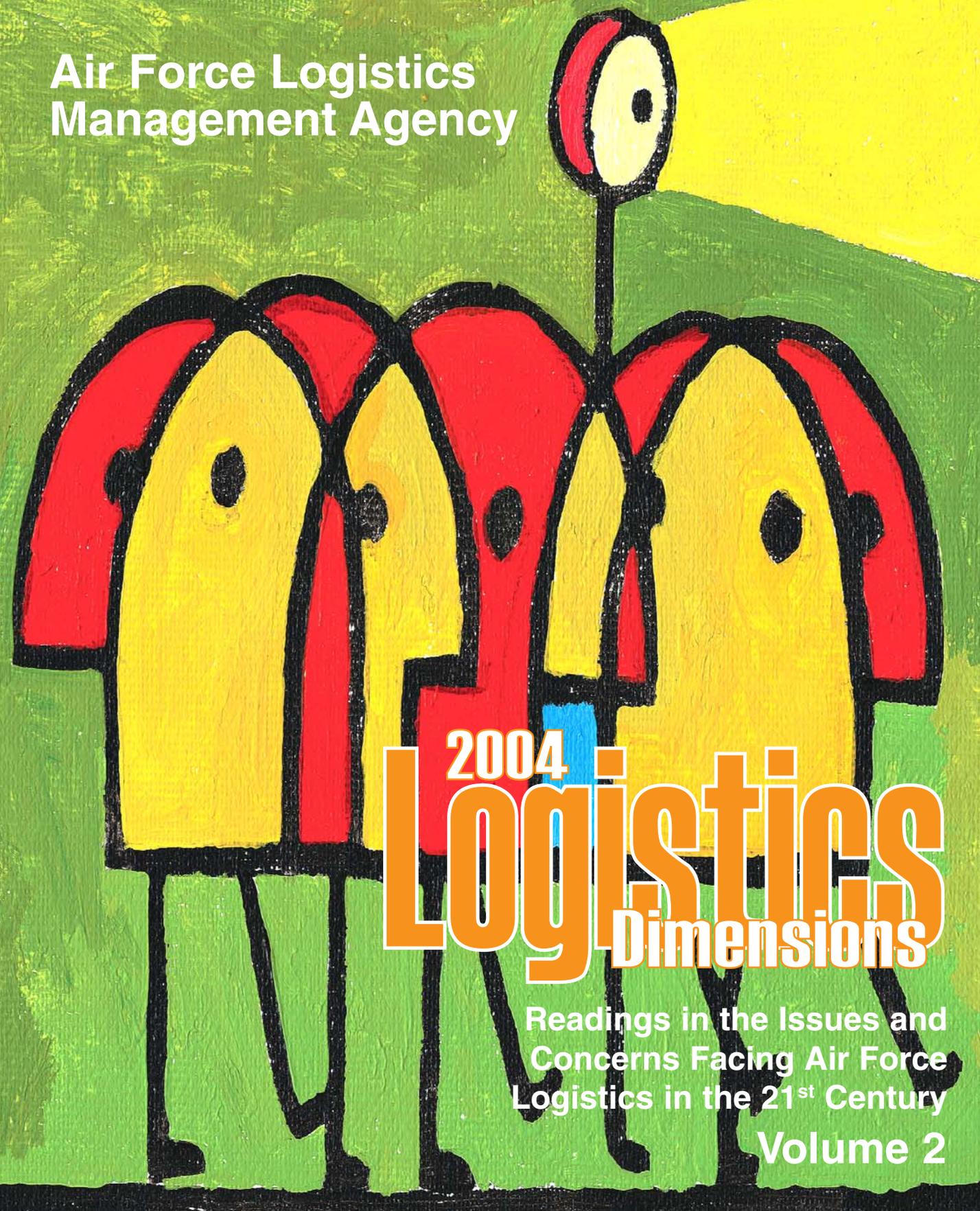


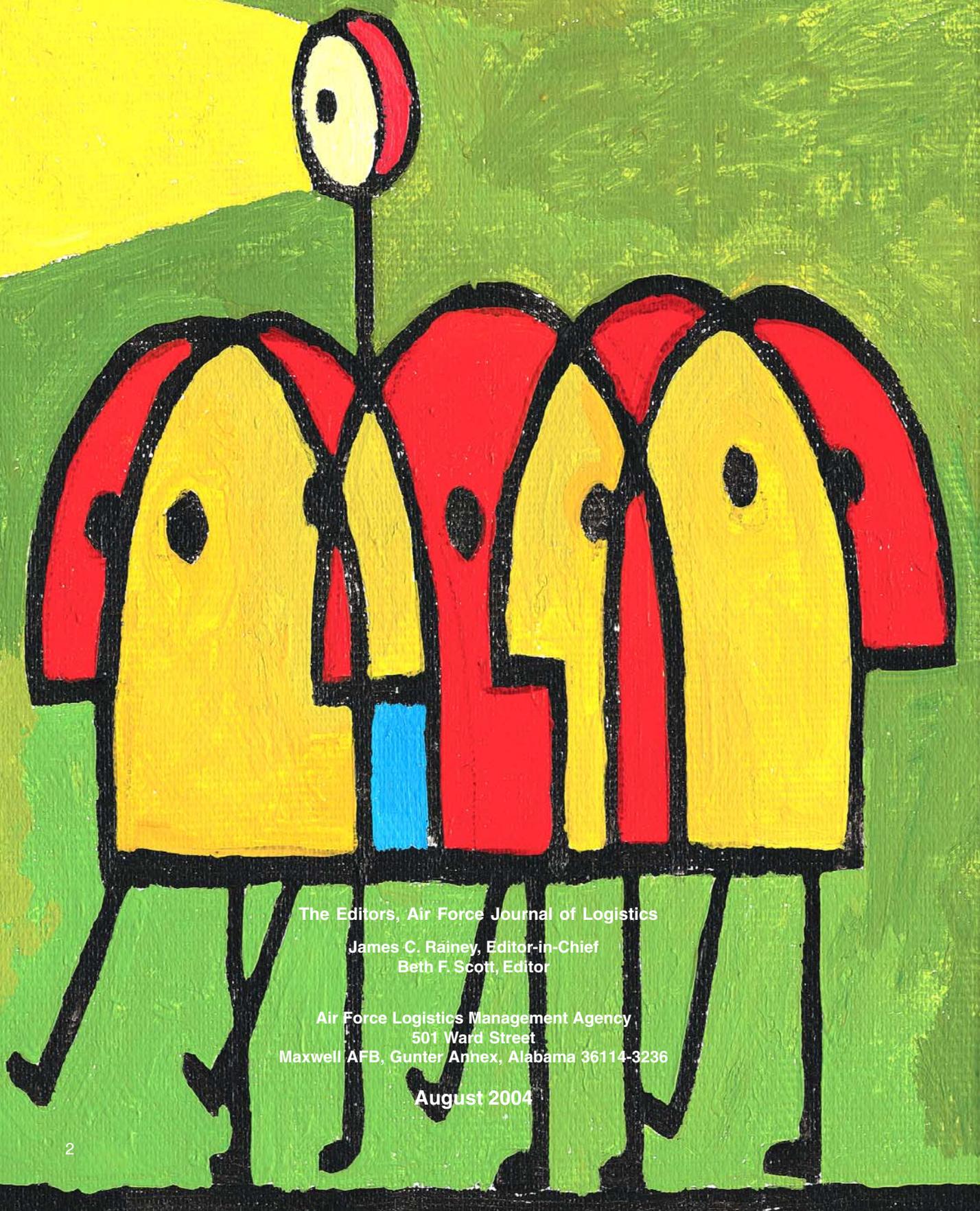
Air Force Logistics
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2004 -
Logistics
Dimensions

Readings in the Issues and
Concerns Facing Air Force
Logistics in the 21st Century

Volume 2



The Editors, Air Force Journal of Logistics

James C. Rainey, Editor-in-Chief

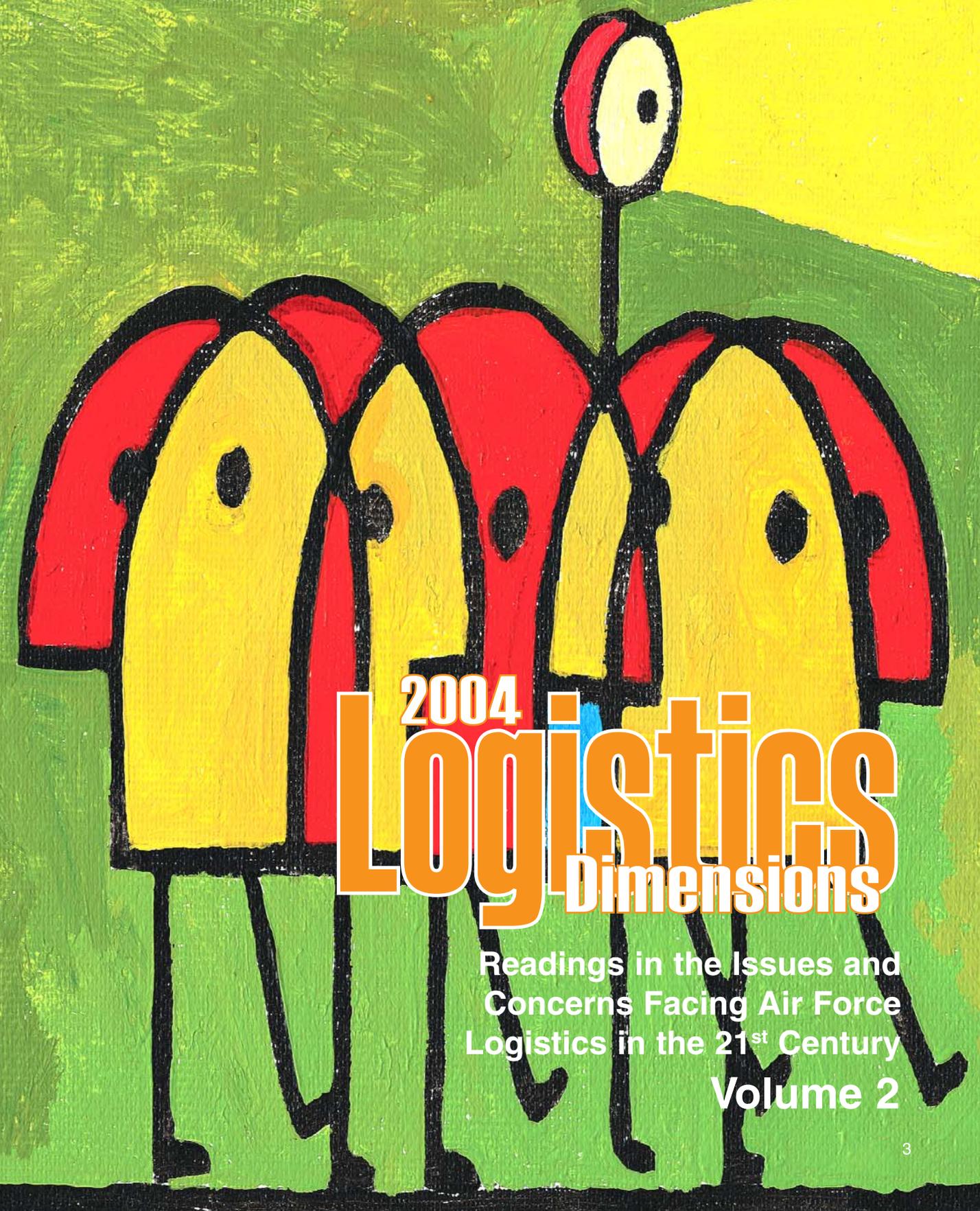
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August 2004



