repeatable and could be exportable for use with similar research in the future.

TNMCM Root Causes and Indicators

To visualize the complexity and interaction of all potential factors affecting C-5 TNMCM time, the study team employed a tool from the field of risk analysis, a Hierarchical Holographic Model (HHM).[5] HHM is an established risk analysis methodology developed by Dr Yacov Y. Haimes at the University of Virginia. Dr Haimes has completed several studies for the DoD, such as risk analysis of military operations other than war[6] and the probability of land mine contamination.[7] Haimes also used HHM in work for National Aeronautics and Space Administration (NASA) to determine the various risk scenarios affecting space shuttle missions.[8]

The HHM provided a framework for considering multiple decompositions (perspectives or views) of the system. Overall, each major view in an HHM represents a high-level factor, in this case factors contributing to not mission capable maintenance (NMCM) hours, and these high-level factors are decomposed into submodels. The HHM also enables both a systematic and systemic framework for the problem and each submodel can be analyzed independently as well as in relationship to other submodels, with analysis of an entire HHM providing a coordinated solution to the problem. With the tools just mentioned and initial data from numerous sources, the study moved into the data analysis phase.

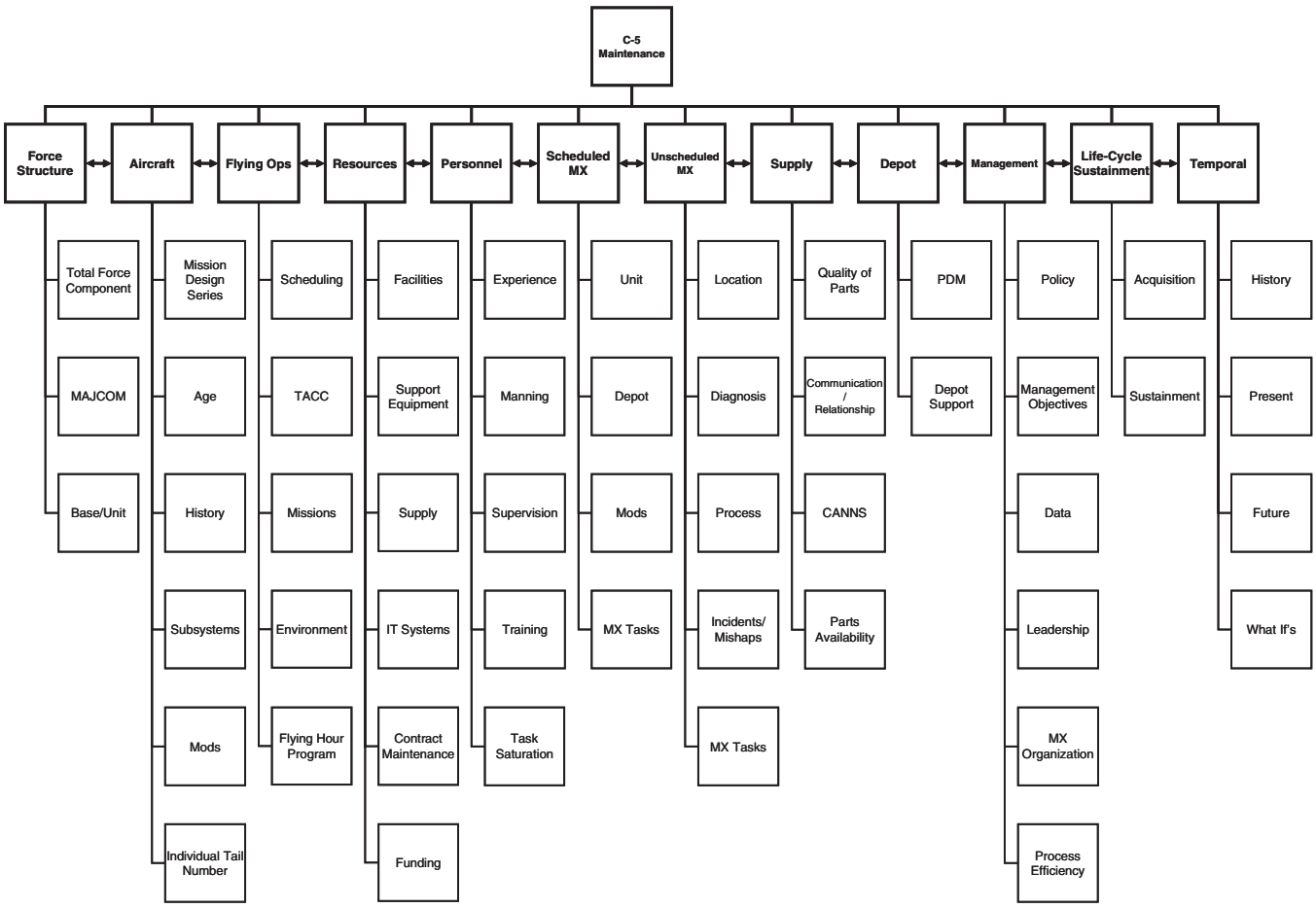
Preliminary analysis resulted in an initial HHM with 184 factors that potentially contribute to the C-5 TNMCM rate. The HHM went through several iterations before it was considered complete. The final iteration of the HHM is shown in Figure 1. The 12 high-level factors are listed horizontally across the top with submodels for each high-level factor located vertically underneath. In order to scope the project to a manageable number of factors to analyze further, and focus the remaining research on factors with the most potential to result in decision-quality results, our team developed a ranking and filtering process. This process considered each factor according to three criteria (factor weights in parenthesis):

- Impact on maintenance time (0.53)
- Data availability (0.30)
- Previously published research on the factor (0.17)

The three criteria were also scored using an ordinal scale with high = 1.0, medium = 0.5, and low = 0.0.

Table 1 describes the rule set observed when scoring the factors. The calculated total score for each factor was the result of the linear decision model; that is, the total score was equal to the sum product of the criteria weights and the criteria scores. The result was a normalized score on the interval [0, 1] for each factor. This score could then be used to perform an ordinal ranking of all 184 factors according to the criteria. The factors were sorted by total score, then alphabetically by category and subcategory. It is important to note that factors with little previous research actually received higher scores. This was part of an effort by the study team to go beyond the existing body of work and factors previously or currently considered on a regular basis.

Using this iterative process, the original 184 initial factors were scaled down to 25 high-level factors. In most cases, continuing analysis of the 25 high-level factors revealed limitations to either data availability, quantifiable impact, or both. Two factors ultimately stood out as the most fruitful to produce actionable, decision-quality results. These factors were aligning personnel capacity with demand and the logistics departure reliability (LDR) versus TNMCM metrics paradigm.



The HHM is a diagram that allows us to visualize the complex relationship of the factors related to C-5 maintenance.

Figure 1. Hierarchical Holographic Model for the C-5 Maintenance System

		Scores		
		1.0	**0.5**	**0.0**
Criteria	Impact to NMCM Time and TNMCM Rate	Direct impact; clear relationship witnessed from preliminary studies; or something so obvious that it should not be ignored.	Indirect impact; or intuitive relationship, but not sure exactly how.	Minimal impact; only related in an "Everything is connected in the universe" way.
	Data Availability	Data exists in a single source; source recognized as the original source; minimal effort to draw fact-based conclusions.	Data exists in multiple unrelated sources; extensive mining and data reduction required; or data exists for recent FYs only.	No data known to exist; would have to conduct an acute data collection effort to draw any fact-based conclusions.
	Previous Work or Studies	Fairly new idea; cutting edge of C-5 and/or general aircraft maintenance body of knowledge.	1-2 major studies; no actions taken or decisions have been made to address the factor.	2 or more major studies; actions have been taken or decisions have been made to address the factor.

Table 1. Factor Subjective Scoring Rationale

$$NEP = T_{75}(A_{75NT} + (P_t A_{75T})) + T_3(P_e A_3)$$

Equation 1. Net Effective Personnel

Factor	Description	Value
T_{75}	Ancillary/CBT Factor for 7- and 5-levels	0.948
A_{75NT}	The number of available nonmanager 7-levels and 5-levels who are not trainers	Varies day-to-day
P_t	Trainer Productivity	0.85
A_{75T}	The number of available nonmanager 7-levels and 5-levels who are trainers	Varies day-to-day
T_3	Ancillary/CBT Factor for 3-levels	0.925
P_e	Trainee Productivity	0.4
A_3	The number of available 3-levels	Varies day-to-day

Table 2. NEP Factors

Aligning Personnel Capacity with Demand

One measure historically used to quantify personnel availability is the ratio between authorized and assigned personnel. While this ratio is an indicator of maintenance capacity, it provides only a limited amount of information. Authorized versus assigned ratios do not take into account the abilities and skill levels of the maintenance personnel, nor does it factor in the availability of the personnel on a day-to-day basis. These issues were addressed in the C-5 TNMCM Study II by quantifying "we need more people," beyond the traditional metric of authorized versus assigned personnel.

To further analyze this factor, our team developed a new personnel capacity equation which encompassed three factors which impact variability in the maintenance technician pool.

- Personnel availability
- Skill-level productivity
- Ancillary and computer-based training (CBT) requirements

The influence of these three factors and their impact on the viable resource pool for the 436 MXG at Dover AFB was examined over a 9-week period during March-April 2007. This collective impact yielded a new resource pool representing a depiction of *effective* capacity rather than just the authorized versus assigned ratio. This new resource pool was denoted as Net Effective Personnel, or NEP, and is detailed in Equation 1. The newly designated factors, factor descriptions, and the associated values used in the NEP equation are listed in Table 2.

The *T* factors relate to training, the *A* factors relate to available personnel, and the *P* factors relate to productivity. These factors were applied to the number of available technicians as recorded in the Dover Aircraft Maintenance Squadron availability snapshots using the newly proposed NEP calculation.

The resulting Dover AFB NEP results and the calculated demand at Dover, defined as aircraft launches and recoveries, were compared using averages for both values over each weekday. This resulted in a comparison of the ratio of NEP per demand event. From this, we demonstrated a current suboptimization of personnel distribution over an average week. Therefore, the study team proposed a realignment of maintenance personnel capacity to better utilize available personnel. This resulted in an estimated improvement (reduction) in the TNMCM rate of 0.040, or approximately 4 percentage points. This assumed the data set utilized represented typical demand.

LDR versus TNMCM Metrics Paradigm

The second factor for detailed focus was the LDR versus TNMCM metric comparison. Based on site visits and feedback from MXG senior leaders and all but one C-5 MXG commander (MXG/CC), the study team determined that the primary metric of the MXG/CC was LDR and that aircraft availability, which is directly related to the TNMCM rate, was the primary metric of higher level leadership. While not totally unexpected, the focus of different levels of an organization on different metrics can be problematic for the enterprise when the pursuit of goals at the local level may not be complimentary to goals at the strategic level. If the metrics are not aligned, pursuit of better performance in a lower level metric could result in worse performance for higher level metrics.

To analyze the potential effects of misaligned metrics, the study team utilized a definition of aligned metrics, which stated that a set of metrics is aligned if improvement in the lower level metric implies improvement of the higher level metric. In order to test the theoretical effect of improving home station LDR (HSLDR) on TNMCM rates, the study team constructed a discrete event simulation using Arena software. The simulation allowed the team to study how different maintenance operations could affect the HSLDR and TNMCM rates in a controlled environment, something impossible to do in the real world. The simulation used Dover AFB aircraft arrival and maintenance-related data from January 2006 through March 2007 to examine the impact of four different priority policies for a hypothetical aircraft maintenance queue. These policies were

- Least maintenance – priority given to an aircraft that requires the least man-hours to make it mission capable (MC)
- Most maintenance – priority to aircraft with the most man-hours of repair remaining
- First-in-first-out (FIFO)
- Last-in-first-out (LIFO)

The simulation confirmed that LDR and TNMCM react differently depending on the prioritization policy. The simulation also demonstrated that changing prioritization policies can improve TNMCM but at a cost to predictability and LDR, depending on the scenario. Overall, the simulation results supported the idea that the priorities of the maintainers impact the metrics and suggest that current maintenance policies do not ensure TNMCM improvement, but do improve LDR.

