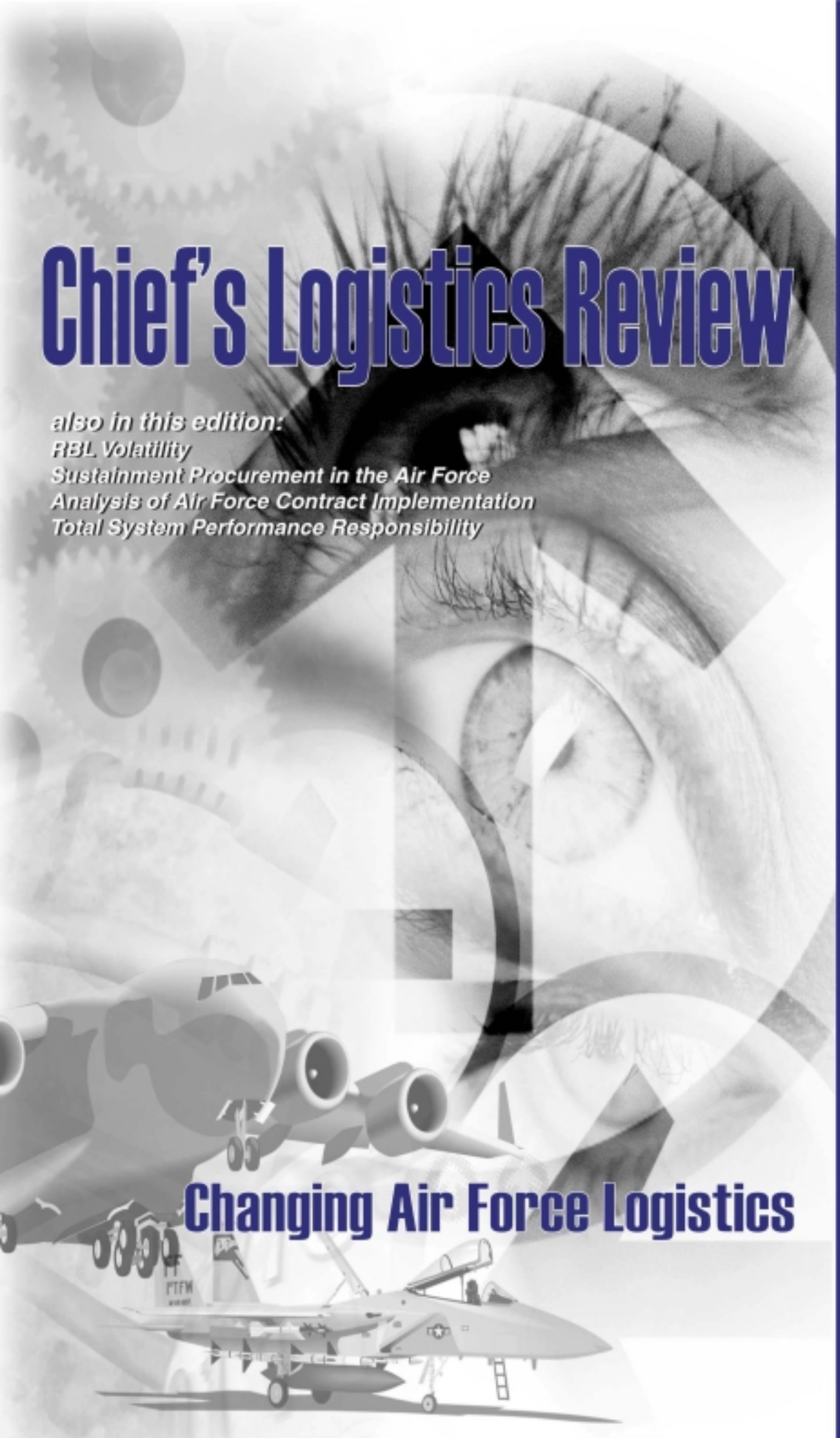

Chief's Logistics Review

also in this edition:

RBL Volatility
Sustainment Procurement in the Air Force
Analysis of Air Force Contract Implementation
Total System Performance Responsibility

Changing Air Force Logistics

JL

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Sustainment Procurement in the Air Force

WING COMMANDER
MARGARET STAIB
RAAF

The Government Accounting Office recently criticized the Air Force for rising aircraft operating costs—they now exceed $16B a year. Since the Air Force expends more than 66 percent of its budget on weapons, goods, and services, any opportunities to produce savings in this segment of the budget should be pursued.

In the commercial sector, companies have significantly reduced costs through smarter purchasing and supply management practices and adoption of e-commerce and e-business strategies. One component of a much broader e-commerce or e-business strategy is the use of business-to-business (B2B) Internet reverse auctions. Many commercial firms report significant reductions in initial purchase prices by using Internet-based reverse auctions. The technique whereby vendors vie for a contract by bidding against each other online is called *buyers* or *reverse auctions* because the price moves downward.

This article discusses the applicability of B2B Internet reverse auctions for sustainment procurement and recommends a policy framework for their use in the Air Force.

Background

The Department of Defense (DoD) recently began using reverse auctions to purchase goods, with the Navy conducting its first one on 5 May 2000. The Naval Supply Systems Command held an auction for ejector seat components and saved an estimated $1M. Another auction held at the end of June 2000 for ship-related services resulted in a savings of almost $3M. The Army has completed four auctions, three for information technology items and one for a military-performance specification connector for the Patriot system. On 3 August 2000, the Air Combat Command (ACC) conducted three reverse auctions for computer equipment, saving $88K (27 percent). On 24 August, ACC followed with its fourth reverse auction for computers and saved another $60.2K (23 percent) from the General Services Administration scheduled price. On 8 September, the Air Force Materiel Command (AFMC) purchased 25 computer monitors using a reverse auction. However, the price reduction amounted to only $225 (1.8 percent). In this case, the three participating vendors were not manufacturers or distributors of computer equipment, and there were only two bids.

The Army is using license-free software developed by the Massachusetts Institute of Technology Media Lab, which has since been purchased by Moai and Frictionless Commerce. It is also negotiating a follow-on agreement that will attract a license fee. The Office of the Assistant Secretary of the Air Force, Acquisitions is examining the Army software and whether the Air Force can be included in future arrangements. They are currently developing policy and examining mechanisms for using reverse auctions. In the meantime, various Air Force commands are testing the Army's software.

Since there is no guidance on the types of spares suited to procurement by reverse auction, the Air Force Deputy Chief of Staff, Installations and Logistics has been tasked with developing guidelines as part of the broader initiative to use e-business strategies to increase supply chain efficiency and responsiveness to the warfighter.

Market Use of Reverse Auctions

The concept of reverse auctions is not new (haggling at a market is akin to reverse auctions). B2B Internet reverse auctions started in late 1994 when Glen Meakem proposed making suppliers compete for manufacturers' orders in live, electronic auctions. Meakem set up his own business, FreeMarkets, Inc, which has a market capitalization of $2.7B and clients such as General Motors, United Technologies, Raytheon, and Quaker Oats. These companies have saved more than 15 percent, on average, buying parts, materials, and services at FreeMarkets auctions.[1] Texas-based Moai Technologies has also developed a web-based platform for conducting online auctions. Moai worked with GoCargo.com to build a custom transaction engine that would support the online auctioning of container shipping space. GoCargo.com, launched in November 1999, drew more than 250 registered shippers in its first few days of operations.[2]

Other companies in the online market offer products ranging from B2B platforms, web-based B2B procurement, and live exchanges to software for online auctions. The web-based transaction systems market is expected to increase to $1.4B over the next 3 years.[3]

(Continued on page 40)

Changing Air Force Logistics

In September 1999, the Chief of Staff, United States Air Force (CSAF) directed a top-to-bottom review of base-level logistics processes. The review was titled the CSAF Logistics Review (CLR), and the purpose was simple: improve our Expeditionary Aerospace Force (EAF) combat readiness. Members from the headquarters staff, as well as operators and logisticians from all the major commands (MAJCOM), jointly participated in the review. The MAJCOM participants identified wing-level operations and logistics issues and recommended ways to strengthen processes to fix disconnects and gaps. The recommendations provide methods to enhance policy, procedures, training, discipline, and enforcement.

Numerous circumstances contributed to the need for the CLR. Following the highly successful Desert Storm campaign, the Air Force embraced the objective wing concept—a significant change to the traditional wing organizational structure. We also replaced

Chief's Logistics Review

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very detailed regulations and manuals with less specific instructions and policy directives. At the same time, we downsized the force by 25-35 percent and entered an era of sustained high ops tempo with Northern and Southern Watch rotations, a presence in the Balkans, and humanitarian missions worldwide. Implementing the EAF concept helped provide predictability to the ops tempo, but our five-skill-level manning shortage continues to put an extreme burden on our core work force supporting the ongoing deployments. All these changes impact our ability to maintain EAF readiness.

Our operational needs have changed with EAF objectives, yet the processes to support them have remained largely unchanged. We simply adapted old processes to new concepts. Without a doubt, we have the most capable Air Force in the world—manned with the finest—and given a job to do, our logisticians will always succeed. However, it is time to rethink the processes and match our support to current operational concepts. CLR is aimed at doing just that. The CLR recommendations are all about restoring the emphasis on policy, procedures, training, discipline, and enforcement to improve our EAF readiness.

From September 1999 to July 2000, we conducted the review with participation of all MAJCOMs and presented the findings to the MAJCOM commanders in October 2000. After presenting additional information to the MAJCOM commanders in February 2001, we were given the go-ahead to test the initiatives at locations throughout the Air Force. The tests began this summer and will last about 6 months. Based on test results, we will develop recommendations and present them for approval prior to implementing tested CLR initiatives Air Force-wide.

I want to assure you that this review was not directed because anyone or any unit failed to perform the mission; rather, it is designed to improve our ability to support EAF operational concepts. We have the finest air force in the world, and the CLR will only make it better.

This article explains in detail the process and initiatives associated with the CLR. It begins with the driving forces behind CLR and culminates with an explanation of the test and evaluation processes.

The CLR is about looking to the future, defining better ways of providing logistics support to meet the dynamic requirements of the EAF. Since the shift to the EAF concept in October 1999, the operations community has implemented initiatives to make the Air Force more expeditionary, placing a premium on rapid deployment and employment of light forces and a smooth shift to sustainment in support of extended operations. The focus of the logistics community during this time has been on reducing the logistics footprint to speed deployment execution. The CLR shifts this focus to improving the execution of logistics processes. Through initiatives aimed at process improvement and realignment, improved focus on fleet capability, and enhanced technical training and officer development, the CLR seeks to position the logistics community more firmly in support of EAF operations.

The Motivation for a Logistics Review

A briefing presented to the Chief in September 1999, by General John P. Jumper, then Commander, United States Air Forces in Europe (USAFE), was a key catalyst for the CLR. The briefing, entitled Posturing Aircraft Maintenance for Combat Readiness, highlighted declining readiness trends and degraded warfighting skills, referencing experiences during Operation Allied Force/Operation Noble Anvil (OAF/ONA).[1] Subsequent to this briefing, the Chief directed a top-to-bottom review of logistics processes and training programs to identify actions required to resolve deficiencies that contribute to declining readiness trends in aircraft maintenance.

Without a doubt, we have the most capable Air Force in the world—manned with the finest—and given a job to do, our logisticians will always succeed. However, it is time to rethink the processes and match our support to current operational concepts.

Responding to the Challenge

The CLR began with a memorandum to MAJCOM commanders enlisting their support to conduct a 1-year review of our logistics processes, with an eye toward recommending changes that facilitate the EAF.[2]

CLR goals and guidelines included:

- Keeping turbulence at a minimum by evaluating processes rather than organizations.
- Relating all changes/adjustments to the EAF, specifically whether changes should be made for more centralized or decentralized support for home and deployed forces.
- Considering leadership development for officers—look at both logisticians and operators.
- Developing changes or adjustments within constrained funding boundaries.

The Chief emphasized keeping turbulence at a minimum by concentrating on the most feasible wing-level process improvements and evaluating options by how they affect EAF implementation. Over the course of the study, the emphasis on EAF objectives led to the following expected impacts:

- Improve not mission-capable maintenance rate by 10 percent by 2004.
- Improve retention of five-level maintenance personnel to desired levels (approximately 55/75 percent).
- Produce a more professionally trained and capable force across all logistics disciplines.
- Stabilize flying-hour program execution.
- Continue officer development for both logistics and rated officers.
- Enhance contingency planning, deployment, and execution.

- Instill same level of concern for fleet health as for sortie production.
- Instill balanced focus for fleet health and sortie production.

Enabling the EAF Through a Balanced Focus

To meet EAF time lines, units must deploy and set up support production processes quickly. Deploying units, therefore, must minimize equipment and support taken during the initial deployment. This, in turn, demands a support system that can deliver sufficient resources to sustain operations. These goals alone would require an analysis to determine if the current support processes can meet these new time pressures.

But an even larger issue faces the Air Force. While wings must respond to daily sortie production requirements, they must also maintain aircraft for other possible simultaneous or future engagements. When these demands compete, tradeoffs must be made. In an earlier RAND Project Air Force[3] study, Dahlman and Thaler noted:

> On the most basic level, United States Air Force (USAF) wings and squadrons are designed to produce two overarching and intimately connected outputs related to readiness. The first is the ability to provide current military capabilities; i.e., the activities universally associated with operational readiness. If a wing had to go to war now, how well would its capabilities match up with the demands levied by the combatant commanders in chief (CINCs)? Are the right numbers of personnel trained appropriately? Is equipment in good working condition with an adequate level of supplies? Can the requisite number of effective sorties be generated?
>
> The current production of future capabilities, while usually receiving less attention, is equally important . . . DoD and USAF guidance on and the management of readiness traditionally emphasize operational readiness, and the requirements for maintaining this readiness are explicit. The production of future capabilities, through the rejuvenation of human capital by on-the-job training (OJT), however, is not normally recognized as a separate and equally important tasking that is embedded in units. As units are deployed to support contingency operations, they must trade off building future capabilities for providing current ones. The longer this continues, the more units must postpone or scale back upgrade training and life-cycle maintenance of aircraft. Future commanders will then have a less experienced, less capable force from which to draw.[4]

The CLR is about looking to the future, defining better ways of providing logistics support to meet the dynamic requirements of the EAF.

Future fleet health and growing the human capital necessary to produce readiness in the future is not receiving enough attention. The tradeoff decisions between fleet health for daily sortie production requirements and investment in human capital through training, as well as other initiatives that contribute to future fleet health, are being made in favor of near-term capability. CLR participants recognize this imbalance, so achieving a balance became an underlying theme for the effort.

Methodology and MAJCOM Inputs

The CLR methodology focused on MAJCOMs and wings. Air Staff and RAND Project Air Force researchers developed and refined the formal methodology, building a study matrix outlining participants, time lines, evaluation metrics, core process definitions, and a list of potential targets of opportunity (ToO) for logistics process improvement.

The MAJCOMs were directly involved in establishing an initial set of ToO and asked to identify problems and solutions associated with each. MAJCOM representatives agreed on a final set of ten basic ToO, cutting across all the core logistics functions, and then were asked to address each in detail through formal written input (Table 1).

The MAJCOM input highlighted a wide range of challenges facing wing-level logisticians, but a number of core issues repeatedly surfaced for each area (Table 2).

MAJCOMs were asked to provide, in collaboration with their peers, a second round of submissions on specific process improvements for each ToO (Table 3). These submissions generated MAJCOM solution statements that addressed the previously identified problem statements. The solution statements were grouped into four process focus areas, within which the options were analyzed.

Four Process Focus Areas

The ToO and MAJCOM inputs were grouped into four process focus areas: technical training and officer development, materiel management, contingency planning, and sortie production and fleet health management (Figure 1).

The first focus area is training and officer development, and the second process focus area is materiel management. The supply management and transportation ToO were mapped into the materiel-management process focus area. Contingency planning, the third focus area, is defined as those activities associated with deployment planning and execution. The logistics plans ToO provided the basis for problems and solution options within the contingency planning process focus area. Finally, the fourth process focus area, sortie production and fleet health management, is defined as those activities associated with sortie generation (organizational-level maintenance), intermediate-level maintenance, and long-term health of the fleet. MAJCOM inputs associated with the following ToO were mapped into the sortie production and fleet health management process focus area: maintenance management, maintenance inspections, maintenance repairs, sortie generation, and ammunition storage/management.

MAJCOMs submitted more than 5,000 inputs that were distilled into 618 individual problem statements with associated solutions. Of those, 423 were within the scope of the CLR. The remaining 195 were deemed outside the scope primarily because they did not focus on wing-level logistics processes.

CLR Targets of Opportunity
1 Maintenance Management
1.1 Describe how best to provide available aircraft to support EAF.
1.1.1 Consider how maintenance is controlled day-to-day and month-to-month (for example, maintenance operations center processes, production superintendent responsibilities).
1.1.2 Consider how maintenance and operations scheduling can be better utilized to provide best support for aerospace expeditionary force (AEF) flying schedules.
1.2 Describe how best to provide analysis for maintenance actions.
1.2.1 Consider predictive capability and deficiency analysis.
1.2.2 Consider deployment of logistics/maintenance information systems.
1.2.3 Consider management of database requirements.
1.3 Describe how best to provide senior-level control and accountability for maintenance actions.
1.3.1 Consider maintenance authority levels.
1.3.2 Consider balance between operational requirements and health of fleet (determinations/timing of deferred maintenance actions).
1.4 Describe how to best provide increased maintenance discipline.
1.4.1 Consider quality assurance requirements/techniques.
1.4.2 Consider technical order usage enforcement.
1.4.3 Consider maintenance documentation enforcement.
1.4.4 Consider maintenance standardization.
2 Maintenance Inspections (scheduled and unscheduled maintenance)
2.1 Describe how to best optimize scheduled inspections.
2.1.1 Consider time change/time compliance technical order/in-process inspections, requirements, and timing.
2.1.2 Consider phase/periodic fleet management.
2.1.3 Consider phase/periodic quality.
2.1.4 Consider manpower requirements.
3 Maintenance Repairs
3.1 Describe how to best provide standardization of repair processes across different organizations.
3.1.1 Consider aircrew protection processes (survival equipment, life support, egress).
3.1.2 Consider aerospace ground equipment (AGE)/munitions trailer/hydraulic maintenance processes.
4 Sortie Generation
4.1 Describe how to best provide maintenance capability of skills (Air Force specialty codes [AFSC]) that bridge multiple organizations.
4.1.1 Consider electroenvironmental processes.
4.1.2 Consider armament/weapons processes.
5 Training
5.1 Describe how to increase priority of and best provide maintenance upgrade and recurring training (enlisted).
5.1.1 Consider advocacy/champion for maintenance training at the base level.
6 Ammo Storage and Management
6.1 Describe how to best provide capability to store and maintain special weapons (for example, nuclear and so forth).
7 Supply Management
7.1 Describe how to best capture demand/compute requirements to support weapon systems.
7.1.1 Consider tailoring kits as appropriate to wartime taskings.
7.1.2 Consider method of developing reachback to support deployed operations.
8 Transportation Management
8.1 Describe how to best develop plans for and operation of transportation portions of base deployment operations.
8.1.1 Consider methods of using centralized control center (for example, air terminal operations center/wing operations center) for peacetime and wartime operations.
8.1.2 Consider special purpose vehicle maintenance capability to maintain AGE or munitions trailers.
8.1.3 Consider vehicle operations capability to operate refueling trucks or other delivery vehicles.
9 Logistics Plans
9.1 Describe how to best direct deployment (command and control).
9.1.1 Consider needs for standardization of logistics plans processes to support EAF/AEF deployments and mobility.
9.2 Describe how to best conduct strategic and war planning.
9.2.1 Consider Joint Operation Planning and Execution System (JOPES) qualifications and currency (potential of development of training database).
9.2.2 Consider site survey currency.
9.2.3 Consider base support plans currency.
9.2.4 Consider host-tenant support agreements currency.
9.3 Describe how to best manage war reserve materiel.
9.3.1 Consider prepositioned equipment ownership and management.
10 Officer Development
10.1 Describe how to best train, educate, and sustain logistics officers (for example, career development).
10.1.1 Consider accession AFSCs and training in development of career paths.
10.1.2 Consider on-the-job logistics officer training program standardization upon initial base arrival (after technical school).
10.1.3 Consider recurring training and life-cycle training requirements.
10.1.4 Consider crossflow or career-broadening opportunities and staging points.
10.1.5 Consider field grade officer utilization in development of career paths.
10.1.6 Consider retention benefits.

Table 1. CLR Targets of Opportunity

Target of Opportunity	MAJCOM Problem Statements
1. Maintenance Management	• Maintenance operations center (MOC) organizational alignment prevents effective scheduling and coordination of maintenance activities. • Authority for maintenance is split between two groups and impedes effective maintenance processes.
2. Maintenance Inspections	• Scheduled maintenance is sacrificed to fill short-term operations requirements.
3. Maintenance Repairs	• Life-support, survival equipment, and egress systems perform very similar core tasks that could be performed by one specialized flight.
4. Sortie Generation	• Functional management and effective streamlined use of armament personnel are limited.
5. Training	• No single point of contact for logistics training management.
6. Ammo Storage/Management	• Combat Ammunition System has shortfalls.
7. Supply Management	• No command-and-control structure to support multiple AEF worldwide deployments.
8. Transportation Management	• Deployment command and control system is slow. • Deployment guidance is insufficient.
9. Logistics Plans	• Lack of guidance negatively impacts ability to lead deployment operations.
10. Officer Development	• Logistics officer training is nonstandard, haphazard, and not mandated.