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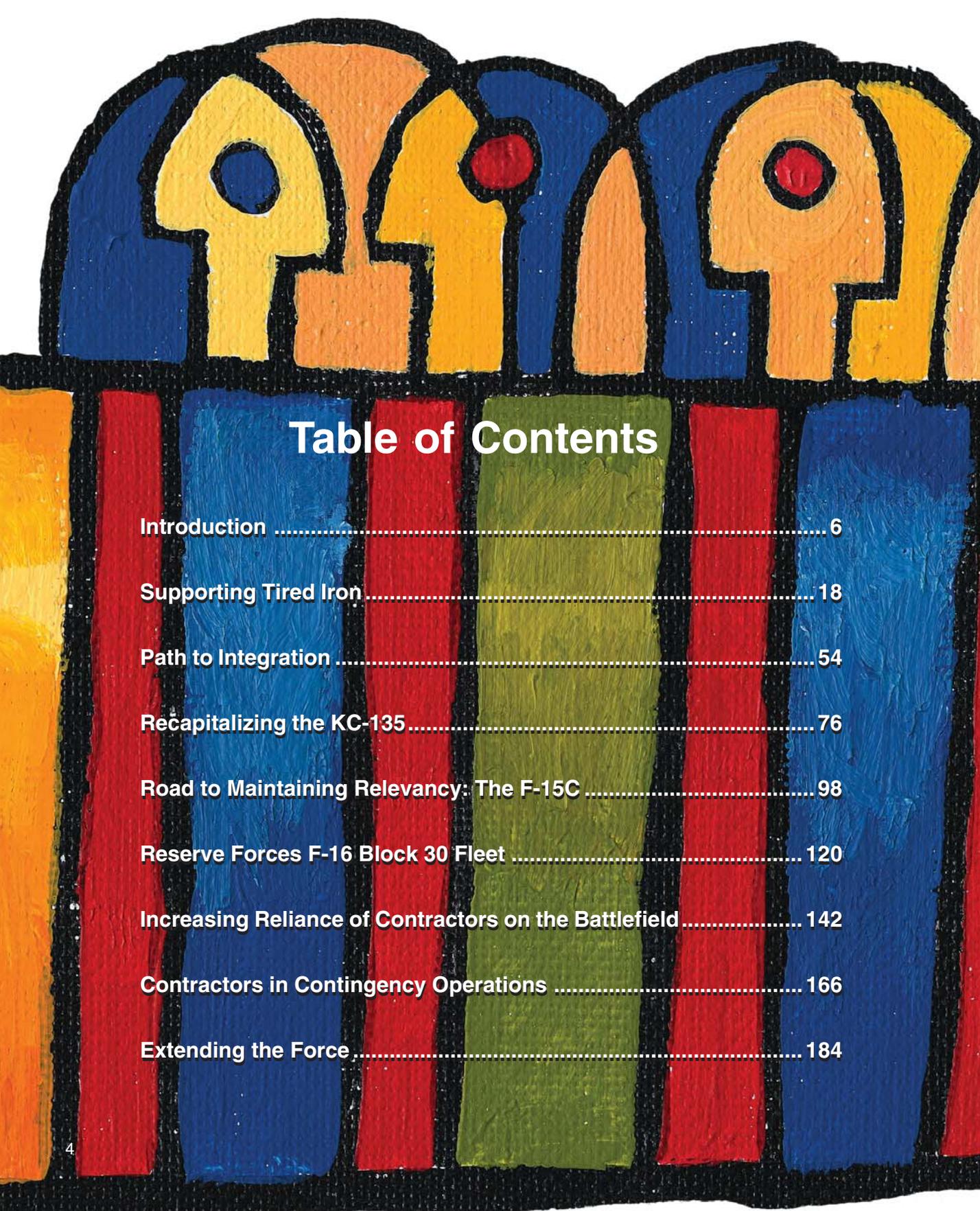
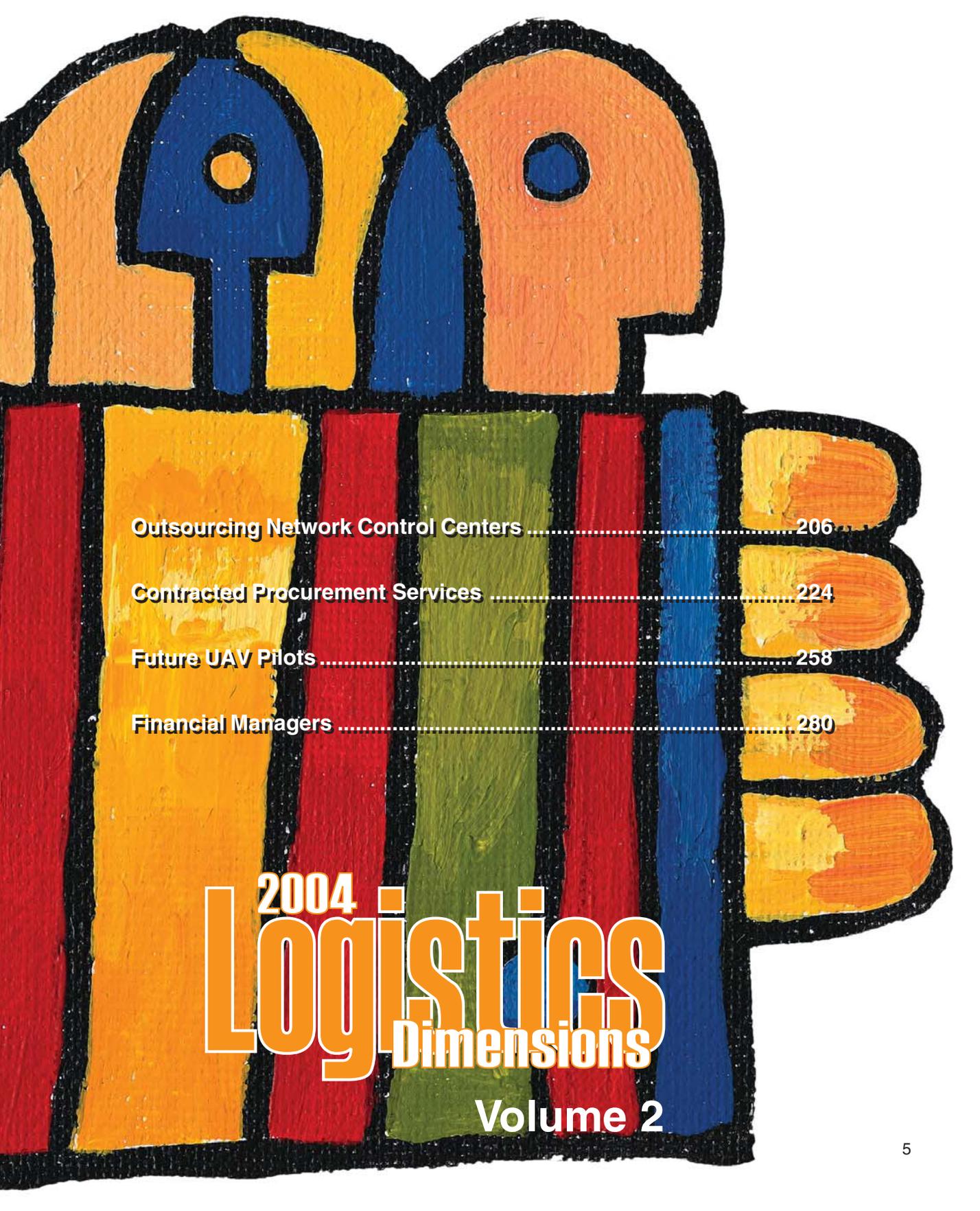
An abstract painting featuring three stylized faces at the top, each with a different colored eye (blue, red, red). Below the faces are several vertical stripes in various colors (orange, red, blue, green, red, blue). The text 'Table of Contents' is centered over the stripes.

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The Dimensions of Logistics

The meaning of logistics can be somewhat fuzzy in spite of its frequent usage in official publications and lengthy definition in service and joint regulations.

Defining Logistics

The word logistics entered the American lexicon little more than a century ago. Since that time, professional soldiers, military historians, and military theorists have had a great deal of difficulty agreeing on its precise definition.¹ Even today, the meaning of logistics can be somewhat *fuzzy* in spite of its frequent usage in official publications and lengthy definition in service and joint regulations. Historian Stanley Falk describes logistics on two levels. First, at the intermediate level:

Logistics is essentially moving, supplying, and maintaining military forces. It is basic to the ability of armies, fleets, and air forces to operate—indeed to exist. It involves men and materiel, transportation, quarters, depots, communications, evacuation and hospitalization, personnel replacement, service, and administration.

Second, at a higher level, logistics is:

...economics of warfare, including industrial mobilization; research and development; funding procurement; recruitment and training; testing; and in effect, practically everything related to military activities besides strategy and tactics.²

Introduction

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James C. Rainey
Beth F. Scott

While there are certainly other definitions of logistics, Falk's encompassing definition and approach provides an ideal backdrop from which to examine and discuss logistics. Today, the term combat support is often used interchangeably with logistics.

Logistics and Warfare

General Mathew B. Ridgway, of World War II fame, once observed, "What throws you in combat is rarely the fact that your tactical scheme was wrong...but that you failed to think through the hard cold facts of



Introduction

Logistics is the key element in warfare, more so in the 21st century than ever before.

logistics.” Logistics is the key element in warfare, more so in the 21st century than ever before. Success on the modern battlefield is dictated by how well the commander manages available logistical support. Victories by the United States in major wars (and several minor wars or conflicts) in the 20th century are linked more directly to the ability to mobilize and bring to bear economic and industrial power than any level of strategic or tactical design. The Gulf War and operations to liberate Iraq further illustrate this point. Long before the Allied offensive could start, professional logisticians had to gather and transport men and materiel and provide for the sustained flow of supplies and equipment that throughout history has made possible the conduct of war. Commanders and their staffs inventoried their stocks, essayed the kind and quantities of equipment and supplies required for operations in the severe desert climate, and coordinated their movement plans with national and international logistics networks. “*The first victory in the Persian Gulf War was getting the forces there and making certain they had what they required to fight* [Emphasis added]. Then and only then, would commanders initiate offensive operations.”³ The same may be said of lightning quick victory in Iraq, although without the massive stockpile of inventory seen during the Gulf War.

In 1904, Secretary of War Elihu Root warned, “Our trouble will never be in raising soldiers. Our trouble will always be the limit of possibility in transporting, clothing, arming, feeding, and caring for our soldiers....”⁴ Unfortunately, the historical tendency of both the political and military leadership to neglect logistics activities in peacetime and expand and improve them hastily once conflict has broken out may not be so possible in the future as it has in the past. A declining industrial base, flat or declining defense budgets, force drawdowns, and base closures have all contributed to eliminating or restricting the infrastructure that made rapid expansion possible. Regardless, modern warfare demands huge quantities of fuel, ammunition, food, clothing, and equipment. All these commodities must be produced, purchased, transported, and distributed to military forces. And of course, the means to do this must be sustained.

The End of Brute-Force Logistics

The end of the Cold War and experience gained from the conflicts in Grenada, Panama, and the Persian Gulf essentially brought the era of *brute force* logistics to a close. The traditional practice of using massive quantities of troops and large stockpiles of supplies available in theater to engage sizable hostile forces is obsolete. Additionally, extensive buildup time and lengthy resupply and repair pipelines to sustain forces are unrealistic. The focus of logistics has now shifted toward rapid movement of small, independent force packages to employ precise combat power anywhere in the world. The rapid change in political dynamics of the world powers, domestic fiscal constraints, and technological advances have rendered the Cold War military strategy and preparation ill-equipped to handle 21st century missions, requirements, and demands.

Logistics Challenges

The US role in the post-Cold War world has changed dramatically. Military forces are no longer dedicated solely to deterring aggression but must respond to and support homeland defense and humanitarian missions. From peacekeeping to feeding starving nations, to conducting counterdrug operations, the military continues to adapt to evolving missions. Logistics infrastructure and processes must evolve continuously to support the new spectrum of demands. The keys to supporting combat operations successfully are robust, responsive, and flexible logistics systems.

Decreases in funding and the drawdown of the US military in the 1990s drove new approaches to logistics support and refinement of the military logistics systems. These fiscal constraints dictated that the military reduce infrastructure, maintain smaller numbers of both inventory and personnel, and find ways to reduce costs without degrading mission capability.

Reduced budgets impact weapons modernization programs in several ways. As dollars decrease, fewer systems can be developed, which increases the importance of decisions made in the acquisition process. The process must develop the most lethal systems while emphasizing reliability and supportability. Therefore, logistics considerations play a more important role than ever in the design, production, and fielding of new systems. Logistics capabilities for supporting future forces require systems to be *smarter* and require less maintenance.

Technology and Logistics

Technology (to include technological change and technological innovation), as a subject, covers a lot of ground and often enjoins heated debate. It has proven to be one of the major tools for dealing with problems, perhaps more so in the 21st century than at any other time in history. However, critics of technology argue that it often causes as many problems as it solves and that the new problems are often far worse than the old ones. Further, they question its validity as a major tool for solving complex problems rooted in ethical, philosophical, political, or other nontechnical areas.⁵ These are, by no means, all the criticisms of technology, but they serve to frame the basic objections. The counter argument to these criticisms would answer that technology is not unique in creating new and, often, more difficult problems, while solving old ones. Very much the same criticism could be aimed at all approaches to problem solving. No problem-solving approach yields simple, final answers to the basic problems of humankind.⁶ One could even argue that philosophical and other nontechnical approaches have done little when measured against the same standards; they fail just as abjectively as technology.⁷ Further, the fact that technological solutions are inappropriate in certain situations does not mean that technology is always unsuited to problem resolution. Technology cannot be viewed as a separate entity within either the military or society in general. This illusion of discreteness simply does not exist. It is and will remain an integral part of both. The real issue is to recognize that technology is a tool with limitations, and these limitations should be

Critics of technology argue that it often causes as many problems as it solves and that the new problems are often far worse than the old ones.

Introduction

Organizational change should and must accompany technological change if new capabilities are to be exploited.

considered in reacting to particular situations. Technology does not offer a *silver bullet* for all situations.