TNMCM Standard

Another study objective was to analyze the process for calculating and establishing aircraft TNMCM standards. The 2003 CORONA directed that Air Force-wide standards for MC, TNMCM, and total not mission capable supply (TNMCS) be established. While directed toward TNMCM, this research revealed that the MC standard is the foundation for calculating the other two metrics' standards. As the process currently exists, the Air Force MC standards are based on requirements and those requirements are determined in one of three ways:

- The flying hour or flying schedule requirement,
- A contract logistics support (CLS) contract, or
- Another requirement based on major command (MAJCOM) input with those inputs determined by the designed operational capability (DOC) statement, readiness study, or any operational requirement the MAJCOM may use

This is not the case for the separate Air Force Reserve Command (AFRC) and Air National Guard (ANG) fleet C-5 MC standards. Those two values are calculated at the Air Staff level. The AFRC MC standard is calculated from utilization rate, attrition, turn pattern, annual fly days, spares, aircraft held down for scheduled maintenance, and primary aerospace vehicle (aircraft) authorized (PAA). The ANG MC standard equation uses variables portraying daily operations and maintenance (O&M) flying hours, aircraft taskings per flying day over and above O&M flying, average number of aircraft required for standard flying operations each day, required daily spares, and the forecast number of unit possessed aircraft over the year.

In the case of the C-5, AMC provides the active duty fleet MC standard to the Air Staff and this standard is based on the Mobility Requirements Study (MRS). However, it is not actually calculated in the MRS, it is an assumption used in the MRS. The director of the AMC Office of Analysis, Assessments, and Lessons Learned (AMC/A9) concurred that the C-5 MC standard is not based on any formal calculation or analysis, and stated that the original estimate (circa 1990) of a 75 percent MC rate was deemed a *prudent objective* for planning purposes.[9]

During Operations Desert Shield and Desert Storm in fiscal year 1991, the C-5 fleet MC rate achieved was less than 71 percent. During Operation Iraqi Freedom in FY 03, the C-5 fleet MC rate was less than 64 percent. This is particularly intriguing because numerous personnel interviewed suggested that MC rates are usually better during conflicts. Indeed, the highest quarterly MC rate the C-5 fleet has ever achieved, 81.8 percent, was observed during FY 91, Quarter 1 (Operation Desert Shield). These observations bring into question the feasibility of a 75 percent figure for use as a realistic peacetime standard. Still, consistent failures to meet a standard are more than likely perceived as a shortfall in the performance of the units supporting the C-5, rather than an unrealistic expectation not being met. A tremendous amount of time and effort is put forth explaining why standards are not met. Historical performance would suggest that the standard is not driving improvement in performance, which is the fundamental purpose of a performance measure. It should drive performance, not simply document it, and the measure should be useful for decisionmaking.

The examination of the standards calculation methodology suggests that the C-5 MC, TNMCM, and TNMCS standards fall short in the areas of accuracy, objectivity, and ease. AFI 21-101 states that "metrics shall be used at all levels of command to drive improved performance."[10]

At least in the case of the C-5, the existing maintenance standards referenced here and their associated metrics appear to fall short of this goal.

Historical Modifications and Improvement Initiatives Return on Investment

At the beginning of this article a reference was made to how our study team needed to eat the entire elephant smartly, the elephant being the C-5 TNMCM Study II. Our team realized very early that a research partner would be needed in order to accomplish all the study's objectives in the given time frame. AFLMA formed a strategic partnership with the Office of Aerospace Studies (OAS) at Kirtland AFB in order to accomplish the return on investment objective of the study. The OAS research team consisting of Captain Greg Steeger and First Lieutenant Matt Compton pursued three questions asked by the project sponsor:

- What was the C-5 advertised reliability *out of the box*
- What modifications were completed on the aircraft
- What was the ROI from these modifications

OAS developed the ROI methodology, data requirements, and the overall research process for this particular study objective. OAS used the Air Force Smart Operations for the 21st Century (AFSO21) definition for ROI in conjunction with a formula which utilized the maintenance man-hours (MMH) saved from completing a modification in the year after the modification was completed. The MMH savings were then multiplied by the cost per MMH and that resulting number was then divided by the total modification cost to ultimately calculate the ROI for a particular C-5 modification.

OAS also conducted an exhaustive literature review of their own and analyzed the C-5 time compliance technical order (TCTO) database scouring literally thousands of TCTOs, in addition to a site visit to Warner-Robins Air Logistics Center in pursuit of all potential data sources and subject matter expertise which might assist in that phase of the research. Still, OAS research was limited by a lack of data. Detailed historical data on many past C-5 modifications either did not exist or could not be located. Much of the data required for their objective of the study was apparently lost when the C-5 depot responsibilities transferred from Kelly AFB to Robins AFB. Regardless, OAS developed a sound methodology for analyzing potential ROI for aircraft modifications. OAS wrote their portion of the study's report as a stand alone document and it was included in the overall final study report as Appendix F.

Conclusions

In order to blueprint an exportable methodology, the study team developed and utilized the HHM and a ranking and filtering process. This overall process is suitable for complex problem modeling and is exportable to other weapon systems.

The exhaustive analysis resulted in the study team scaling down from 184 potential C-5 TNMCM root causes to two factors yielding actionable, decision-quality results. These factors were aligning personnel capacity with demand and the LDR versus TNMCM metrics paradigm.

The process for calculating and establishing Air Force level TNMCM standards is not well known across the Air Force and not equally applied across the total force. Also, the process currently in use does not produce realistic, capability-based metrics to drive supportable operational decisions.

Finally, OAS conducted a thorough review of historical documents, aircraft modifications, and existing data sources in an effort to answer the sponsor's original questions. OAS also developed a sound methodology to analyze potential ROI but with limited availability of reliable data—the results proved inconclusive.

Recommendations

Methodology

Similar research efforts for any MDS will require reaccomplishment of the full HHM and ranking and filtering processes.

Root Causes and Indicators

- Apply the NEP methodology utilizing data from other units to verify potential gains.
- In order to most directly improve TNMCM, all levels of leadership would need to make TNMCM their primary metric.

TNMCM Standard

Develop a repeatable methodology to compute the standard that:

- Reflects day-to-day minimum operational requirements
- Adjusts to fully mobilized force capabilities and surge mobility requirements
- Accounts for historic capabilities and fleet resources

ROI

- To succinctly calculate an aircraft modification ROI, the Air Force needs to develop and implement better tracking methods to capture the required data needed for ROI calculations.
- Ensure data integrity is improved and maintained in the current maintenance data collection systems as well as in the future expeditionary combat support system (ECSS).

Additional Recommendation

Incorporate the inputs from field personnel and this research into the ongoing ECSS blueprinting effort.

Notes

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Logistics Officer Association

In November 2007, the AFLMA participated in the Logistics Officer Association's 25th Anniversary Conference. The purpose of the Association, comprised of more than 3,500 military officers and civilians in logistics fields around the globe, is to enhance the military logistics profession. The Association provides an open forum to promote quality logistical support and logistics officer professional development. The conference provided an ideal forum to exchange a wide variety of logistics knowledge and demonstrate innovative technologies valuable to logisticians at all levels. The AFLMA exhibit was one of more than 70 that showcased new technology and initiatives. At the conference, we featured the new two-volume box set of the *Quotes for the Air Force Logistician* and provided approximately 180 hard copies to conference attendees. Other AFLMA publications provided to attendees included the *Logistics Dimensions 2006*, *AFLMA Year in Review 2006*, the *ECSS Special Edition of the Air Force Journal of Logistics*, and the *AEF Fuels Management Pocket Guide*. There were also numerous requests for the upcoming *Contingency Contracting: A Joint Handbook,* but it was not yet in print at the time of the conference. The conference afforded AFLMA the opportunity to speak with senior Air Force and industry leaders about our capabilities and ongoing studies and analysis in support of the warfighter, particularly in the areas of transformation and agile combat support.

ECSS Blueprinting

Blueprinting is the first phase of the ECSS implementation plan. It consists of critically looking at Air Force logistics processes as they currently are, mapping them, and improving them to take advantage of business best practices. It also considers the software capabilities and how we want it configured to best support the newly mapped processes.

Captain Gerald W. Morris, Jr, AFLMA

If you had an opportunity to hang out around the Air Force Logistics Management Agency (AFLMA) over the past year, you would have heard a lot of discussion about *architecture* and *blueprinting*; no need to worry. The AFLMA isn't expanding into civil engineering; rather this is the lexicon used to describe new ways of organizing logistics. Architecture refers primarily to the structure used in Logistics Enterprise Architecture, or LogEA. LogEA is the model the Air Force logistics community is using to provide a common structure for many of the new processes and innovations that are being developed to support Expeditionary Logistics for the 21st Century (eLog21) while also ensuring the new processes work together efficiently. It is also the topic for another article. This article is about that other word blueprinting. Blueprinting, as we use it, is mapping out logistics processes, so that the connections between different processes can be seen in detail. Mr Grover Dunn is leading the effort to create a blueprint of the future of Air Force logistics as empowered by the Expeditionary Combat Support System (ECSS). This article will briefly describe ECSS, the blueprinting process, and what the AFLMA has done in 2007 in this revolutionary effort. It will end with a brief preview of what to expect in blueprinting for 2008.

If you are in the Air Force logistics community, and especially a reader of this Journal, you may already know about ECSS. For others, the following is a brief description of ECSS. As a result of increasing Air Force logistics costs that reached more than $27.5B in 2003, the Secretary of Defense charged all the military services to optimize warfighter support and reduce operating costs. Out of this effort to increase warfighter support and reduce costs, eLog21 was born. The eLog21 campaign consists of several initiatives, one of which is ECSS. ECSS is an enterprise resource planning (ERP) system that is in part new software and, in part, a new set of processes designed to optimize business processes at the enterprise level. ECSS will be the largest ERP implementation in the Department of Defense and among the largest implementation of any ERP system. It is considered a critical component of eLog21 success. The contract for the software to power ECSS went to Oracle in October 2005, and in September 2006, Computer Science Corporation (CSC) was awarded the job as system integrator. When fully implemented, ECSS will consolidate more than 250 legacy logistics systems into one, integrated, commercial-off-the-shelf system. At its core are the goals to increase equipment availability 20 percent and reduce operations and support costs 10 percent. ECSS will go beyond this; it will revolutionize Air Force logistics. The implementation of ECSS will usher in an age when logisticians will have an enterprise view of logistics rather than the current retail and wholesale stovepipes. After ECSS implementation, one system will be used to manage the life cycle of materiel from supplier to warfighter. Duplication of effort, wasted movement, excess levels, and excess or stock outage cycles will be reduced or eliminated. Increased visibility, optimized enterprise stock levels, more responsive and flexible support will result from using one system for managing most Air Force logistics processes. The question then becomes how do we get from where we are today, to where we should be with the implementation of ECSS? The answer comes primarily through blueprinting.