Table 2. Common MAJCOM Problem Statements

Target of Opportunity	MAJCOM Solution Statements
1. Maintenance Management	• Authorize MOC to resume control functions. • Centralize aircraft fleet management and planning functions. • Align maintenance under experienced, professional maintainers.
2. Maintenance Inspections	• Centralize phase scheduling and plans scheduling and documentation (PS&D) under organization responsible for fleet health.
3. Maintenance Repairs	• Investigate realignment of tasks for life-support, survival equipment, and egress systems into a single AFSC.
4. Sortie Generation	• Centralize all armament personnel under single group commander.
5. Training	• Centralize training management within the wing under the logistics group (LG).
6. Ammo Storage/Management	• Upgrade or replace combat arms storage.
7. Supply Management	• Redesign readiness spares packages to enable flexible deployments. • Require regional supply squadrons (RSS) to provide timely mission-capable status to customers.
8. Transportation Management	• Reorganize/realign the deployment structure and information flow. • Revise deployment guidance and standardize critical steps.
9. Logistics Plans	• Revise deployment guidance to standardize organization and process.
10. Officer Development	• Develop Air Force training policy to standardize OJT for logistics officers

Table 3. Common MAJCOM Solution Statements

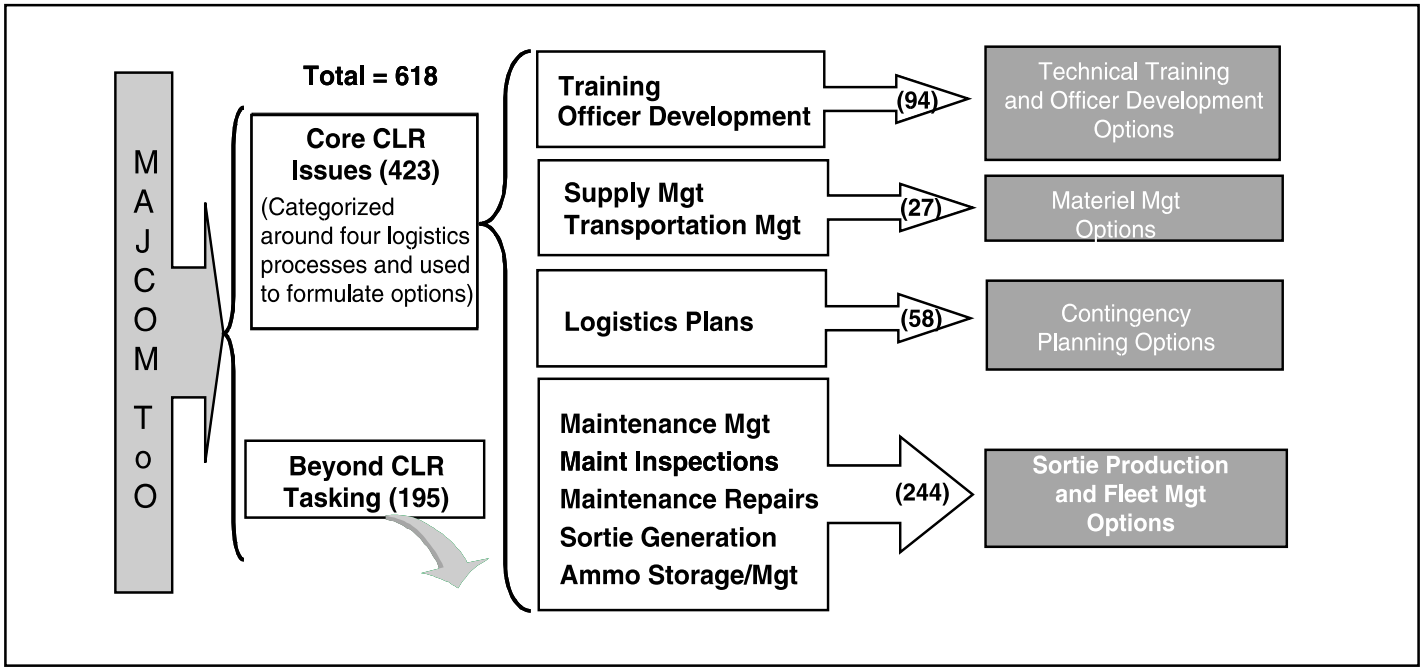

Figure 1. Process Focus Areas

Items beyond the scope of CLR were forwarded to the appropriate Air Staff agency for consideration in future policy and programming decisions. The 423 core CLR problem-and-solution options were analyzed within one of the four process focus areas and refined for presentation to senior Air Force leaders.

Analysis Results

MAJCOM, Air Staff, and RAND Project Air Force representatives analyzed the MAJCOM inputs for common themes and improvement strategies in each of the process focus areas, as outlined below.

Technical Training and Officer Development

Training for all logistics officers needs improvement. One problem is the somewhat haphazard nature of the current process. For example, there is no training plan that spans a logistics officer's career, and OJT is not standardized across wings. A second problem is that the opportunities for formal training, after completion of technical school, are limited. Furthermore, there is no requirement that officers complete the courses offered. The training situation was similar in the past, but deficiencies were overcome in several ways, including more comprehensive basic technical school training, closer monitoring of logistics careers, performance recognition by the Air Force Personnel Center under Palace Log, and finally, diligent and competent mentoring. Mentors provide opportunities to attend secondary schools or field training detachment classes, as well as their own training and education.

In addition to training and mentoring, there are problems with career paths for maintenance and logistics officers. Too much emphasis on crossflow into other logistics functional areas detracts from the development of core competencies. The emphasis on crossflow results from the orientation of the 21L (logistician) career path, which is geared to the development of generalists. The 21L designation requires acquisition of a second AFSC, mandating crossflow. Since wartime unit type codes are usually mated with specific AFSCs, generalists are in less demand for AEF deployments, calling into question the utility of the generalist in wartime scenarios.

The crossflow and career development issues resulted in an initiative to refine the core logistics officer career field. The foundation of the refinement effort is establishing dual-track logistics officer career paths. The dual-track concept aligns aircraft maintenance and munitions/missile maintenance in one track and supply, transportation, and logistics plans in another. Officers will gain experience and qualifications in their core track or path with some amount of crossflowing between the two tracks. The details of the dual-track concept are still being formulated, with the goal of developing officers with greater depth of experience.

Complementing the logistics career path refinement is development of a logistics weapons school. Lessons learned from Desert Storm and, most recently, Operation Allied Force highlighted deficiencies in logistics officer training. The difficulties confronted by company-grade logistics officers, deployed forward and placed in key decision-making positions, centered on a lack of understanding and ability to integrate the combat support resources available to them to meet operational requirements. The Air Combat Command is leading the effort to develop an in-depth *PhD-level* logistics officer weapons school curriculum for a select group of highly qualified, company-grade logisticians. The logistics weapons school will train a small number of officers each year, creating highly skilled operational logisticians competent in producing the following logistics effects: mobilization, deployment, beddown, sustainment, combat employment, redeployment, reconstitution, and command and control. In addition to honing logistics skills, the school will provide instructional tools, enabling the graduates to return to their units and teach other wing-level logisticians in the art and science of logistics. Ultimately, this provides warfighting commanders with special expertise in the application of expeditionary logistics.

In addition to training and mentoring, there are problems with career paths for maintenance and logistics officers. Too much emphasis on crossflow into other logistics functional areas detracts from the development of core competencies.

A final point for improving officer development regards rated officers who require maintenance training. This is particularly important in light of the increasing need to balance current sortie requirements with future capability. Without appropriate training, the officers who command maintenance functions may not be prepared to understand the intricacies of balancing sortie production and fleet health. There is a need for more senior noncommissioned officer (NCO) training to better prepare them to assume expanded leadership roles under EAF operational concepts. Finally, Air Force training policy should be changed to synchronize training cycles with the AEF rotational cycle.

Materiel Management

The MAJCOMs agreed to integrate the wing-level materiel management processes into a single authority responsible for base-level supply and transportation functions. This could be achieved by combining the current supply squadron and transportation squadron into a new squadron focused on base-level materiel management, thus streamlining processes and eliminating overlapping functions. The advent of RSS and improved information technology have made base-level integration of these management processes more feasible.

Combining the squadrons also makes sense for better supporting the AEF concept. Computer technology in the RSS makes it possible to oversee all Air Force supplies. That took us a giant step beyond overseeing what is in the base

supply warehouse. Armed with the ability to see all assets of the type needed, the next decision becomes selecting the one that can most quickly be moved to the place where it is needed. That brought together supply and transportation thinking in new ways.

Forming regional supply squadrons also reduced the size of the base supply operation. What is left of base supply is the cargo-receiving, storing, and issuing functions that are very similar to the transportation squadron's receiving, temporary storage, delivery, pickup, packaging, and shipping duties. Combining these functions under one squadron commander reduces the handoffs and complexity of the base distribution system and synergizes some of the processes in ways that could reduce handling time.

Improvements will also be made in making timely and accessible mission-capability status reports by RSS available to their customers. Specific RSS support responsibilities should be established in the operation plan or negotiated between the RSS and the supported organizations.

Contingency Planning

Recommendations for contingency planning included improvements in planning and execution policy as well as base-support planning and site-survey policy. Many of these suggestions stem from experience in OAF/ONA. The most popular suggestion was updating Air Force Instruction (AFI) 10-403, *Air Force Deployment Planning*, and AFI 10-404, *Air Force Base Support Planning Policy*, to include more detailed guidance for deployment and site surveys. Next, commands requested a standard, detailed deployment process and structure that clearly defines the tasks to be accomplished and the organization responsible for performing each action. They also suggested clearly defining the flow of deployment task assignments to each wing.

The MAJCOMs believe the current alignment of contingency planning activities and, more specifically, the logistics plans function inhibit wing-level contingency planning and execution. Some commands have logistics planning in the logistics support squadron, other commands have logistics planning in the wing planning office, and still other commands have

The MAJCOMs believe the current alignment of contingency planning activities and, more specifically, the logistics plans function inhibit wing-level contingency planning and execution.

some mix of these two structures. After extensive evaluation, there is a consensus among MAJCOMs that the alignment of logistics planning needs to be standardized. MAJCOMs view standardization as key to both officer development and smooth execution of deployment processes execution. MAJCOMs suggested two options for standardization: aligning all logistics plans functions under the wing logistics group or the wing planning function.

Sortie Production and Fleet Health

MAJCOMs indicated that balancing current sortie production requirements with maintaining fleet health for future requirements is not receiving enough attention. Better focus by wing commanders, operations group commanders, and logistics group commanders on metrics for both fleet health management and current sortie production requirements should improve both near- and long-term capabilities. To ensure such focus, training courses will include instruction on the proper use of metrics and their contribution to the quality of maintenance. Such metrics could contribute to fleet health assessments, quality assurance, maintenance analysis, and data collection and integrity enforcement. MAJCOMs also recommended enforcing policy on the use of metrics. This may be instituted at various levels of command, beginning with changing Air Force instructions and other directives. Wing practices may be monitored through regular reporting to higher levels, staff assistance visits, and inspector general inspections for compliance. MAJCOMS did not note specific faults with existing metrics, but all felt that a standard set of metrics should be created for managing sortie production and fleet health balance, guidance in AFI 21-101 and MAJCOM supplements should be strengthened, and more should be done to ensure compliance at every level. Wing commanders should ensure local strategies are in place to bring together data flowing from the two groups with aircraft maintenance responsibilities, and such data should meet MAJCOM reporting requirements. All commands emphasized the need to continue improving and simplifying data recording, maintenance data system accuracy, and availability of decision support tools as a means to improve performance.

MAJCOMs generally agreed on the need to improve maintenance policy detail and enforce compliance. The main recommendation was to update the current 21 series Air Force instructions and provide more detailed policy for maintenance scheduling and analysis to assist daily decision making. The MAJCOMs also recognized the need for supplemental updates to bring about wing-level and functional management guidance changes.

The review concluded that aligning fleet health functions under the logistics group would serve to better balance sortie generation and long-term fleet health requirements. This alignment will be tested as a near-term test initiative. The MOC, maintenance analysis, PS&D, quality assurance, and phase inspection sections would be consolidated under the logistics group. The MOC will remain a vital activity that coordinates maintenance actions between organizations. Sortie generation maintenance (on-equipment) remains in the operations squadrons under the operations group. MAJCOMs favored strengthening planning and scheduling coordination between the operations group and logistics group and increasing attention to metrics at group and wing levels. Finally, clearly defined lines of authority for the operations group

commander and logistics group commander responsibilities will ensure proper balance of sortie production and fleet health needs.

Other areas where weaknesses in knowledge imply the need for improved training on sortie production and fleet health management include aircraft scheduling, aircraft battle damage repair, war reserve materiel management, computerized systems and analysis, and production supervisor/expediter basics. Several mechanisms are available to improve training, including an expanded role for the logistics training flight, increasing the availability of training managers, and improving the Career Field Education Training Plan.

Better training, including cross-utilization training and training in agile work force tasks that are mission design series (MDS)/AFSC-specific, can help realize more efficient use of personnel. The Air Force would benefit if more three-level personnel could deploy for expeditionary operations. This would reduce the stress of excessive deployments for more senior personnel and help maintain the proper seniority mix needed for OJT of three-level personnel at home bases. A process to accomplish this should consider three-level maintenance upgrade training at such locations.

In general, maintenance efficiency could be improved with better policy enforcement. This requires training in the importance of the policies and in methods of ensuring their enforcement. Specific areas where better enforcement is needed include maintenance documentation, quality assurance, and technical orders.

The Air Force has a wealth of experience in developing job performance aids in maintenance at levels from junior technician to senior leadership. At the technical level, conversion from general technical orders to job performance guides has decreased training requirements and improved the accuracy of maintenance troubleshooting and repair actions. At the top level, a handbook developed years ago for USAFE wing commanders and the more recent Senior Level Maintenance Course have helped provide greater maintenance knowledge to higher ranking operators. Most MAJCOMs noted the need for a senior leaders' analysis handbook and a scheduling and planning quick-reference guide. There may be additional opportunities for leveraging investments in logistics decision support tools that should also be considered.

Formulating Recommendations

The consolidated recommendations resulted in a set of *must-do* and *should-do* solutions and implementation actions (Table 4). The recommended solutions were presented to each MAJCOM commander, whose comments were incorporated prior to being presented at Corona Fall in October 2000.

With few exceptions, the recommendations received widespread support and were approved for testing. The Chief asked that some recommendations undergo additional analysis. These were subsequently approved for testing. Prior to implementation across the Air Force, however, the Chief of Staff asked that the initiatives be tested over a 6-month period, resulting in CLR phase 2 testing and implementation.

Next Steps–Implementing and Evaluating Process Improvements

For CLR phase 2, it was necessary to classify initiatives according to their evaluation and implementation time line. Some, such as policy refinement, were already underway as a function of day-to-day business at the Air Staff. Others, focused on the near term, were appropriate for CLR field testing. Still others were more strategic in nature and could be implemented only over several years. Below are, first, near-term initiatives—or those that will undergo implementation testing at selected sites beginning in summer 2001—with subsequent implementation across the Air Force (subject to favorable test results). We then discuss long-term initiatives or those that have implementation and evaluation lead times extending beyond 2001. Finally, we discuss continuous refinement initiatives already underway, either as a result of previous efforts (for example, regional supply squadrons) or policy revisions that are accomplished routinely.

Near-Term Test Initiatives

Near-term test initiatives focus on process improvement and realignment of responsibilities for key processes. In materiel management, these initiatives will examine the integration of wing-level supply and transportation processes and alignment of those functions under a single squadron. In the contingency planning process focus area, initiatives include aligning the logistics planning responsibilities under the logistics group commander, with one test placing logistics plans functions in the logistics support squadron, and the second placing them within the new squadron created to integrate supply and transportation processes.

Other near-term initiatives are in sortie production and fleet health. These include evaluating the impact on long-term fleet health of a renewed focus on metrics and the publication of a metrics handbook and aligning the responsibility for core fleet health functions (that is, MOC; phase; quality assurance; analysis; and plans, scheduling, and documentation) under the logistics group.

The tests of these initiatives have two goals. The first is to evaluate the impact of the initiatives on wing-level process performance. Measuring the impact on wing-level processes is difficult because of the short duration of the test and possibility of confounding effects. The test will, therefore, include both qualitative and quantitative measures. Air Staff and RAND Project Air Force teams will gather quantitative data on process performance over the 6-month test period. The quantitative results may indicate little change in performance, but the qualitative analysis, conducted through focused and open-ended interviews, will help in determining causal relationships between the process changes and quantitative measurement results. The second purpose is to ensure the initiatives do not produce unintended results in related logistics processes. The results of this analysis will be used to formulate final implementation recommendations to the Chief of Staff and senior Air Force leaders.

Long-Term Evaluation Initiatives

While the process improvement and realignment initiatives have a near-term focus, the officer development and

Focus Areas	
Technical Training Options	
Must-Do Initiatives	**Implementation Actions**
• Enhance technical training.	• Redefine training manager duty policy.
• Increase availability of training managers.	• Devote training manager to production training.
• Standardize and enforce training of wartime tasks.	• Standardize MDS minimum upgrade requirements/ documentation. • Develop Air Force-wide standardized curriculum for wartime tasks such as fuel tank buildup, aircraft battle damage repair, aircraft scheduling, war reserve materiel management, and so forth. • Develop a process for units to utilize three levels at AEF contingency locations—must include three-level maintenance upgrade training at such locations.
• Change Air Force recurring training timing to coincide with AEF cycles.	• Match recurring training with AEF cycles.
• Train logistics senior NCOs in technical leadership development.	• Develop technical leadership course for senior NCOs that teaches: o Relationship of maintenance metrics to management decisions. o Long-term fleet health discipline.
Officer Development Options	
Must-Do Initiatives	**Implementation Actions**
• Refine core logistics career-field management and crossflow policy.	• Establish training/experience *gates* for logistics officers.
• Develop weapons school for logistics officers.	• Create logistics course integrated with weapons school at Nellis AFB.
• Improve crossflow management.	• Publish specific logistics officer crossflow policy to guide commander decisions.
Should-Do Initiatives	**Implementation Actions**
• Align logistics officer career paths into two tracks (maintenance/munitions and materiel management/ planning); include initial skills and advanced training requirements.	• Implement two officer career paths: o Logistics: transportation/supply/logistics plans. o Maintenance: aircraft/munitions/missiles. • Ensure crossflow between the two. • Outline development process to grow senior logisticians in consonance with developing aerospace leaders.
Materiel Management Options	
Must-Do Initiatives	**Implementation Actions**
• Provide guidance for materiel management pipeline analysis.	• Develop overarching command and control (C2) policy to support EAF.
• Develop specific metrics for materiel management activities to drive pipeline performance in support of operational requirements.	• Define performance indicators for moving parts from flight line to end destination. • Refine Air Force policy to ensure spares are equitably distributed during AEFs/contingencies.
• Improve RSS policy.	• Build standard Air Force RSS policy/procedures.
• Continue to develop and refine policy to address RSS responsibilities in support of contingency operations.	• Define for peacetime, wartime, and contingency operations. • Incorporate lessons learned from air war over Serbia.
• Develop training on RSS processes, tools, and metrics.	• Develop training to enable rapid deployment. • Develop standard Air Force tools and metrics.
Should-Do Initiatives	**Implementation Actions**
• Create single authority for distribution process.	• Combine wing supply and transportation squadrons.
• Enhance combat support C2 at regional activities.	• Develop standard Air Force logistics C2 processes and procedures for AEF/contingencies.
• Add capabilities to RSS to improve C2 decision support. • Provide tools for reachback, visibility, and followup.	• Identify standard Air Force C2 suite of tools to be used in regional supply squadron.
Contingency Planning Options	
Must-Do Initiatives	**Implementation Actions**
• Create and report metrics for contingency planning against EAF goals.	• Develop operational goals and metrics for expeditionary combat support (ECS) planning activities.
• Develop specific metrics for each wing commander to assess site survey, deployment, and beddown timing.	• Develop ECS readiness reporting structure.

Table 4. CLR Proposed Initiatives and Implementation Actions[5]

• Improve policy for deployments and site surveys.	• Standardize Air Force site survey process.
• Ensure more definitive EAF guidance in deployment policy.	• Establish specific wing, MAJCOM, and Air Force responsibilities for information gathering and standard Air Force suite of tools.
• Refine policies, standardization, and integration for EAF site surveys.	• Redirect EAF/contingency policy to guide beddown planning actions before/during deployments.
• Create JOPES certification policy and track training qualifications.	• Identify requirements for Air Force-wide JOPES-trained cadre. • Develop and institutionalize training and tracking via ECS readiness reporting.
Should-Do Initiatives	**Implementation Actions**
• Standardize logistics plans under LG.	• Wing plans remains accountable for wing plans. • Assign all logistics planners under the LG. • Make LG accountable for logistics plan development, deployment training, and execution.
Sortie Production / Fleet Management Options	
Must-Do Initiatives	**Implementation Actions**
• Place increased emphasis on sortie production and fleet health processes.	• Rewrite AFI 21-101, *Maintenance Management of Aircraft.* • Specify policy, procedures, training, discipline, and enforcement. • Spell out OG/LG responsibilities. o Combat air force and tactical airlift wing. o OG—sortie production; LG–fleet health. o Air Force Special Operations Center/Air National Guard/Air Force Reserve Command/Air Force Space Command and Air Mobility Command strategic wings remain *as is*.
• Provide policy for current versus future readiness tradeoff analysis. • Develop specific metrics for each wing commander to drive balance between operations requirements and fleet health.	• Establish specific metrics to drive balance between daily sortie production and long-term fleet health.
• Develop senior leaders' metrics handbook.	• Write *how-to* book to guide senior maintenance decision making.
• Assist rated officers and logisticians in interpreting metrics.	• Identify leading and lagging indicators. • Recognize/manage trends.
• Improve enlisted maintenance training. • Use personnel more effectively: revitalize cross-utilization training and standardize AFSC task training records.	• Improve cross-utilization training. • Develop cross-utilization training task lists for each MDS Air Force specialty combination. • Standardize MDS training folders.
• Improve logistics and rated officer maintenance training. • Integrate rated officer maintenance metrics course. • Direct mandatory senior leader maintenance training for operations group and flying squadron commanders.	• Develop maintenance courses for commanders. Mandatory for OG/LG maintenance/flying squadron commanders prior to command.
• Determine requirement/location of MOC.	• Place MOC under the LG, accountable to an O-4 or higher maintenance operations officer (MOO). • MOO also responsible for PS&D, quality assurance, and analysis.
Should-Do Initiatives	**Implementation Actions**
• Regionalize intermediate repair facilities for wartime and peacetime. o Avionics, LANTIRN, electronic warfare systems o Engines o Munitions o Phase inspections	• Determine appropriate peace and wartime regionalized repair requirements. • Write implementation concept of operations.