Organizational change should and must accompany technological change if new capabilities are to be exploited. Stephen Rosen, in *Winning the Next War*, points out that innovation does not always result from new technologies. Rather, new technology simply may be used to improve the ability to perform a particular mission.⁸ The relationships among technological innovation, fundamental military operations, and changes in concepts and organizations are nonlinear. That is, changes in input may not yield proportionate changes in output or other dynamics.⁹

Significant organizational, intellectual, and technological changes are seen during periods of transition. The major change, however, must be intellectual. Without this, technological change becomes meaningless and organizational change impossible. The US military is now in a period of rapid change. Recent changes—order of magnitude changes—in technology have led to both long-range and strategic planning efforts that integrate current and future technological advances into operational concepts. In the logistics arena, these include Focused Logistics at the Joint level and Agile Combat Support (ACS) within the Air Force. The vision of both these is the ability to fuse information, transportation, and other logistics technologies to provide rapid response, track and shift assets while en route, and deliver tailored logistics packages at all levels of operations or war (strategic, operational, and tactical).¹⁰ This same vision includes enhanced transportation, mobility, and pinpoint delivery systems.¹¹ The operational forces that must be supported logistically will be smaller and more flexible—emphasizing mobility, speed, and agility. These forces will utilize technological superiority in stealth, precision weapons, surveillance, and dominant battlefield awareness.

Military logistics, at a more fundamental level, is in a period of transition brought about by the evolving information revolution. Many challenges concerning workflow, improving data integrity, and efficient communications still exist. A variety of human and cultural factors still impede full-scale adoption of many new information technologies—complexity and difficulty in the use of some systems, loss of control, changes in fundamental power relationships, uselessness of old skills, and changes in work relationships.¹² Change and instruments of change, as apparent as they seem once implemented, often elude understanding before they enter the mainstream.¹³ As an example, Chester Carlson, the inventor of the photocopy machine (often referred to as the Xerox machine) was told by business that his invention was unnecessary because libraries and carbon paper already filled the need. This was a technology that drastically altered the way people approached information, yet finding interested businesses and investors in the beginning proved elusive.

Any discussion of technology and logistics would be lacking without citing Martin van Creveld. In *Technology and War*, he notes:

...technology and war operate on a logic which is not only different but actually opposed, nothing is less conducive to victory in war than to wage it on

technological principles—an approach which, in the name of operations research, systems analysis or cost/benefit calculation (or obtaining the greatest bang for the buck), treats war merely as an extension of technology. This is not to say... that a country that wishes to retain its military power can in any way afford to neglect technology and the methods that are most appropriate for thinking about it. It does mean, however, that the problem of making technology serve the goals of war is more complex than it is commonly thought to be. The key is that efficiency, far from being simply conducive to effectiveness, can act as the opposite. Hence—and this is a point which cannot be overemphasized—the successful use of technology in war very often means that there is a price to be paid in terms of deliberately *diminishing* efficiency.

Since technology and war operate on a logic which is not only different but actually opposed, the very concept of “technological superiority” is somewhat misleading when applied in the context of war. It is not the technical sophistication of the Swiss pike that defeated the Burgundian knights, but rather the way it meshed with the weapons used by the knights at Laupen, Sempach, and Granson. It was not the intrinsic superiority of the longbow that won the battle of Crécy, but rather the way which it interacted with the equipment employed by the French on that day and at that place. Using technology to acquire greater range, firepower, greater mobility, greater protection, greater whatever is very important and may be critical. Ultimately, however, it is less critical and less important than achieving a close *fit* between one’s own technology and that which is fielded by the enemy. The best tactics, it is said, are the so-called *Flaechenund Luecken* (solids and gaps) methods which, although they received their current name from the Germans, are as old as history and are based on bypassing the enemy’s strengths while exploiting the weaknesses. Similarly, the best military technology is not that which is *superior* in some absolute sense. Rather it is that which *masks* or neutralizes the other side’s strengths, even as it exploits his weaknesses.

The common habit of referring to technology in terms of its capabilities may, when applied within the context of war, do more harm than good. This is not to deny the very great importance of the things that technology can do in war. However, when everything is said and done, those which it cannot do are probably even more important. Here we must seek victory, and here it will take place—although not necessarily in our favor—even when we do not. A good analogy is a pair of cogwheels, where achieving a perfect fit depends not merely on the shape of the teeth but also and, to an equal extent, on that of the spaces which separate them.

In sum, since technology and war operate on a logic that is not only different but actually opposed, the conceptual framework that is useful, even vital, for dealing with the one should not be allowed to interfere with the other. In an age when military budgets, military attitudes, and what passes for military thought often seem centered on technological considerations and even obsessed by them, this distinction is of vital importance. In the words of a famous Hebrew proverb: “The deed accomplishes, what thought began.”¹⁴

Since technology and war operate on a logic that is not only different but actually opposed, the conceptual framework that is useful, even vital, for dealing with the one should not be allowed to interfere with the other.

Air Force Logistics in the 21st Century

The Air and Space Expeditionary Force

To meet current and anticipated challenges, the Air Force has developed an air and space expeditionary force (AEF) concept that has two primary goals.¹⁵ The first is to improve the ability to deploy quickly from the continental United States (CONUS) in response to a crisis, commence

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The dramatic increase in deployments from the CONUS, combined with the reduction of Air Force resource levels that spawned the AEF concept, have also increased the need for effective combat support.

operations immediately on arrival, and sustain those operations as needed. The second goal is to reorganize to improve readiness, better balance deployment assignments among units, and reduce uncertainty associated with meeting deployment requirements. The underlying premise is that rapid deployment from CONUS and a seamless transition to sustainment can substitute for an ongoing US presence in theater, greatly reducing or even eliminating deployments the Air Force would otherwise stage for the purpose of deterrence.

To implement the AEF concept, the Air Force created ten air and space expeditionary forces,¹⁶ each comprised of a mixture of fighters, bombers, and tankers. These ten AEFs respond to contingencies on a rotating basis: for 120 days, two of the ten AEFs are *on call* to respond to any crisis needing airpower. The on-call period is followed by a 12-month period during which those two AEFs are not subject to short-notice deployments or rotations. In the AEF system, individual wings and squadrons no longer deploy and fight as a full or single unit as they did during the Cold War. Instead, each AEF customizes a force package for each contingency, consisting of varying numbers of aircraft from different units. This fixed schedule of steady-state rotational deployments promises to increase flexibility by enabling the Air Force to respond immediately to any crisis with little or no effect on other deployments.

The dramatic increase in deployments from the CONUS, combined with the reduction of Air Force resource levels that spawned the AEF concept, has increased the need for effective combat support (CS).¹⁷ Because CS resources are heavy and constitute a large portion of the deployments, they have the potential to enable or constrain operational goals, particularly in today's environment, which is so dependent on rapid deployment.¹⁸ Consequently, the Air Force is reexamining its CS infrastructure to focus on faster deployment, smaller footprint, greater personnel stability, and increased flexibility.

The AEF rapid, global force projection goals and associated sustainment requirements create a number of support planning challenges in such areas as munitions and fuel delivery, engines and navigational equipment maintenance, and forward operating location (FOL) development. Support is a particular challenge in expeditionary operations (dealing with conflicts in an expeditionary fashion and with little warning) since the traditional assumption associated with Cold War support planning was that scenarios and associated support requirements could be fairly well developed in advance and materiel prepositioned at anticipated FOLs. Much of the existing support equipment is heavy and not easily transportable; deploying all the support for almost any sized AEF from the CONUS to an overseas location would be expensive in both time and airlift. As a result, the Air Force has focused on streamlining deploying unit CS processes, leaning deployment packages, and evaluating different technologies for making deploying units more agile and quickly deployed and employed. Decisions on where to locate intermediate maintenance facilities such as the jet engine intermediate maintenance (JEIM) shop and nonunit heavy

resources—those not associated with flying units, such as munitions, shelters, and vehicles—are significant drivers of employment time lines.

Agile Combat Support—A Brief Discussion

What is Agile Combat Support

The development and refinement of expeditionary airpower (expeditionary aerospace forces) required rethinking many Air Force logistics functions and concepts—principally the combat support functions. Expeditionary airpower required making the Air Force support systems far more agile than they previously had been. Recognizing this, the Air Force began transforming its support systems into the Agile Combat Support system. ACS is the central support concept that ensures both the viability of expeditionary airpower and the ability to support joint force requirements. It improves the responsiveness, deployability, and sustainability of forces, and it substitutes responsiveness for the massive inventories of the past.

Time-Definite Resupply

Since the early 1990s, the Air Force has been developing and refining the practices and processes supporting Agile Combat Support and Focused Logistics. Clearly, military operations in the 21st century must have responsive and agile operational and support forces. To achieve this, Agile Combat Support employs what has been termed time-definite resupply, a fundamental shift in the way deployed forces are supported. With time-definite resupply, the mobility footprint of early arriving forces is reduced, and resupply of deployed forces begins upon their arrival, thus reducing initial lift requirements. This not only optimizes available lift and reduces costs but also makes it possible to reduce the size and, therefore, the vulnerability of forces.

Reachback

Historically, logistics systems *pushed* support to deployed forces to compensate for less-than-perfect resource information and planning systems. This often resulted in an expensive and wasteful stockpile of material in US warehouses and forward locations. This approach to prestocking large quantities of materiel globally is not viable in the 21st century—operationally or politically. Under the ACS concept, high-velocity, reliability transportation, and information systems are used to get the right parts to the right place, at the right time. When a part is required, the system will *reach back* and *pull* only those resources required. Time-definite delivery forms the basis for all resupply in the theater of operations, thereby reducing total lift requirements. This reachback approach makes it possible to deploy fewer functions and persons forward for deployment and sustainment processes. This, in turn, reduces the size and, therefore, the vulnerability of forward deployed forces.

Streamlined Depot Processes

Under ACS, streamlined depot processes will release materiel in a more timely fashion than in the past. Rapid, time-definite transportation will

The development and refinement of expeditionary airpower (expeditionary aerospace forces) required rethinking many Air Force logistics functions and concepts—principally the combat support functions.

Introduction

Time-definite delivery forms the basis for all resupply in the theater of operations, thereby reducing total lift requirements.

complete the ACS support process by delivering needed materiel directly to the user in the field. Integrated information systems will provide asset visibility throughout this process, tracking items throughout the order and delivery cycle with the capability to redirect them as the situation dictates.

There are still many issues associated with ACS that require resolution. A variety of studies have been completed or are ongoing to examine these issues. RAND and the Air Force Logistics Management Agency have played a principal role in the ACS studies and analysis process. This research¹⁹ has resulted in what is aptly called an Agile Combat Support (ACS) network, consisting of five principal elements.

- **Forward Operating Locations.** FOLs are sites in a theater, out of which tactical forces operate. FOLs can have differing levels of CS resources to support a variety of employment time lines. Some FOLs in critical areas under high threat should have equipment prepositioned to enable aerospace packages designed for heavy combat to deploy rapidly. These FOLs might be augmented by other, more austere FOLs that would take longer to spin up. In parts of the world, where conflict is less likely or humanitarian missions are the norm, all FOLs might be austere.
- **Forward Support Locations (FSL).** FSLs are sites near or within the theater of operation for storage of heavy combat support resources, such as munitions or war reserve materiel, or sites for consolidated maintenance and other support activities. The configuration and specific functions of FSLs depend on their geographic location, the threat level, steady-state and potential wartime requirements, and costs and benefits associated with using these facilities.
- **CONUS Support Locations (CSL).** CSLs are support facilities in the CONUS. CONUS depots are one type of CSL, as are contractor facilities. Other types of CSLs may be analogous to FSLs. Such support structures are needed to support CONUS forces should repair capability and other activities be removed from units. These activities may be set up at major Air Force bases, appropriate civilian transportation hubs, or Air Force or other defense repair or supply depots.
- **Theater Distribution System.** A transportation network connects the FOLs and FSLs with each other and with the CONUS, including en route tanker support. This is an essential part of an ACS system where FSLs need assured transportation links to support expeditionary forces. FSLs themselves could be transportation hubs.
- **Combat Support Command and Control (CSC2).** CSC2 systems facilitate a variety of critical management tasks: (1) estimating support requirements, (2) configuring the specific nodes of the system selected to support a given contingency, (3) executing support activities, (4) measuring actual CS performance against planned performance, (5) developing recourse plans when the system is not within control limits, and (6) reacting swiftly to rapidly changing circumstances.

This infrastructure can be tailored to the demands of any contingency. The first three parts—FOLs, FSLs, and CSLs—are variable. The Air Force

configures them as deployments occur to meet immediate needs. In contrast, the last two elements—a reliable transportation network and CSC2—are indispensable ingredients in any configuration. Determining how to distribute responsibility for the support activities required for any given operation among CSLs, FSLs, and FOLs is the essence of strategic support decisions. For example, in determining the number of FSLs to support a given operation and their role, the Air Force must evaluate such factors as the support capability of available FSLs and the risks and costs of prepositioning specific resources at those locations.

Logistics Dimensions 2004

Logistics Dimensions 2004 is a two volume collection of essays and articles that looks at a broad range of logistics challenges facing the Air Force in the 21st Century. Four major themes dominate the work presented—Agile Combat Support, global support and mobility, supporting and maintaining aircraft, and contractor support and its implementation and implications. All of the major articles and essays are the result of work done at the Air War College during 2003 and 2004. Specific subject areas included in Volume 2 include:

- Supporting aging aircraft
- Integrating active Air Force and Reserve units
- Recapitalizing tanker aircraft
- Aircraft modification versus new aircraft procurement
- Contractor support and contractors on the battlefield
- Financial management as a force multiplier

Subject areas included in Volume 1 are:

- Agile Combat Support
- Bare-base support in the ACS framework
- Global combat support systems
- Reducing the logistics footprint within the ACS framework
- Transformation
- The defense industrial base
- Global and theater mobility
- Transportation technology implementation

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The Air Force must carefully evaluate such factors as the support capability of available FSLs and the risks and costs of prepositioning specific resources at those locations.