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Blueprinting is the first phase of the ECSS implementation plan. It consists of critically looking at Air Force logistics processes as they currently are, mapping them, and improving them to take advantage of business best practices. It also considers the software capabilities and how we want it configured to best support the newly mapped processes. In addition, change management, project team training, and data migration issues need to be considered. This is no small undertaking. CSC has broken down blueprinting into three phases, the first two running 18 months total. The first phase is Enterprise Blueprinting, which is a high-level review of the logistics process. Next is Process Area Blueprinting, which entails taking the results from the first phase of blueprinting and going into more detail in each process area. It also looks at the software capabilities and begins to meld the processes and software capabilities together into a final product that, at minimum, meets requirements identified in the ECSS integration contract. The last phase of blueprinting is Release Planning. During this phase, team ECSS will prioritize and schedule functional specifications; that is to say, it will plan when different parts of ECSS will be implemented.

So what was AFLMA's role in ECSS blueprinting in 2007? AFLMA's support for ECSS during 2007 actually began prior to blueprinting, so when blueprinting began in March 2007, AFLMA had members in place and ready to help. In 2007 AFLMA had a total of four individuals embedded on ECSS blueprinting teams. Others were available back at the Agency for research and analysis as it was needed. Embedded members were Master Sergeant Glenn Dredden, a senior enlisted maintenance system expert, Master Sergeant Ricky Benton, a senior enlisted supply system expert, and an officer position that rotated in July 2007 from Captain Crow to Captain Morris (both logistics readiness officers).

Enterprise blueprinting began by *Walking the Diamond*. CSC uses the Business Diamond® Model as its tool for blueprinting in a process it calls Walking the Diamond. Walking the Diamond entails looking at business processes and how they affect each of four main points:

- Management and control systems
- Corporate beliefs, values, and norms
- Information technology and systems
- Organization, jobs, and skills

Walking the Diamond, in our case, was a systematic approach to look at the effect of current logistics processes and proposed changes to reduce gaps or unintended negative consequences. It also provided a means for looking at other areas that could change, such as training or policies, when the new processes are implemented. The Walking the Diamond effort was conducted by different integrated process teams (IPTs) focusing on different aspects of logistics. The IPTs consisted of Enterprise Level Planning, Enterprise Asset Management, Order to Settlement (OTS), Procure to Pay, and Enable (which was coordinated primarily by Master Data Management (MDM)).

AFLMA's initial team to support ECSS blueprinting was composed of MSgt Dredden, MSgt Benton, and Captain Crow. All three were assigned to MDM, with Captain Crow being an MDM team member embedded with OTS during Enterprise Blueprinting. AFLMA's ECSS team attended seven, 2-week Enterprise Blueprinting sessions in 2007, Captain Crow attended the first four sessions and Captain Morris replaced her during the last three. Enterprise Blueprinting consisted of Walking the Diamond, as we mapped out the future state of Air Force logistics using the Supply Chain Operations Reference (SCOR) model. This initial phase was taking a big picture approach at level three in SCOR-speak. There was an Accelerated Solutions Environment in July, to ensure blueprinting was on track with regard to time, scope, and integration between IPTs. This was followed by two more sessions that culminated Enterprise Blueprinting. During Enterprise Blueprinting, the IPTs identified a total of 343 enterprise requirements and more than 157 process elements, and this was at the macro level! In late September and early October 2007, Team ECSS members attended training on the capabilities of the software that they would need for the next phase—Process Area Blueprinting.

Process Area Blueprinting began in mid-October 2007. The different IPTs grew as more technical specialists from the field attended blueprinting sessions. AFLMA continued its support with the same three embedded team members, MSgt Dredden, MSgt Benton, and Captain Morris. This time all three were assigned to the same MDM breakout team, Business Intelligence (BI), and together comprised approximately half the BI team. There have been three Process Area Blueprinting sessions in 2007, and one Solutions Demonstration Lab in which the initial melding of processes and software were demonstrated. We began to see a preview of what ECSS would look like and where we needed to go back and make refinements. In 2007, Process Area Blueprinting was just beginning and will continue to factor in ECSS events for most of 2008.

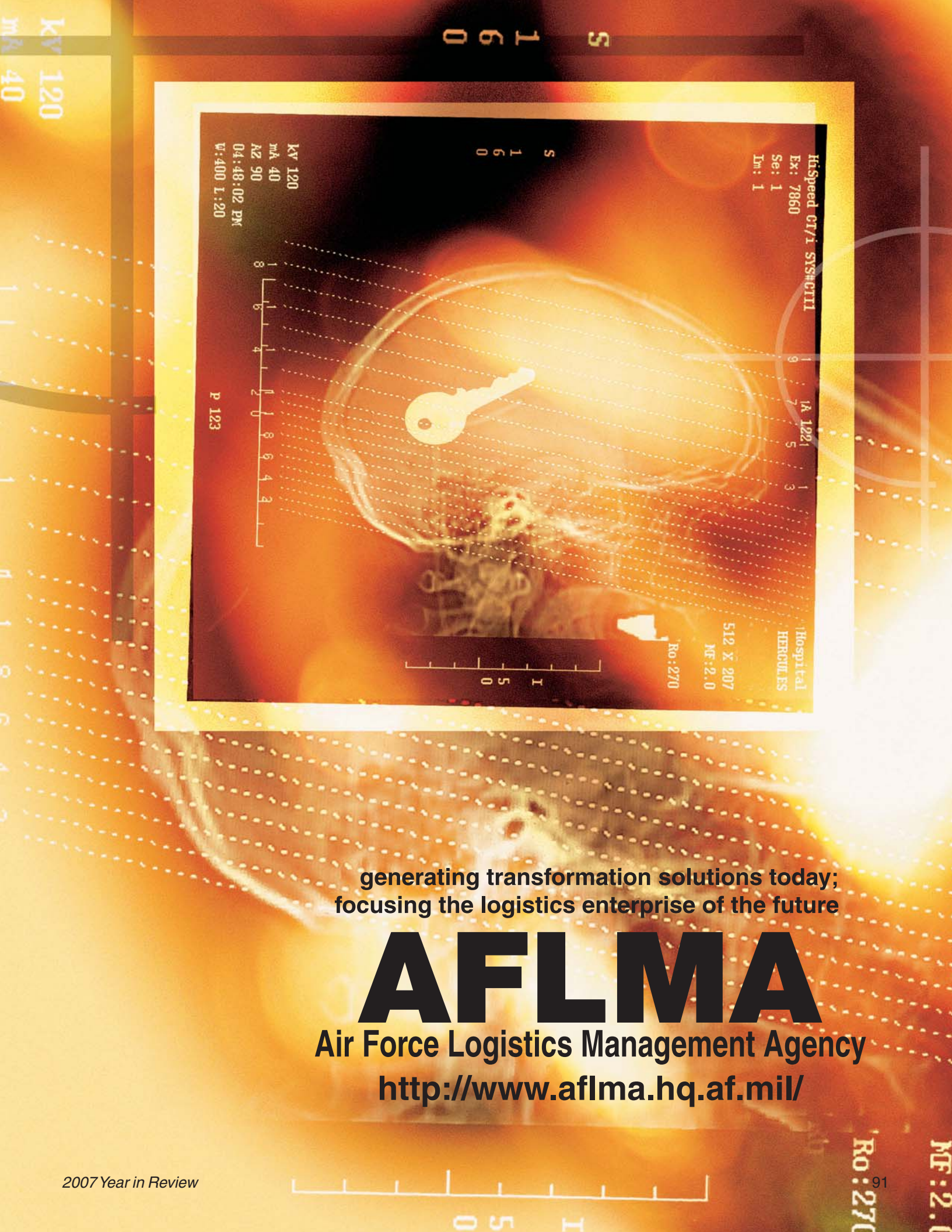
In addition to the work being done by our embedded team, AFLMA has also provided reachback research support for ECSS. For instance, two major studies were undertaken in 2007 and will continue into 2008 to provide methodologies for cleansing data from legacy systems for migration into ECSS, and to develop a means for constructing bill of materials. Both of these methodologies will be critical to the success of ECSS. There have also been a few short turn inquiries for information by individual IPTs, for which AFLMA found or provided the requested information.

So what is ahead for blueprinting? In 2008, there are already ten scheduled blueprinting sessions through June 2008 with more work expected through October 2008. This is when ECSS is scheduled to transition into Release Planning. Some major events scheduled in 2008 in conjunction with blueprinting include the following:

- Integrated Workshops in January, March, June, and October
- Solution Demonstration Labs in March and June
- Design Reviews, including a Critical Design Review in August

Of course there will also be a lot of work gearing up for each of these events as ECSS moves from planning and designing to implementation in late 2008. Throughout 2008, AFLMA will continue to be there supporting ECSS.

So the next time you are out and about and hear someone talking about blueprinting, you need not think about it in the narrow terms of civil engineering. You can recall AFLMA's involvement in ECSS blueprinting and how ECSS, when implemented, will transform Air Force logistics. Stay tuned with AFLMA to remain current on ECSS progress and to stay on the leading edge of logistics transformation.



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AFLMA

Air Force Logistics Management Agency

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The JCC Handbook initiative benefits not only the Air Force, but ultimately the entire DoD by synchronizing and accelerating contingency contracting transformation efforts of all four Services. This initiative eliminated redundancy and standardized core contingency contracting training for all of DoD.

Contingency Contracting

The Joint Environment

Captain Dennis Clements, AFLMA

Introduction

Since the invasion of Iraq and the ongoing Global War on Terror, contingency contracting operations have taken on a whole new perspective. Air Force contingency contracting officers now comprise approximately 70 percent of the military contracting capability postured to support the Department of Defense (DoD). However, most of these taskings are not in direct support of Air Force missions. In fact, most were in support of the Army or operations in a Joint environment. In light of the Air Force's high operations tempo and coupled with the fact that contracting is a stressed career field, the Air Force sought to find a way to better meet the overall requirements of the national defense strategy. To meet this challenge, the Office of Under Secretary of Defense for Acquisition, Technology and Logistics, Defense Procurement and Acquisition Policy (OSD [AT&L] DPAP) sponsored the Air Force Logistics Management Agency (AFLMA) in the development of a Joint contingency contracting handbook. The following paragraphs will highlight AFLMA's efforts in the development of this handbook. It is envisioned to better equip contingency contracting officers with the tools to efficiently and effectively operate in the Joint environment.

Selling the Vision

In June of 2006, AFLMA began exploring the idea of publishing a new contingency contracting guide. AFLMA last published the Air Force contingency contracting guide in 2003, and since then, contingency contracting has changed dramatically and has taken on a whole new meaning. Recent deployments to Iraq, Djibouti, Afghanistan, Pakistan, and other countries had been anything but Service-specific. Rather, most deployments were centered around a truly Joint Service environment. Not only had this aspect of contingency contracting changed, but deployments were leaning toward operating in a more sustained environment. With this in mind, AFLMA built a briefing to introduce its concept to OSD for a new *Joint* contingency contracting handbook.

OSD [AT&L] DPAP had already been working with Secretary of the Air Force, Acquisition (SAF/AQC), as part of a Joint Contingency Contracting Working Group (JCCWG), to develop Joint contingency contracting policy. This new policy was envisioned to lay the groundwork for Joint contingency contracting operations and the deployment of a Joint framework for contingency contracting during current and future contingency contracting operations. AFLMA's vision was directly in line with what OSD was working to accomplish, except AFLMA's timeline provided an end product to the warfighter faster. AFLMA briefed their vision to OSD and received sponsorship to participate in the JCCWG and to develop a new Joint contingency contracting handbook for the DoD contracting workforce. The working group had two main objectives.

- Develop Department of Defense Federal Acquisition Regulation Supplement (DFARS) 218 *Procedures, Guidance, and Information* (PGI)
- Develop a pocket-sized Joint contingency contracting handbook

By working on the JCCWG, AFLMA was able to capitalize on the research performed by the group. Additionally, the JCCWG became a Joint conduit to facilitate the development of the handbook.