Table 4. CLR Proposed Initiatives and Implementation Actions (Continued)

technical training initiatives being developed by Air Staff and MAJCOM teams are more strategic or long term. Because the Centralized Intermediate Repair Facility (CIRF) test period extends beyond 2001, it is also in this category.

The officer development team is focusing attention on refining the core logistics career paths. First on its agenda is the move to a dual-track logistics officer career path. Aligning aircraft maintenance and munitions/missile maintenance in one track and supply, transportation, and logistics plans in another track will create the dual-track career path. In considering alternatives to the current crossflow policy, the team is researching methods for creating officers

with more depth in a few core logistics functions, rather than, as currently done, less experience across many logistics functions. Additionally, the team is defining specific experience and qualification *gates* that logistics officers would pass through during their career. Other initiatives seek to develop job performance aids and courses for both logistics and flying squadron commanders, providing them the tools needed to balance the needs of day-to-day sortie production and long-term fleet health maintenance.

The technical training team is working initiatives to improve and sustain the experience level of the enlisted force by improving cross-utilization training, standardizing MDS training requirements and documentation, training for wartime tasks such as tank buildup and battle damage repair, and increasing training opportunities through improved management and availability of training managers. Another key initiative underway is the development of a course for maintenance senior noncommissioned officers on the use of metrics and tradeoff analysis in balancing the needs of daily sortie production and long-term fleet health.

Establishing the logistics weapons school will take an extended period of time. The process entails identifying a cadre of personnel to stand up the school, preparing facilities, and developing the initial course curriculum. The cadre will refine, then validate the curriculum, targeting January 2003 as the first class start date.

The CLR validated the need to continue defining the peacetime and wartime benefits of the CIRF concept. The CIRF concept, which proved invaluable during OAF/ONA, is in the initial test/implementation stages for F-15 avionics, low-altitude navigation and targeting infrared for night, and electronic warfare systems, as well as engines and phase inspections.

The testing of CIRFs will extend beyond the 6-month period and evaluate their effectiveness in supporting the AEF 7/8 and 9/10 rotations. The objectives of the CIRF tests are to:

- Analyze logistics footprint during AEF rotation deployments,
- Evaluate CIRF capabilities to support deployed unit's mission,
- Exercise decision authority between RSS, CIRFs, and transportation,
- Evaluate logistics costs, and
- Evaluate maintenance manpower trigger points at CIRFs.[6]

Both Air Staff and RAND Project Air Force will evaluate the test results and make recommendations on CIRF policies and procedures prior to implementation of the concept throughout the Air Force.

Continuous Refinement Initiatives

In addition to enhancements to officer development and technical training for improving the skills of the logistics corps, the CLR also recognized the need for improvements in policy, specifically those that govern maintenance activities and force deployment and beddown. Maintenance policy is being revised to include detailed guidance that had been dropped. These revisions include a renewed emphasis on discipline and policy enforcement. Similar changes have already been made to the force deployment and beddown policies.

The CLR validated the ongoing efforts regarding RSS that are critical for expeditionary operations. The RSS effort focused on refining policies and procedures regarding the role of the RSS in supporting contingency operations, including pipeline metrics and decision support tools facilitating the RSS role as a combat support command-and-control node. These changes will enable the RSS to complement CIRF implementation.

Summary

The initiatives resulting from the CLR are designed to create a core logistics capability enabling the EAF to respond quickly and conduct sustained operations anywhere in the world. Realizing that potential, however, depends on Air Force recognition of the importance of balancing current day requirements with future needs. The Air Force must embrace different ways of doing business to deal with some of the fundamental problems that the MAJCOMs identified, many of which concerned the current imbalance between daily operations and future needs. Both operators and support personnel must understand the tradeoffs necessary in striking a balance between producing sorties now and producing continuous fleet health and growing human capital to meet future operational requirements. Operations and support personnel must share a set of proven metrics that bring day-to-day progress in attaining this balance, and wing leadership must act to attain a balance and improve human capital.

The CLR highlights the need to improve technical training in officer development and, thus, develop human capital necessary for supporting EAF operations. Many CLR initiatives aim to invest in the human capital and provide the tools needed for continued development of the logistics corps.

While achieving a balance between daily sortie production and maintaining a healthy fleet for future needs are critical to the expeditionary force, contingency planning and materiel management are also critical for quick deployment, immediate employment, and support of expeditionary operations. Recent history has proven the value of quick deployment and rapid resupply.

The CLR recommendations are aggressive, but they are tempered by a cautious approach to implementation. The test period can help ensure the initiatives are steps in the right direction and refine the initiatives to produce the desired impacts. However, the full impact of these initiatives will not be realized for years.

Notes

1. Gen John P. Jumper, "Posturing Aircraft Maintenance for Combat Readiness" briefing, Washington DC: HQ, USAF, Sep 99.
2. Gen Michael E. Ryan, "Air Force Logistics" memorandum, Washington DC: HQ, USAF, 4 Oct 99.
3. Lt Gen Michael E. Zettler, "Chief of Staff Logistics Review" briefing, Washington DC: HQ, USAF, 3 Oct 00.
4. RAND Project Air Force is the Air Force federally funded research and development center for studies and analyses.
5. C. J. Dahlman and D. E. Thaler, *Assessing Unit Readiness: Case Study of an Air Force Fighter Wing*, RAND, DB-296-AF, 2000.
6. Zettler.
7. *CLR CIRF Test Plan (Draft)*, HQ USAF/ILM, Apr 00.

General Zettler is the Air Force Deputy Chief of Staff, Installations and Logistics.

Analysis of Air Force Contract Implementation

Major
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The use of incentive contracts by federal agencies, including the Air Force, has increased significantly in the last 20 years. Incentives (in time or money) are given to contractors for specific results or quality standards. As the use of incentive contracts increases in both the public and private sectors, debate over their use has also increased among the professional acquisition community. Recent professional discourse includes anecdotal experiences centered on whether or not incentive contracts are implemented properly in the Air Force. Specifically, there are concerns that award-fee incentives or the newest hybrid award terms are not being implemented in a manner consistent with their original intent. Also, it is possible that the application of these instruments to motivate contractors could give incentive to the wrong behavior and be detrimental to acquisition initiatives.

The Air Force uses numerous types of incentives to motivate contractors to either save money or perform at a level considered above satisfactory. Award-fee contracts, through which contractors are evaluated and granted additional money for excellent performance, are popular within the Air Force acquisition community. Its popularity has spawned a new award term, in which contractors are granted contract extensions in lieu of money.

Award fees can be used in cost contracts in which contractors are reimbursed actual costs or in fixed-price contracts in which the contractor is guaranteed a fixed price no matter what costs are. Additionally, award fees can be used in conjunction with fixed fees. For example, a contractor can be granted costs plus a fixed fee for just meeting standards and an award fee on top of that depending on how far those standards are exceeded. For purposes of this article, the term *award fee* will refer to fixed-price contracts only, without a fixed fee. These award-fee contracts have a fixed price and an available pool of dollars, which the contractor may earn in any percentage from 0-100, based on performance level.

History of Award-Fee Incentives

This type of contract gives a company a definite incentive to cut its costs. In fact, the heart of the contract is the conviction that American business can perform miracles of low-cost production given a profit incentive for doing so.

Under Secretary of the Navy Forrestal

Attempts by federal agencies to motivate contractors using incentives reach back to the American Civil War. The *Monitor*, the Navy's ironclad ship, was bought using a contract that included a performance incentive.[1] Another famous use of contract incentives involved the country's first aircraft buy. The Army Signal Corps' contract with the Wright Brothers included a performance incentive based on flight speed. A $25K flat price was established for a 40 mile-per-hour flight, but the contract also included positive and negative incentives for actual speed obtained. The aircraft flew 42 miles per hour, and the brothers received a $5K incentive payment.[2]

Incentives were also common during both world wars. Navy contracts with Bethlehem Steel for shipbuilding in World War I included incentive fees for performance and capital investment.[3] During mobilization for World War II, competitive bidding was overcome by the urgency of the times. War Production Board Directive No 2, 3 March 1942, stated that formally advertised bid procedures were not to be used in war contracts; negotiation was to be used (as it was in other mobilizations). The directive also established three criteria for contracts: speed of delivery, conservation of superior facilities for the more difficult items of production, and placing contracts with firms needing the least amount of additional machinery and equipment.[4] This need for speed encouraged the Army and Navy to break new ground in contract terms. The War Department developed an *evaluated-fee* contract similar to the cost-plus-fixed fee construction contracts of World War I, except part of the fee varied depending on the contractor's performance. The Navy's Bureau of Ships also modified the cost-plus-fixed-fee contract so a portion of the fee was firm and the rest was paid as a bonus for achieving cost savings. This contract appeared in 1943 in large shipbuilding programs and some ordnance items.[5] These innovations were the precursors of

the award-fee contract that is so popular today. Under Secretary of the Navy James V. Forrestal was a grand proponent of incentive contracts, and in 1943, the Navy tried to convert as many of its contracts as possible to incentive contracts. However, industry gave lackluster support to the initiative because of its lack of experience with contracts and frequent government contract changes. Production experience was low, so contractors had difficulty estimating costs, and government changes and interference often interrupted delivery schedules. Consequently, contractors were cool to incentives because they did not want their profit tied to changing goals. The lesson learned was that incentive contracts can be powerful but must be used at the right time and place and under the right conditions to be truly effective. The National Aeronautics and Space Administration (NASA) would successfully reintroduce this incentive 20 years later.

Award Fee Comes of Age

A convergence of government forces in the 1960s led to the development of the award-fee process currently used in government contracting. Secretary of Defense Robert S. McNamara, who served under Presidents Kennedy and Johnson, had a tremendous effect on defense procurement. McNamara, a graduate of Harvard's Graduate School of Business Administration and a statistician for the Army Air Corps in World War II, was determined to upgrade procurement practices with modern management techniques. He put a halt to cost-based contracts, believing they encouraged waste by not linking profits to how well the job was done. During McNamara's term as Secretary of Defense, the percentage of military procurement dollars awarded by cost-plus-fixed-fee contracts fell from 39 percent in 1960 to 14 percent in 1964. Conversely, fixed-price contracts and fixed-price incentive dollars awarded rose from 45 to 55 percent in the same period.[6]

Although NASA is largely credited with creating the award-fee contract common today, both NASA and the Navy issued contracts with award-fee provisions in 1962. The Navy issued a contract for logistics operations support at Kwajalein Island that year, which included provisions for award fees. NASA issued a contract in October 1962 that provided for the research and development of a nuclear-powered rocket engine. A second NASA contract, issued in January 1963, covered the operation, maintenance, and engineering services for the Mercury Manned Space Flight Network.[7] NASA went from one incentive contract in 1962 to 34 by 1964 and by the beginning of 1967 was managing some 200 contracts with incentives.[8]

The Air Force was reluctant to jump into the award-fee game and did not issue its first contract until 1964. After the Electronic Systems Division issued the contract, no more were accomplished until late 1969, due to an unwritten policy against subjective incentives.[9]

Throughout the 1960s, NASA and the Navy used award-fee contracts extensively while the Air Force and Army shunned them. However, the Air Force expanded their use in the 1970s, as then Secretary of the Air Force Robert C. Seamans, Jr, mandated their use on major programs like the B-1 and F-15.[10]

Growth of Use

Throughout the 1980s and 1990s, the use of award-fee contracts increased *exponentially* throughout the DoD and Air Force. Historically reserved for large program contracts, award-fee contracts expanded into the smaller dollar arenas, and their use grew widely among installation-level service and maintenance contracts. In fact, one of the largest users of award-fee contracts on a consistent basis is the Air Education and Training Command (AETC). This command contracts out to private industry almost all the aircraft maintenance and many base support services conducted at its bases. With the rapid increase in use of award-fee contracts for base-level activities, the Air Force tasked the Air Force Logistics Management Center (now the Air Force Logistics Management Agency [AFLMA]) to author a guide on award-fee contracts, which was published in 1988.[11] The promulgation of this contract type among base-level offices and program offices caused AFLMA and Air Force audit agencies to do repeated reviews of implementation throughout the last 10 years. It is clear that award-fee use has grown substantially among Air Force contracting agencies.

The Next Step in Evolution—Award Term

The award-term incentive is a genuine innovation and one with great potential to forever alter the landscape of Government service contracting.

—Vernon J. Edwards

The award-term contract is the newest incentive in government contracting. It was first used in 1997 but is not yet covered in the *Federal Acquisition Regulation* (FAR). Modeled after the award-fee incentive, it rewards the contractor by extending the contract term without competition. Under an award-term incentive, a government team monitors and evaluates the contractor's performance and reports their findings to a government term-determining official (TDO), who decides whether the contractor's performance is good enough to merit an extension. The award-term incentive was the inspiration of Tommy Jordan, a senior Air Force civilian employee at Kelly AFB, and was first used on a contract that the Air Force Aeronautical Systems Center awarded to the McDonnell Douglas Corporation in October 1997 for F-15C aircraft simulation services. The contract has a 7-year base period, which can extend to 15 years with excellent service.[12] Since that first use, at least 25 programs have included award-term incentives, including the $10.2B public/private competition at Kelly AFB for aircraft engine maintenance.

In the last 3 years, agencies have used award-term incentives to acquire a variety of services, including technical and logistics support, laundry and dry cleaning, depot-level maintenance, aircraft maintenance, grounds maintenance, janitorial services, real property maintenance and repair, and training.[13] The incentive is being used with several contractual configurations such as fixed price, cost reimbursement, indefinite delivery/quantity, and requirements. The Air Force, NASA, Naval Facilities Engineering Command, Naval Sea Systems Command, Fort Drum in New York, and the General Services Administration have all conducted or plan to conduct acquisitions with award-term incentives.

Future Application

As of March 1990, the Air Force had identified 114 active, installation-level, award-fee contracts with a total contract value of about $2.6B (including multiyear options) and potential award fees totaling $145M.[14] Between fiscal years 1993 and 1998, the Air Force awarded commercial activity contracts totaling $5.8B, with award-fee pools totaling $230M.[15]

Although no one can speak with certainty regarding the future, it appears the use of award-fee and award-term contracts will continue to increase. The most likely category of acquisition for these incentives to grow in is competitive sourcing contracts and public/private competitions. There are two reasons for this. First, these types of contracts lend themselves to qualitative review since they are service oriented and not well suited to objective (versus subjective) evaluation criteria. Quality is inherently a subjective determination in performance of services. Award-fee and award-term incentives best suit these kinds of situations. Second, these competitive sourcing or public/private competitions are excruciatingly painful for the acquisition community. They take enormous time and effort to complete (frequently 1 to 2 years). Therefore, award-term contracts should flourish because the benefits are great if they extend the time between competitions. If the contractor is performing well, the agency can use its manpower more efficiently on other acquisitions rather than relet the contracts because the minimum time is up. This more closely mirrors the private sector where long-term relationships with satisfactory performers are preferred. It is also quite likely that DoD competitive sourcing and public/private competition efforts will continue to grow or at least remain status quo as agencies search for the most efficient way to use available resources. These efforts will continue to be pursued where efficiencies and cost savings can be gained without impacting mission effectiveness.

Finally, it is the objective of DoD acquisition agencies to use incentives as much as possible. In 1997, the government iterated a policy encouraging agencies to use incentives "to the maximum extent practicable when contracting for services."[16]

Official Reviews and Findings

Audit Reports

Despite the encouragement of senior acquisition officials throughout government to make use of incentives, particularly award fees, the challenge lies in using them correctly. Numerous studies and audits have been accomplished by Air Force agencies to review how well the acquisition community has done in implementing the award-fee concept. Occasionally, the decision to use award fees is questioned, but in most cases, the manner in which the contracts were implemented is the focus of the review.

Titan IV Audit

In 1995, the Air Force Audit Agency (AFAA) conducted an audit of the Titan IV production contract incentive and award-fee program to determine if program office personnel effectively structured and administered the multiple incentive contracts to motivate the contractor to achieve all program objectives. Though the audit covered numerous areas, this article highlights just the award-fee portion.

The general conclusion was that Titan IV program office personnel did not effectively structure the incentive and award-fee program or develop adequate procedures for evaluating and administering contractor incentive payments. Specifically, with respect to award fees, personnel did not adequately evaluate contractor performance based on the award-fee plan criteria. As a result, contractor performance ratings were not supported, and fees awarded were not commensurate with actual performance.[17]

The Titan IV production contract included an $85M award-fee provision (pool) to motivate the contractor to achieve increased management, schedule, technical, and launch performance. The audit team determined that the contractor's performance was not adequately evaluated in accordance with the award-fee plan. Therefore, performance ratings recommended to the Award Fee Review Board (ARB) were not supported, and ARB award-fee percentages recommended to the fee determining official (FDO) were not commensurate with actual contractor performance. The following are summaries of specific findings:

- Evaluation monitor performance ratings did not provide comments with respect to key evaluation criteria or include specific examples that indicated the criteria were not satisfied. Further, monitor comments were too general to demonstrate whether the contractor complied with the criteria.
- Between January 1990 and January 1995, the prime contractor experienced significant cost increases due primarily to subcontractor cost overruns in the solid-rocket motor effort and schedule delay of 5 years and 2 years in the motor upgrade and other programs. However, the ARB-recommended management effectiveness and schedule performance ratings during this time period did not appear to consider contractor schedule performance in these areas. Moreover, the ARB recommended ratings for management and schedule performance that were higher than previous reviews. The audit team believed these should have been rated marginal at best, and the contractor should have received less award fee.[18]

These problems occurred because award-fee evaluation monitors were not adequately trained in evaluation and documentation requirements, evaluation criteria were ambiguous and difficult to apply, and the ARB used the award-fee process to place more emphasis on technical performance than permitted under the award-fee plan.

Experts from the Air Force Acquisitions Office concurred with the comments and instituted efforts to correct deficiencies noted by the audit. To prevent future questionable fee awards, the program office implemented new training and documentation requirements.

Management of Award-Fee Provisions in Installation-Level Supply and Services Contracts

In February 1991, the AFAA released Project 0046411, which evaluated award-fee contracts at installations throughout the Air Force. The overall objective of the audit was to determine whether the Air Force effectively used and administered award-fee provisions in

installation-level supply and services contracts. Specifically, the agency determined whether use of the award-fee provisions was adequately justified, the contract provisions included appropriate award-fee criteria, the evaluation and payment process was effective, and award-fee funds were effectively managed. The team found that Air Force management of installation-level, award-fee contracts required significant improvements. Specifically the report found:

- Contracting officers (CO) included award-fee provisions in contracts without determining that anticipated award-fee benefits would exceed the cost of the fees and associated effort to administer the special contract provisions. As a result, the Air Force incurred at least $1.7M over the contractual life of the 17 contracts without determining and documenting whether commensurate monetary and nonmonetary benefits would result. The audit team determined the costs far outweighed the benefits in many cases. At Maxwell AFB, a $4.6M contract included a $40K per year award-fee pool as an incentive. The calculated administrative costs to administer the contract amounted to $152K annually, far above the $40K in possible incentives.
- Contracting personnel did not apply an appropriate methodology to establish the award-fee pool for 13 of the 17 contracts. In most cases, no formula or standards were used to establish the award-fee amount. As a result, 4 of the 13 contracts examined included about $830K in potential excess profits.
- At least one award-fee contract provision was missing from 15 of the 17 contracts reviewed. Without these contract provisions, COs were not adequately protecting the government's interests, and contractors were not certain what was required to earn the award fees. The Air Force paid award fees when contractor performance did not warrant the fees and was more susceptible to litigation because its legal rights were not contractually established.
- For 13 of the 17 contracts reviewed, COs did not monitor the process for selecting performance evaluation team members to ensure only appropriate personnel were selected. In four instances, performance monitors had potential conflicts of interest, including actually working part time for the contractor they were evaluating. In 12 instances, people working for the organizations being served were excluded from the team.
- The process for evaluating contractor performance was not effective for 15 of 17 contracts. The Air Force paid award fees for 11 contracts without adequate evidence the contractor earned the fees. This included $94K paid for 6 of the 11 contracts even though the contractor did not meet minimum acceptable performance requirements. At four locations, contractors were paid award fees for performing voluntary work that was not contractually required or included in the award-fee criteria. At one location, fees were paid when a janitorial contractor worked on days not required and performed services in buildings not covered in the contract. The fee-determining official did not adequately justify the award fee paid and used criteria that were deemed unacceptable.
- Installation officials did not provide timely award-fee payments to contractors, requiring an average of 60 days after the end of the evaluation period to issue payment. This delay in providing award-fee payment was a potential demotivator for contractors.
- Accounting and finance personnel did not properly record award-fee funds as a contingent liability in accounting records for 15 of the 17 contracts. These officials prematurely recorded more than $2.9M as obligations before the government had any legal liability to pay the contractor.