For 2005 and Beyond

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Notes

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14. Martin van Crevald, *Technology and War*, London: The Free Press, 1989, 319.
15. In the early genesis of the concept of expeditionary operations, the Air Force used the term expeditionary aerospace force (EAF) to define this new concept of force organization. In recent years, the term air and space expeditionary force or AEF has replaced EAF.
16. Henceforth, when it is clear from the context, we will use AEF to represent both the concept and force package.
17. Air Force doctrine defines combat support to include “the actions taken to ready, sustain, and protect aerospace personnel, assets, and capabilities through all peacetime and wartime military operations.”
18. Theater assets are provided by organizations outside the combat unit itself.
19. From the beginning, RAND and the Air Force Logistics Management Agency developed a close partnership in the ACS research.

Generating Solutions Today, Shaping Tomorrow's Logistics

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

Lots of organizations have catchy mottoes. Likewise, many have catchy vision statements. We do, too. But there's a big difference—we deliver on what we promise. *Generating Solutions Today, Shaping Tomorrow's Logistics* aren't just words to us; they're our organizational culture. We use a broad range of functional, analytical, and scientific expertise to produce innovative solutions to problems and design new or improved concepts, methods, systems, or policies that improve peacetime readiness and build war-winning logistics capabilities.

Our key strength is our people. They're all professionals from logistics functions, operational analysis sections, and computer-programming shops. Virtually all of them have advanced degrees, some of which are doctorates. But more important, virtually all of them have recent field experience. *They've been there and done that.* They have the kind of experience that lets us blend innovation and new technology with real-world common sense and moxie. It's also the kind of training and experience you won't find with our competitors. Our special blend of problem-solving capabilities is available to every logistician in the Air Force.

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

Lieutenant Colonel Jon M. Sutterfield, USAF
Colonel Steven R. Jones USAF

Today, the Air Force faces a growing crisis with respect to the costs of maintaining its aging aircraft fleet. How did we get in this situation? What can we do to avoid similar problems when we do procure new weapon systems such as the F-35? What are the factors affecting aging aircraft, and are we addressing them thoroughly enough right now to turn the tide?

Supporting Tired Iron

The Challenges of Supporting Aging Aircraft—Transformation or Train Wreck

Introduction

We are trapped in a “death spiral.” The requirement to maintain our aging equipment is costing us more each year: in repair costs, down time, and maintenance tempo. But we must keep this equipment in repair to maintain readiness. It drains our resources—we should be applying to modernization of the traditional systems and development and deployment of the new systems. So, we stretch out our replacement schedules to ridiculous lengths and reduce the quantities of the new equipment we purchase—raising their costs and still further delaying modernization. Compounding this problem is the increased operational tempo required by our worldwide role as the sole remaining superpower, which more rapidly wears out the old equipment. And, if this weren’t bad enough, we must deal with the uncertainty of unanticipated crises, which...can...further drain funds from modernization.¹

—Jacques S. Gansler, Under Secretary of Defense for Acquisition and Technology



Supporting Tired Iron: The Challenges of Supporting Aging Aircraft—Transformation or Train Wreck

Today, the Air Force faces a growing crisis with respect to the costs of maintaining its aging aircraft fleet. In response, organizations—such as the Department of Defense (DoD) Joint Aging Aircraft Council, Air Force Fleet Viability Board, and Air Force Aging Aircraft System Program Office (SPO) have been established to oversee the efforts to tackle aging aircraft challenges. Modernization programs—have been initiated to build capability into aircraft we cannot afford to replace, and major cultural changes are being pursued via organizational and process changes. Cultural changes include efforts under the Air Force Spares Campaign, Total Life-Cycle Cost (LCC) Management, and Supply Change Management. In addition to all these things, legacy information technology systems developed and fielded during the Cold War slowly are being replaced.

How did we get in this situation? What can we do to avoid similar problems when we do procure new weapon systems such as the F-35? What are the factors affecting aging aircraft, and are we addressing them thoroughly enough right now to turn the tide? This article sheds some light on the answers to these questions, while highlighting the magnitude and urgency of the aging aircraft matter, and persuades the reader that more must be done now to avoid bigger problems when the first F-35 is fielded.

The disintegration of the Soviet Union in 1991, combined with an increased operational tempo, catapulted aging aircraft issues to the forefront of military readiness concerns. Senior leaders now focus on solving technical challenges such as engineering solutions to KC-135 corrosion problems and efforts to modernize the fleet through modification and procurement, including the leasing of Boeing 767 tankers.

“With the end of the Cold War and subsequent realignment of US defense strategy, procurement of new aircraft has decreased.”² In addition, inventories of spare parts were cut and levels of operations increased. Years of underfunding affected spares availability and repair and overhaul line production, and a working capital fund was established without a real understanding of the costs involved, resulting in large depot-pricing swings.³ This situation, combined with the operational tempo demands placed on the Air Force in the post-Cold War world, has resulted in many technical challenges and an across-the-board escalation of operations and support (O&S) costs. This situation has put the Air Force into a funding *death spiral*. The *death spiral* is induced by maintaining an aging aircraft fleet. The average age of the aircraft fleet is increasing and will continue to do so because of the post-Cold War decrease in system procurements. More and more O&S funds are required to keep system availability at acceptable levels. This is caused by a decrease in system reliability rates for systems operating beyond their 20-year design service life. The increase in O&S costs, combined with the need to modernize systems to improve combat capability and system reliability, compete for funding that is not adequate to satisfy both O&S and modernization requirements,

The average age of the aircraft fleet is increasing, and it will continue to do so because of the post-Cold War decrease in system procurements.

resulting in an overall decrease in system availability and capability combined with increasing costs.⁴

The Air Force is determined to tackle the technical challenges and reverse the O&S trend. However, the way we are going about solving the problems is setting us up for even more substantial problems as the F/A-22 and F-35 are fielded. We traditionally have sacrificed supportability on the altar of cost, schedule, and performance, and if we do not take action now to correct problems early in the acquisition life cycle of the F/A-22 and F-35, we will live with the adverse impacts for years to come. Sustainment requirements are harder to defend than capabilities in our financial decisionmaking processes, which has caused part of the sacrifice.⁵ In the Advanced Tactical Fighter SPO from 1987 to 1989, we were told reliability and maintainability would enjoy the same emphasis as cost, schedule, and performance. That position did not see 1989 with the advent of aggressive engine weight-reduction programs aimed at reducing the life-cycle cost and improving aircraft energy-maneuverability (P_s) (for example, performance). Additionally, we have redesignated the F-22, originally an air superiority fighter, as the F/A-22, a multirole fighter, which means the aircraft's mission mix has changed. Have we gone back and added in the weight necessary to make the aircraft durable enough to meet its revised mission requirements? The cost of these decisions has yet to be fully realized, but we will gain back the durability traded off one time compliance technical order (TCTO) at a time to modify the engine and airframe. Supportability is a key performance parameter for the F-35 program, but how does it rate relative to cost, schedule, and performance when push comes to shove and a tough decision must be made in favor of one vice the other? It will be interesting to see what happens now that at least one version of the F-35 is undergoing a weight-reduction effort.⁶ The decisions made today will affect the ability to support the system as part of an ever-aging fleet, beginning with fielding of the first F-35 in fiscal year (FY) 2008.

While top Air Force leaders focus on quickly solving high-profile aircraft technical and modernization challenges, ubiquitous but mundane aircraft support matters are addressed at a slower pace because of the lack of adequate resources needed to make them efficient and effective. Without senior Air Force leadership commitment of resources before fielding the F-35, a train wreck will occur. The train wreck will take the form of significantly degraded aircraft availability or failure of a particular mission.

The Challenge of Aging Aircraft

Those airplanes that used to spend 4 or 5 months in depot status are now spending upwards of a year in depot status, just because of the aging problem.⁷

—General John Jumper, USAF

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Aging of the fleet has been exacerbated by decisions to cut numbers of new aircraft acquisitions over the last several years.

In 2001, General Charles T. Robertson, Jr, summed up the situation faced today by saying, “The problem is that the fleet of aircraft is aging and the infrastructure is inadequate.”⁸ As of January 2003, the average age of an active-duty Air Force aircraft was 22.2 years with 48 different mission/design/series (MDS) in the fleet. As of January 2003, the average age of the Air National Guard’s (ANG) fleet of 13 mission/design/series was 22.5 years while the Air Force Reserve Command’s (AFRC) fleet of 8 mission/design/series was an average of 25.6.⁹ Additionally, one-third of the Air Force fleet, 11 mission/design/series, has an average age of more than 30 years.¹⁰ “The Service’s aircraft will continue to age dramatically: if all existing acquisition programs are executed as planned, by 2020, the average Air Force aircraft will be 29 years old—meaning that for every airplane fresh off the assembly line, there will be another that is 58 years old.”¹¹

Aging of the fleet has been exacerbated by decisions to cut numbers of new aircraft acquisitions over the last several years. The B-2, F/A-22, and C-17 are examples of systems that we intended to buy in large quantities but ended up procuring in relatively small quantities. Procurement of smaller quantities of unique configurations results in increased supportability costs over the life of the system because our demand for repair and replacement parts is lower than it would have been if the fleet sizes were bigger—the effect of the basic law of supply and demand. Within each of these fleets, there may exist airframes with unique configurations caused by flight-test modifications or manufacturing deviations and waivers that further complicate supportability. But we have plenty of aircraft, and if we inspect and repair them, they can just keep flying, right? So why should we be concerned?

There are plenty of reasons to be concerned. With proper inspection and repair, many of these aircraft will be able to fly for years to come; however, as they get older, they cost more to maintain, while modernization is needed to enhance their capabilities. Sustainability competes with the need for modernization in a financial zero-sum game, and we gradually begin to descend down a *death spiral*. So how do we define aging with respect to an aircraft anyway, and how do we start to address the problem?

Dr Jack Lincoln of the Aeronautical Systems Center at Wright-Patterson AFB, Ohio, defined aging this way: “Aging occurs when a weapon system requires changes to its maintenance plans because of corrosion damage, repairs, widespread fatigue damage, and/or flight operations that carry the aircraft beyond its original design usage.”¹²

Furthermore, newly fielded aircraft tend to suffer from technical surprises and infant mortality failures. These setbacks are caused, in large part, by a lack of material characterization data, accuracy, sophistication, or conduct of developmental analyses and modeling, the extent and realism of developmental testing performed, or a lack of quality or process control. Time and money are required to address these matters in the phases of system acquisition prior to production. It is a *pay me now or pay me*

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later proposition as these things affect the accuracy of reliability, service life, and ultimately LCC calculations. Hence, the root of some aging aircraft issues goes all the way back to system development and testing.

Once a weapon system has made it beyond infancy in the field, it generally will become a stable and mature design unless preplanned product improvements and technology insertion cause surprises. When a system nears the end of its design service life, it will have low reliability and maintainability caused by parts and systems running out of life unless proactive measures are taken, such as service-life extension programs to extend the life, improve the reliability, and cut costs.¹³ The *Asian Defence Journal* summed up the aircraft maturity issue this way:

... a stage is eventually reached, at which serviceability and availability rates begin to taper off. The onset of this is almost imperceptible, and the increase of nonavailability of more unserviceability and longer repair times creep up with deceptive insidiousness. Expenditure on repair of aging equipment soon becomes good money thrown after bad—and a law of diminishing returns begins to apply.... When this situation occurs, major overhauls and upgrades may well provide solutions, and it has become almost standard practice for systems to be designed from the outset for “midlife” updates to be incorporated later. The term “midlife,” however, has become somewhat misleading....¹⁴

Indeed, the Air Force has conducted modernization throughout the service lives of many weapon systems. Some efforts are a result of preplanned product improvement programs; others are *midlife* aircraft modernization efforts, and at design service-life intervals, we conduct service-life extension programs in an attempt to keep aircraft flying safely, update aging weapon systems with the latest technology (that is, B-52, C-5, F-16, A-10, KC-135R), and improve reliability and maintainability.¹⁵ The majority of these efforts do offer reductions in O&S costs over the remaining life of the system. However, there are more items that affect system availability, reliability, and maintainability that we cannot afford to address because of modification funding constraints, and those will continue to contribute to O&S costs because they are *must pay* bills. Examples of such *must pay* items, which many times are not funded with modification funds as they once were and under Air Force Materiel Command (AFMC) configuration change management policies, include modification of rotatable pool assets, support equipment, and training.

Maintaining near-term readiness of aging systems, while modernizing them and reducing infrastructure, presents serious challenges.¹⁶ However, “current operating tempos dictate that current operations take precedence over future modernization.”¹⁷ Senior leaders need to understand that without top line budget increases modernization efforts negatively impact readiness because they compete directly with O&S costs in a zero-sum game.