Evolution of the Joint Contingency Contracting Handbook

AFLMA initially proposed to OSD that the handbook be called a "Joint Contingency Contracting Guide." However, the first objective of the working group was to develop Department of Defense Federal Acquisition Regulation Supplement (DFARS) 218, *Procedures, Guidance, and Information (PGI)*. It was completed in January of 2007, and was labeled as a *Guide*. Although the first objective is still under review, to differentiate between the two objectives, the AFLMA guide became known as the "Joint Contingency Contracting Handbook."

AFLMA began specifically focusing on the research and development of the pocket-sized "Joint Contingency Contracting (JCC) Handbook" in February of 2007. Prior to the JCC handbook initiative, no standardization existed within DoD as to how each Service trained its contingency contracting officers (CCOs). Each Service had its own contingency contracting handbook and training plan, which was in many ways unique and tailored to the individual Service it supported. As a result, CCOs showed up to the fight with different training backgrounds and experience. This equated to a twofold problem for the warfighter: lack of training standardization and deployment experience—two significant factors contributing to recent US Army procurement problems in the United States Central Command (USCENTCOM) area of responsibility (AOR).

Major William Long of AFLMA devised an innovative plan that would standardize contingency contracting and fulfill the Joint training needs across the entire DoD. The plan included accompanying the JCC handbook with an electronic DVD filled with hundreds of contingency contracting tools, templates, checklists, websites addresses, and standardized training modules that maximizes available resources for deployed CCOs. An integrated approach was stressed, which earned DoD-wide support and aligned future budgets and planning functions towards a unified strategy. By focusing all four Services toward a unified strategy, the time and cost savings generated by the initiative would be significant and repeatable year after year. More importantly, this standardized training approach ultimately provides our deployed CCOs with a more robust, efficient, and effective means of supporting the warfighter.

Incorporation of Air Force Standardized Contingency Contracting Training Plan

With today's operations tempo, high deployment rates, low manning, and constant personnel turnover, individual squadrons didn't have the time or resources to develop their own contingency contracting training program. To fill this training gap, Air Education and Training Command had already tasked AFLMA to standardize a contingency contracting training plan for Air Force contingency contracting and to develop an electronic compact disk for contracting tools. AFLMA performed an analysis of base-level contingency contracting training plans and an analysis of the existing contingency contracting tools, and decided to use the handbook as a foundation for standardizing the Air Force's contingency training program as well. The handbook and DVD, along with the Silver Flag course, would better prepare and educate contingency contracting officers prior to their scheduled deployments.

A team of functional experts from across DoD was established to form two Joint Contingency Contracting working groups. The *red team*, which assisted in the review of the handbook and the *training team*, which assisted in the development of the training portion of the handbook. The AFLMA-led training team developed more than 350 standardized contingency training modules and 230 plus test questions aiding the unit training managers in the performance of monthly CCO training. This proved critical for the highly stressed and deployed career field with little or no time to develop and implement unit level CCO training programs. The team also collaborated with sister services and linked the JCC handbook DVD back to 90 other Service contingency guides and handbooks for Service-specific guidance. The versatility of the handbook and DVD gives CCOs flexibility to train while in garrison or on the battle front, allowing CCOs to hit the ground running and travel lighter and more lethal than ever before.

Contingency Contracting: A Joint Handbook

AFLMA aggressively embarked on a self-initiated project to spearhead development of the Department of Defense's (DoD)

first ever JCC Handbook. As a result, the AFLMA and its team was successful in leveraging standard core competencies across an entire DoD enterprise, thus meeting Congress' vision of Joint warfare capability. The pocket-sized handbook and its accompanying DVD directly facilitate the training and support of 3,100 acquisition professionals from all branches of service averaging over $5B a year in contingency spending to support the warfighter. The handbook has captured Joint contingency contracting doctrine and describes the military's capabilities, best practices, and fundamental principles that guide the employment of US contracting forces in a Joint environment. It has made history and the team has been recognized in the fiscal year 2007 Contracting Awards in the Special Recognition Award category. *Contingency Contracting: A Joint Handbook* is becoming recognized as a world-class training tool shaping the future of DoD contingency contracting.

The Way Ahead

Since 2001, contingency contracting has been all about change. Over the past 7 years, contingency contracting support has evolved from purchases under the simplified acquisition threshold to major defense procurement and interagency support of commodities, services, and construction for military operations and other emergency relief, such as Hurricane Katrina. Today, this support includes unprecedented reliance on support contractors in both traditional and new roles, including private security and contracting support. Keeping up with these dramatics changes, while fighting a global war on terror, is no doubt an ongoing challenge. The way ahead for the JCC handbook is to ensure that it is updated in a timely manner to provide the most impact to the warfighter.

In efforts to ensure timely updates, AFLMA has taken the JCC handbook initiative a step further and developed a plan for sustaining the handbook well into the future. We've coordinated directly with OUSD (AT&L) DPAP staff officials and developed a budget identifying future funding for contingency workshops, publishing, shipping, and temporary duty (TDY) costs. Also, AFLMA will conclude a strategic partnership with the Defense Acquisition University (DAU) which creates synergy and exploits core strengths of both organizations while maintaining the JCC Handbook on an annual basis. Subsequently, this strategic partnership drove the architectural blueprint for rewriting DAU's Contingency Contracting Course (CON 234). This foresight ensures that DoD contingency contracting will be sustainable and standardized for decades to come.

However, no training program can be beneficial without a set training plan to implement it. Prior to final release of the JCC handbook, the team set forth and developed a 12-month training schedule. This training plan outlines CCO training for all four services, providing the warfighter with a standardized, more predictable expeditionary force.

Since its inception, the JCC handbook and standardized training approach has been benchmarked DoD-wide. Its overall impact reaches well beyond that of an Air Force best practice. In fact, the JCC handbook initiative and its standardized process was submitted before Congress as a *DoD best practice* and for implementation by the entire Joint contracting community. Additionally, the Guard and Reserves, Defense Contract Management Agency (DCMA), and Defense Logistics Agency CCOs are now using the handbook.

This initiative has generated international interests as well. Recently, the JCC handbook concept was selected for presentation at the 2007 Agile Combat Support Conference. After the demonstration, representatives from coalition forces were lined up requesting copies of the handbook.

Conclusion

The JCC Handbook initiative benefits not only the Air Force, but ultimately the entire DoD by synchronizing and accelerating contingency contracting transformation efforts of all four Services. This initiative eliminated redundancy and standardized core contingency contracting training for all of DoD. The handbook was lauded by the Director for Defense Procurement and Acquisition Policy as an "interagency solution" to US Army procurement problems in Iraq, Afghanistan, and Kuwait. In fact, the impact of this project was immediately noticed by the Gansler Commission, a 45-day commission on US Army acquisition and program management reform, citing the JCC initiative as a "key recommendation" in their final report to Congress.

Contingency contracting is a world of constant change. It has changed dramatically over the past few years, especially in dealing with the reconstruction efforts in Iraq and Afghanistan. Current legislative initiatives are a big step in the right direction in laying the groundwork for Joint policy and doctrine development. As we transform the DoD acquisition workforce, it is important to standardize contingency contracting operations and at the same time find innovative ideas to give the warfighter a greater capability to fight the Global War on Terror.

I said to myself, I have things in my head that are not like what anyone has taught me—shapes and ideas so near to me—so natural to my way of being and thinking that it hasn't occurred to me to put them down. I decided to start anew, to strip away what I had been taught.

—Georgia O'Keeffe

Planning is everything—plans are nothing.

—Field Marshal Helmuth von Moltke

more than 2

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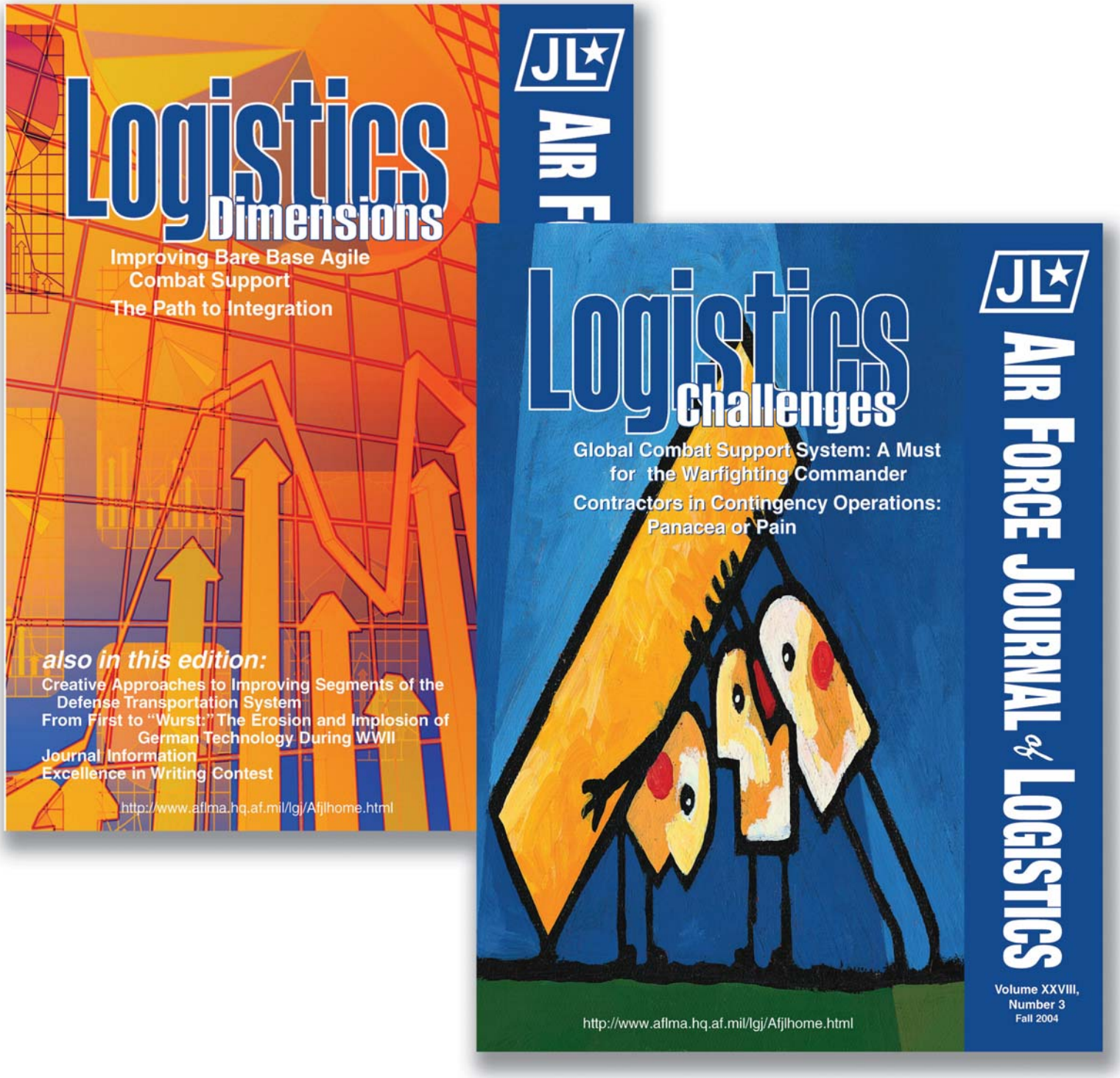