Analysis of Operational-Level, Fixed-Price, Award-Fee Contracts

In January 1992, AFLMA began a project to help acquisition offices overcome findings in the 1991 AFAA audit report. The agency was chosen because it published a base-level, award-fee guide in 1988 to assist offices in implementing the *new tool* known as award-fee contracts.

AFLMA reviewed the audit report and performed an independent analysis of the entire award-fee process from contract solicitation through administration of award-fee provisions. AFLMA also conducted interviews with using agency officials and contracting professionals to develop a professional consensus.

They concluded that many of the award-fee processes were broken and, in order to fix the system, a fundamental change in how base officials view award-fee decision making is necessary.

> Contractors should have to earn award-fee money through above-and-beyond performance during each evaluation period instead of base officials looking for reasons not to pay the contractor the entire award fee amount.[19]

This finding indicates that AFLMA determined FDOs were committing a common error by starting the contractor's fee entitlement at 100 percent and making reductions based on performance rather than starting at zero and working up (as the FAR requires). The agency also concluded that bases needed structured guidance to standardize award-fee procedures and that, under current processes, it is likely government is improperly spending money through unwarranted and unjustified award-fee decisions.

Award-Fee Management of Commercial Activity Contracts

In March 2000, AFAA released an audit on award-fee contracts that highlighted continuing problems and a few new ones. Interestingly, the audit team was apparently unaware of the similar audit 10 years before, as they did not reference it in the prior audits section or in the body of the report. Therefore, the findings were certainly independent and show no bias toward confirming earlier findings.

The audit was conducted because of the increased use and associated cost of award-fee contracts, with the overall objective to determine whether Air Force personnel adequately managed award fees for commercial activity contracts. Specifically, the agency determined whether award-fee officials established award-fee provisions consistent with overall contract strategy, supported fees awarded, and managed award-fee funds.

The team concluded that award-fee officials could improve award-fee management for commercial activity contracts. Although officials established provisions consistent with the overall contract strategy, five of ten locations did not maintain adequate documentation supporting award-fee determinations.[20]

Specifically, performance monitors did not maintain adequate records supporting award-fee recommendations, award-fee review board members did not always document the results of award discussions, and FDOs did not adequately document the rationale for award-fee amounts that varied from review board recommendations. In at least two cases, the FDO significantly increased the fee amounts without rationale. Supporting documentation is important to help ensure the government pays appropriate award fees and is also critical if the contractor disputes the award-fee determination.

Award-fee officials at six of ten locations did not accurately account for award-fee funds. Specifically, they did not commit funds to establish contingent liabilities for award-fee amounts. Instead, they recorded the entire award-fee amounts as obligations or actual liabilities when evaluation periods began. As a result, for fiscal years 1996 through 1998, award-fee officials overstated funding obligations by $1.9M.

The auditors recommended that the Air Force establish award-fee guidance incorporating best practices and procedures and rescind inaccurate award-fee obligation guidance. They also recommended the issuance of a policy letter instructing award-fee officials to commit funds as contingent liabilities when evaluation periods begin. The Air Force Acquisitions office concurred with the findings and tasked AFLMA to develop an Air Force guide. It also issued a finance policy with coordination on obligation of award-fee funds.

Problems Resolved?

Analysis of these four audits indicates recurring problems with award-fee contracts. In every instance, the reviewers found that performance monitors were not documenting or justifying their recommended award-fee amounts to the FDO. Therefore, there was no legitimate rationale for paying the award fees. While the fees may be justified, lack of explicit rationale leads inquiring investigators to conclude fees are being paid for no good reason. Similarly, in three of the four audits, the FDOs were not explaining their rationale for granting the fees. In some cases, they even overruled recommendations from the monitors and board members. Again, lack of documented rationale could lead one to conclude contractors did not earn the fee but were granted it anyway. This conclusion is further supported by the AFLMA study, which indicated that FDOs commonly begin deliberations at an inflated fee amount (100 percent) and deduct for shortfalls. While the FDOs may have good rationale for the fees provided, the rationale is usually not clear.

Additionally, all three audits reported some sort of discrepancy in financial calculations with respect to the fee pool amount. Both the 1991 and 2000 audits, specifically highlighted that funds should be tracked as contingent liabilities, not up-front obligations. At the time of this article, it is clear the Air Force has adopted such a policy.

Award Fee in Application

Concept

The purpose of an award-fee incentive is to obtain better performance from the contractor than could logically be expected from a contractual arrangements. It provides a means of applying incentives in contracts where performance objectives cannot be expressed in advance by definite milestones, targets, or goals susceptible to actual measurement of performance.[21]

For contracts with an award-fee incentive, the buying office establishes an award-fee plan that defines formal evaluation periods throughout the life of the contract. For each evaluation period, *fee pools*, which may be earned in part or whole by the contractor, are identified, as are the criteria, techniques, and data that will be used in the evaluation of the contractor's performance. During an evaluation period, technical and business monitors collect data and provide them to an award review board for further evaluation. Additionally, the contractor is invited and encouraged to submit self-assessments of performance for consideration by the review board during the formal evaluation process that occurs at the end of each evaluation period. The evaluation results and recommendations are documented by the board and given to the FDO.

Based on all inputs and personal judgment, the FDO determines the portion of the available fee to be awarded. The FDO then advises the contractor, in writing, of the fee decision and performance evaluation within 30 days of the end of the evaluation period. The fee decision and performance evaluation are subjective, unilateral, and until recently, not subject to the disputes clause of the contract.[22]

From the process just described, it can be seen that the nature of the award-fee concept allows the government to provide formalized periodic feedback to the contractor. It also provides the government with an opportunity to make periodic, thorough evaluations of progress and cause corrective action in areas under evaluation if performance is not as expected. The subjective after-the-fact nature of the performance evaluation and fee-determination process provides unique flexibility for its users.

Regulations

Early coverage of the award-fee type contract was included in the Armed Services Procurement Regulation in the 1960s at the behest of senior government officials such as McNamara. In 1962, DoD promulgated new policies for the use of incentive contracts in the ASPR and published its first incentive contracting guide.[23] In 1969, DoD and NASA jointly published a second edition, the *DoD/NASA Incentive Contracting Guide*, and NASA has published several editions of award-fee guides since then. The Air Force published an award-fee guide in 1988 through AFLMA, and in 1997, the Air Force Materiel Command (AFMC) published its own version of the award-fee guide for use throughout its own command.

There is general guidance in the FAR but little prescriptive guidance. FAR Subpart 16.4, *Incentive Contracts*, states the government's policy about contractual incentives, describes five standard contractual incentives, and provides guidance for their use. It describes two classes of incentives: predetermined, formula-type and award-fee. However, most of the actual guidance has been published in unofficial guides or handbooks.

Although common in the Air Force for years, the award-fee incentives were not included in the FAR until publication of Federal Acquisition Circular 90-46 in May 1997. FAR 16.404 (a) explains the fixed-price, award-fee (FPAF) incentive as follows:

> Award-fee provisions may be used in fixed-price contracts when the government wishes to motivate a contractor and other incentives cannot be used because contractor performance cannot be measured objectively.

FAR 16.404 (a) requires that, in FPAF incentive contracts, the parties negotiate a fixed price that includes profit. The government will pay the fixed price if the contractor performs satisfactorily. The parties must also negotiate an award (bonus) and an award-fee plan. FAR does not, however, prescribe the contents of the award-fee plan.

Although the FAR contains many passages about incentives in general, there is little award-fee guidance and no award-term guidance in the regulations. The organizational structure and procedures associated with these incentives, fee-determining official, award-fee board, and award-fee plan are not prescribed in the Federal regulation. Therefore, acquisition offices must turn to agency-specific guidance such as the award-fee guides published by NASA, AFMC, and AFLMA.

Fee Determination in Practice

To determine exactly how award-fee contracts are being implemented and used in the Air Force, a telephone survey was conducted with government COs and FDOs, as well as representatives from industry, to collect their perspectives on award-fee contracts and their impact. Eleven COs with award-fee experience in AETC and AFMC were interviewed. These two commands represent the bulk of experience in Air Force award-fee contracts. AETC uses them for contracted base support and/or aircraft maintenance at virtually all their bases, and AFMC supervises most of the major systems acquisition efforts in the Air Force. FDOs from four bases were interviewed. These officials were usually the senior officer on the base or in the wing and held at least the rank of colonel. Eight members of industry who frequently bid on and currently hold award-fee contracts were also interviewed. These individuals were either in charge of or closely aligned with the proposal writing teams and very involved in actual performance of the contracts for which they competed. They also represented some of the largest companies in the defense industry, as well as some moderate-sized companies competing for government contracts.

To collect completely open, honest, and useful data, all participants were interviewed under the guarantee of nonattribution to themselves and their organization. This guarantee was necessary to ensure the most candid and descriptive answers possible. The analysis that follows represents the consensus of the consolidated answers.

Industry Strategy Perspective

The industry respondents indicated that, on average in the last 3 years, they had bid on five separate programs that contained award fees. Additionally, average number of award-fee contracts the respondents were currently being performed was three. These averages indicate credibility, showing they have extensive experience in both bidding and performing contracts with award-fee provisions. The average earned award-fee percentage for the companies varied by agency and command. One respondent clearly indicated that NASA typically gave higher fees on average but the Air Force was not far behind. The average for the Air Force was between 88 and 90 percent. The respondents did note that they track this data pretty carefully and know what the historical average is for each organization, major command, or agency. That information is used extensively in the proposal process.

Most respondents agreed award fees really do give incentive to performance, to some extent. However, the consensus was that the mere granting of a bonus does not in and of itself increase performance significantly. Notable improvement is usually not seen unless the award fee is somehow shared with the employees. In other words, in those companies that share award-fee sums (or some other inducement) with employees for increased performance, a marked improvement is seen. If the award fee is not shared among the employees, the incentive is only marginally effective, if at all.

The consensus was that award fees do not constrain contractors but they shift resources. The proposals are manpower intensive for both bidders and the award-fee boards. Typically, the companies expend significant effort making their case to the board that they deserve the fee. This *show* adds cost in both manpower and money to the contractor's bottom line. This, in effect, increases the cost of performance (which they account for in the original proposal) and takes manpower away from performing the actual work.

When asked if award fees cause a contractor to alter proposal strategy, every respondent unequivocally answered yes. It is inherent in proposal writing to account for the fee at least partially in structuring the proposal. When asked the followup question, "Do you plan on 100 percent of the fee," all answered no. However, they all said they count on a portion of the fee based on their assumptions, detailed analysis, and calculations from historical records. Rarely did history show they could count on 100 percent of the fee. However, all respondents confirmed that this lowered their profit margins in the initial proposal and increased their risk somewhat in the early stages of the contract. However, most believed the risk was no greater than moderate because they had never been denied a substantial portion of the fee. All agreed that if the FDO granted them little or no fee they would then be in a high-risk position but, again, stated that this almost never happens.

And finally, when asked if they found themselves performing work under award-fee contracts that they would not normally perform if the contract were structured differently, a majority of the respondents answered yes. The consensus was that they were more likely to do extra things to keep the board members and FDO happy. This could include tasks that, if performed under a fixed-price contract, would result in a claim.

Government Perspective

Government COs are currently working on an average of two contracts with award fees (responses varied from one to five). None of the respondents indicated this was their first award-fee contract. Therefore, like industry representatives, the COs were seemingly well experienced in award-fee execution and

administration. Therefore, the FDOs were not. Two of the four FDOs were on their first award-fee contract, and none were serving as an FDO on more than two. Despite little experience, all felt comfortable in the role and competent to perform as an FDO.

COs and FDOs agreed the average percentage of fee earned by their contractors was 85 to 90 percent.

COS and FDOs agreed that award-fee provisions in contracts improve contractor performance. The consensus was that award-fee incentives create a partnership-like environment and inspire innovation in contractors, which leads to more efficiency. Additionally, they believed employees genuinely work harder to gain the incentive. As a corollary to this question, the respondents believed the great improvement in performance was worth the extra effort and administrative burden on the government's part.

All respondents were asked if they knew or believed that the contractor's profit in the original proposal is considered when determining award-fee amounts. The two groups differed. FDOs indicated it was not a factor in their decision and, in most cases, they are unaware of the profit on the original proposal. The COs, however, had a perception that it was, in fact, a consideration, with the board and the FDO. The consensus among COs was that, even if it was not directly addressed, the FDOs were certainly aware of the original profit margin proposed either by direct personal evaluation or by fee lobbying by the contractors. They believe FDOs want to ensure contractors remain *healthy* and perform.

Both groups of government officials were asked if, during fee determination, the board and FDO tend to start from 0 percent and work up or start from 100 percent and work down. The typical CO response to this question was, "Are you asking what we should do or what we actually do?" That response summarizes the common view among the contracting community in general and certainly among the respondents that fees are usually worked from 100 percent down. COs believe the FDO starts out wanting to give the maximum fee and then finds reasons to deduct for things not done well instead of justifying why the contractor should get any increment of the fee at all. Interestingly enough, the FDO responses did not fully support this but did not refute it either. The FDO consensus was that they usually start from the board recommendation and work from there. However, one FDO did indicate a bias toward higher amounts by focusing on the negative performance indicators rather than the positive ones. Given that this FDO's award amounts fell into the same range as the others, it can be reasoned that this FDO sets an amount and subtracts for performance rather than trying to justifying any fee at all.

All COs believed the contractor's risk of lower profit margins was increased with award fees due to contractors shaving initial profits in proposals. COs believe contractors have begun to count on the award fees as part of their total profit and, therefore, are bidding tremendously low profit margins to stay competitive and win the business. They believed (like the contractors) this translates into a moderate risk for the contractors. However, none of the COs could provide data showing the increased risk is detrimental. None of their award-fee contracts had failed, indicating the increased risk did not result in any casualties.

Conclusion and Recommendations

Review of the data collected during this research has illuminated numerous problems with award-fee contracts. The conclusions associated with research are mixed, however, when compared with the research question. Indeed, it appears there are genuine disconnects in the implementation and administration of award-fee contracts, and those disconnects prevent the contracts from working as originally intended. However, the deleterious effects of the broken process are not as grave as one might imagine. The question of whether changes are necessary to improve the effectiveness of this contract tool is the difficult one. The research clearly indicates changes are necessary. However, in most cases, it appears changes would improve efficiency but not necessarily effectiveness.

Principal Conclusions

The findings clearly show that award-fee contracts are not implemented as intended, since the same problems are being experienced now as 10 years ago. These problems, however, are procedural in nature and can be fixed easily.

Improvements are needed, but they will not impact effectiveness, only efficiency. As the audits and studies show, guidance is needed for the Air Force community on how to implement award-fee contracts properly. However, based on the nature of the findings, it appears the Air Force has been directing its guidance to the wrong audience. The guidance is usually produced by the contracting community for the contracting community. However, the recurring problems identified with the performance monitors and FDOs; therefore, any guidance produced to help the process should be directed toward them.

Finally, it is clear from the data gathered from industry and government sources that we indeed are giving incentives to contractors to bid near zero profit and, therefore, increase their risk. However, the effects of that issue are not detrimental, as might be expected, for two reasons. First, the process to award this type of contract is usually complex and uses best-value approaches, enabling the government to consider lots of quality indicators. Therefore, the contractors typically selected are quite solid and less prone to failure in the first place. The increase in risk is mitigated by the quality of the company. Second, the award-fee process, by its nature, allows the contractor to gain additional funds throughout the contract, and the government evaluation team is likely to *help* a contractor in order to maintain consistency of service. This built-in dynamic also mitigates the risk to contractors by providing a mechanism to lessen the contractor's exposure to risk throughout the contract.

The research supported the contention that the Air Force is not implementing award-fee contracts as intended and is, in fact, giving incentive to the wrong behavior in industry. However, the result is not extraordinarily detrimental to Air Force goals because of the inherent ability of the award-fee board to overcome additional risk. It is clear that improvements are necessary, but the gains will be in efficiency, not in effectiveness.

Recommendations

- The Air Force should develop and distribute a standardized format and template for performance monitors and FDOs to use when documenting their support of the fees awarded.
- Training initiatives should be redirected, and training and assistance for noncontracting personnel (performance monitors and FDOs) is needed. The next product (guide or training course) developed should target them specifically and cover topics outlined above.
- COs should seek feedback from industry before including fee or term incentives in future contracts. The value of incentives can be overestimated by government personnel, causing great administrative burden with little return.

Notes

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notable quotes

When the enemy assesses our forces, he values only those forces which the logistics community has ready for combat, or can get ready in time, and then sustain for a requisite period of combat.

—General F. Michael Rogers

Let nothing swerve you from the American policy of highest quality in the greatest abundance of which your best efforts are capable, to the end that our way of life may prevail and our nation maintain its position of leadership in the upward march of civilization.

—Major General Oliver P. Echols

Function of RBL

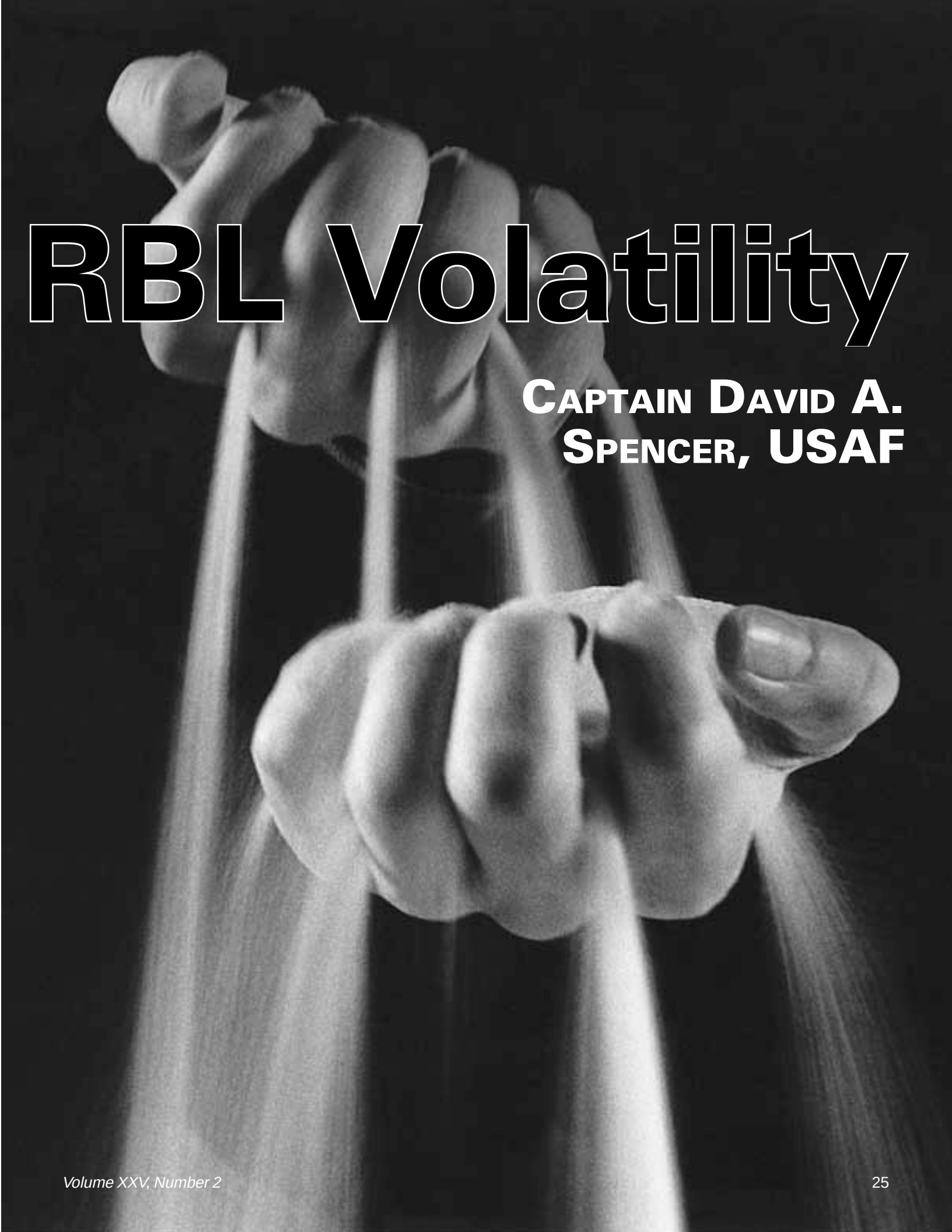
RBL allocates the worldwide recoverable item requirement to bases and depot accounts (program depot maintenance [PDM]) so as to minimize EBOs for base-level customers and, therefore, the Air Force as a whole. It is an optimization model that uses marginal analysis to allocate the next level to a base or depot that will result in the greatest EBO decrease. Even a small decrease in EBOs resulted in a level change, due to coded algorithms in the RBL model. RBL did not look at the current base level, the previous quarter's RBL allocation, in

determining the newest allocation. As a result, RBL changed a level to achieve a reduction of even 0.0001 of an EBO. It also did not consider the cost of the increased redistribution order (RDO) pipeline resulting from these changes and, as a result, potentially placed assets in the RDO pipeline, thus making them unavailable for use. Therefore, potential back orders could have resulted from redistribution of assets among bases to meet the new, changed RBL allocation.