A RAND report stated the Air Force had reduced new aircraft procurements and modernization efforts to extend the service life of several aircraft types.¹⁸ RAND also cited that heavy maintenance workload for a select group of airframes would increase five- to ninefold over a 40-year span, and for the fleet as a whole, if current trends continued, would result

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The Air Force share of the DoD budget must increase to support operations, support, and modernization adequately.

in an increase in depot costs of \$5-6B by 2020.¹⁹ Obviously a zero-sum game proposition cannot support the magnitude of such increases in O&S expenses, so acquisition and logistics reform efforts need to focus on solving the zero-sum game dilemma by changing processes and policies to affect efficiency and effectiveness, freeing up funding for modernization.²⁰ However, this will not be enough to solve the problem. At the same time, the Air Force share of the DoD budget must increase to support operations, support, and modernization adequately, or we will continue to make trades in a zero-sum game and further descend into the *death spiral*.

What does the future hold if the Air Force cannot adequately support O&S costs as well as modernization? Here is the probable scenario. Infant mortality failures associated with the operational fielding of the F-22 and F-35 and technical surprises on the remainder of the Air Force's very new and very old weapon systems—combined with the law of supply and demand's response to small MDS fleet sizes and the sheer number of mission/design/series—will drive O&S costs ever upward. Additionally, we will continue to insert technology into a wide variety of fielded systems at all points within their service life to enhance system capabilities, reliability, and maintainability at the expense of O&S bills. The result will be a decline in weapon system availability rates. But where does the Air Force find funding needed to address the challenges of supporting aging aircraft? Our options include divesting ourselves of infrastructure and systems we cannot afford to support or leveraging technology to enable us do so (for example, a single B-2 can now drop 80 joint direct attack munitions, so do we still need B-1Bs or B-52s), changing our operational concept by buying systems that are cheaper to operate (for example, remotely piloted vehicles vice F/A-22s and F-35s), mothballing some weapon system modernization efforts, or securing additional obligating authority from Congress. It is a tough decision but one that needs to be made soon if we are to avoid a train wreck while the F/A-22 and F-35 are experiencing infant mortality and technical surprises during their early years in the field.

Addressing Aging Aircraft

As corrosion and structural issues are resolved, weapon system operators continue to experience degradation of availability and readiness due to systems, equipment, and support limitations of aging aircraft. These include: 1) equipment item obsolescence, 2) mission requirements changes, 3) diminishing manufacturing resources, 4) age degradation of the systems/equipment, 5) reduced manpower levels (both skills and numbers of personnel), and 6) funding constraints.²¹

—Mike Enloe, Boeing Information, Space and Defense Systems

The good news is that we are not having to start from scratch in addressing the aging aircraft problem as, “The study of aging aircraft is not new; it

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actually began in 1958 as the result of a series of B-47 mishaps. The effort to understand these events became the Aircraft Structural Integrity Program (ASIP)... ASIP is the centerpiece of Air Force efforts to manage aging aircraft.”²² And we are not alone in our endeavor.

Others have been dealing with the impacts of an aging aircraft fleet for quite some time. France, the United Kingdom, Singapore, the Netherlands, the countries of Eastern Europe, and others face many of the same challenges regarding keeping old airplanes available and effective.²³ At home the Navy, Coast Guard, Army, Defense Logistics Agency (DLA), and Air Force all face problems associated with supporting aging weapon systems.²⁴ Because of the commercial aircraft accidents in the 1980s, including the Aloha Airlines 737 accident in Hawaii on 28 April 1988, Congress increased the scope of the Federal Aviation Administration’s (FAA) mission, and in response, the FAA, created the National Aging Aircraft Research Program, which teams with the Government, industry, and commercial airlines to address aging aircraft issues.²⁵ Many aging aircraft problems emerge with little or no warning, making the situation a real cause for concern.²⁶

Department of Defense

The DoD has established the Joint Aging Aircraft Council (JAAC) with representatives from each of the Services to address the problems of the aging fleet. “The JAAC’s purpose is to leverage efforts across the Services and help field products to improve the availability and affordability of aging aircraft.”²⁷ The JAAC has identified its top 12 concerns, ranging from technical issues dealing with corrosion to providing maintenance personnel specific training on how to deal with old aircraft.²⁸ While the JAAC is the only DoD organization established specifically to address aging aircraft, the Joint Logistics Board (JLB) is working to transform logistical support through several broad initiatives. The JLB’s initiatives are inextricably linked to weapon system availability through weapon system reliability and supply system responsiveness to warfighter needs. The extent of the JLB’s success will influence directly the degree of success that the JAAC can achieve.

The Deputy Under Secretary of Defense (Logistics and Materiel Readiness) established the Joint Logistics Board whose members are the commanders of the service materiel commands, senior service staff logisticians, the Joint Staff Director for Logistics, the deputy commander of US Transportation Command, and the director of DLA. The Joint Logistics Board meets quarterly, and its purpose is to assess the policy and implementation implications for the transformation initiatives the Services and defense agencies have undertaken to meet the emerging threats documented in the 2001 Quadrennial Defense Review (QDR), the goals of the Future Logistics Enterprise (FLE), and the Focused Logistics goals of Joint Vision (JV) 2020. The FLE is the midterm vision (2005-2010) that builds upon the QDR and National Defense Strategy to obtain the goals of JV 2020. The specific goals of the FLE include depot

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The end-to-end distribution initiative's purpose is to provide the warfighter the right material at the right time to continuously support deployed force combat effectiveness.

maintenance partnerships, condition-based maintenance + (CBM+), total life-cycle systems management (TLCSM), end-to-end distribution, executive agents, and enterprise integration.²⁹

The primary intent of the depot maintenance partnership initiative is to provide depots the ability to partner with contractors while retaining that portion of the workload necessary to ensure national security. CBM+ is aimed at increasing weapon system availability and readiness throughout the system life cycle at a reduced cost. The goal of TLCSM is to establish clear responsibility and accountability for meeting specified warfighter performance requirements in order to improve weapon system sustainment. The end-to-end distribution initiative's purpose is to provide the warfighter the right material at the right time to continuously support deployed force combat effectiveness. The executive agent initiative is to ensure support of combatant commanders is improved by making certain that executive agent roles, responsibilities, resources, and capabilities are responsive to the warfighters' needs. Finally, the Enterprise Integration goal is to implement rapidly the modern, commercially based software products that provide the skilled and trained personnel within the DoD's logistics enterprise to access near real-time, actionable information, enabling reengineered logistics and business rules.³⁰

United States Air Force

The Air Force and the Navy have responded to these concerns by setting up independent program offices to address aging aircraft issues from end to end.³¹ The Air Force has created two new organizations to deal with these issues—the Aging Aircraft SPO at the Aeronautical Systems Center and the overarching Secretary of the Air Force (SECAF) chartered Fleet Viability Board, with membership including engineers, cost analysts, and sustainment logisticians and advisers from the other services, industry, Government, and academia.³²

The Aging Aircraft SPO, established 25 January 2001, has responsibility for all the Services' aircraft and is to have branch offices at all depots and major command (MAJCOM) headquarters.³³ The chief of the SPO Planning Division, Colonel Michael R. Carpenter, says the office is first focusing on *ilities*, such as reliability and maintainability that affect aging; encouraging cross-organizational technology sharing; and supporting *cross cutting* programs and technologies that affect several platforms.³⁴ Examples of the kinds of *cross cutting* programs Carpenter is talking about include a radar-absorbing skin inspection system and ongoing projects such as the Joint Ejection Seat Program and the Large Aircraft Countermeasures Program that apply to several types of aircraft.³⁵ The system program office is attempting to do this across services, agencies, and industry, but unfortunately, cross-cutting solutions are not widely recognized or accepted.³⁶ The system program office coordinates with the Air Force Research Laboratory (AFRL), Applied Technology Council (cochaired by the AFRL Commander and AFMC Vice Commander), and aircraft depot system to convert research and

development efforts in the labs into fieldable solutions at the bases and depots.³⁷

The Air Force Fleet Viability Board was born when Secretary of the Air Force James G. Roche asked the Deputy Chief of Staff Air Force Installations and Logistics to come up with a process to provide unbiased assessments of the aircraft inventory, like the Navy’s process for retiring ships.³⁸ The Fleet Viability Board, also located at the Aeronautical Systems Center, will have a survey and assessment team (S&AT) headed by an O-6 that will report directly to the Air Force Deputy Chief of Staff, Installations and Logistics. The S&AT will lead the detailed assessments of three to four aircraft types per year with augmentation from the responsible program offices. The team’s findings and recommendations will be reviewed by a part-time senior board of experts from industry and academia and then be given to the SECAF and Chief of Staff of the Air Force. The recommendations will not consider force structure or operational impacts, and the process will be continuous and repeatable.³⁹

Additionally, Air Force Installations and Logistics has established a director of Innovation and Transformation, and AFMC’s depots and the Logistics Information SPO have responsibility for the transformation of processes and logistics information systems, respectively, that affect aircraft availability. Obviously, the number of organizations dealing with a diverse set of aging aircraft issues necessitates unity of effort to arrive at cost-effective solutions that share resources and minimize duplication of effort. While it is clear that there are lines of communication between many of these organizations, it is not clear if these efforts are unified and comprehensive, which is what they must be to be efficient and effective. All levels of supervision in the organizations that work aircraft issues need to ensure efforts are coordinated with the organizations that work with aircraft support issues. Also, it is unclear whether the JAAC has the authority to secure the resources necessary to implement the solutions it formulates. Why have the JAAC make the effort to propose solutions if there’s a chance those solutions will not be acted on? Now that we are familiar with the major organizations involved with aging aircraft issues, let us examine some of the issues on which these organizations should be focusing their efforts.

Changes in Usage

Usage is helpful when assessing the increased rate of damage accumulation that occurs when aircraft are flying different and more severe missions than in the original design specification. Under such conditions, the aircraft accumulate “equivalent damage hours,” and age more rapidly than normal.⁴⁰

—Karl Hart and Terry Mitchell

The major airlines have recognized this in the past, and in well-publicized moves, they have reduced the number of aircraft types operated in an effort to reduce operating costs. It also has been well publicized that one reason

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It is unclear whether the JAAC has the authority to secure the resources necessary to implement the solutions it formulates.

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The Air Force needs to ensure its force structure is optimized and program managers are fulfilling their obligations to control and manage configuration changes in order to control costs.

Southwest Airlines has been so successful is because it only operates one type of aircraft, the 737, which allows them to buy supplies in bulk and focus maintenance workforce skills on this one aircraft type—saving money by reducing operating costs. The disadvantage is that should the 737 fleet suffer a major technical surprise Southwest Airlines is totally at the mercy of Boeing’s engineers to come to their rescue. However, the risk is low considering the maturity of the design, and Southwest has avoided the major airframe divestitures that other airlines have had to make to remain profitable. Configuration control and change management are absolutely vital to controlling costs. The Air Force needs to ensure its force structure is optimized and program managers are fulfilling their obligations to control and manage configuration changes in order to control costs.

Initial fielding of the F-35 is not scheduled to begin until FY08.⁴¹ These new aircraft will go only to active-duty units. This will concentrate some of the aging problem of the fighter fleets in the ANG and AFRC while adding two more mission/design/series to the total force fleet requiring support. Between FY08 and FY23, when both the F/A-22 and F-35 are in the field along with the F-15 and F-16, we will be supporting two more fighter airframes and one more engine configuration than we are supporting today.⁴² Air Force O&S costs will be driven higher by the effects of additional unique configurations on our logistics footprint and the addition of three configurations within the small Air Force F/A-22 and F-35 fleet sizes. This can be predicted by applying the law of supply and demand. Supply support will continue to be complicated and costly because of technology insertion and manufacturing process waivers and deviations, which make inevitable the use of *usable on* codes to identify parts unique to blocks of aircraft and sometimes unique to particular aircraft tail numbers.

Sutterfield experienced the problems of small fleet and *usable on* codes firsthand when maintaining EF-111s. Because the balance of the F-111A airframes had been retired and only 42 EF-111As were produced, getting parts in 1990-1991 required a lot of micromanagement of the supply process. Additionally, some part numbers were unique to a single aircraft tail number. Why do we allow this sort of thing to happen? Is it because we live in a society with a throwaway mentality and our service culture demands technology insertion for the sake of combat capability, at the expense of the same? We need to ensure program managers are familiar with configuration management policies and the program executive officers ensure they follow them.

Senior leaders need to realize that changes in *usage* (also known as mission mix or design duty cycle) and increases in sorties and hours will impact supportability. When a fighter aircraft that was designed to be an air superiority fighter is given an air-to-ground role, the weapon system will see higher stresses and temperatures. Parts that are not designed to handle the higher stresses and temperatures will not last as long. More parts and maintenance will be required to keep the system airworthy.