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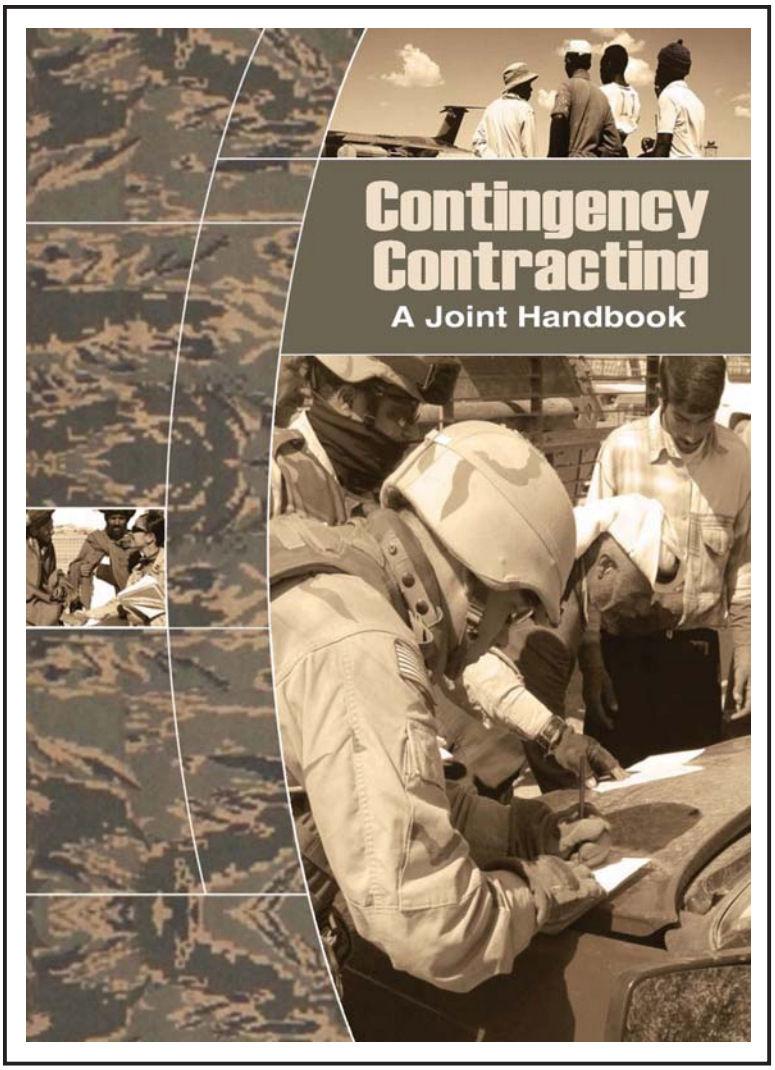
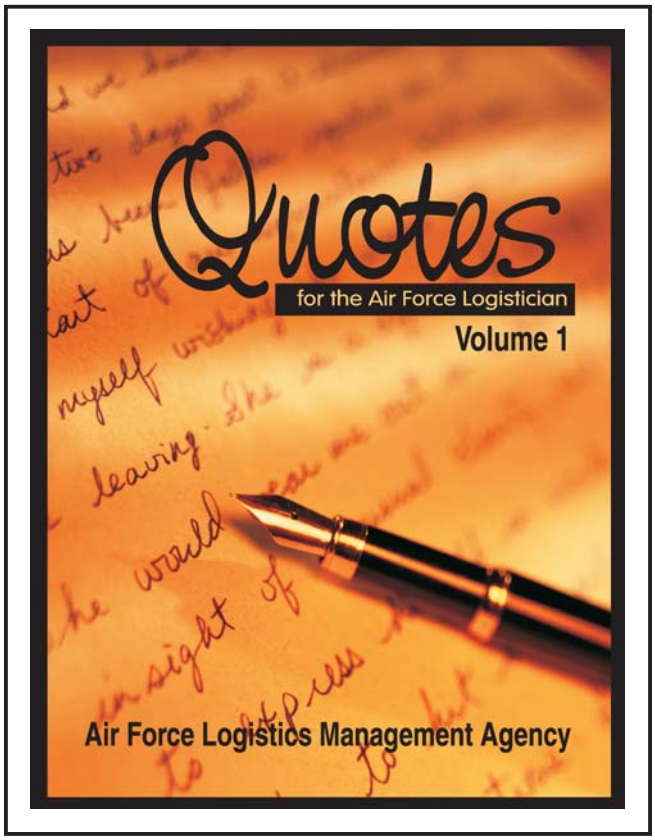


contingency contracting: a joint handbook

In order to enhance the contracting officer's ability to successfully operate in a variety of mission environments, we've produced *Contingency Contracting: A Joint Handbook*. This pocket-sized handbook and its accompanying DVD provide the essential information, tools, and training for contracting officers to meet the challenges they will face, regardless of the mission or environment. *This handbook is in its second printing, but copies are limited.*

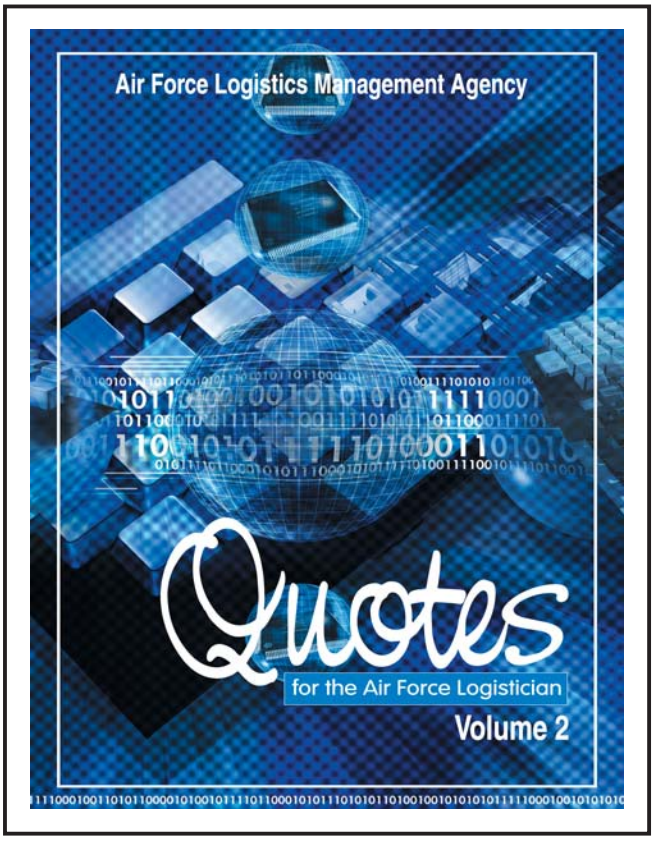


quotes for the Air Force logistician, volume 1

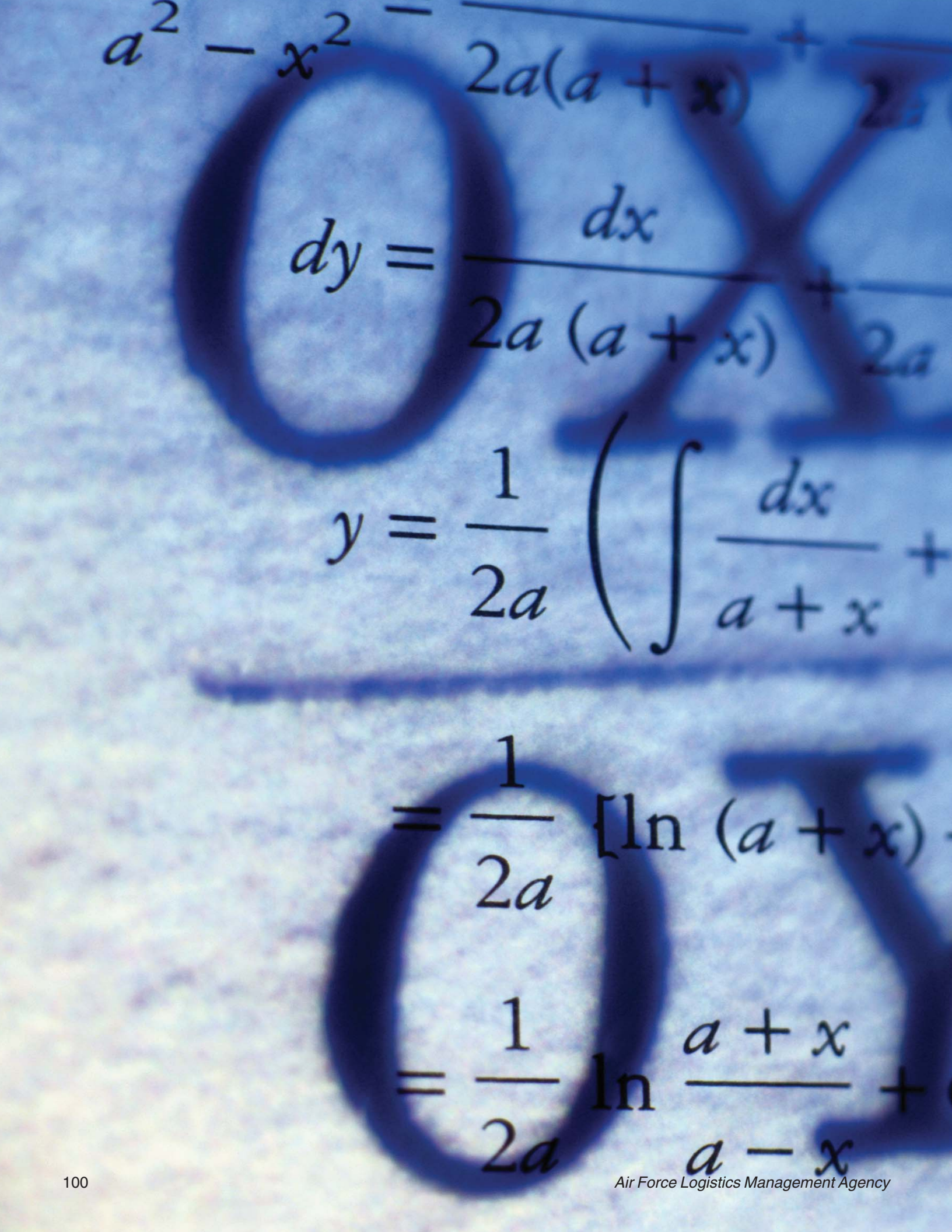
Quotes for the Air Force Logistician, Volume 1 is a teaching resource that can be used in classroom, education, training, and mentoring programs for Air Force logisticians. It is a tool that can be used by instructors, teachers, managers, leaders, and students. It is also a tool that can be used in research settings and a resource that should stimulate comment and criticism within educational and mentoring settings. Copies of the book are provided free of charge to any Air Force logistician, educational institution, teacher, instructor, commander, or manager. *Quotes for the Air Force Logistician, Volume 1* is packaged with *Quotes for the Air Force Logistician, Volume 2* as a boxed set.

quotes for the Air Force logistician, volume 2

Quotes for the Air Force Logistician, Volume 2 is a teaching resource that can be used in classroom, education, training, and mentoring programs for Air Force logisticians. It is a tool that can be used by instructors, teachers, managers, leaders, and students. It is also a tool that can be used in research settings and a resource that should stimulate comment and criticism within educational and mentoring settings. Copies of the book are provided free of charge to any Air Force logistician, educational institution, teacher, instructor, commander, or manager. *Quotes for the Air Force Logistician, Volume 2* is packaged with *Quotes for the Air Force Logistician, Volume 1* as a boxed set.



Have you noticed there seems to be a void when it comes to books or monographs that address current Air Force logistics thought, lessons from history, doctrine, and concerns? We did, and we're filling that void. Our staff produces and publishes selections of essays or articles—in monograph format—on a quarterly basis. Each has a theme that's particularly relevant to today's Air Force logistics. Informative, insightful, and in many cases, entertaining, they provide the Air Force logistics community the kind of information long taken for granted in other parts of the Air Force.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Thomas Gage, PhD, AFLMA

Analysis Connection

Man masters nature not by force but by understanding. That is why science has succeeded where magic failed: because it has looked for no spell to cast on nature.