In November 1998, the Air Force Materiel Command Item Management Division asked the Air Force Requirements Team whether or not the Air Force could reduce the number of readiness-based leveling (RBL) changes and frequency of RBL runs. Since RBL's inception, supply personnel perceived RBL levels to be more volatile than the previous leveling technique of the Standard Base Supply System (SBSS) Repair Cycle Demand Level (RCDL). In other words, RBL seems to change more frequently than RCDL. If RBL were unnecessarily volatile, then more assets would be in the redistribution pipeline, which would result in fewer assets on the shelf for the customers and increased transportation cost.

Our first goal in this study was to reduce the number of level changes by eliminating unnecessary, noncost-beneficial level changes, changes where the savings in expected back order (EBO) reduction are not enough to offset the cost of increasing the redistribution pipeline.

Then we sought to reduce the workload associated with RBL runs by reducing their frequency (for example, from quarterly to semiannually) and/or reduce the major command (MAJCOM) and base-level actions to review and load RBL levels.



RBL Volatility

Captain David A. Spencer, USAF

RBL Push Levels

RBL currently pushes levels at least quarterly. It can and does push levels between quarterly computations for database corrections and high-priority requirements, such as contingency operations. These levels can and do change based on fluctuations in the D200A-computed worldwide recoverable asset requirement, base demand rates, base pipeline time, depot pipelines, and other base factors. It allocates one national stock number (NSN) at a time across all bases, so a change in one base's pipeline data may cause changes in other bases' levels.

RCDL Changes

The RCDL method can change levels as a result of base demand or base pipeline changes only. It is not affected by other bases, the depot pipelines, or the worldwide requirement. RCDL is computed quarterly and is used for recoverable NSNs for which RBL does not allocate levels (primarily two types of RBL-identified problem items), but RCDL levels do not necessarily change from one quarter to the next. In addition, the SBSS has a rule that dampens RCDL level changes. Unless the absolute value of a new RCDL level is greater than the square root of the old RCDL level, the old RCDL remains in effect. For example, an RCDL of two will not change to one or three since that change is not greater than the square root of two.

Analysis

We conducted our analysis by comparing RBL with other alternative leveling policies to identify a means to reduce RBL volatility. The analysis is divided into three parts. Part one describes the methodology and alternatives for reducing the number of RBL level changes; part two documents the results of the analysis; and part three discusses implementation.

Part One

Using four quarters of historical data, we ran RBL in the two quarters in which we do not receive new D200A worldwide requirements data (April and October, hereafter referred to as the off quarters). We compared the changes in levels from the previous quarter's RBL computation to the current RBL set of levels, RCDL, and alternative models. The D200A requirements data are updated semiannually, and RBL uses that updated requirements data in its January and July runs, the months when the September and March D200A cycle results become available. We wanted to reduce volatility in the RBL in the off cycles because these cycles have the least number of RBL input data changes.

We chose to allow RBL to run as it does today in the requirements cycles, January and July, because the latest worldwide requirement becomes available in those 2 months. One of the reasons for RBL to change is a change in the D200A-computed worldwide requirement. In the off cycles, one of the sources of volatility is already reduced since RBL uses the same D200A requirements data from the previous quarter. One of the features of RBL is to ensure the sum of the base levels does not exceed the worldwide requirement. So to ensure worldwide requirements and base-level consistency, we should run RBL for all items in the first and third quarters when we receive new worldwide requirements data. For example, we would not want to allocate only part of the worldwide requirement just to reduce levels volatility.

Causes of RBL Changes. Because RBL changes levels as a result of base pipeline changes and changes in the D200A-computed worldwide requirement, one would expect RBL to change more than RCDL; indeed that is what we found. When comparing the January 2000 RBL Central Leveling Summary (CLS) file to the October 1999 file, RBL is more volatile than RCDL; 9 percent of RBL levels changed compared to 7.4 percent for RCDL. Those statistics include all levels, such as zero levels. The percentages are higher when only positive levels are measured.

Table 1 shows the causes of RBL changes by case (each case being a stock record account number (SRAN)-NSN combination as displayed in the CLS file). The table summarizes all level changes that occurred in the period from April 1998 to January 1999. Many of the changes resulted from worldwide requirements changes (4.5 percent exclusively, plus some portion of 62 percent). To ensure consistency and accurately allocate the entire worldwide requirement, we applied level reduction alternative changes only in the off-cycle quarters.

Volatility Reduction Techniques. We looked at two different approaches to reducing volatility. One is to run RBL only semiannually, in January and July; in other words, reduce the frequency of runs from quarterly to semiannually. The other approach is to run RBL only for certain items in the off cycles, those for which there is a benefit to changing the levels. For example, for level changes between April 1998 and January 1999, we looked at the cases that had level changes and noted the EBO reduction.

Table 2 shows that 38.6 percent (21.8 + 16.8) of the RBL levels that changed from April 1998 to January 1999 resulted in less than a .1 EBO reduction. Almost 50 percent had no reduction, or less than .2, and 57 percent had no reduction, or less than .3. So there is little benefit in terms of EBO reduction to changing levels for many of the items that had levels changed in that period. However, some items had level changes that resulted in significant EBO reductions. More than 20 percent had EBO reductions greater than one. New RBL levels should be computed for those items with significant changes.

How do we decide which NSNs RBL should relevel and which changes are significant? How do we decide what amount of EBO reduction is trivial?

NSN Releveling Techniques. We tried two methods to decide which NSNs RBL should relevel because the changes in pipeline data were significant.

Method 1. The first method, RCDL change, would let RCDL determine which items to relevel. In method one, RBL recomputed and, if appropriate, changed levels for those items that the RCDL technique would change in the off-cycle quarter. (As previously noted, we recommend RBL be recomputed for all NSNs in the requirements quarters.) We tested two RCDL techniques, unmodified RCDL and the square root RCDL (the damping rule described earlier that is currently in use) to identify which items RBL should relevel. The advantages of using RCDL are that it changes levels using a technique designed to optimize base levels as a result of changes in base pipeline data, the only data that changes in the off cycles. Also, it did not require major format or program alterations to the RBL data input programs because the RBL model does not require any additional data.

Method 2. The second method, EBO change, required a change to RBL input data; RBL would need to know the previous

Causes of RBL Changes (Cases With Positive RBL Only)		
Causes of RBL Changes (Totals from April 1998 to January 1999)	**Cases Affected**	
Change in Daily Demand Rate (DDR)	0.46%	(502)
Change in Requirement (Req)	4.49%	(4,829)
Change in Pipeline	11.03%	(11,840)
Combination of DDR and Pipeline	20.03%	(21,502)
Combination of DDR, Req, and Pipeline	62.23%	(66,815)
Adjusted Stock Levels	1.05%	(1,123)
Other		
Total	100.00%	(107,368)

Table 1. Causes of RBL Changes (Cases with Positive RBL Only)

Changes in EBO (Level Changes Only)		
EBO Changes	**Number of Cases**	**Percent of Cases**
0.0	23,405	21.8
0.1	18,053	16.8
0.2	11,862	11.0
0.3	8,171	7.6
0.4	6,024	5.6
0.5	4,685	4.4
0.6	3,683	3.4
0.7	3,060	2.9
0.8	2,507	2.3
0.9	2,115	2.0
1.0	1,673	1.6
> 1.0	22,091	20.6

Table 2. Frequency Chart of Level Changes for April 1998 to January 1999

quarter's level. For this method, RBL relevels items with sufficient EBO reduction. As stated, method two would require changes to the RBL input file and requires RBL to compare last quarter's levels allocation and the resulting EBOs to the current quarter's levels and EBOs to decide if there is sufficient EBO reduction to warrant a level change.

Whether method one or two is applied, RBL would run every quarter; however, in the off-cycles, RBL would push fewer levels, thus reducing variability.

Part Two

Comparison of Off-Cycle Leveling Techniques. Table 3 provides the results of the various methods using October 1998 data.

Table 3 compares the total EBO and number of levels selected for releveling for five alternatives. The number of levels selected does not mean the levels all change; it shows the number of NSN-SRAN combinations identified for RBL to compute. The first alternative, no RBL, uses the previous quarter's levels in the new quarter. (That is, RBL would not run at all in the off quarter.) There is a 53 percent ([10208-6735]/6735) increase in the number of EBOs compared to running RBL for all items, full RBL. Clearly, not running RBL at all is a poor option.

Next, we looked at running RBL on a relatively smaller group of items to achieve most of the EBO reduction without generating new levels for all NSN-SRAN combinations. For other methods, the resultant EBO is close to a full RBL run, and there were fewer cases selected for releveling. Table 4 compares alternative techniques for running RBL in more detail.

RCDL Technique. Table 4 shows that running RBL only for NSNs that had an RCDL change would not generate any changes for 67,477 NSNs. Full RBL would have releveled 2,844 of those NSNs and achieved an additional 101 reduction in total system-wide EBOs (the sum of all back orders generated by all NSNs leveled by RBL). These 2,844 NSNs show a potential error in using the RCDL method; these additional NSNs should be releveled because they reduce EBOs but were not selected by the RCDL method. The RCDL method identified 35,113 NSNs for a possible level change. RBL would not have changed levels for 20,988 of those NSNs identified for change because basically no reduction in EBOs occurred by altering levels.

Square Root RCDL Technique. The square root RCDL method had similar results. Modified RBL did not relevel 70,411 NSNs because they did not meet the square root RCDL criteria. Full RBL would have releveled 3,992 of those 70,411 NSNs and reduced total system-wide EBOs by 280. Just as in the ordinary RCDL technique, these items again reflect potential error from this method. The square root RCDL method identified 32,179 NSNs for RBL to relevel, of which full RBL would not relevel 19,212.

EBO Technique. The final method identified in Table 4 would relevel items only if there was a change in the EBO of at least 0.1. The EBO (0.1) method identified 71,826 NSNs (all within plus or minus 0.1 EBO) that would not relevel with a total system-wide increase of 27.3 EBOs. Therefore, the EBO (0.1) method identified captured all NSNs for releveling which would generate a reduction in total system EBOs. The EBO (0.1) method identified 30,764 NSNs that would change, although not all SRAN-NSN level combinations would change. The small increase in system-wide EBOs and prevention of trivial changes proves that the EBO (0.1) method is in practice superior to the RCDL method.

Preliminary Findings. Using the EBO method is also theoretically superior to the RCDL method. With the EBO method, RBL would actually measure the EBO impact of not changing levels as a criterion to select levels for change. With the RCDL methods, modified RBL would decide which NSNs to relevel without taking into account the impact on the requirements system as a whole (increase or decrease in total system-wide EBOs). Therefore, the RCDL methods could still make trivial changes, releveling NSNs while achieving little reduction in system-wide EBOs. Using the RCDL method, modified RBL would not make changes for NSNs that probably should be changed. The number of these errors would be small

RBL Off-Cycle Run Options (October 1998)		
Option	**Total EBO**	**Levels Selected for Releveling**
No RBL	10,208	None
Full RBL	6,375	535,800
RCDL	6,796	62,775
RCDL Sq Rt	6,869	62,775
EBO (0.1)	6,810	64,833

Table 3. RBL Off-Cycle Run Options

Comparison of Alternative Techniques (October 1998 Data)				
Technique	Unchanged NSNs	Additional Changed NSNs Using Full RBL/EBO Reduction	Changed NSNs	NSNs Full RBL Would Not Have Changed
RCDL	67,477	2,844/101.2	35,113	20,998
SQRT RCDL	70,411	3,992/280.0	32,179	19,212
EBO (0.1)	71,826	4,504/27.3	30,764	-

Table 4. Comparison of Alternative Techniques (October 1998 Data)

with the RCDL method, but they would occur. So we selected EBO as the means to identify NSNs for releveling.

EBO Threshold. The EBO method is theoretically and actually superior to the RCDL method; about the same number of level changes occurred with fewer EBOs. What EBO threshold should the Air Force use to select NSNs for releveling? In other words, which changes should be considered as trivial changes?

To answer that question, we ran RBL to see the EBO impact if we added a 10-day RDO pipeline to any base that had a level change. If levels change, theoretically, that means an asset must be redistributed from the base with the decreased RBL to another base with an increased level. We measured the EBO increase caused by the added 10-day RDO pipeline, 10 days being the average time it takes for completion of the RDO process. That EBO increase can be considered the cost of a change in levels. The EBO change threshold, the measure of the benefit achieved by changing a level, should be greater than the EBO cost.

Table 5 shows the frequency of the EBO increase as a result of adding the 10-day RDO pipeline. Excluding outliers, changing levels and adding a 10-day RDO pipeline incurs an average 0.08 increase in EBOs. Using 0.08 as the threshold criteria would exclude 80.96 percent of the level changes. We proposed using 0.08 as the threshold criteria. Basically, if the EBO reduction for the level change is not sufficient to offset the 0.08 EBO increase caused by the RDO pipeline, do not change the level.

Using the EBO Technique. With a method to select NSNs for releveling in the off cycles, EBO, and a threshold criterion (0.08), there are still two issues to consider. Should RBL relevel for new users in the off cycles? What about levels to support PDM account needs?

New Users. In RBL, a change in one level usually is offset by a change in another level, since RBL has a fixed amount of worldwide requirements to allocate. Also, RBL currently determines when a base will receive a positive level. (RBL can and does allocate positive levels to bases with only one demand, and it can and does allocate a zero level to bases with two or more demands.) Should RBL change levels for new users in the off cycles? For bases with a new adjusted stock level (ASL) or with sufficient demand history to receive a positive level, should RBL allocate to that new user regardless of the EBO impact?

Theoretically, RBL should honor a new ASL once it is approved. It is possible a new ASL will cause an increase in the worldwide requirement and, therefore, not affect any base levels except the base with the new ASL. However, it is not clear that RBL should provide a positive level to a new demand user unless the EBO criterion (0.08) is met. Theoretically, pushing a positive level to a new user will incur an added redistribution pipeline. We tested three methods of leveling to try to answer these questions. Table 6 displays the results of using these three methods: the EBO-only rule which ignores new ASLs or new users; releveling using EBO and new ASLs; and finally, releveling using EBO plus allocating levels for new users and ASLs.

Running RBL for all items generated 81,563 level changes. Using the EBO (0.08) method only generated 9,341 changes, 11.45 percent of the full RBL changes.

Using the EBO (0.08) method and honoring all new ASLs generated 16,935 changes. (The Air Force Communications Agency implemented its new stockage policy at this time, which explains the relatively high number of ASL changes.)

If new users were exempted from the EBO (0.08) rule, there would be 69,632 level changes representing 85 percent of the changes that would occur from running full RBL. This, in essence, would negate the benefit of the EBO (0.08) rule and create almost as many level changes as are generated today. We proposed using the EBO (0.08) method and honoring new ASLs, while only releveling for new demand users if there is an EBO reduction greater than 0.08.

PDM. Should the Air Force apply the EBO (0.08) rule to the D035K depot account (PDM) levels? The PDM worldwide requirement is not based solely on the D035K reported daily demand rate. For example, the depot may repair an end item or exchange for use on another item in next quarter's repair cycle. The other item may not have been repaired last quarter or even last year, which means there may not be any DDR for it in the

EBO Change for 10-Day RDO Pipeline			
EBO Change	Number of Cases	Percent of Cases	Cumulative Percent of Cases
0.00	3,002	33.29	33.29
0.01	1,806	20.03	53.32
0.02	745	8.26	61.58
0.03	547	6.07	67.64
0.04	366	4.06	71.70
0.05	313	3.47	75.17
0.06	223	2.47	77.64
0.07	167	1.85	79.50
0.08*	132	1.46	80.96
0.09	131	1.45	82.41
0.10	419	4.65	87.06
0.20	463	5.13	92.19
0.40	223	2.47	94.67
0.60	116	1.29	95.95
0.80	64	0.70	96.66
1.00	30	0.33	96.99
>1.00	271	3.01	100.00
*Average increase in EBOs = 0.08			

Table 5. Frequency Chart of EBO Change

Comparison of Leveling Techniques for New Users				
Technique	EBO	EBO Increase	Level Changed	Percent Changed (Levels Changed/81,563)
Pushing Last Quarter Requirement	6,702	N/A	81,563	N/A
Pushing Last Quarter Levels	9,068	26.10%	0	0
EBO > 0.08 only	8,162	21.78%	9,341	11.45
EBO > 0.08 w / ASL rule	8,083	20.61%	16,935	20.76
EBO > 0.08 w/ASL & user rule	6,739	0.55%	69,632	85.37

Table 6: EBO Change Analysis

D035K database. So, RBL's measure of EBOs (based on the reported D035K DDR) may not accurately forecast the change in EBOs in this example. Many PDM items are exclusively used at the depot; therefore, there is no redistribution pipeline. For these reasons, we proposed running RBL without constraints for all NSNs in use at the PDM/DO35K accounts in the off cycles.

Conclusions

We proposed running full RBL twice annually to coincide with the D200A requirements cycle. The January RBL run uses September D200A cycle requirements data, and the July RBL run uses March D200A requirements data. Off-quarter (April and October) RBL computations would relevel significant EBO changes as well as ASL and D035K account changes. This results in the relatively lowest total system-wide EBO increase with the fewest number of level changes. Table 7 shows the expected results of the proposed policy.

As indicated in Table 7, RBL currently pushes to the average base, excluding depot retail accounts, more than 1,400 XCA data images (levels). In the off quarters, RBL will only push XCAs for levels that change based on our proposed criteria. For the April and October RBL pushes, bases should average only 100 to 150 XCAs. Our proposal reduced the number of levels pushed in those quarters by 90 percent (1250/1400) and eliminated trivial level changes, those with an EBO reduction of 0.08 or less.

Part Three

Implementation Plan. We briefed our proposal to the Air Force Supply Executive Board, and they approved the changes in February 2000. The Requirements Team, together with the Air Force Materiel Command, fully implemented the changes in October 2000. The RBL model was reprogrammed to push XCAs for EBO changes greater than 0.08 plus ASLs and D035K account changes for the off-cycle RBL runs.

Comparison of Levels Pushed (XCAs Released)		
Technique	Average Number XCAs Using Oct 98 Data	Average number XCAs Using Apr 99 Data
Present Rules (Full RBL)	1,471	1,403
EBO > .08 w/ASL Rule	153	95

Table 7. Average Levels Pushed Per Base

The proposal requires some changes to programs other than the RBL model. AFMC changed the RBL input file to provide the previous quarter's levels. RBL will push only XCAs on levels that change. However, the CLS file (RBL output file) remains a complete file. The CLS should reflect all levels, even those not changed from the previous quarter. This will facilitate accurate item management at the air logistics centers and MAJCOMs.

The Standard Systems Group (SSG) made a programming change to the SBSS. Currently, the SBSS follows up if it does not receive an XCA every 120 days. SSG changed the followup time period to 210 days.

The proposal did not affect out-of-cycle RBL runs and changes. Out-of-cycle, Air Mobility Command forward-supply location level changes will still be honored (XE4 data image with an *I* procedure) without any leveling change constraints. If the item manager identifies an NSN for RBL to rerun (for example, correcting RBL-identified problem items), RBL will run the item without the leveling change constraints. These out-of-cycle changes must also be posted to the CLS. AFMC has plans to post level changes to the RBL web site and the CLS.

Captain Spencer is a logistics career-broadening officer at the Oklahoma Air Logistics Center, Tinker AFB, Oklahoma. At the time of the writing of this article, he was Chief, Requirements Policy Branch, Air Force Logistics Management Agency.

notable quotes

Change is not necessarily progress, but there can be very little progress without change.

—General Bruce K. Holloway

Total System Performance Responsibility

Major
Henry P. Pandes
USAF

We expect to achieve greater successes from every person, dollar, and hour we expend to acquire and sustain our current and new weapon systems.

—Darleen Druyun, Principal Deputy Assistant Secretary of the Air Force for Acquisition and Management

The quest for the perfect acquisition can be synonymous with a field commander's quest for the decisive plan prior to battle. The field commander derives his strategy at the tactical level after the operational objective is clearly defined. Likewise, the program manager (PM) leads the development of the acquisition plan once approval is granted. In support of the PM, the contracting officer (CO) should be thinking about the business strategy to be used in support of the program's vision and goal. The PM and CO have no shortage of guidance from system program office (SPO) leadership, the program executive office (PEO), and legal experts. Moreover, today, the environment is influenced by Air Force Lightning Bolt initiatives that emphasize commercial practices to capture savings and the Year 2000 Department of Defense (DoD) acquisition goals that emphasize process improvement and gaining efficiencies. Ultimately, the team must ensure there is sound acquisition strategy tailored to the unique needs of the weapon system.

This article will look at one acquisition approach being used in weapon systems contracts known as Total System Performance Responsibility (TSPR). The focus on solely Air Force programs is not intended to imply that the TSPR approach does not exist throughout other DoD departments or agencies. One major portion of the Air Force Materiel Command's (AFMC) mission is to manage the integrated research, development, test, acquisition, and sustainment of weapon systems.[1] The programs being profiled belong to AFMC SPOs that support customers outside of the command.

Acquisition professionals receive consistent messages to make the next acquisition better than the last and to apply lessons learned. Why is this? The bottom line is we owe it to the taxpayers to spend wisely, and we owe it to the warfighter to deliver a mission-ready product on time. Faster, smarter, and stay within budget and on schedule—these words often resound in a PM's and CO's ears as they prepare to embark on a new acquisition or take over an existing weapon system program. Since the 1990s, acquisition reform has resulted not only in written guidance to acquisition professionals but also in creating a mindset and attitude to avoid the business-as-usual approach. We cannot afford to go back to the early days of acquisition when Chief of Staff General Merrill A. McPeak gave a harsh but realistic view of acquisition.