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Increased severity of usage is believed responsible for an increase in fatigue-related problems with older F-16s.⁴³ A simple increase in sorties flown without a change in mission mix will result in significant usage, as noted by Lieutenant Michael E. Zettler, Deputy Chief of Staff for Installations and Logistics, when he said, “We tend to use more spare parts per sortie than we do per hour.”⁴⁴ This is confirmed by a recent spare parts computation study that states, for fighter aircraft, demands are driven approximately 10 percent by flying hours and 90 percent by sorties.⁴⁵ Carpenter recently commented regarding operations in Southwest Asia, “‘Hidden costs in operations’ may come in later years—when aircraft begin to wear out faster.” Carpenter cautioned that the Air Force may be setting itself up for a future problem because “there’s a hidden bill out there.”⁴⁶ Changes in usage drive O&S budgets now and will continue to do so in the future. The cost of the Air Force flying-hour program currently grows by about 11 percent annually because of fleet aging, and ongoing RAND research suggests aircraft support costs might grow as much as \$9B a year by 2020.⁴⁷ “Aging aircraft will continue to increase operations and support costs. In an era of constrained budgets, those costs will continue to be paid by robbing procurement and research-and-development accounts. This further slows replacement of aging aircraft—creating a *death spiral*.”⁴⁸

Obsolescence and Diminishing Manufacturing Sources

*It can take up to 6 months to find a new company interested and able to produce spare parts that meet Air Force standards. It is quicker to place a call to the “boneyard” at Davis-Monthan AFB, Arizona. It takes about 15 days for a replacement part to be taken off an old A-10 (aircraft)...and shipped. But parts from the bone yard are not always usable. Sometimes they are in worse shape than the part we wanted to replace.*⁴⁹

—Captain Stephen Williams, USAF

Weapon system availability rates are negatively affected by parts obsolescence and diminishing manufacturing sources (DMS).

The long life span expected in current and future weapon systems, coupled with the fast-paced advances in commercial technologies and the gradual erosion of the manufacturing base for military electronics, has created the so-called “obsolescence” program that plagues many weapon systems.⁵⁰

A 51-percent decline in DoD research and development and procurement funding during 1985-1998 triggered a wave of mergers and acquisitions as commercial firms exited the defense industry.⁵¹ In 2001, DoD business was less than 1 percent of component purchases and a relatively unprofitable portion of production for an electronics industry swamped with consumer demands for more and better technology.⁵² “Contractors are no longer capable or interested in supporting old systems because the technology is no longer relevant to the commercial sector.”⁵³ “A new set of costs, only now being fully understood, have actually driven

Weapon system availability rates are negatively affected by parts obsolescence and diminishing manufacturing sources.

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Our ability to avert obsolescence and DMS issues will have a direct impact on weapon system availability of all our weapon systems.

the total life-cycle cost of commercial components higher than the Mil Spec components they replace.”⁵⁴

“For older platforms, it gets progressively difficult to find spare parts or even repair manuals.... Production lines shut down. Companies go out of business or merge with other firms.”⁵⁵ However, “even the F-22 Raptor ...is facing challenges with obsolete parts.”⁵⁶ The National Research Council reports that the avionics system of the first production F/A-22 to roll off the line already will have undergone four technology refresh cycles.⁵⁷

The problem is greatest for avionics and electronic subsystems because of the pace of technological development and the fact the Air Force tradition has been to design an avionics suite that is “static, producible, and maintainable for the lifetime of the airframe,” but it is a problem across the board for aging systems.⁵⁸ The Air Force estimated in 2001 it would need \$275M more per year to address avionics obsolescence.⁵⁹

The B-2 experience with obsolescence and diminishing manufacturing sources is that there are no easy fixes, and the process is very labor-intensive despite the use of transitional analysis of component technology and refinement with the Pentagon’s Diminishing Manufacturing Sources Management System database on component availability.⁶⁰

In Hamilton and Chin’s *National Defense* article “Aging Military Electronics: What Can the Pentagon Do?” they make several good recommendations as to what can be done to combat the effects of parts obsolescence. They illustrate the impact of not establishing close vendor relationships. In a specific instance, it was learned there was no chip available for procurement to support a military system requirement because the commercial cell phone market had completely *locked up* all supplies of a critical component thought to be readily available. Although the authors did not state how this problem was solved, one of their recommendations included maintaining close vendor relationships, the extent of which is limited by laws and regulations.⁶¹ The question is, how much regulation is enough regulation?

Proactively working to ensure obsolescence does not impact weapon system availability and requires us to be vigilant through establishing close relationships with prime contractors and vendors who will give us the intelligence we need.⁶² Another solution is to modernize the fleet to a flexible open architecture design that can accommodate future configuration changes.⁶³ Smart application of spares acquisition, integrated with production during new procurements, also can realize savings.⁶⁴ Again, solutions depend on funding, design, technology, and close relationships with vendors. Our ability to avert obsolescence and DMS issues will have a direct impact on weapon system availability of all our weapon systems—from the very newest to the very oldest.

Strategic Raw Materials

No nation has unlimited resources. No matter how well-intentioned the nation’s behavior, it still must work within the constraint of finite

*resources. Then, too, the nation must bear in mind that many of the resources it needs to reach its goals must be obtained from sources outside its own boundaries...some of those...may not always be friendly or cooperative. Thus a significant problem involving national survival presents itself.... Yet we seem unwilling or unable to move to ensure an adequate stockpile of these critical materials for our national defense.*⁶⁵

—*The Logistics of War*

Do we have access and will we continue to have access to the strategic raw materials needed to ensure weapon system availability? Many of our high-tech systems have components made of alloyed strategic raw materials because of their high-temperature characteristics, wear characteristics, conductivity, or other properties that provide us critical or enhanced weapon system capabilities. The majority of ore deposits of many strategic raw materials—such as titanium, cobalt, manganese, nickel, and so on—are not within US borders.⁶⁶ This means we are at the mercy of others for those materials. We must ensure that we maintain good relations with the countries that provide us those materials while pursuing ways to rework, repair, or reuse parts containing those materials or recycle and reclaim the materials to sustain our capabilities. We have made good progress over the years relative to reclaiming and recycling materials.⁶⁷ However, we should strive to do more, with the primary thrust being to relieve ourselves of dependence on other countries for materials important to military capability. Those materials also can become very expensive as a result of private sector demands since many of the same supply-and-demand effects that were discussed relative to obsolescence apply to this discussion as well.⁶⁸

In the post-Cold War environment, the movement has been toward divestiture of stockpiles of strategic raw materials. Our access to material in some cases not only is an issue of our relationship with foreign governments but also can be driven by domestic consumer demand for items made from these materials. Titanium-head golf clubs are an example of an item in high demand by consumers the world over, which has, on at least one occasion, affected the Air Force's ability to procure jet engine fan blades in a timely manner. When it is more profitable for a vendor to make golf clubs, they will make golf clubs unless we have the ability to influence the vendor via the ability to make long-term commitments or give price incentives. Since DoD demand is low compared to the private sector, we pay more for it, and some vendors may opt not to do business with the Department of Defense because commercial business is so lucrative—resulting in diminishing manufacturing sources. Thus, the availability of some aircraft parts is driven by the availability of *strategic* raw materials.

The retirement for cause (RFC) nondestructive inspection systems that have been in use at the depot to inspect fracture-critical rotating jet engine parts, typically made of titanium or nickel, are an example of a capability

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Do we have access and will we continue to have access to the strategic raw materials needed to ensure weapon system availability?

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Many of the problems with aging materials have emerged with little or no warning.

that specifically addresses the challenge. RFC machinery return on investment for the first 12 years of operation was 25 to 1, with a savings of 6 million pounds of critical materials and \$1B. Recent enhancements of the RFC capability, to include addressing of hardware and software obsolescence, are expected to achieve a return on investment of 10 to 1 over the next 2 years alone.⁶⁹ Other technologies with the potential promise of a return on investment of retirement for cause need to be developed to reduce our strategic raw material requirements and our ability to repair and reuse high cost parts. This type of initiative is one that the Joint Logistics Board should continue to pursue under the Future Logistics Enterprise initiatives.

Acquisition

The Air Force does not give operating and support cost management the same high priority it assigns to other program issues such as weapon system performance during system development or improved combat capability after a system is fielded.... Projects that could lower operating and support costs are unable to compete effectively for funding against projects that enhance safety or readiness or improve combat capability.... First, most cost-reduction initiatives require up-front investments of procurement funds that take many years to pay back the initial investments. This slow payback...make(s) it difficult for the initiatives to compete against investments that provide near-term improvements in safety, availability, or combat capability.... Second, the Air Force sees improved combat capability as the most important priority.⁷⁰

—August 2000 GAO Report

Since the advent of the ASIP, we have designed aircraft and engines to have the equivalent of 20 years of service life, but in the post-Cold War world, we expect them to fly for 40-plus years.⁷¹ “ASIP is also the standard by which aging aircraft structural issues are evaluated.”⁷² Appropriate elements of the program were extracted to perform damage tolerance assessments in the 1970s and 1980s.⁷³ All it takes is planning and money. While it is possible to make this happen in some cases, it is not done without careful inspection, data collection, and analysis to preserve airworthiness—that feeling of security born from the confidence that the aircraft will accomplish its mission safely.⁷⁴ This investment is costly. It is even more costly when we have not put in the effort on the front end of the weapon system life-cycle to ensure system reliability and maintainability. But we must keep in mind, “The importance of a seemingly esoteric engineering exercise like honeycomb component replacement was brought to light last spring (2002) when an F-15...broke apart...killing its pilot.”⁷⁵

“Many of the problems with aging materials have emerged with little or no warning. This raises the concern that an unexpected phenomenon may jeopardize an entire fleet’s flight safety, mission readiness, or support

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costs.”⁷⁶ Problems such as corrosion, composite structure water intrusion and delamination, and wiring harness chafing are insidious. One of the solutions is development and fielding of reliable nondestructive inspection techniques for items of concern.⁷⁷ Effective nondestructive inspection equipment and techniques are a good example of a technology that can be developed for use on multiple weapon systems, possibly be conducted nonintrusively, and can extend service life given adequate probability of detection and availability of spare parts or repair procedures.⁷⁸ “Continuous inspection and condition-based maintenance of aging aircraft components...are key elements in the safe and cost-effective utilization of many existing military and commercial aircraft.”⁷⁹ Of course, fielding of such capabilities is dependent on funds available to develop, test, and procure the equipment; establish inspection procedures; train maintenance personnel; publish technical data; and provision spare parts. All these issues have to be addressed properly to ensure supportability and airworthiness.

Cost, Schedule, Performance

Even though program managers and senior leaders can pressure program managers to accelerate fielding of new systems by accelerating research, development, test and evaluation phases, we end up paying for the decision later by having to modify new systems in the field to make them more safe and durable.

The pressure to get this aircraft (F-16) into production considerably shortened the engineering effort that would be required to perform these tasks (ASIP) adequately in the engineering and manufacturing development phase of acquisition. Finally, both the contractor and the system program office placed considerable emphasis on maintaining production rates and operational performance.⁸⁰

This was also the case when we fielded the F100-PW-229 engine in the early 1990s. The -229 powers a small fleet of F-15E and F-15C/D Block 52 aircraft in the active duty and ANG. Sutterfield was the lead program manager for the F100-PW-229 engine at the San Antonio Air Logistics Center (SA-ALC) from 1993 to 1996. Before getting got the job, the SA-ALC -229 team constantly was trying to address supportability challenges associated with infant mortality failures and technical surprises, which drove more than 50 TCTOs in 1994 alone.

Despite the fact the -229 engine is part of the F100 family of engines, it has less than 40-percent parts commonality across the board when compared to the -100, -200, and -220. Additionally, with a small fleet of engines that have many unique parts, the law of supply and demand can be costly, and although some of the effects were attenuated by foreign military sales production, spare parts costs were still high.

The Engine SPO at Wright-Patterson AFB, Ohio, had overall program management responsibility for the F100-PW-229 engine. Congress mandated that the engine be interchangeable between the F-15 and F-16. However, modifications had to be funded by the F-16 and F-15 aircraft system program offices because the Engine SPO was not given

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Program managers must be held accountable for ensuring configuration management directives and change management procedures are adhered to.

modification funding authority. Modifications tended to be safety critical for the single-engine F-16 but more of a reliability and maintainability issue for the F-15, which tended to put the airframe SPO positions 180 degrees out. If the F-16 system program office funded a modification, more often than not, the F-15 system program office did not unless it was safety-critical to the dual-engine aircraft. The F-16 system program office and F-15 system program office obviously had different priorities, and keeping the -229 engine interchangeable was not near the top of the list for either. The issue was briefed to the propulsion product group manager, who, in turn, briefed the Air Combat Command (ACC) Commander, who made the decision to ensure the \$25-\$30M gap in configuration changes needed to make the engines interchangeable again was committed. This was essential to maintaining combat capability of a small fleet of engines shared between two airframes and to keeping spare part costs under control by having a single configuration. Keeping the engines interchangeable was not an easy task because of organizational barriers and the cost, schedule, and performance pressures placed on the three SPO managers involved in this scenario.

And the problems did not end there. Because of insufficient funding, we implemented some modification TCTOs without a kit (meaning the field units had to order and pay for parts for modifications) or kit proofing, validating, and verifying technical data, publishing the TCTO and technical order change pages, establishing a rotatable pool, or providing the required support equipment to the field. We had configuration management policies and procedures, but they often were ignored for the sake of cost, schedule, and performance.