—Jacob Bronowski, "The Creative Mind," *Science and Human Values*, 1956

And, we add, the same is true in military affairs and military logistics. While many are looking for the magic spell, the right incantation, to make things go as they wish, we are looking for understanding. How do things really work? Only in that way will we master our affairs.

What We Did This Year

What didn't we do this year? LGY analysts were involved in all phases of the Air Force Logistics Management Agency (AFLMA) operations this year, from contributing to decisions about the future mission of the AFLMA, to helping create and revise the new *AFLMA Project Manager's Handbook*, to civilians transitioning to the much-touted National Security Personnel System (NSPS), to writing articles for the Air Force Journal of Logistics, to leading projects, to contributing to humanitarian efforts, to helping the AFLMA's morale and welfare, and manning many of the Agency's additional duties, because our military personnel were deployed to Afghanistan or Iraq. In summary, there is probably nothing, or not much, which LGY didn't do, or was not involved in this past year.

This was true even as our numbers continue to dwindle, as other Air Force organizations do also. This is not an exhaustive account, but a reflection on what we have been involved in, what we have accomplished, and where we hope to go.

First Lieutenant Frank Iubelt did a superb analysis of reviewing a set of recommendations for replacing the presidential aircraft fleet in a project titled *Presidential Aircraft Replacement: Analysis of Alternatives.* This will lead to our president and his staff being better able to handle crises in future years. He led the project "Maintenance Metrics Handbook," commissioned by the Director of Maintenance, Deputy Chief of Staff, Installations and Logistics. This handbook will aid Air Force maintainers and managers of maintainers to a better understanding of what they are doing and what they are managing, and better ways to do that. In addition, First Lieutenant Iubelt also led our Christmas party, the AFLMA summer picnic, and has kept building 205 running as physical facilities manager—a very large and sometimes frustrating task.

Captain Jenine Cowdrey, as project manager, finished a study on *Measuring the Effect of Collective Bargaining Agreements (CBAs) on A-76 Costs*, and briefed the results of the study in Monterey this summer to *a bunch of Navy guys* at a contracting conference. She found (and we found) that a lot people seem to be trying to confuse things so that it's harder to get at the truth. This is a lesson we at the AFLMA learn over and over. She performed much behind-the-scenes analysis help in AFLMA's *C-5 Total Not Mission Capable for Maintenance* study, an effort to find the wheres and wherefores of degrading C-5 mission capability, aiding Captain Ben Thoele and First Lieutenant Frank Iubelt. She has been and is currently working on "Review of F-22 Spares Forecasting Techniques—Part 1 Peacetime Spares Cost," a massive data analysis which will lead to enterprise-wide decisions. We're sad that she has decided to head for greener fields and will separate from the Air Force to become an optometrist. We wish her every success as she continues to serve others with her superb skills.

Captain John Flory presented his research from the project he led, *DLA Forward Stocking* at the 75th Military Operations Research Society Symposium (MORSS) conference in Annapolis this year, telling the Defense Logistics Agency (DLA) what they did not want to hear: that it wasn't smart to move spare parts forward to the area of responsibility (AOR) without considering the impact on the Air Force. Captain Flory completed the *Depot Purchased Equipment Maintenance (DPEM)* project, an effort to find out why projected deferrals in budget years vary from actuals in execution years. John has been our *gumby* man, having several changes of direction and projects thrust upon him, but keeping his balance and continuing to serve the Air Force as a superb analyst. He is currently supporting efforts at developing metrics in the new Expeditionary Combat Support System (ECSS), which will set directions for the Air Force for a long time to come. He was recently selected for deployment to the Combined Air Operations Center in Qatar, following some of our other analysts who have been previously deployed to the same location. He looks forward to the heat, zero humidity, 12-hour days, and sleeping in the sand.

Ms Gale Bowman, as project manager, finished the *Bench Stock Implementation Support* project, which was an extended effort to *rationalize* the bench stock in the Air Force, that is, improved by using consolidated demand data from multiple organizations with similar weapon systems and missions to compute the range and depth of bench stock. Our lesson learned was that the Air Force isn't ready to implement this concept because it requires too much information which can't be supplied by our legacy information systems. However, this issue will be revisited as ECSS comes online, and the required data should be available instantly and constantly to those who need it and can use it to make Air Force enterprise-wide decisions. She also has been serving as alternate unit security manager, but with the primary security manager deployed or on temporary duty (TDY) most of the time, she has, in fact, been performing that additional duty, which has taken a great deal of her time.

Mr John Dietz is, and has been for years, one of our premier *workhorses*, doing RBL (readiness-based leveling) analysis quarterly, and many CHPMSK (Contingency High Priority Mission Support Kit) analyses as required. These CHPMSK requests arrive at irregular intervals and are always *hot*. Mr Dietz performs many or most of these in a few hours. He was also involved in creating the new version of our *Project Manager's Handbook*. This document was created so that our project managers will have a clear understanding of when and how to do what, so that when AFLMA does a study, we have the best input and advice to guide us. This year Mr Dietz also presented a briefing at the 75th MORSS in June at Annapolis on the practice of readiness-based leveling, after a briefing by Dr Gage on the theory of RBL. Mr Dietz is also our unit safety representative, reminding us all of safe practices before we can get too far astray.

Major Jennifer Walston joined the AFLMA team last September, and was made LGY deputy, supervising all our military. She was immediately thrown into the AFLMA chopper, becoming an alternate for several different initiatives at once, coming up to speed for LEAN, Air Force Smart Operations for the 21st Century (AFSO21), LogEA, and Supply Chain Operations Reference (SCOR) training, and learning how to do rapid improvement events. She also has been designated as study advisor for several projects currently underway, and has been giving invaluable advice to the project teams, especially in light of her expertise in Multiple Objective Optimization. Major Walston deployed in February to Germany to assist in Joint Task Force Nomad Fire. We have received notice that she performed exceptionally in that effort, and will be recognized when the exercise has finished. She has truly become one of our team, and a real asset to the AFLMA.

Dr Gage became the acting LGY director last June as Dr Golden assumed his new duties as the deputy director of the AFLMA upon the retirement of Colonel Currie and the assumption of command by Lieutenant Colonel Cushion. Dr Gage assisted in revising the AFLMA Project Manager's Handbook, and in creating the briefings the new commander required to convince senior Air Force leadership to alter the mission of the AFLMA, to take the agency in a new direction. Many hours were spent in discussion, clarification, and in fine-tuning the language and direction for the AFLMA, in order to put flesh on the bones of the commander's vision. Between Dr Golden and Dr Gage, LGY civilians were brought under NSPS; they are no longer *GS*, but are now *YD*.

Both Captain Ben Thoele and First Lieutenant Beau Nunnally went on to a new phase of their lives; both are still serving others with their expertise and leadership. Captain Thoele was the *analytical workhorse* for the AFLMA *C-5 Total Not Mission Capable for Maintenance* study, performing many long hours of analysis of maintenance manpower data in all of its aspects. First Lieutenant Nunnally contributed to many projects at the AFLMA, and helped us transition to performing our roles in the new ECSS, an effort which will lead to major changes in the way the Air Force does business. He was chosen as Maxwell-Gunter Company Grade Officer of the Quarter, an accolade which we heartily agree with. We know that both of them will have great success in anything they undertake.

LGY will continue to focus on what it takes to do analysis—keeping analytical skills current and sharp, and continuing to learn the new skills required to perform our new missions. It's been said that the only constant thing is change, and that is certainly true for the AFLMA and LGY.

Business Operations

Captain Steve Peña, AFLMA

It was another great year for the business operations division. For starters, our ongoing effort to outsource information technology support finally paid off. After months of maintaining our computer and network resources using out-of-hide manning, we finally awarded a service contract and forged a partnership with a local firm to take over functional support for the Air Force Logistics Studies Workshop and the administrative tasks that come with maintaining client support, security, and user training. The transition was virtually seamless. We made information technology process and infrastructure improvements right off the bat, and created a tech-refresh schedule for our future client and server requirements. We also injected resilience into our systems by bolstering data backup processes and uninterrupted power supply systems. Maintaining the Air Force Logistics Studies Workshop infrastructure and supply data is critical to providing the information necessary to support the studies and research we tackle here at the Agency as well as our external customers; we're now more prepared than ever to live up to that challenge. We weren't only focused on hardware and infrastructure; we also made great strides this year in improving project status reporting and tracking progress toward goals laid out in our strategic plan.

One of our Agency successes this year was the completion of an internal Air Force Smart Operations for the 21st Century (AFSO21) event in which we leaned-out our logistics study process, slashing study completion time by an average of 42 percent. Of course, changes in the study process necessitate changes in the information system used to monitor the process; our Project Information Reporting System (PIRS) is no exception. We added tools to track direct links to agile combat support in our studies. We updated the system to facilitate increased accuracy in milestone prediction and to track chapter completion dates. We ensured AFSO21 trained members are part of project teams by creating reports that identify which teams have AFSO21 trained personnel and which don't. We created a complete team member report that incorporates study advisors, project managers, analysts, and other team members. We've also incorporated a method for classifying studies into overarching research objectives. It's great for multiple studies that support or answer a broader overarching research question or issue important to Air Force logistics leaders. Last, we designed and implemented a study request form and tools to be used by our studies assessment team for prioritizing requests. These new tools help us focus manpower on those requests whose subsequent study will have the greatest potential impact on the Air Force. Many of our strategic plan goals relate to our studies and these changes help us track toward achieving our strategic vision.

None of this great work can be accomplished without the hard work and diligence of the people that make it happen. Computer specialist, Ms Mary Donald, is one of those outstanding performers. Not only did she bring home Maxwell-Gunter's Civilian of the Quarter for Tenant Units during the fourth quarter, she was also the 2007 Maxwell-Gunter community Federal Women's Program Distinguished Service Award winner in her category. We're very proud of her accomplishments. She's our PIRS administrator and also provides support for the weapons load crew management tool which is used to track bomb loader certification throughout the Air Force. The business operations division has a promising future with great people and partnerships. We're looking forward to the challenges of 2008 and will meet each one head on.