> The acquisition system is much closer to failure . . . . The fact that military procurement provides steady work for more than 25,000 auditors is compelling evidence of a widespread skepticism about the defense acquisition process.[2]

The TSPR approach addresses General McPeak's assessment of acquisition and seeks to turn failures into successes.

Defining TSPR and Its Intent

TSPR is certainly more than a passing catchy phrase or acronym. It is an approach that is contractually and legally binding between the government and contractor. After reviewing various expectations of TSPR from the field, common themes surface that lead to at least one definition. Essentially, TSPR is the transfer of government tasks in order to gain efficiencies by taking advantage of a contractor's overall management approach and commercial practices with minimal government oversight. Gaining efficiencies can best be described as identifying redundant and/or unnecessary practices; eliminating those practices; and in their place, using commercial practices to improve the acquisition process.

> TSPR is a very complex relationship to put on a contract that requires a champion at the highest agency levels to be successful. This overarching goal, however, is to reduce costs while maintaining or improving the quality or service levels.[3]

The decision to contractually implement TSPR is accomplished by placing a tailored clause (contractual term or condition) in Part I, Section H under the Uniform Contract Format.[4] It is placed in Section H because it is a special contract requirement and must be tailored to the needs of each specific

program. Conversely, if the clause is not in the contract, TSPR can still be construed as *philosophically* binding between the government and contractor because a firm commitment was made prior to contract award. Of the three programs reviewed, one did have the TSPR clause in the contract, and two did not have it documented in Section H of the contract but were still advertised as TSPR contracts.

Identifying a universal definition of TSPR is impossible because TSPR means different things to different people. "The TSPR concept is one element of an acquisition strategy that must be tailored to fit each program"[5]—a possible explanation for a TSPR clause not being included in the *Federal Acquisition Regulation* (FAR), Part 52, "Solicitation Provisions and Contract Clauses." Although each SPO will define TSPR differently based on the unique needs of the program, common themes—such as eliminating redundant tasks, reducing costs, improving the quality of product or service, and gaining efficiencies—remain constant.

The CO of the Have Stare contract at Hanscom AFB, Massachusetts, provides this definition:

> . . . requiring a contractor to propose, within existing constraints, a solution to fill a government requirement. Then, allowing the contractor, with minimal oversight and adequate funding to cover proposed costs, to implement the proposed solution. The contractor is held responsible for program success.[6]

A program manager at Raytheon for the Clear Radar Upgrade Program at Hanscom AFB sees TSPR as:

> . . . a way for the government to minimize contract price increases as a result of contractor initiated claims or ECPs (engineering change proposals) by transferring responsibility . . . .[7]

The PM for the Integrated Logistics System (Supply) at Maxwell AFB, Gunter Annex, Alabama, says the purpose of TSPR:

> . . . would seem to be to simplify the management structure for the acquisition of an information weapon system for the total performance of the system to a single management entity, thus simplifying the management structure and accountability for cost, schedule, and technical performance of the system.[8]

He further states, "The net result of this simplification would seem to be a reduction in acquisition oversight that might otherwise be required to manage the integration of multiple entities."[9] The Chief of the Contract Policy Division at AFMC views TSPR as:

> . . . an acquisition strategy to have a single contractor manage the integration of all subelements of a system to ensure that the entire system meets performance requirements . . . how the contractor meets the broad performance requirement is at their general discretion.[10]

After reviewing a few of the TSPR definitions in the field, common denominators mentioned earlier again become apparent—improve the quality of product or service, reduce costs, and gain efficiencies.

TSPR's Place in Acquisition Reform

TSPR is an acquisition approach that responds to the government's and industry's recognition of change needed in government procurement. In 1997, the president and chief executive officer of McDonnell Douglas said:

> Both sides [government and industry] now realize that, to ensure we get the most bang for our buck during this great competition for dollars…we have to act as a team.[11]

Additionally, that same year, Ms Druyun gave the direction acquisition was headed after the Lightning Bolts were released to jump start acquisition reform. The direction "is basically toward creating a partnership with our contractors. They are not our enemy. If we erect a wall between us, then chances are we are going to walk away with a failure."[12] The expected outcomes of TSPR respond not only to Ms Druyun's message of partnership but also to industry's desire for the government to give contractors more responsibility for the overall management of weapon system development. A number of defense contractors have voiced a desire for less oversight and more management in developing the contract's deliverable.

The DoD announced two initiatives related to acquisition reform, and the principles of TSPR respond to both initiatives. First, in June 1994, the Secretary of Defense issued a memorandum requiring the use of performance specifications rather than military specifications. Military specifications can be used only if the appropriate milestone decision authority approves a waiver.[13] This memorandum paved the way for more performance-based acquisitions with the hope of giving the contractor the flexibility to use commercial practices and possibly reduce costs in the process. Stringent military specifications are discouraged, and contractors are given ample flexibility in determining the most cost effective means to supply a service or product.[14] The memorandum made it easier to justify and use outcome-based work documents such as a statement of objectives versus the traditionally lengthy statement of work, which tends to be a step-by-step or how-to document. Second, Pentagon Acquisition Chief Jacques Gansler sent out a 5 April 2000 memo on performance-based services acquisitions (PBSA). The policy guidance on performance-based requirements:

> . . . allows offerors maximum flexibility to attain the greatest degree of innovation and creativity . . . . Studies have documented that service requirements converted to a performance-based approach have generated both significant savings and performance gains.[15]

The military specifications memorandum and the PBSA memorandum created opportunities for the government to obtain efficiencies through contractor innovation—TSPR responds to both DoD initiatives.

Industry has reacted to the two DoD initiatives, and there is strong indication they like what they see. In 1997, an industry survey was conducted by Coopers & Lybrand for DoD Service acquisition executives to assess the implementation of acquisition reform initiatives in DoD contracts. Ten major contractors participated in the study, resulting in 430 structured interviews. One of the survey recommendations was that government requirements be performance-based. Requirements, they stress, should be outcome oriented, not input oriented.[16] The survey further stated:

> Acquisition reform is open communications, trust, teaming, partnering, and giving the managers at these contractor sites the opportunity to do what they were hired to do—manage.[17]

The 1997 survey emphasized industry's desire for the government to give contractors more opportunity to manage and the government to stay with performance-based requirements. TSPR responds to both desires because it provides an increased opportunity to manage with less oversight and the motivation to use commercial practices to meet an outcome-based requirement.

It is evident that industry wants more freedom to manage the delivery of a product or service and welcomes performance-based requirements. Likewise, DoD has set guidance for agencies to create more performance-based requirements wherever possible in order to gain innovation, savings, and overall efficiencies. Unquestionably, TSPR shifts a specified amount of responsibility, traditionally held by the government, to the contractor—for some SPOs this shift is a huge change in process and culture. Therefore, it is imperative, prior to the inclusion of a TSPR approach in an acquisition plan that the government include this transfer of responsibility in the program's risk assessment. This risk assessment is the process of subjectively determining the probability that a specific interplay of performance, schedule, and cost as an objective will or will not be attained along the planned course of action.[18] The process of assessing risk takes place after forming a risk assessment group consisting of the PM, CO, engineers, acquisition development staff, and customer.

If after careful review the group's assessment concludes the benefits of implementing TSPR outweigh the traditional methods of government oversight, then and only then should a PM give the *green light* to proceed with this approach. If the decision is to implement TSPR, then one of two scenarios will likely be the outcome of the contract. It may play out like this on the who-takes-the blame/credit spectrum. On one end of the spectrum we have scenario one. Upon delivery of *XX* weapon system, the contractor assuredly says, "We delivered on schedule and within budget because we had the latitude to manage development, the government gave us the resources, and we had a solid requirement." On the other end of the spectrum we have scenario two. After receiving a phone call from the terminating contracting officer for *XX* weapon system, the contractor grudgingly says it could not deliver because the government did not provide the resources promised. The contractor may have gotten in over its head and feels that is why the government reverted to the oversight mode.

TSPR Is Put to the Test in the Field

The TSPR approach, with its common theme of delivering the required product or service to the customer in a more efficient and cost-saving manner, is alive and well in the Air Force. To determine how TSPR is doing in the field, three SPOs will be profiled to see how TSPR has affected each respective program. When TSPR is placed in a contract clause, it normally will state specifically what the contractor is being held responsible for (that is, research, development, integration, or sustainment of systems/sub-systems). The government takes the lead when determining the responsibilities to be transferred to the contractor.

A survey was used because it was the best method for obtaining the most meaningful and current feedback from the PMs, COs, and contractor counterparts. The survey was the best means of giving each respondent time to think about TSPR and provide feedback. The SPOs selected were the C-17 and F-117 at Wright-Patterson AFB, Ohio, and the Space-Based Infrared System (SBIRS) SPO at Los Angeles AFB, California.

C-17 SPO

The C-17 SPO (ASC/YC) is located at the Aeronautical Systems Center (ASC), Wright-Patterson AFB. A press release from the Warner-Robins Air Logistics Center (ALC), Robins AFB, Georgia, stated the SPO is moving C-17 parts management from Defense Logistics Agency centers and other ALCs to the aircraft contractor, Boeing. This move is what the SPO referred to as flexible sustainment. The C-17 system support management office at Robins stated:

> We're the lead-the-fleet operation in flexible sustainment and we're giving Boeing a trial period of about two years to let the contractor do all the support for the weapon system.[19]

The implementation of flexible sustainment and the subsequent transfer of responsibilities from the government to the contractor led to the application of TSPR. The ultimate goal is to support the C-17 weapon system more efficiently—a key tenet of TSPR. The C-17 aircraft flexible sustainment contract is a performance-based contract and does not have a TSPR clause, but the flexible sustainment "…concept is in itself a TSPR approach."[20] The flexible sustainment concept proposes that the government will transfer specific responsibilities normally held by the government—another tenet of TSPR.

> The concept proposes the contractor will be held responsible for configuration control, materiel management, depot-level maintenance, support engineering, modifications, and just-in-time spares management.[21]

The CO's view of using the TSPR approach is to achieve cost savings, increased quality, and flexibility. The SPO has given Boeing the freedom and flexibility to manage the spares because the contract is performance based, and it is the contractor's responsibility to determine the how-to activities to arrive at the end-state. The PM's desired effect in giving Boeing TSPR responsibility is accountability.

Supplying the highest level of availability at the lowest total cost is the desired end-state. As a system integrator, the company [Boeing] must determine the best resource mix for support; that is, if competencies reside in a public source, the contractor must enter into partnering arrangements that provide the best value while maintaining levels of support.[22]

TSPR allows Boeing to determine the best resources to get the job done and use its own creativity to deliver the product. According to Boeing, the expected goals of TSPR in this contract are that it:

> …optimizes performance and cost parameters and results in minimum organizations being accountable for a weapon system over its life cycle.[23]

Boeing has some key expectations with the TSPR approach, such as reducing system integration concerns by having a single person manage the integration tasks; reducing costs by eliminating redundant management systems; and finally, enhancing weapon system capability by ensuring

accountability for key performance parameters.[24] The common link in the government's and Boeing's approach to TSPR is accountability and efficiency. Establishing this type of common understanding is critical prior to contract award and program execution.

So how is the contract doing thus far? The C-17 PM states, "So far so good! There have been some scope versus out-of-scope issues, but not enough to endanger performance."[25] Boeing states the:

> . . . flexible sustainment contracts have and continue to be huge success stories . . . . It is providing excellent customer support overall and showing the cost of support per aircraft is steadily decreasing.[26]

When asked if both the PM and Boeing liked the TSPR approach in government contracts, both agreed. The PM states it is the "best means that I have found to provide the carrot and stick in government contracting." Additionally, Boeing stated, "TSPR allows for a more efficient way of managing weapon systems. It is designed to provide timely support in a cost-efficient manner."[27]

F-117 SPO

One of the SPOs that stood out from the others in terms of using TSPR as a core philosophy in managing its weapon system was the F-117 SPO (ASC/YN), located at the Aeronautical Systems Center. The SPO has a performance-based contract with Lockheed Martin to provide coverage for all aspects of acquisition and management for the F-117 aircraft, the weapon system trainer, and the mission planning system. Interestingly, similar to the C-17 contract, the F-117 contract does not have a TSPR clause in it. The mutually agreed upon approach was established early on, and the TSPR philosophy approach permeates the contract's requirements document. Essentially, both the government and Lockheed Martin operate with the TSPR principles without a clause in the contract. The TSPR support approach for the contract came into being after the base realignment and closure decision to close McClellan AFB, California, necessitating relocation of the SPO to Wright-Patterson AFB. Afterwards, the Secretary of the Air Force, Acquisition office, directed the SPO to increase efficiencies in support via the TSPR concept. Throughout the relocation process, the transitioning had to be transparent to the users at Holloman AFB, New Mexico, who belong to the Air Force Air Combat Command (ACC). As a result of the TSPR approach, the SPO reduced its staff from 242 to 20 and realized a savings of $90M.

Under the F-117 contract, Lockheed Martin took responsibility for tasks historically performed by the Air Force (for example, item management).[28] According to the F-117 CO:

> Our goal in pursuing this TSPR philosophy was to continue sustainment and support of the F-117 weapon system at a lower total cost to the Air Force (including SPO manpower), while providing the same or better level of support to the user (ACC).[29]

Inclusion of the TSPR philosophy allowed for significant changes in the way weapon systems support is usually conducted at air logistics centers. Under the TSPR concept, management of the F-117 repair-cycle assets transferred to Lockheed Martin in order to improve asset availability. "We believe Lockheed Martin's market focus will help gain control of the repair cycle and drastically reduce cycle time."[30] The mandatory relocation of the SPO and the directive to implement a reduction in total ownership cost set the stage for the TSPR approach to flourish and take the F-117 out of the business-as-usual approach. The PM states:

> The TSPR contract will provide depot-level acquisition and sustainment requirements necessary to support the mission, operation, and continued combat capabilities of the F-117 weapon system into the next decade.[31]

Lockheed Martin sees the performance-based contract as a key to success. The business development integrator for Lockheed Martin-Aero states:

> Let the results of what the user needs and requires be the foundation for the performance metrics, drive out no-value-added work, and eliminate any duplication of work, whether it's in the contractor or in the SPO.[32]

When implementing TSPR, a transfer of management responsibilities does occur, but so does risk sharing. Lockheed Martin's perspective on assuming risk is a realistic one in that, although more freedom now exists to manage with less government oversight, there is now an opportunity to experience the impact of not only good results but also bad ones. "Risk isn't bad as long as you have a plan to deal with each element that offers you risk in the execution of the contract."[33]

Lockheed and the SPO were both up front in letting it be known there are lessons to be learned since the TSPR concept was conceived. For instance there was the need for multiple acquisition strategy panels (ASP) to convince senior leadership the TSPR business approach was sound, address job security of government employees affected by the reorganization, and ensure contract incentives were sufficient to properly motivate the contractor. Without the approval of the acquisition plan by senior contracting officials at the ASP, the acquisition would not have moved forward.

So how is the contract doing thus far? According the PM:

> The contractor has met the performance level in the first two years, under run cost the first two years by about $18M, the government has not had to revert back to any government oversight . . . the only drawback I see is we lost experienced government folks, and our ability to interpret the contract in a few vague areas has caused us some additional workload.[34]

When asked if both the government and Lockheed Martin favored TSPR in government contracts, both had similar comments. The PM stated TSPR ". . . is a great way for the government to reduce costs while providing the warfighter with as good or better support."[35] Lockheed added a tone of caution. As a result of TSPR:

> . . . the aircraft has higher performance ratings, and the customer is happier than it has ever been . . . the figures speak for themselves: $82M in personnel cost savings, $80M in stabilized funding, and almost $20M in shared cost under run for the first two years.[36]

The caution Lockheed states the "F-117 TSPR is not a contract that should be used as a template for the next TSPR contract."[37] Each acquisition team will have to determine what benefits they want from TSPR and then tailor it accordingly to meet their particular needs.

SBIRS SPO

The SBIRS SPO (SMC/MT) is located at the Space and Missile Systems Center (SMC), Los Angeles AFB, California. This SPO is handling the Air Force Space Command's (AFSPC) top program, according to Brigadier General Michael A. Hamel, AFSPC Director of Requirements.[38] SBIRS is a consolidated, cost-effective, flexible, space-based system that, in time, will meet US infrared global surveillance needs through the next several decades.[39] The SBIRS program will replace the 30-year old Defense Support Program (DSP) satellites that watch the earth for the telltale heat signatures of intercontinental ballistic missile launches.[40] The focus here will be on the SBIRS High contract with the Lockheed Martin Space Systems Company. The contract is performance based and contains the TSPR clause in Section H. The SBIRS contract responds to the 1994 DoD military specifications memorandum since SBIRS has "no military standards or specifications used to define supportability engineering requirements."[41] Furthermore, the contract is in step with the April 2000 PBSA memorandum since "all documented supportability engineering requirements are performance-based statements reflecting a need rather than a solution."[42] The transfer of responsibility is clearly defined in the TSPR clause:

> . . . the contractor agrees to assume TSPR in accordance with the terms and performance requirements of this contract, and to furnish all necessary effort, skills, and expertise within the estimated cost and award-fee pool of this contract.[43]

The TSPR clause for this contract goes on to state the responsibilities that fall under the TSPR umbrella. A point to be made is how the clause carefully limits Lockheed Martin's TSPR liability by virtue of the availability of funds to execute the program. The clause sets the standard that Lockheed Martin will carry out itsTSPR responsibilities only ". . . within the estimated cost and award-fee pool of this contract." These few words in the TSPR clause illustrate the fact that the government's expectation of giving TSPR is directly related to its ability to secure proper funding from year to year. Budgeting to properly execute a program is a significant task in itself for the PM and financial staff. Hence, a CO actually receiving an approved funding document to keep the contract moving is a significant event. The SBIRS TSPR clause language lets both parties know TSPR performance is dictated by available government funding. Today's limited dollars for DoD acquisition will continue to be a challenge for the foreseeable future.

The expectations of TSPR by the SBIRS High PM and the Lockheed Martin contract administrator are very similar to the previously addressed programs. The PM stated:

> …the desired outcome should be allowing the contractor flexibility…the government taking the insight and facilitator roles more strongly and the removal of direct government oversight and inter-agency coordination.[44]

As the party that has been given TSPR, the contractor has translated the government's expectations into its own vision for SBIRS High development. A few of the benefits being sought by Lockheed Martin as a result of putting TSPR in the contract are achieving system performance rather than unintegrated or difficult-to-integrate elements, reducing costs through more efficient contractor processes, less duplication of and more collaboration on functions between government and contractor, and greater risk sharing passed to the contractor in the areas of design and integration.[45] Throughout Lockheed Martin's survey, key points such as relative freedom, opportunity, and efficiency were mentioned—all common denominators of TSPR.

So how is the contract doing thus far? According to the PM:

> . . . TSPR has been successful in allowing the contractor to determine approaches for interfacing . . . it has not shown to be successful in meeting acquisition program baseline parameters for delivery of the first increment consisting of a DSP compatible, consolidated ground system.[46]

Lockheed Martin recognizes the shortcomings mentioned by the SBIRS High PM and did not shy away from this fact. Lockheed Martin says that the contractor team was unsuccessful in bringing the first ground increment on line on schedule. The contractor recognizes the ramifications of this delay by stating that, as a result, there have been cost overruns, unplanned operation and maintenance expenditures by the user, and schedule delays with other elements in the program.[47] The impact of this delay was significant. According to the CO, no award fee was given during this time. This program has shown that the road to success is not an easy one despite the inclusion of TSPR in the contract. Complex weapon systems such as SBIRS High will challenge the best and brightest minds from both the government and contractors. Although not addressed in the TSPR clause, it is conceivable that, as a last resort, the government reassumes aspects of SBIRS High management if the delivery of the system is behind schedule or over budget.

The prospect for placing TSPR in future government contracts is cautiously optimistic after reading the response from the SBIRS High PM.

> TSPR can be favorably used in the right context for the right product set . . . the constraints [budget and schedule] placed on the contractor with TSPR tended to incentivize greater emphasis on meeting cost and schedule versus system performance.[48]

The PM continues his cautious tone when he says TSPR is not a *universal solvent*. Lockheed Martin looks favorably on taking on TSPR responsibility in government contracts. According to Lockheed Martin, TSPR is:

> …a continuation of its longstanding role as an integrating contractor designing, developing, integrating, testing, and deploying large complex space and related systems.[49]

If the government continues with TSPR, then Lockheed Martin sees itself as being able to produce systems cheaper and better integrated for the user as a result of an incentive to expand the company's program management and engineering services with other resources and suppliers.

Contract Law Comments

An integral member of any acquisition team is the legal expert from the Staff Judge Advocate's Office. A legal review of the contract document and its file is a mandatory requirement that takes place prior to executing a large-dollar contract. Furthermore, most experienced acquisition teams will always invite the

legal office when forming their acquisition strategy. Legal offices at Eglin AFB and Hanscom AFB were sent surveys in order to determine what cautions and concerns exist based on their experiences.

Getting the language right in a TSPR clause is paramount because of transfer of specific responsibilities from the government to the contractor. Establishing agreeable language is critical because the language sets the standards and guidelines for the contractor's acceptance of development, integration, or sustainment responsibility. Conversely, the language defines the parameters for which the government will provide the oversight and resources necessary for the contractor to meet the performance based requirement. An attorney at Hanscom AFB states:

> . . . the biggest problem is getting the language right. The government wants the contractor to assume all the risk for everything, while the contractor wants to avoid as much of the risk as possible. In the end, the language is a compromise between these two extremes.[50]

Defining requirements is the highest risk, so that both parties have a clear understanding of expectations and likely costs to meet those expectations.[51]

Changes such as engineering change proposals will no doubt occur in most acquisitions, but constant changes due to uncertainty in what the user wants should be avoided. Besides getting the language right, it is prudent to review an interested offeror's past history with the weapon system.