The bottom line is that the F-15 system program office thought it was saving money by not approving TCTOs, even though it knew the F-16 system program office was approving the TCTOs, and the engine SPO was caught in the middle because it did not have obligating authority for modifications. Again, the fix is that program managers must be held accountable for ensuring configuration management directives and change management procedures are adhered to because they drive flight safety, ground safety, system availability and supportability, and O&S costs.

Another effort aimed at saving money occurred in 1993 when the Air Force “decided not to upgrade any of its F-16A/Bs (all of which have been transferred to ANG and AFRC units). But the European effort continues.”⁸¹ Was that the right call considering the role of the ANG and AFRC in air operations post-Desert Storm? Our decision has adversely impacted NATO interoperability and O&S costs. How many O&S dollars has this decision cost us over 10 years?

Insufficient funding causes problems as it encourages program managers to field deficient designs that require more funds to fix later—after they move to another assignment.⁸² Allowing cost centers to funnel savings realized from reforms and improvements in efficiency to increase procurements or fund modernization is an option that can provide some incentive and a degree of fiscal relief.⁸³

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Reliability, Maintainability, Supportability

Experiences produced lessons in terms of how we could improve reliability, maintainability, and supportability of the next generation of even higher technology weapon systems from cradle to grave through concurrent engineering and testing. We have been either less convincing or less committed than necessary to secure the resources to support these endeavors and, thus, passed up opportunities to capitalize on these lessons in the name of cost, schedule, and performance. This probably is caused by the incorrect perception that the time-honored tradition of logistics redundancy and duplication is inefficient.⁸⁴ While time has shown that there certainly was room for improvement, the fact remains that redundancy enhances weapon system survivability and flight safety. Surely, the goodness of these features must be worth at least some of the cost and performance offsets they have cost.

Early in the development of a system, cost projections can be inaccurate because their calculation is totally dependent on reliability and maintenance (R&M) forecasts, which are based largely on probabilities and statistics. As engineering, manufacturing, and development (EMD) progresses and the design stabilizes, the quantity of systems bought declines and is spread over a longer period of time. As the number of end items procured decreases, O&S costs increase because of the law of supply and demand. If the acquisition program office lacks funds to get the material properties characterization and component testing done (and done properly) during the EMD phase, the LCC computations cannot be accurate.⁸⁵ Mission changes, technology insertion, and modifications all impact O&S costs of a fielded system.⁸⁶ Reliability and maintainability routinely are considered in program management reviews. Unit (end item) costs were tracked easily, but the O&S costs were “generally outside the sight and control of the acquisition community...and attempts to control life-cycle costs were minimal.”⁸⁷ Coincidentally, it is a lack of material property characterization data that makes the current problems of airframe corrosion, insulation cracking, composite delamination, and other material degradation more challenging and demanding.⁸⁸ Getting somewhat accurate LCC estimates and weapon system durability are a *pay me now or pay me later* proposition.

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Life-Cycle Cost

The cost of operating an aircraft often increases over time, not just because of physical aging, but also because of other factors such as changing supply philosophies or component vendors going out of business. DoD must develop the ability to quantify these costs if it is to make sound investment decisions, according to the JAAC.⁸⁹

A root cause for the rising O&S costs of the aging fleet is errors in cost estimating that occurred before the systems were fielded. LCC estimations begin to be calculated early in the life of a program and receive great emphasis in a realm where cost, schedule, and performance reign supreme. “Life-cycle cost is defined as the total cost of a system over its full life, which includes a research and development phase, an investment or

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Efforts to reduce the life-cycle cost must make O&S costs a prime consideration with regard to design of new systems and support of existing systems.

procurement phase, an operating and support phase, and final disposal or phase out.”⁹⁰

O&S costs make up the bulk of the total cost of ownership of a weapon system and can amount to 60-80 percent of life-cycle costs over a 20-year service life.⁹¹ For a shorter service life, O&S costs are lower, but the system may need to be replaced if the capability does not exist in another form. As we extend the life of systems beyond 20 years, the percent of life-cycle cost attributable to O&S becomes larger. We can deal with the problem by either designing systems for longer service lives or committing up front to periodic rebuilds to extend service life.⁹²

The life-cycle cost has been used in the past to calculate total cost of ownership; however, most LCC models fall short of accurately predicting O&S costs, owing to uncertainties in data and methodology.⁹³ In fact, a RAND study showed that the LCC estimation models the Air Force used did not address several O&S cost elements, assumed away some cost elements, and gave poor coverage to the remainder.⁹⁴ LCC estimates also may be of limited value because of a variety of pitfalls and fallacies.⁹⁵ LCC models must be amended to reflect the technological sophistication of current and future weapon systems and then fine-tuned through the accumulation of actual cost data.⁹⁶

LCC estimates need to be scrutinized closely to ensure their validity and determine the level of risk associated with uncharacterized O&S cost elements.⁹⁷ Furthermore, efforts to reduce the life-cycle cost must make O&S costs a prime consideration with regard to design of new systems and support of existing systems.⁹⁸

The measures of weapon system success are life-cycle cost and effectiveness. “Despite the fact that the majority of a defense system’s life cycle is spent in peacetime, we must design weapon systems for the worst case environment—war. But war is the world’s most uneconomical undertaking.”⁹⁹ If we combine the two measures, improvement efforts can be summed up as cost-effectiveness. “But cost-effectiveness is a judgment call—a subjective versus objective measure. This ensures that continued controversy will remain an integral part of the defense acquisition process, now and in the future.”¹⁰⁰

Information Technology

There are nearly 100 legacy Department of Defense or Air Force systems used in collecting, tracking, and analyzing the whole scope of logistics and cost information. Until very recently, there has been little or no integration of the data in all of these, though Weapon System Cost Retrieval System and Air Force total ownership costs are very good steps in the right direction.¹⁰¹

—Karl Hart and Terry Mitchell

Do our senior leaders put enough emphasis on the criticality of information technology systems to achieve our goals relative to operations, sustainment, modernization, and acquisition? During recent

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Air Force Times interviews with General Gregory S. Martin (AFMC Commander) and General Hal M. Hornburg (ACC Commander) regarding their goals, neither of them mentioned addressing information technology to support any of the efforts they discussed—including aging aircraft.¹⁰² Information technology support is critical to the effective and efficient support of an ever-aging fleet.

If we are to conquer challenges associated with an aging aircraft fleet, we must make our support processes efficient and effective. The processes we currently use to support the maintenance of our aging fleet rely on legacy information technology systems that are functionally and organizationally stovepiped and reactive by nature and lack decision support tools. We should be using enterprise systems (that is, collaborative and interoperable) to eliminate the inefficiencies associated with legacy system processes.

The standup of the Aeronautical Enterprise Program Office (AEPO) at Wright-Patterson AFB is just one step toward achieving a solution. “The AEPO decided to change the focus of Air Force decisionmaking from a program-centric perspective to one that is enterprise-wide to leverage investment and interoperability across aerospace vehicles and systems.”¹⁰³ Initiatives such as the Air Force Installations and Logistics’ eLog21 (Expeditionary Logistics—21st Century) and Enterprise Resource Planning are underway with the goal of achieving significant improvements in supportability effectiveness and efficiency through the replacement of legacy information systems with systems that are collaborative and proactive.¹⁰⁴

“It’s estimated that between \$1.5B and \$2.5B is spent annually to support these (legacy) logistics systems that remain susceptible to errors and delays that do not support today’s more agile, lethal defense forces.”¹⁰⁵ Many legacy systems do not talk to each other and are not accessible by all stakeholders, which can lead to some systems having current data and others not. This was the case in January 2003 when the Air Force Audit Agency (AFAA) reported that C-130 buy and repair requirements were overstated by \$28.3M because of Air Mobility Command and AFMC developing flying-hour and support program requirements that, respectively, included 77 and 15 aircraft scheduled to retire.¹⁰⁶ The AFAA also reported that for FY00 through FY05 reparable spares buy and repair requirements for airlifters, tankers, and F-16Ds were overstated by \$65.6M because of disconnects between the using commands, Air Staff functionals, and AFMC.¹⁰⁷ When such errors go uncorrected, we can end up spending money on parts we do not need or not be able to satisfy valid needs because we understated our requirements.

During Sutterfield’s 3 years as the F100-PW-229 engine program manager at SA-ALC, I had to address many problems caused by disconnects among the system program office at Wright-Patterson AFB, depot functions in the directorates supporting the –229 program, and DLA. The problems were geographic separation of the system program office from the depot, DLA’s information systems operating independently of Air

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Efforts to improve supply chain command and control to provide everyone a common operating picture must continue and should include contracting activities, DLA, other service repair centers that could support the Air Force, and prime vendors and contractors as a part of the system.

Force depot supply computers, and systems that were reactive, not proactive. Systems such as D041 (used for management of reparable assets) are reliant on knowledgeable and experienced personnel to forecast manually and make adjustments to part repair and usage data on a quarterly basis, one stock number at a time.

The experiences of United Kingdom and US forces during Operation Iraqi Freedom revealed that a “heritage of constant efforts to cut the cost of logistics and supply had created” a just-in-time delivery approach that “could not react to new and unanticipated demands in war time.”¹⁰⁸ Furthermore, Cordesman’s study of Iraqi Freedom operations led to the conclusion that supply chain management concepts “cannot compensate for systematic underinvestment in sustainability and logistics systems.”¹⁰⁹ The rest of the bad news is that the progress of the Air Force eLog21 program was characterized as *too slow* by the Deputy Director of Innovation and Transformation for Air Force Installations and Logistics at the Single Manager’s Conference held 29-30 October 2003.¹¹⁰

To have the most benefit, we must ensure the effort includes the supply chain improvements described by Brigadier General Robert E. Mansfield.¹¹¹ However, efforts to improve supply chain command and control to provide everyone a common operating picture must continue and should include contracting activities, DLA, other service repair centers that could support the Air Force, and prime vendors and contractors as a part of the system.¹¹² The Logistics Management Institute’s effort to develop an intelligent collaborative aging aircraft parts support tool to improve DLA support of Navy depots should not result in a system that cannot be part of a collaborative system that can be accessed by all the Services.¹¹³

Standard tools like the Aging Aircraft Structural Database should continue to be developed for use across families of weapon systems in all services.¹¹⁴ The standardized data collected from such tools should be stored in the electronic data warehouse to ensure visibility to those conducting research and development programs to repair or modify affected items.

We need to transform information technology quickly if we are to reduce the impact of the aging fleet on O&S costs and optimize aircraft availability. We need to make it a priority to design new systems that are collaborative and interoperable and get them fielded sooner, not later. Although Air Force Installations and Logistics has created investment portfolios to ensure precious dollars are invested in information system transformations that provide the best payback, will those investments be timely enough to transform all legacy systems before the train wreck? Continued reliance on legacy systems will waste money on Band-Aid efforts to network them without making them interoperable and collaborative. Legacy systems that affect supportability (financial, maintenance, supply, transportation, and so on) need to become enterprise systems and incorporated into the Global Combat Support System to give all stakeholders near real-time status.¹¹⁵

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The cross-cutting end-to-end solution the aircraft supportability information technology problem demands is just the kind of challenge the Air Force Fleet Viability Board and the Aging Aircraft SPO should pursue in coordination with the Logistics Information SPO. Although the program management directive for the Aging Aircraft SPO indicates the program manager is responsible for cross-cutting initiatives, efforts to improve supply chain command and control and spares campaign support, as well as the DoD end-to-end procurement system, need to be married into the Aging Aircraft SPO's activities to be sure senior Air Force leaders are kept informed of progress and ensure unity of effort and realization of seamless processes.¹¹⁶ If this issue is worked separately from the issue of aging aircraft, it will not get the visibility, support (service, other service, and DLA), or resources necessary to transform the supportability processes before the F-35 is fielded in FY08. The Fleet Viability Board advocates the effort while the Aging Aircraft SPO should coordinate with the Logistics Information SPO to ensure it gets the resources and support needed to transform supportability to an enterprise system and that those systems will meet the need.

The urgency of the fleet aging issue should make it clear that we must make replacement of legacy information systems with enterprise systems a priority so we can provide optimum weapon system availability, efficiently and effectively without further delay. Can we afford to incrementally transform—from both cost and aircraft support perspectives? Can we and should we approach a solution independently of the other services and DLA? Solving the information technology support challenge will require more tough choices.

Budgeting, Funding, and Acquisition

Over the last quarter century, numerous acquisition reform initiatives have been implemented in an effort to extract greater effectiveness and efficiency from the Federal acquisition system. Interestingly, while such initiatives have made a positive difference, uniformly positive results have not been achieved across the board.¹¹⁷

—Dominique Myers

Why is that? It is because reforms have not gone far enough. “One difference (among many) between a *real* business and the Department of Defense (related to the total cost of ownership) is that business has only one *color of money*, while the Department of Defense has many.”¹¹⁸ Within a weapon system program, there are several pots of money: Research, Development, Test and Evaluation (3600), Operations and Maintenance (O&M) (3400), Production (3010), Equipment (3080). Within those divisions, there are further divisions: Materiel Support Division, Repairable Support Division, and fly and nonfly O&M. On top of that, DLA is funded separately. It takes 3600, 3010, 3400, and sometimes 3080 funding to effect a modification, and if there is not enough left in any one of the pots, it will not happen effectively or efficiently and sometimes not at all.¹¹⁹

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To properly develop, field, and support weapon systems and modernization of weapon systems, we must have sufficient funding in all the pots of money.