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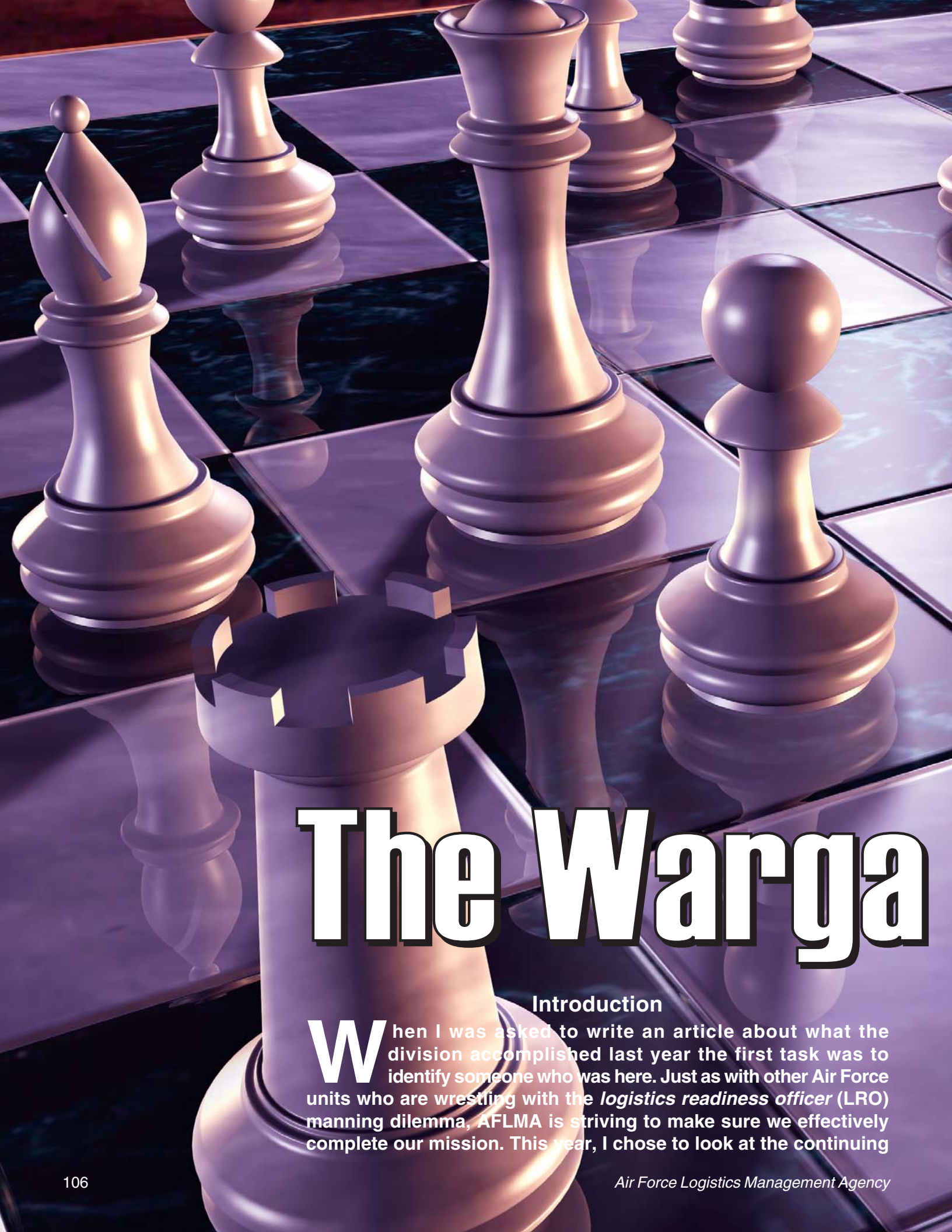

The Warga

Introduction

When I was asked to write an article about what the division accomplished last year the first task was to identify someone who was here. Just as with other Air Force units who are wrestling with the *logistics readiness officer* (LRO) manning dilemma, AFLMA is striving to make sure we effectively complete our mission. This year, I chose to look at the continuing

Captain Wesley B. Eagle, AFLMA

ming Mission

evolution of wargames at AFLMA in the face of high deployment rates and ever-expanding expertise and specialization in wargame execution, and more importantly, what we've done to turn challenges into opportunities and how we develop wargame professionals.

Wargames

AFLMA has supported wargames for over a decade. Our role then is the same as it is now—infuse logistics *truth* into the scenarios and evaluate proposed logistics concepts in diverse scenarios, looking at capabilities

Logistics Wargames

of today and the future. A constant in today's Air Force is change in order to stay relevant. As a result, AFLMA established a separate Wargames Division in response to the expansion of agile combat support (ACS) requirements within exercises, wargames, and experiments (EXWAREX); a significant increase in preparation requirements; and a significant increase in planning and analysis man hours required to develop many of the concepts. Faced with continuous turnover and high deployment rates, this proved an excellent decision, maximizing the manpower available. To meet the challenge, an accelerated training program was needed to build an effective wargamer in only 4 to 6 months. In response, AFLMA created a roadmap to accomplish this task, authored the "Wargames Primer," and developed the requisite training plan.

Successful execution of EXWAREX typically occurs in three phases, pregame design, game execution, and postgame analysis.

Pregame Design. This is where baseline research, definition, and development of ACS objectives that represent the heart of current AF/A4 issues occur. A typical event requires several thousand hours of preparation ranging from definition and phasing of futuristic force modules to assembly of specialized modeling and simulation tools to analyze specific events. Detailed study of emerging topics, such as alternative fuels, is required to develop the background expertise needed to build the scenario fuel situation, game objectives, and determine how we will employ the objective to effect the overall scenario.

Game Execution. Game execution focuses on: developing and validating the fidelity of ACS objectives and ensuring emerging ACS capabilities are played in a realistic manner during game execution; guiding and facilitating participants through ACS objective resolution; and participation as key players or game assessors. This is where the pregame preparation pays off. The idea isn't to say what can't be done; rather, we look to what can be realistically supported with an eye always looking for unconventional methods of solving problems or identifying capability gaps. A means to fill those gaps is always developed; no problem is left unanswered.

Postgame Analysis. This phase involves combining, organizing, formatting, and reviewing postgame data; analyzing the impacts ACS had on play compared to stated objectives; determining and capturing those insights garnered from analysis; and providing recommendations for problem resolution or further study. The end result is a published report illustrating

the effect ACS had on game play and the cumulative impact various game decisions had on ACS. Similar to pregame preparation, this phase may take hundreds if, not thousands of hours depending on required follow-up study, additional modeling and simulation, or validity of data gained from the event.

As we look to the future, we see a continuing need to expand our capabilities. We've partnered with other government agencies to leverage their specific expertise. Additionally, we've embarked on a study of many commercial industry initiatives to ensure we've captured emerging concepts. We now screen all completed studies for candidate objectives in a wargame. Similarly, we also look at the EXWAREX event itself to see if there are topics that warrant deeper analysis in a separate study. The goal is to test the theories developed in past studies and ensure we develop answers for the hard questions developed during the game.

2007 Accomplishments

Some specific accomplishments for 2007 include participation in two wargames, production of a fuels pocket guide, and analysis of fuels mobility support equipment data (FMSE). A summary of each is provided below.

Future Capabilities (FUTURES) Game 07

The purpose of the Future Capabilities Game 07 (FG 07) was to assess the capability and capacity of an alternative Air Force force structure utilizing futuristic, yet plausible, concepts to generate the required military effects within and from the air, space, and cyberspace domains in the 2030 timeframe. The final event in the FUTURES 2007 series, FG 07, was held 14-19 October 2007 at Maxwell AFB, Montgomery, Alabama.

Senior Decisionmaking Exercise (SDME) 08

SDME is held at the Army War College located in Carlisle, Pennsylvania. The aim of SDME 08 was to reinforce earlier core curriculum learning objectives and allow the student participants to: work effectively in highly complex, ambiguous environments; deal with problems which have not one, but multiple solutions; succeed based on spirit of cooperation and consensus; be involved in Joint, interagency, intergovernmental, multinational, international, and private or nongovernmental organizations and issues; and communicate complex concepts effectively and persuasively, both verbally and in writing.

Fuels Mobility Readiness Spare Packages (MRSP) Kit Consumption Data

The effort compared fuels mobility support equipment (FMSE) mobility readiness spares packages (MRSP) and fuels operational readiness capability equipment MRSPs to identify stock number duplication and consumption data. The research identified parts commonality between kits and the cost of parts replacement to analyze kit sustainment costs.

AEF Fuels Pocket Guide

This guide was designed to assist deployed fuels supervisors in the various avenues of fuels operations. The guide highlights important factors of setting up a bare base operation as well as maintaining a forward site. It provides fingertip access to aircraft fuel factors, compatibility, FMSE, dimensional data, and other critical information needed to support effective planning.

2007

AFLMA Facts

Articles Published

Beau Nunnally and Benjamin Thoele, "Logistics Analysis," *Air Force Journal of Logistics*, Vol XXX, No 4 and Vol XXXI, No 1.

C. A. Boone, CW Craighead, and JB Hanna, "Critical Challenges of Inventory Management in Service Parts Supply: A Delphi Study," *Operations Management Research* (forthcoming), 2008.

C. A. Boone, CW Craighead, and JB Hanna, "Postponement: An Evolving Supply Chain Concept," *International Journal of Physical Distribution and Logistics Management*, Vol 37, No 8, 2007, 594-611. (Note: This article is the Outstanding Paper Award Winner at the Literati Network Awards for Excellence 2008)

C. A. Boone, JR Drake, JA Bohler, and CW Craighead, "Supply Chain Management Technology: A Review of Empirical Literature and Research Agenda," *International Journal of Integrated Supply Management*, Vol 3, No 2, 2007, 105-124.

C. A. Boone, JB Hanna, CW Craighead, and B Gibson, "A Grounded Theory Investigation of Supply Chain Research Issues in Service Inventory Management," *Proceedings of the 36th Annual Supply Chain Management Educators Conference*, Council of Supply Chain Management Professionals, 2007.

Damelsa D. White and Jeffrey C. Bergdolt, "The Road to Success," *Air Force Journal of Logistics*, Vol XXXI, No 2.

Douglas J. Blazer and Jeoffrey D. Sloan, "Logistics Support: Relating Readiness to Dollars," *Air Force Journal of Logistics*, Vol XXXI, No 2.

Glenn Dredden and Jeffrey C. Bergdolt, "Enterprise Resource Planning," *Air Force Journal of Logistics*, Vol XXXI, No 2.

James C. Rainey, Cindy Young, and Roger D. Golden, "Introduction, ECSS Facts at a Glance, and Essential ECSS Glossary," *Air Force Journal of Logistics*, Vol XXXI, No 2.

Jeffrey C. Bergdolt, "Meeting the Challenges of the Base Support Installation," *Air Force Journal of Logistics*, Vol XXXI, No 4.

Jenine Cowdrey, "Monsters in the Closet: The Unanticipated and Uncontrollable Impact of Collective Bargaining Agreements in A-76 Sourcing Decisions," Fourth Annual Acquisition Research Symposium, June 2007.

Jeremy A. Howe, Benjamin A. Thoele, Scotty A. Pendley, Anthony F. Antoline, and Roger D. Golden, "Beyond Authorized versus Assigned: Aircraft Maintenance Personnel Capacity," *Air Force Journal of Logistics*, Vol XXXI, No 4.

John A. Flory, Douglas A. Blazer, and Gale Bowman, "DLA Forward Stocking: An Economic Analysis," *Air Force Journal of Logistics*, Vol XXXI, No 3.

John K. Dietz, "Air Force Experience with Readiness-Based Leveling - Practice," Military Operations Research Symposium, June 2007.

Kimberly A. Fiato, "AFSO21: A Case Study in Process Improvement," *Air Force Journal of Logistics*, Vol XXXI, No 3.

Thomas W. Gage, Ph.D, "Readiness-Based Leveling - Theory," Military Operations Research Symposium, June 2007.

Edited Research or Peer-Reviewed Works

AEF Fuels Management Pocket Guide, James C. Rainey and Cindy Young, eds, Montgomery, Alabama: Air Force Logistics Management Agency, January 06.

AFLMA Year in Review 2007, James C. Rainey and Cindy Young, eds, Montgomery, Alabama: Air Force Logistics Management Agency, 2007.

Air Force Journal of Logistics, Vol XXX, No 4 and Vol XXXI No 1, James C. Rainey, Cindy Young, and Roger D. Golden, eds.

Air Force Journal of Logistics, Vol XXXI, No 2, James C. Rainey, Cindy Young, and Roger D. Golden, eds.

Air Force Journal of Logistics, Vol XXXI, No 3, James C. Rainey, Cindy Young, and Roger D. Golden, eds.

Air Force Journal of Logistics, Vol XXXI, No 4, James C. Rainey, Cindy Young, and Roger D. Golden, eds.