The Director of Acquisition Law at Eglin AFB emphasizes the need to review the history the contractor has with the specific weapon system. Specifically, what role did the contractor previously have developing the system and what opportunity did the contractor have assessing the design of the weapon system for which it was not previously responsible.[52] The legal experts agree that both parties must sincerely understand where the TSPR boundaries or parameters lie prior to contract award. Establishing a mutual understanding of TSPR is even more important for those contracts that do not have a clause and rely solely on the spirit or buy-in of the TSPR concept.

An issue a CO may encounter when implementing TSPR is determining the right type of contract. Since COs may have wondered if a single contract type is preferred over another, the survey asked legal offices, "Is there a certain type of contract that makes more sense to use when implementing TSPR?" When deciding on a contractual approach, a CO considers many factors. Selecting a type of fixed-price contract may be chosen after the CO determines:

> . . . performance uncertainties can be identified, and reasonable estimates of their cost can be made, and the contractor is willing to accept a firm fixed price representing assumption of the risks involved.[53]

Conversely, the CO may choose a cost-reimbursement type contract after determining the ". . . uncertainties involved in contract performance do not permit costs to be estimated with sufficient accuracy."[54] With the help of the PM, a CO can make the decision with relative ease as to what type of contract to use. However, including TSPR in the contract necessitates some further thought before a decision is made. On the surface, using a cost-type contract may appear to be the wrong type because it essentially results in the payment of all allowable and allocable costs. Consequently, one may conclude any competent contractor can take on TSPR as long as there is funds availability. Attaining cost efficiency in this scenario is then questionable. So what is legal's answer? The consensus from the legal responses is that there is no single contract type that works best with the TSPR approach. The key when selecting either a fixed-price or cost-reimbursement contract is to "create a balance of risks and benefits between the parties, which contributes to and motivates a cooperative relationship."[55]

After determining the true risk in the program, the *art* for the CO is finding the right type and mix of incentives to place on either a fixed-price or cost-reimbursement contract that motivates the contractor. Once the incentives are identified, then both parties must clearly understand what areas will be evaluated for program success. For example, if using an award-fee plan, both parties must understand how the fee determining official will equate ratings of excellent, good, or unsatisfactory to dollars for the contractor and what performance evaluation areas will be evaluated to achieve program success. Either a fixed-price or cost-reimbursement contract can be used with TSPR. The key task for the CO is to find the proper balance of incentives to ensure the contractor is duly compensated, the government's interests are protected, and the TSPR clause has the *teeth* the government intended it to have.

Conclusion

TSPR has responded to Air Force expectations as dictated by the acquisition reform climate. However, TSPR is not the panacea for all programs and does not make a program immune to difficulties with cost, performance, or schedule. In the current environment of acquisition reform, greater industry, and government communication and budgetary constraints—which the Under Secretary of Defense for Acquisition and Technology describes as having ". . . unlimited demands for very limited resources"—TSPR is an acquisition approach that should not be ignored.[56] Further, TSPR fits right in line with the Air Force policy of clear accountability in design—"laying out what we want and not telling the contractor how to do it"—an outgrowth of the Defense Department's move toward performance-based contracting.[57]

The decision to use the TSPR approach in government contracts sets a tone characterized by avoiding a *business-as-usual* approach. Furthermore, TSPR fosters a fresh environment that is ready for innovation and creative thinking. It is very important that both parties agree on TSPR language in the contract. Agreeing on the right language to fit the needs of the program puts in writing the type of working relationship to which each level of the program will adhere. If conditions within a program dictate a change to any of the characteristics or desired outcomes of TSPR, then the CO can issue a change to the TSPR clause through a contract modification. The TSPR clause by no means has to remain stagnant throughout the period of performance. Conversely, the F-117 contract operates with the TSPR label but without a TSPR clause in the contract. In this program, both the government and contractor rely on the TSPR spirit or buy in to define their working relationship and determine how

the program will be executed. This is not to say that the F-117 SPO will not be successful. In fact, the program is doing quite well thus far, but not having a TSPR clause leaves the possibility of future disagreements on responsibility-related issues. A CO needs to have language in the contract that can be referred to so the contract can be properly administered, especially if scope-of-work issues arise between both parties. Personnel turnover and resulting loss of corporate history is a common source of conflict. Furthermore, changes in the needs of the user and the subsequent changes in design, production, or sustainment needs can lead to time-consuming conflict without a TSPR clause. The safest way to avoid conflict with TSPR is to put it in writing and avoid having to rely on the TSPR *spirit* that can wane over time due to personnel turnover.

Acquiring the freedom and flexibility to manage a program is something for which most contractors have longed. Once it gives TSPR, the government should proceed on the assumption that the contractor has the managerial ingenuity and technical expertise to deliver the product/service with minimal government oversight. The government's expectations become explicit once TSPR is included in the program, since "in theory, the more responsibility the government can turn over to a contractor under a TSPR strategy, the greater the potential benefits."[58]

The TSPR approach is here to stay for the foreseeable future. The General Accounting Office "identifies 44 programs currently managed with a TSPR agreement" and "lists 31 programs planned for TSPR."[59] In future programs, COs should tailor a TSPR clause to meet the program's needs and place it in the contract to minimize the possibility of disagreements later in the program. As the program matures, the clause acts as a baseline and important placeholder that does more than set the tone for the execution of the program. If it makes sense to transfer responsibilities from the government to the contractor, then TSPR can and has proven to work. Given the right requirement, it is one acquisition approach that will help the SPO team get the very best product or service to the warfighter.

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Focused Logistics Wargame

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Over the last 10 months, the joint logistics community has been identifying the issues that will most impact its capability to meet the objectives of Joint Vision 2020. The avenue being used to identify these issues is the Focused Logistics Wargame (FLOW), an approved Defense Planning Guidance assessment game (Joint Planning Document). Set in the 2005 to 2007 timeframe, the wargame provides a chance for the joint logistics community and our allies in Australia, Canada, and the United Kingdom to explore logistics issues on several scenarios, ranging from humanitarian aid to major theater war. The game will come to its conclusion in October 2001, producing a list of the most important issues facing the logistics community.

The game is centered around a group of seven pillars based on the tenets of Focused Logistics. These pillars are agile infrastructure; information fusion; joint deployment and theater distribution; ordnance, engineering, and construction; multinational logistics; and interagency and joint health service support. The pillars are led by a group of general officers or equivalents from each of the Services and composed of subject matter experts from Service headquarters and major commands. Representatives from the Department of State, Australia, Canada, the United Kingdom, and various other national agencies, as required, comprise the multinational and interagency pillar. This pillar also gives support to all the other pillars, providing positions of their governments or agencies on a given issue. Each pillar, with the support of a modeling and simulation subgroup, analyzes each scenario for logistical issues specific to its area of expertise. Each issue must be supported by the scenarios, which include disaster relief, humanitarian assistance, major theater war, small-scale contingency, and redeployment. The issues must address programs, doctrine, or execution. Pillar issues and analyses are presented to the senior logistics leadership at four briefings, called Moves, from June through September. In October 2001, all the pillars and senior leadership for logistics will gather for the final game week at the Air Force Wargaming Institute, Maxwell AFB, Alabama. They will present all the issues developed through analysis of the scenarios from each of the Moves. By consensus, the senior leadership will identify those issues the joint logistics community feels are the most important.

These issues will be assigned to the Service or agency best suited to address them. The short list of four major issues identified from more than 100 original issues at the 1999 game were engineering capabilities, trusted logistics information environment/capabilities, on-demand communications for logistics, and contractor logistics support integration. During the last 2 years, the joint community has worked to solve these problems, and the pillar responsible for each of these issues is looking at each issue again to see if the issue still exists or if it has been solved. As of the writing of this article, the Move 1 briefings are complete and the 2001 set of issues arising from Move 1 developed. Over the next several months, these issues will be more closely examined and new issues will arise that may take on greater importance. Some of the issues identified from the humanitarian assistance, disaster relief scenarios, and ongoing operations of Move 1 are listed below.

- Joint engineering planning capabilities
- Information and data and data with civilian agencies and humanitarian relief organizations
- Disruption of communication
- Contractor logistics support
- Lack of coalition logistics doctrine
- Lack of visibility of coalition deployment and sustainment
- Vagueness of joint theater logistics management doctrine
- Wartime logistics executive agent responsibilities
- Rotation of Service war reserve assets that have the Defense Logistics Agency as the source of supply
- Sustainment planning for class IV materials
- Use of prepositioned assets for operations other than major theater war
- Fact that 75 percent of the Department of Defense civilian work force will be eligible for retirement in 2008
- Absence of current agreed upon coalition logistics planning mechanisms
- Repositioning of munitions
- Twenty-foot International Organization for Standardization containers for the shipment of munitions
- Requirement for tools to analyze the requirement for medical supplies

Each of these issues is being worked by the pillars to identify the causes, logistics impact, alternatives, possible solutions, and lead agency. As the game progresses through October, we plan to provide a follow-on article with the details of the final outcome.

Why Should Loggies Care About Purchasing?

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It is not the strongest of the species that survive, nor the most intelligent, but the ones most adaptive to change.

—Charles Darwin

When talking to Air Force people about purchasing, the question that often comes up is, "Why should I care about purchasing; that is someone else's job, right?" Let us face it, Air Force people work pretty hard in their functional stovepipes and seldom have the time or energy to cross over those barriers. In fact, most fight hard to keep business as usual. So why should you care about purchasing? In the most basic sense, aircrews want mission-ready aircraft to fly and modern, new weapons to play with. Logisticians want available spare parts or at least accurate information on delayed spare parts in order to make wise maintenance decisions. How the purchasing process is accomplished directly relates to spare parts availability and information on spares to support mission-ready aircraft. Having too small a supply base can result in poor spares support. Conversely, having too large a supplier base, let alone one that frequently changes, naturally results in increased variability in lead times, materiel consistency, interpretation of specifications, and the quality of relationships.[1] If you are a logistician, you should absolutely care about purchasing because you have to live with its outcome. Perhaps it is time to take a good look at how the Air Force might make the purchasing process better by focusing on the very start of the supply chain.

While the Air Force continues to do purchasing and materiel management in a very functional, vertical structure, many leading commercial firms have dramatically changed their purchasing and supply management (PSM) practices and earned some impressive cost savings and performance improvements for both the short and long term. For the Air Force to take advantage of the benefits achieved by innovative firms, it must change the way it purchases and sustains its weapon systems and commodities.

Explained broadly, PSM[2] is a horizontal, integrated process that encompasses all key areas of spending and core supplier networks. PSM's goal is to create continuous improvement in the performance and cost of purchased goods and services. Innovative buyers recognize that these areas can account for a very large percentage of an organization's expenditures—for 38 percent of the total Air Force budget, $31B in fiscal year 2000.[3] As a result, PSM commands the attention of high-level leadership, and best PSM practices are often at the heart of successful, continuous improvement programs. In other words, PSM is a strategic weapon for continuous improvement in total costs and performance (improving buyers' competitive advantages), and it requires an integrated team effort.

Implementation of the best PSM practices represents a number of major shifts in practices, processes, status, focus, organization, and outcomes. The largest shift changes the present operation of PSM from a tactical, backwater shop to a strategic, corporate resource. The total change effort must be led and supported by top management to change a vertical, functionally stovepiped organization into a horizontal, integrated process as shown in Figure 1.

PSM replaces small, distributed, low-skilled purchasing functions with highly skilled, multifunctional teams that transfer many short-term contracts, often with adversarial relationships, into fewer, long-term partnerships with the best suppliers. The dozens of small, distributed buys, normally based upon price data, are replaced with more centralized, large commodity or industrial group buys based on lowest total ownership costs using supply markets and supplier economics insights. Instead of one-time cost reductions generally associated with the many initiatives implemented over the years, PSM offers continuous

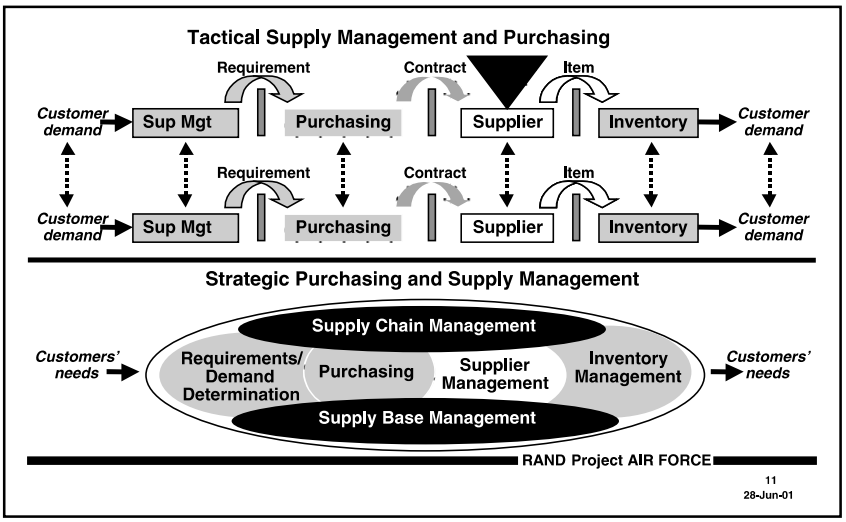

Figure 1. The Change from Tactical Purchasing to Strategic Teams

improvements in costs, quality, responsiveness, flexibility, and technology.

Many innovative buyers have reported that implementing best PSM practices has produced substantial benefits. The types and magnitude of the benefits and how quickly they are realized vary significantly based upon the characteristics of the goods and services involved and the initial sophistication of the existing procurement function and supplier relationships. Some buyers have reported very impressive results as follows:

- Cost savings as high as 20, 30, and even 50 percent for a specific group of goods or services[4]
- Savings of as much as 3 to 4 percent of the total spend per year for 4 or 5 years
- Average quality improvement of 10 to 13 percent per year
- Delivery responsiveness improvement of 10 percent per year[5]
- Faster (22 percent over 8 years) and better product development[6]

The Air Force is in the process of implementing acquisition reform (AR), which includes some PSM practices. However, most AR initiatives target the acquisition community as opposed to the broader Air Force functional community. Some focus primarily on system acquisition, excluding the characteristics and needs associated with sustainment and operational contracting. The key difference between PSM and AR is PSM's strategic, horizontal (that is, cross-functional/business unit), integrated process approach that focuses on continuous improvement, not just on one-time cost savings or performance improvement. For example, a best PSM practice of supplier rationalization has not been an explicit goal of AR due to concerns about the Air Force's meeting obligations for competition and socioeconomic goals.

The commercial world has already stepped out smartly in implementing PSM. One merely has to read any purchasing or supply chain magazine to see the large benefits earned by the firms. The following examples from the commercial world highlight the ongoing change effort and the savings and performance improvements achieved. This change is so dramatic the National Association of Purchasing Management recently changed its name to the Institute for Supply Management.

The aerospace industry is revamping purchasing to enhance material and component quality and reduce delivery cycle times and costs. Toward these goals, firms are making strategic efforts to outsource noncore activities, consolidate their supply bases, forge stronger relationships with remaining suppliers, and create long-term commodity contracts. Other strategic efforts include adapting lean manufacturing techniques, integrating purchasing and key suppliers into product development, and pushing manufacturing techniques that increase productivity into the supply base.[7] Recently, the Center for Advanced Purchasing Studies surveyed 48 aerospace product manufacturing firms and found that 91 percent use multifunctional teams that include purchasing, engineering, manufacturing, quality, finance, logistics, customer support, and supplier relations executives.[8]

Less than 10 years ago, IBM was an extremely vertically integrated company that made most of the components for its own computers. They hired Gene Richter as chief procurement officer and transformed a collection of divisional purchasing groups into a centralized structure that truly recognized the importance of suppliers in keeping IBM a leader in the technology marketplace. The company combined the requirements of all its divisions and locations to gain clout, and Richter formed commodity teams to manage the global purchase of components and services. Purchasers began evaluating the performance of suppliers, reducing the number of suppliers, and identifying potential new ones. The teams also negotiated long-term contracts with suppliers and reduced IBM's supplier base from about 4,900 in 1993 to only 50 for 85 percent of its $17B in production purchases.[9] "Of the 3,800 men and women in procurement globally, we are 70 percent tactical and 30 percent strategic with the way we spend our time," says Richter. He goes on to say, "We think we can flip those percentages."[10]

At Lockheed Martin, finding the *best-in-class* suppliers is important to maintaining delivery of best technology and best product components and systems. According to Northrup, they will be concentrating more work with fewer best-in-class suppliers.[11]

In 1988, there was no corporate visibility because there was no strategy, according to Terry Sueltman, Honeywell's Vice President of Supply Management. He also noted, "Nobody cared about the money being spent as long as manufacturing got what it needed to make the products. Purchasing people were viewed simply as the in-house group that expedited orders and sometimes solved material supply problems." Sueltman says, "When this operation was just purchasing, it was a tactical subset of manufacturing—its duties were transactional." The purchasing group has since evolved into a strategic part of the company's supply management, quality control, and cost-reduction systems. Among the internal changes necessary to manage the total supply chain was upgrading the personnel within supply management. Today, 90 percent of the staff members have 4-year degrees, and 27 percent have advanced degrees. Nearly 30 percent have become certified public accountants. Long-term relationships with cost-effective suppliers are a key piece of the company's global supply strategy, called Supplier Alliance. The results speak for themselves. From 1990 to 1996, product quality defects were reduced by 90 percent. Honeywell has more than halved the company's suppliers, with 55 key suppliers now providing 75 percent of all production components. Lead times for parts shipments have been reduced by 75 percent, and investments in materials for major products were reduced by 50 percent.[12]

DaimlerChrysler developed a program called Supplier Cost-Reduction Effort that netted $2.3B in savings in 1999. According to the author of the program, Tom Sidlik, head of purchasing:

> We are after waste and cost, not price. Some other major suppliers go after price, which reduces profit margins. We are not after reducing profit margins—we want to get the whole supply chain better managed to take the waste out so everyone makes more money.[13]

The salient point from the organizational perspective is the transformation of the purchasing arena from a tactical to a strategic focus. Air Force PSM is very tactically oriented with many short-term contracts and adversarial relationships with suppliers. A change from the small, distributed low-skilled purchasing functions now prevalent in the Air Force must be made to centralized, multifunctional teams that include logisticians and create fewer, long-term partnerships with best suppliers. The pain involved in the change will be worth the effort to obtain the benefits and experience of PSM.

Contracting cannot and should not work the PSM transition alone. Logisticians need to take the lead in shaping this change and making it happen. We do not have anything to lose but a little of our time, and we and the Air Force have much to gain if we do this right!

Notes

1. Robert J. Trent, "Applying TQM to SCM," *Supply Chain Management Review*, May/Jun 01, 75.
2. There are many facets to PSM and several excellent projects that describe PSM more completely than this brief article. One in particular from RAND—Report AB-352-1, *Implementing Best Purchasing and Supply Management Practices: Lessons from Innovative Commercial Firms*, by Nancy Y. Moore, Laura H. Baldwin, Frank Camm, and Cynthia R. Cook—is a superb document providing a comprehensive background on PSM.
3. *USAF FY00 Statistical Digest*, Tables C-3 and C-6.
4. Robert J. Trent and Robert M. Monczka, "Purchasing and Supply Management Trends and Changes Throughout the 1990s," *International Journal of Purchasing and Materials Management*, Fall 1998, 3-4.
5. *Ibid*.
6. *Ibid*.
7. Tom Stundza, "Aerospace Purchasing Gets Overhauled," *Purchasing*, 3 Jun 99, 1.
8. Tom Stundza, "Prepping the Supply Base for Leaner Supply Systems," *Purchasing*, 1 Jun 00, 3.
9. James Carbone, "Reinventing Purchasing Wins the Medal for Big Blue," *Purchasing*, 16 Sep 99, 2.
10. Carbone, 7.
Stundza, "Aerospace Purchasing Gets Overhauled," 3.
12. Tom Stundza, "Purchasing Evolves into Supply Management," *Purchasing*, 17 Jul 97, 1-4.
13. John McCormick, "Scoring Goals Towards Cost Reduction," *Automotive Sourcing*, Vol 7, Issue 3, 3-4.

(Sustainment Procurement in the Air Force continued from page 3)

Reverse auction business and revenue models vary. Some firms charge a transaction fee for service from the buyer or suppliers, and others sell the software so organizations can run their own auctions in house.

Although many firms have been established to support B2B Internet reverse auctions, a recent reader poll conducted by *Purchasing Magazine* found that fewer than 20 percent of the buyers reported that either they or someone else in their purchasing organization had ever participated in one. Of those who had not, 53 percent said they were not likely to do so in the near future. Lack of time, lack of research, and buying from original equipment manufacturers were reasons cited for not pursuing reverse auctions.[4] Use of reverse auctions may be minimal among buyers, but auctions now become important due to the interactive nature of the Internet. Auctions should be considered as part of most e-commerce strategy planning efforts.[5]

Utility of Reverse Auctions

B2B Internet reverse auctions are simple in concept, but many underlying complexities need to be explored to avert any unintended consequences. Market structures will affect—and be affected by—reverse auctions, particularly where the sole determinant is price. Also, the amount of information available to buyers and sellers affects markets. The Internet allows firms to participate that were previously excluded because of cost entry or lack of information. A good understanding of the characteristics and dynamics of the market where reverse auction is proposed is necessary; otherwise, buyers may unintentionally influence market structures.