Contingency Contracting: A Joint Handbook, James C. Rainey, Cindy Young, and Roger D. Golden, eds, Montgomery, Alabama: Air Force Logistics Management Agency, 2007.

at a Glance

Quick summary of AFLMA activities and results

AFLMA Results *Improvement, Consulting, and Wargames*

2007/2008 Completed Projects[1]

60 Total Projects

- 17 Improvement Studies
- 40 Consulting Studies
- 3 Wargames Studies

Commander (CC)
- 1 Improvement Study

Logistics Innovation Studies
- 1 Consulting Study

Maintenance Branch
- 3 Improvement Studies
- 3 Consulting Studies

Readiness Branch
- 5 Improvement Studies
- 24 Consulting Studies

Contracting Branch
- 2 Improvement Studies
- 6 Consulting Studies

Logistics Wargames
- 3 Wargames Studies
- 2 Consulting Studies

Logistics Analysis
- 6 Improvement Studies
- 2 Consulting Studies

Business Operations
- 1 Consulting Study

Logistics Management Institute
- 1 Improvement Study

Notes

1. Includes projects from 1 January 2007 to 30 April 2008

Command Relationships

The Air Force Logistics Management Agency is a field operating activity reporting to the Director of Resource Integration, Headquarters, United States Air Force.

Chain of Command

Deputy Chief of Staff for Logistics, Installations, and Mission Support (USAF/A4/7)

↓

Director of Resource Integration (USAF/A4/7P)

↓

AFLMA (FOA)

Manpower and Personnel

Manpower for the Agency continued to decline this year as additional Air Staff-mandated cuts became effective. Five authorizations were lost in 2007 (20 percent reduction). A total of 12 authorizations will be lost between 2006 and 2009. These cuts are in addition to the nearly 50 authorizations lost during previously mandated reduction cycles. Approximately 20 percent of AFLMA personnel were deployed in 2007. Authorizations are shown in Table 1.

		Three Manpower-Cut Drills	Current Manpower	Balance-the-Books End-State	TF 720 End-State
	1987	2003	2007	2009	2009
Officer	59	36	27	29	21
Enlisted	16	16	10	10	8
Civilian	22	12	10	10	8
Total	97	64	47	49	37

Table 1. AFLMA Manpower Review

2007 Completed Efforts

Books and Monographs

AEF Fuels Management Pocket Guide

Contingency Contracting: A Joint Handbook,

Reference

Cumulative Index: Air Force Journal of Logistics, Seventh Edition

Information for Contributors: Air Force Journal of Logistics

Information Book: Air Force Journal of Logistics

Project Manager's Handbook

Strategic Plan: AFLMA

Magazine

Air Force Journal of Logistics

Other

AFLMA Year in Review 2006

Agency folder and brochure

Journal advertising material

Automated Agency presentation

Air Staff Support

Conferences and Major Meetings Attended

General

- Logistics Officer Association Convention
- Develop and Sustain Warfighting Systems Supply Chain Operations Design Team Subprocess Governance Meeting
- Logistics Board of Advisors Conference
- Global Logistics Support Center Program Manager Review
- Logistics Transformation Office Expeditionary Combat Support System Enterprise Level Blueprinting (Training)
- Air Force Analytic Community Steering Group Meeting (held in conjunction with 2007 Air Force Operations Research Symposium)

Logistics Wargames

- Wargames planning meetings
- Wargames planning conferences
- Wargames after action reviews

Logistics Innovation Studies

- APICS International Conference and Exposition
- Council of Supply Chain Management Professionals
- Worldwide Contracting Training Conference
- Acquisition Symposium
- Department of Defense Procurement Conference
- Vehicle Management Action Group
- Material Management Board
- Joint Contingency Contracting Policy Working Group
- Defense Acquisition University Training Conference
- Defense Acquisition University strategic partnership meeting
- Air Force Worldwide Contracting Spring Conference
- Naval Post Graduate School Research Symposium
- Joint Contingency Contracting Handbook presentation for Gansler Commission

- Air Force Worldwide Contracting Fall Conference
- United States Central Command Conference
- Agile Combat Support Conference
- United States Special Operations Command Conference
- Defense Procurement Acquisition Policy Conference

Logistics Analysis

- 75th Annual Military Operations Research Society Symposium

2007 Organizational Structure

Organizationally, the Agency has two product divisions (Logistics Innovation Studies and Logistics Wargames), two support divisions (Logistics Analysis, and Business Operations), and the Office of the Air Force Journal of Logistics (Figure 1). This structure takes advantage of economies of scale while retaining a multidisciplinary approach for all research, analysis, and project activity.

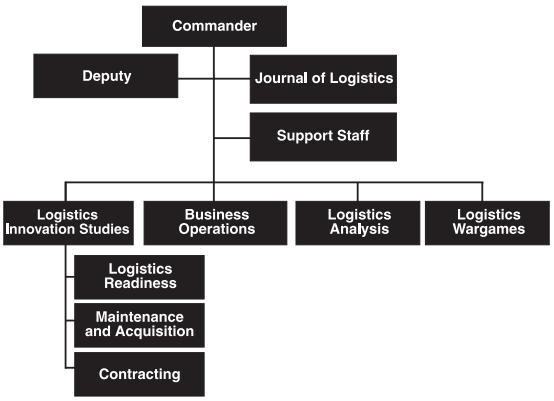

Figure 1. AFLMA Organization

2007 Conferences and Meetings Hosted

- Program reviews
- Training sessions
- Numerous senior logistics leader visits
- Defense Acquisition University discussions
- Global Logistics Support Center discussions
- Expeditionary Logistics for the 21st Century discussions
- *Red Team* review (*Contingency Contracting: A Joint Handbook*)
- Supply Chain Operations Reference model training
- Wargame planning meetings

AFLMA

Building 205 History

What would be known as Building 205 was originally built as Kilby Prison Hospital for tubercular prisoners in the late 1930s, although it was never used as such. The cost to construct the facility was $158,688.32.

In 1940, the need for additional flying training led to the establishment of the Army Air Corps Basic Flying School, Municipal Airport, Montgomery, Alabama, at the site of Montgomery's Municipal Airport on 27 August 1940. On site were one lone hangar, a commercial airline building, and the unused Kilby Prison Hospital building.

Immediately, a tent city was raised in front of the hospital building, by then functioning as the headquarters building. During the war years, it also housed temporary bunks at times, two cadet messes, an officers' mess, an operations facility, an instructor facility, and three school facilities.

After World War II, Building 205 was utilized by several units or organizations: in the early 1960s the building housed the Deputy for Gunter, 3800th Air Base Wing; on 6 April 1966, Headquarters Fourteenth Air Force took up residence; and in 1975 the Air Force Logistics Management Center (the original name of the Air Force Logistics Management Agency [AFLMA]) moved into the building. AFLMA has occupied the building continuously since then.

Over the years, a number of quality-of-life improvements were made to Building 205; however, it still had the mark of a building built in another era: 12-foot high ceilings, ceramic floor tile, exposed wiring and steam pipes, and concrete walls. By the 1990s, while the building was structurally sound, the World War II era mechanical and electrical systems were in need of a complete facelift to bring them up to current building codes. The building was renovated in 2004 and reoccupied by the AFLMA in 2005. Funding for the renovation was provided by the Air Staff.

Good Sam–Helping Others

For more than 16 years, AFLMA has assisted the Good Samaritan Ministries of Montgomery with distributing Thanksgiving food boxes. This last year, volunteers helped assemble and pass out more than 440 boxes of food to families ranging in size from 1 to 14 members. The Good Samaritans is an interfaith committee formed from representatives of local area churches. They provide assistance when area churches and agencies request help for a family. The Good Samaritans maintain a food closet so they can respond quickly when necessary. They accept cash donations throughout the year and nonperishable food items around Thanksgiving.

On Tuesday before each Thanksgiving, volunteers meet at a local church where the food boxes are packed. The first vehicles to be loaded are those of the social workers who sponsor various families. AFLMA volunteers then load the boxes into the vehicles of families who come for their individual boxes. The volunteers also deliver to families who are unable to come to the church and pick up their food boxes. At the end of the day, needy families not on the initial list may receive a box if there are any left.

News Notes

Current information about the Agency, its people, and its mission

AFLMA Support *Combined Federal Campaign*

♥ of Alabama

The 2007 Heart of Alabama Combined Federal Campaign (CFC) proved to be a banner campaign—third highest ever contributions. AFLMA continued its tradition of strong support and generosity. It surpassed the assigned unit goal with a total of $10K in pledges—211 percent of the target amount—and earned the coveted Early Bird and CFC Gold awards.

AFLMA's *dinner raffle* and several *burger burns* proved to be outstanding events and raised extra money for the CFC while also enhancing unit esprit de corps.

All in all, the 2007 Heart of Alabama CFC was a huge success not only for the Agency, but also the Maxwell-Gunter community at large.

Meals on Wheels

The Montgomery Area Council on Aging is a nonprofit organization that works through the Meals on Wheels Association of America (MOWAA) to provide warm meals to elderly and homebound people in need. However, MOWAA thrives only through its network of hard-working volunteers. More than half the people at the AFLMA take time out on a rotating schedule to help deliver these warm meals to folks in need. Volunteers provide a friendly smile; a chance to communicate with community members; and most important, a nutritious meal to get them through the day. The AFLMA volunteers work hard but find the program rewarding. Delivering meals gives volunteers a chance to get away from their desks and reach out to a community in need.

2007 Annual Awards

The AFLMA annual awards recognize outstanding job performance, community involvement, and civic service. The criteria for selection are demanding, and the evaluation process rigorous. The AFLMA norm is excellence, and to be selected signifies the individual demonstrated the highest standards of excellence, integrity, and service.

Civilian Category III

Mr James C. Rainey, Journal of Logistics

Civilian Category II

Ms Gloria J. Witherspoon, Command Section

Company Grade Officer of the Year

Capt Dennis C. Clements, Contracting Branch

Senior NCO of the Year

MSgt Kimberly A. Fiato, Readiness Branch

2007 Maxwell-Gunter Tenant Awards

Senior NCO

MSgt Kimberly A. Fiato

CGO

Capt Dennis C. Clements

Category III

Mr James C. Rainey

Mr James C. Rainey, Capt Dennis C. Clements, and MSgt Kimberly A. Fiato were selected as 2007 Civilian of the Year, Category III, Company Grade Officer of the Year, and Noncommissioned Officer of the Year, respectively, for Maxwell-Gunter tenant organizations. These awards are given on an annual basis to those individuals who have documented outstanding job performace and have made a major contribution to supporting or improving the Maxwell-Gunter community.

2007 Quarterly Awards

To be selected as an AFLMA quarterly award winner is a particularly significant accomplishment. The recipient must have demonstrated outstanding job performance and meaningful community involvement or service. As with the annual award, the criteria are demanding and the selection process rigorous.

First Quarter

Lt Beau Nunnally**
Analysis Division
Company Grade Officer

MSgt Kimberly A. Fiato**
Readiness Branch
Senior NCO

James C. Rainey*
Journal of Logistics
Civilian, Category III

Second Quarter

Capt John Flory
Analysis Division
Company Grade Officer

MSgt Glenn Dredden
Maintenance Branch
Senior NCO

MSgt Ricky D. Benton
Readiness Branch
Senior NCO

Ms Mary H. Donald*
Business Operations Division
Civilian, Category III

Third Quarter

Capt Dennis C. Clements*
Contracting Branch
Company Grade Officer

MSgt Kimberly A. Fiato
Readiness Branch
Senior NCO

Mr John K. Dietz
Analysis Division
Civilian, Category III

Ms Maxine Graham
Business Operations Division
Civilian, Category II

Fourth Quarter

Capt Frank A. Iubelt
Analysis Division
Company Grade Officer

MSgt Ricky D. Benton
Readiness Branch
Senior NCO

Ms Gloria J. Witherspoon
Commander's Support Staff
Civilian, Category II

Ms Gale J. Bowman
Analysis Division
Civilian, Category III

*Maxwell-Gunter tennant winner for the quarter **Quarterly winner for entire Maxwell-Gunter community