Simple B2B Internet reverse auctions are suited to commodities of standardized value, where there is competition in the marketplace, largely based on price. Examples are fuel, cargo space, and stationery items. Auctions are also useful on the seller's side, where there is surplus inventory to be moved.[6] "Corporations can achieve lower prices using e-procurement platforms (directly or in exchanges) in areas where there are many buyers and sellers in products or services that can be adequately specified."[7] However, reverse auctions become complex where other dimensions contribute to the buy decision or where collaboration with the supplier is required. Sutherland states:

> Our experience suggests that claims of price reductions are often overstated, as industry structures are often very concentrated, meaning the benefits have either already been captured or are not available . . . the blanket reverse auctioning is inappropriate where there are dimensions of quality and service that are critical in the purchase decision but not easily specified.[8]

Reverse auctions provide buyers with an opportunity to save on the initial purchase price of goods and services. Therefore, it is a tool the Air Force should consider.

The seller can also realize reductions in sales costs, commissions, and administrative overheads.[9] A further benefit for the vendor is easier access to bids via the Internet. Small businesses can now easily access requests for quotations (RFQ) on the Internet. However, purchasing lead times for complex items such as aviation spares may not be significantly reduced because of the time required to prepare a detailed RFQ.

However, when using reverse auctions, integrity of the auction needs to be maintained. Issues such as vendor collusion, buyers' supplying inaccurate information or dummy bids, and the rules for awarding a contract need to be considered. Careful screening of market participants will aid in maintaining the integrity of the auction.

Reverse auctions also can be used as the initial step in striking a strategic relationship. An auction can be run to establish pricing and select the preferred supplier. A multiyear agreement might then ensue, allowing both parties to achieve other mutual benefits through a strategic alliance. The Air Force might consider this approach to developing corporate contracts, which would reduce transaction costs and reduce purchasing lead times.

Value of B2B Internet Reverse Auctions in E-Business Strategies

The value added by reverse auctions changes depending on the primary basis of competition for the items being sourced. Where price is the prime factor, the value added is higher because savings on price can be significant. Where other factors such as quality or technical complexity are paramount, the value added is less because cost reductions are achieved through other techniques such as value engineering or reductions in failures through quality control programs. Where close collaboration with the supplier is required or where risk sharing is paramount, the value in reverse auctions is questionable.

Figure 1 examines the value that supply e-markets can provide to a company's end product based on the category of items; for example, systems, engineered components, and commodities. The model suggests that the highest level of value added for a company is derived through the much broader strategies of product development collaboration and supply chain integration. While this article does not go into discussion of other strategies,

reverse auctions should not be considered in isolation from broader B2B strategies that seek to integrate supply chains from customer and supplier. More significant gains in cost reduction are achieved through collaboration and the integration of the total supply chain. The digital marketplace facilitates reverse auctions, but as Figure 1 shows, reverse auctions are but one technique available in the digital marketplace.

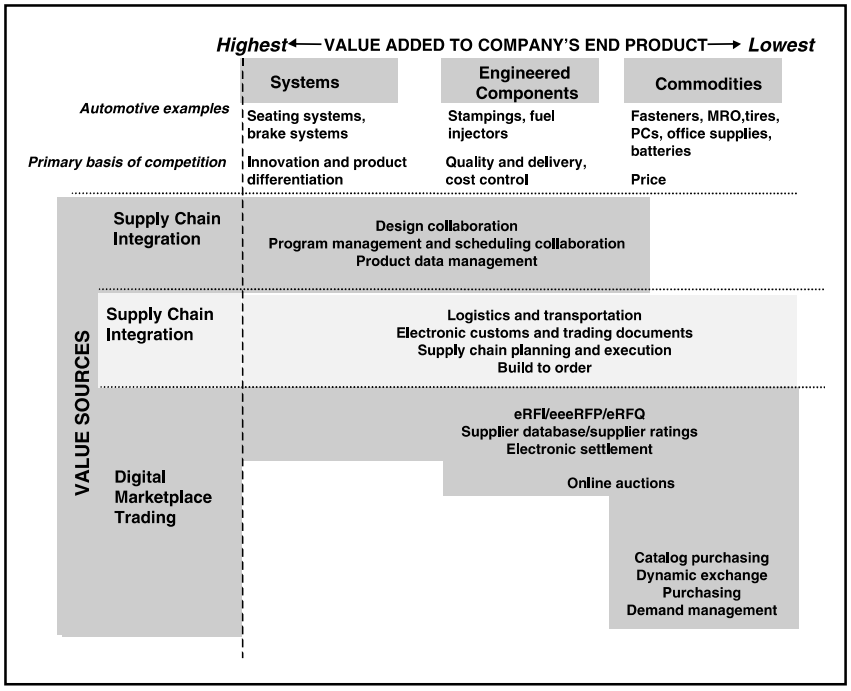

Figure 1. Supply E-Markets Can Provide a Broad Range of Value

Supplier Base

A goal of strategic procurement is to ensure continuity of supply. "The buyer's first responsibility in source selection is to develop and manage a viable source base."[10] In a marketplace where there are few players and competition is based on price, the future of organizations may become tenuous if prices are driven below the level that covers costs, particularly in the long run.

> Getting caught up in the frenzy of an auction can lead sellers to underbid, even to their own detriment . . . . Thus, it is critical for companies on the sell side of auctions to understand their own economics so they can price in a way that does not bankrupt the business.[11]

Federal Acquisition Regulation (FAR) 3.501 and 15.405 advise the contracting officer to consider risks to the government in both price and contract type. In using reverse auctions, the Air Force should guard against firms that bid cost, because over time, with the aging weapon systems and reduced numbers of prime platforms, long-term assuredness of supply is critical.

Reverse auctions require more than one player in the market. Dobler suggests that, when competitive bidding takes place, three to eight firms should be involved.[12] Work currently being done by RAND in support of Project Air Force suggests that competition in the majority of markets for the supply of spares is low. RAND aggregated all fiscal year (FY) 1999 transactions for each contract, segmented the spend by buying organization (for example, weapons, sustainment, and operation), and looked at how many bidders each contract had. While the figures are preliminary and currently being reviewed, the initial data show that for FY99 contract transactions, for a sustainment greater than $25K, 63 percent of the dollar amount spent received only one bid. This represents 65 percent of contracts let. Only 16 percent of the contracts received three or more offers.[13] These statistics suggest that the bulk of Air Force sustainment purchases occur in markets that may not support reverse auctions. However, in these situations, the electronic marketplace might be used to solicit other, previously unknown firms.

A long-term relationship with suppliers is one of the key principles of best supply chain management practice.[14] However, reverse auctions may not promote long-term relationships with suppliers. The move toward e-trading fundamentally alters buyer-seller relationships. A distinct polarization is likely to develop opportunistic and trading net relationships.[15] Opportunistic relationships will develop where price is paramount and when the cost to switch suppliers is low (in terms of both money and goodwill), the impact on end-customer value is minimal, and cost savings can be large. Trading net partnerships will represent the close supplier-customer relationships typical of supply chain management but will use the B2B construct (the electronic coupling of supply chains) to minimize costs and increase the real-time exchange of information.

Another aspect of the supplier base of concern to the Air Force is support to small and disadvantaged businesses. B2B Internet reverse auctions do not preclude such firms from competing, and they can increase their access to government work through easier access to government tenders. However, Internet access is required, and the lead time to contact and prequalify may extend the time to tender.

Risk

Buyers of military aviation spares also have to consider flight safety, configuration management, and total ownership costs. Aviation spare parts must meet the specifications. This requires careful screening of suppliers to mitigate against the risk of unairworthy parts. FreeMarkets does this by surveying company finances and using extensive questionnaires, the International Organization for Standardization, or other quality ratings.[16] When using reverse auctions, buyers need to ensure they are dealing with qualified suppliers who will comply with the technical specifications. If price alone is driving the decision, the risk of introducing noncompliant spares into the inventory could be significantly increased. Thorough screening of suppliers prior to the auction (including quality compliance and economic evaluation) would mitigate against the risk of failure. Total ownership costs could also be affected where suppliers are forced from the market, allowing the remaining players to increase prices.

Technical Complexity

Significant preparatory work is required for reverse auctions, particularly for technically complex items. The requirement in the RFQ needs to be specified carefully to ensure buyers can compare values.

Specifications and technical drawings need to be made available to bidders in sufficient time for adequate evaluation. Administrative lead times will be reduced when technical drawings can be posted on the web from an Air Force perspective. The Air Force Mission Area Directorate for Information Dominance is fielding the Technical Data Solution (TeDS), a

system that will allow technical drawings to be posted on the web. TeDS has the appropriate security facilities to protect proprietary data.

Cost of Procurement

Air Force internal procedures for micropurchases promotes the use of the Government-wide Purchase Card (more commonly referred to as IMPAC [International Merchants Purchase Authorization Card]) for purchases less than $2.5K. This limit is extended to $25K where items are already on an approved contract and approval has been obtained from the contracting officer. IMPAC reduces the cost of individual transactions, but if the buys are combined for a single purchase through a medium such as reverse auctions, the reduction in price may be more beneficial. Further, data on the type of items and frequency of buys needs to be collected to assess whether these items would be better purchased via B2B Internet auctions. In the early stages of implementing Air Force reverse auctions, however, items subject to IMPAC purchasing might be excluded until such an analysis could be conducted.

Multifactor B2B Internet Reverse Auctions

The discussion in the preceding paragraphs has been confined to reverse auctions that are conducted using price as the deciding factor. Because many purchasing decisions are more complex than this, e-auction technology is moving forward to accommodate the real-life aspects of procurement decision making. E Breviate has developed software that allows buyers to conduct e-auctions with multiple parameters being evaluated simultaneously.[17] Numeric values are given to parameters of the total cost equation so buyers are making awards based on total cost rather than lowest price. The software also accommodates the cost of switching suppliers. Further, FreeMarkets has introduced aspects into its software that allow the normalization of bids. A simple example is the ability to receive bids in different currencies while software converts the figure into dollars.[18] E-auction rules can be adapted to many market situations. This advance in technology only serves to complicate the decision regarding the use of reverse auctions, because now several previously separate markets can be trading in the same marketplaces with removal of barriers through the use of easily obtained information.

Proposed Air Force Criteria for Reverse Auctions

Industry is still learning about reverse auctions, and buyers need to have a good understanding of the consequences that the technique could have on a market. The preceding paragraphs suggest that, in the first instance, reverse auctions are appropriate where price is the prime criterion for award of contracts, the value of the purchase warrants the cost of reverse auctions, and there are at least three vendors in the market. Buyers should also ensure reverse auctions do not escalate whole-of-life costs or compromise continuity of supply in the long term, other strategic partnering strategies, flight safety, or configuration management. To facilitate the Air Force evaluation of reverse auctions in sustainment procurement a phased approach may be practical.

Phase I would be an initial examination of B2B Internet reverse auctions by the Air Force for spares using the best available software. (Later use of the software would be subject to further negotiation among the Secretary of the Air Force, Acquisitions; the Army; and the software vendor.) This phase would test the concept through actual reverse auctions, while minimizing the risk to the Air Force. Candidates would be selected from the 16 percent of purchases for spares where there were more than two bids. Items would then be examined to determine if they meet the following criteria:

- Source selection is based on *lowest price technically acceptable* (no quality, safety, or through-life costs that impact the buy decision).
- Item is not subject to IMPAC purchase requirement.
- Market has at least three vendors based on previous spend analysis.
- Specification is fixed and not likely to change.
- Reverse auctions will provide the best value for money in the long run (FAR 3.501 and 15.405 considerations).

Using the criteria suggested for Phase I, the FY99 data for purchases greater than $25K and where there were three or more bids registered, possible candidate Federal Stock Classes (FSC) have been identified. Table 1 lists those candidates and the range of bids received, FY99 dollar amount spent in that FSC, and total number of contracts raised. The information was sourced from the RAND extract of the DD250 database that records purchases greater than $25K.

Phase II, which could be conducted parallel with Phase I, would use B2B Internet reverse auctions to identify a potential supplier for corporate contracts and set prices. The criteria for identifying candidates in Phase II would be the same as that used for Phase I. In addition, an assessment of the level of activity for a given item would determine which items would yield a higher payback from being incorporated into corporate contracts. Thus, the benefit to the Air Force would be reductions in price, transactional costs, and procurement lead times. Possible candidates for Phase II are listed in Table 2. The candidates show a high level of activity, which may suggest corporate contracts would reduce administrative lead times and transactional costs.

Phase III would develop a multifactor model that suits the Air Force for the purchase of more complex buying through e-auctions. This phase could also be conducted in parallel with Phase I and II but should take into account lessons learned from the trial of reverse auctions. Criteria for items subject to a multifactor model would not be confined to those listed above. Rather, any item where there are more than two suppliers should be considered. This phase may also require a technology partner.

Each phase requires careful evaluation for lessons learned, with procedures being documented.

While the training and education required for Air Force buyers to use B2B Internet reverse auctions has not been discussed, this aspect should not be underestimated, particularly in the wider context of a more strategic approach to purchasing and supply management. The best return to the Air Force from using reverse auctions may result from consolidation of purchasing, but it may also have ramifications for the organizational construct for purchasing in the Air Force.

Throughout this approach, B2B Internet reverse auctions should be examined as part of the comprehensive development of B2B marketplace strategies.

Opportunities for Further Research

Because B2B Internet reverse auctions are still a relatively new strategy, the total costs associated with them have not been

examined, particularly in relation to the long-term impact on markets and future supply. The DoD examples cited are ones where the savings for future buys for the same items would be useful for comparing first-time results and determining whether savings can be made in a second round of reverse auctions.

This review examined the data RAND extracted from the DD250 database that records only purchases greater than $25K. It may be useful to study IMPAC activity and other purchases less than $25K for possible consolidation of purchasing activity using a B2B Internet reverse auction medium.

Reverse auctions should also be considered in the broader context of best purchasing and supply management practice as described in the RAND paper.[19]

FSC	FSC NAME	#Bids	#Contracts	$ FY99
2520	Vehicular power transmission components	4	1	233,260
2815	Diesel engines and components	3-5	2	317,146
4320	Power and hand pumps	3-6	9	2,004,957
4510	Plumbing fixtures and accessories	4-6	3	2,401,635
4710	Pipe and tube	3-4	2	192,581
4930	Lubrication and fuel-dispensing equipment	8	1	1,943,896
5110	Handtools, edged, nonpowered	3	1	140,151
5120	Handtools, nonedged, nonpowered	3-8	5	521,659
5820	Radio and TV communications equipment except airborne	4	1	427,980
5945	Relays and solenoids	9	1	31,930
5999	Miscellaneous electrical and electronic components	3-7	3	13,578,592
6115	Generators, generator sets, electrical	7	1	934,480
6220	Electric vehicular lights and fixtures	4-5	2	74,003
6225	Electrical and electronic measuring and test instruments	3-6	6	1,937,654
6680	Flow, level, motion-measuring instruments	3-9	6	309,054

Table 1. Possible FSC Candidates for Reverse Auctions Phase I

FSC	FSC NAME	#Bids	#Contracts	$ FY99
4920	Aircraft maintenance and repair shop specialized equipment	3-10	23	10,082,342
1560	Airframe structural components	3-14	42	36,686,680
2840	Gas turbines and jet engines, aircraft % comps	3-9	80	506,631,217
9135	Liquid propellant fuels, chemical base	3-7	38	26,747,651

Table 2. Possible FSC Candidates for Reverse Auctions Phase II

Conclusion

Reverse auctions can achieve savings on the initial purchase price of spares, with some commercial firms reporting an average of 15 percent. The Air Force has already tested reverse auctions for computer hardware with identified savings on initial price. The practice works well where price-oriented decisions are paramount; however, reverse auctions tend to promote short-term relationships with vendors. Reverse auctions may also distort market behavior, leading to changes in the dynamics of the marketplace. Where the objective is to develop closer relationships with nominated suppliers in pursuit of supply chain management objectives (such as collaborative planning and information exchange) or where other criteria are used for source selection (such as quality or configuration management), auctioning may not be appropriate. Further, where continuity of supply is threatened by price competition, forcing too many players from the market, reverse auctions provide only a short-term gain and may significantly compromise longer term availability.

With more than 65 percent of Air Force sustainment spares contracts in FY99 receiving only one bid, a significant portion of sustainment procurement does not meet the necessary condition for reverse auctions of more than one supplier. However, approximately 16 percent of the FY99 contracts had more than two bidders, so there is opportunity in this segment to examine whether items meet the other criteria for reverse auctions. This segment has been reviewed, and possible candidates have been identified. While the discussion has focused on buying situations where price is the determining factor, developments in e-auction technologies (software and process) mean multifactor e-auctions are also possible.

Recommendations

- While simple in concept, B2B Internet reverse auctions can fundamentally change the dynamics of the market; therefore, care should be used in the decision to employ the technique. B2B Internet reverse auctions are but one tool in a broader B2B strategy that the Air Force is developing.
- Use proposed framework and phased approach for selecting reverse auction candidates.
- The Deputy Chief of Staff, Installations and Logistics and the Air Force Materiel Command review the proposed candidates for trials of reverse auctions.

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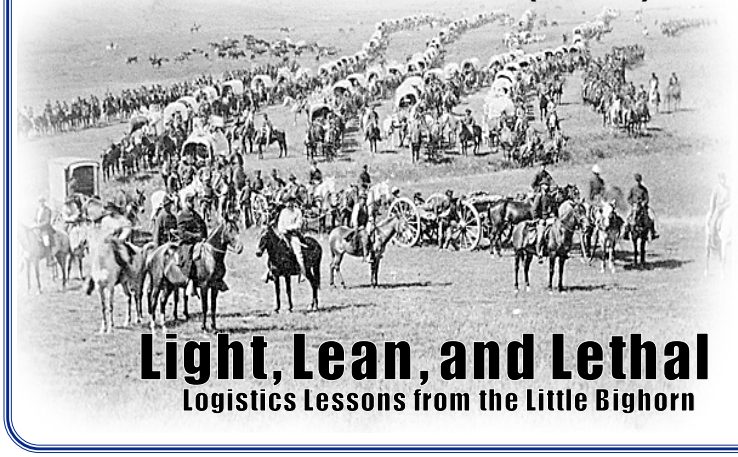
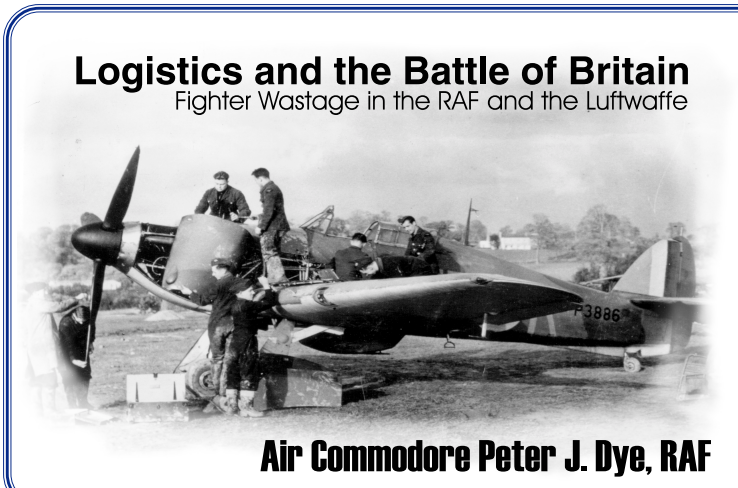
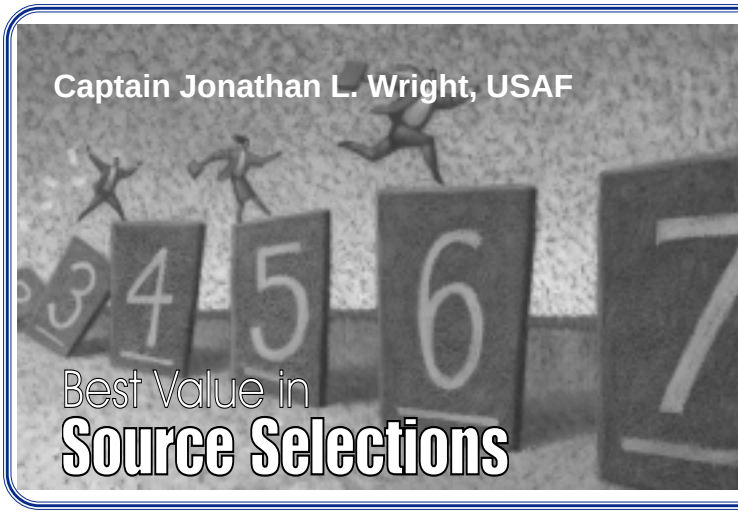


The Editorial Advisory Board selected "Light, Lean and Lethal: Logistics Lessons from the Little Bighorn"—written by Richard M. Bereit, Colonel, USAF (Retired), Vol XXIV, No 3—as the most significant article to appear in the *Air Force Journal of Logistics* in 2000.



The Air Force Historical Foundation selected "Logistics and the Battle of Britain: Fighter Wastage in the RAF and the Luftwaffe"—written by Air Commodore Peter J. Dye, RAF, Vol XXIV, No 4—as the best article containing logistics lessons learned to appear in the *Air Force Journal of Logistics* in 2000.



The SOLE - The International Society of Logistics, Montgomery, Alabama, selected "Best Value in Source Selections"—written by Captain Jonathan L. Wright, Vol XXIV, No 2—as the best article written by a junior officer to appear in the *Air Force Journal of Logistics* in 2000.

The Editorial Advisory Board also selected "Expeditionary Airpower: The Need for an Integrated Logistics School"—written by Major J. Reggie Hall, USAF—as the most significant article to appear in the *Air Force Journal of Logistics*, Vol XXV, No 1.