Additionally, “because of different accounting rules and since every controlling interest jealously guards its *pot* from other DoD interests, scoring total savings...is difficult at best.”¹²⁰ We need financial flexibility approaching that enjoyed by the private sector to be more effective and efficient.

Typically, the wings and squadrons get the flying-hour dollars needed to provide aircrew training and support operational missions, but the nonfly O&M side is underfunded and so are the various pots at the depot that are used for procurement, repair, and recapitalization.¹²¹ On the average, Air Force aircraft are funded at 44 percent of sustaining engineering requirements. Some mission/design/series are funded at as little as 30 percent, so the big picture is that the Air Force currently is operating a 6,200-aircraft fleet on a budget that only can support 4,300 aircraft.¹²² When a flying-hour program is 100 percent funded and the necessary support activities are funded at less than 100 percent, there will always be a need to prioritize scarce resources and manage risk. However, by doing this, we mortgage the future because what some see as optional are *must pay* bills, if you desire long-term O&S cost savings. To properly develop, field, and support weapon systems and modernization of weapon systems, we must have sufficient funding in all the pots of money. Our lessons learned as an air force tell us this. As illustrated with the case of F100-PW-229 modifications, sufficient funding may not ensure a fleet-wide improvement when two different program offices control the purse strings and have different priorities.

A lack of funds delays routine technical order changes, causing maintenance problems in the field. Some O&S costs may not be properly captured because sources of supply list items for IMPAC (International Merchant Purchase Agreement Card) procurement by field units. Program offices opt to skip validation and verification of TCTOs and get MAJCOMs to waive labor requirements and support field purchase of parts that should be kitted and provided by the program manager as part of the TCTO. Some program managers succumb to the pressures of managing cost, schedule, and performance and opt to field systems and capabilities without required support equipment. A case in point is the recent fielding of the Joint Direct Attack Munitions at Kunsan AB and Osan AB, Korea, without y-stands. Both bases ended up having to pay for the stands *out of hide* and locally manufacturing them vice the program office’s procuring and providing the assets with 3080 funds. The Navy also needs “additional funding for testing, engineering, acquisition, and logistical support.”¹²³ These are all symptoms of an inflexible and underfunded planning, program, and budgeting system (PPBS). The problems driving this are threefold:

- Faced with resource limitations, we make too many things priority one.¹²⁴
- Our public laws and Federal acquisition regulations hamper efforts to achieve supply chain integration. They are not conducive to

developing long-term relationships between DoD entities and contractors in that the requirement for full and open competition is required for all items that do not have sufficient justification for sole source procurement.¹²⁵

- “...the Pentagon must anticipate its needs as much as 30 months before money is to be spent. And the military, which spends \$42M an hour, is forbidden to shift \$15M from one account to another without getting permission from four to six congressional committees.”¹²⁶

These things must change if we are to achieve long-term O&S transformation and cost savings. If not, the alternative is to prioritize and limit operations to what can be supported.¹²⁷

In 1994, Darleen Druyan, Principal Deputy Assistant Secretary of Air Force for Acquisition and Management, launched 11 *lightning bolt* initiatives aimed at streamlining the Air Force acquisition processes.¹²⁸ The Air Force *lightning bolt* initiative achieved results in short order. However, service acquisition reform initiatives cannot be expected to remedy inefficient Federal acquisition processes, so reforms must take place in both arenas for true transformation.¹²⁹ Major service and Federal acquisition reforms, like the *lightning bolts* of 1994, are necessary if we are to reap the desired outcomes of supply chain management and the Air Force Spares campaign, decrease O&S costs, and maximize availability of our aging aircraft.

In a February 2003 report by the Office of the Deputy Under Secretary of Defense (Industrial Policy), a recommendation was made that the Department of Defense restructure its R&D and acquisition planning, programming, and budgeting processes.¹³⁰ The report also specifically cites current processes as a hindrance to the “DoD’s ability to effectively leverage limited financial resources for an optimal mix between emerging and legacy defense systems.”¹³¹ The Air Force’s recent consolidation of program executive officer positions, elimination of designated acquisition commander positions, and addition of operations officer positions at product centers, under Air Force Instruction (AFIT) 63-101, are the most recent efforts to streamline the acquisition process.¹³² Yet, more changes are needed. Congress must take action to reform PPBS to make substantial gains toward true transformation. Congress does not have to sacrifice control over the Department of Defense to do this, but members of Congress will need to put aside parochial interests for the greater good of the nation, or we will never achieve the flexibility needed to truly transform. Secretary of Defense Donald Rumsfeld summed up the situation best when he said, “We have an industrial-age organization to fight information-age wars.... We must have legislative relief.”¹³³

Technology, Training, and Equipment

A short-term solution is used to correct a problem, with seemingly positive, immediate results. As this correction is used more and more, more fundamental and long-term corrective measures are used less

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Breaking out of the death spiral will require rethinking how we use technology.

*and less. Over time, the capability for the fundamental solution may atrophy or become disabled, leading to even greater reliance on the symptomatic solution.*¹³⁴

—Peter M. Senge, PhD

Breaking out of the death spiral will require rethinking how we use technology. In the past, defense primarily sought technological advances that improved the operational capabilities of weapon systems.¹³⁵ However, “in those cases where technology insertion has been implemented, it usually has been by individual subsystem upgrades, a *bits and pieces* approach” bearing “the entire development and implementation cost by itself.”¹³⁶ In most cases, the nonrecurring costs are prohibitive, and the remainder must compete with fleet maintenance costs and other modernization efforts for limited resources.¹³⁷ “Probably the most important thing the Department of Defense can do to improve and develop innovative technologies is to provide robust funding.”¹³⁸ This was a top 12 concern recently identified by the DoD’s JAAC.¹³⁹ It is beyond the scope of this work, but more detailed research needs to be done on this topic.

Training and education are keys to ensuring we successfully conquer the challenges associated with an aging aircraft fleet. If the workforce is not trained and educated about the challenges and processes associated with ensuring aircraft safety, capability, and availability, we cannot expect it to be effective or efficient with respect to providing solutions and support. The goal of the Air Force force development initiative is “getting the right people in the right job at the right time with the right skills to fight and win.”¹⁴⁰ To meet its goal, the initiative must ensure the workforce is properly trained and educated so it is adequately prepared to deal with the challenges of supporting the aging fleet. For the initiative to do so, there are a few specific issues that we need to ensure it addresses.

Just as obsolescence affects weapon systems, it can also affect the workforce supporting the weapon systems if the training and education is not providing the people the skills needed to do the job correctly and to completion.¹⁴¹ Transformation of logistics processes necessitates funds be made available to train DoD military and civilian personnel on how to operate new information technology systems and software associated with the transformation for the changes to be effective.¹⁴²

A recent example of technical obsolescence is our experience with the field modification of the AN/ALQ-131 electronic countermeasures pods to incorporate reprogrammable low-band capability at Kunsan AB in 2002. The TCTO was validated and verified by a depot field team at Nellis AFB, Nevada; however, because of funding limitations, the team did not check out the pod operationally before redeploying to depot. The result was that troubleshooting necessary during post-modification testing was ill-defined and a modification sold as requiring on the order of 50 man-hours per pod was taking 90-150 man-hours per pod because of a lack of troubleshooting procedures and experience. Had it not been for the

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experience of some of our seasoned noncommissioned officers and the skill of our Air Force Engineering and Technical Services representative, the TCTO could not have been performed as directed. What happens when we issue depot-level TCTOs to field units and rely on field units to accomplish the task without training? Is that experience always there, or are we making assumptions? Who is accountable if something goes wrong?

Very early in the 1990s, we changed the aircraft maintenance officer technical training school course from a 5-month prerequisite course to a 3-month temporary duty course new maintenance officers would attend in the early stages of their first duty assignment. Was this the right thing to do considering these young leaders have a direct impact on flight safety issues? We would not send people to a fighter wing to fly without first having them graduate from undergraduate pilot training. Why do we have to augment the Air Education and Training Command maintenance officer course with a combat wing maintenance officer course?¹⁴³ Is this still a good approach to indoctrinating our new maintenance officers, considering the ever-increasing age of our aircraft fleet?

Hand in hand with the problem of educating maintenance officers is the education and experience level of production superintendents (pro supers). The pro supers are supposed to be on-the-scene production experts who keep our aircraft safe to fly. Before the post-Cold War drawdown, we had experienced and seasoned senior noncommissioned officers filling these crucial positions. As a result of the drawdown, we saw many folks get promoted *early* to staff sergeant, then to technical sergeant, and some of them are the master and senior master sergeants who are filling the senior production roles in field maintenance organizations

To ensure pro supers were educated properly, ACC created a pro super training course. However, attendance was dependent on operational tempo, leadership support, and temporary duty travel funds availability. This lack of experience and education contributed to the readiness problems the 355th Fighter Wing at Davis-Monthan, Arizona, faced during the summer of 2003.¹⁴⁴ Twenty-two pro supers had not yet attended the ACC pro super training course. This affected the readiness of the 20-plus year-old A-10 weapon systems at Davis-Monthan. A special effort had to be made to get the training made available at that location.¹⁴⁵ Senior leadership needs to commit to ensuring people are properly trained before they are put into positions affecting flight safety and readiness of aging weapon systems.

The weapon system supply chain managers at the depots need to have the right level of training and authority to do the job described by Alexander, et al, for implementation of supply chain management concepts to be effective.¹⁴⁶ Sutterfield's experience at SA-ALC (1993-1996) was that training for civil service employees in nonengineering positions was the first thing cut when funding was insufficient to sustain operations. This did the warfighters a disservice because item managers (and others) were not getting trained on the systems they used to support field units. This had a direct, negative impact on field support. Martin, recently stated:

Hand in hand with the problem of educating maintenance officers is the education and experience level of production superintendents.

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Technology, training, and equipment must be funded and managed properly to ensure effective support to the aging aircraft fleet.

I've got to pay attention to the proper development of the force. The people we have serving us need to get out of the Air Force Materiel Command. They need to get out of the acquisition chain and go out into the operational Air Force in a planned way so they can be connected to their military counterparts and understand the difficulties that those people deal with every day.¹⁴⁷

However, personnel still will need formal training on information and equipment they use and maintain, and that requires time and money.

Efforts to develop and field standardized, interoperable support equipment will enhance combat capability through reduced deployment footprints, decreased aircraft turnaround times, and decreased support equipment maintenance costs. One such Air Force program is the Modular Aircraft Support System for the F-22 and joint strike fighter.¹⁴⁸ Such efforts should be joint to realize their full potential. Aging of support equipment also should be addressed to ascertain end-to-end solutions.

Technology, training, and equipment must be funded and managed properly to ensure effective support to the aging aircraft fleet. Program managers fielding new capabilities need to ensure they provide the field and depot the tools, equipment, and parts needed to perform the TCTO and support that new capability. MAJCOM staffs must ensure the program managers meet their obligations to both the field and depot. Technology improves system availability and capability, which, in turn, improves our ability to fly, fight, and win, but it must be supportable. Finally, proper training and education of support personnel in the field, at depots, and at DLA is essential to making processes effective and efficient. Training and education is an investment we must make to ensure personnel develop specialized skills needed to perform their duties. We must recognize there are limits to the ability to properly educate and train support personnel via on-the-job training. All trainers are not created equal in terms of their ability and experience, obsolescence, and the operational and personnel tempo demands to get the job done without delay. The bottom line is, are we willing to make the investments in technology, training, and equipment necessary to ensure support personnel can be more efficient and effective?

Conclusions and Recommendations

Our senior leaders must recognize that incremental ideas focusing on evolutionary change must be linked to and work in concert with quantum ideas that are revolutionary or transformational in order to achieve a breakthrough.¹⁴⁹

—Noel M. Tichy

Conclusions and recommendations on how to address specific challenges associated with aging aircraft are prescriptive will take superior leadership, commitment and teamwork to ensure they are implemented before the first F-35 is fielded in FY08. The unstable reliability historically experienced with the fielding of new systems such as the F/A-22 and F-35, combined with the addition of two unique airframe and engine

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configurations to an already diverse fleet, will add pressure to an ever-increasing O&S account. We have missed our window of opportunity to put solutions in the field before fielding of the F/A-22. We must act now to ensure we transform the many processes and policies discussed here before the F-35 is fielded, or we may face even more daunting challenges 4-10 years from now.

Raymond Pyles of RAND stated in testimony to Congress, “It may appear that these issues will not reach crisis proportions for many years. However, the problem is extensive, complex, and susceptible to surprises. Long-term solutions will require considerable time to develop and implement.”¹⁵⁰ And according to JAAC Chairman Bob Ernst, “It’s not just technology.... If we don’t fix our training and other logistics support elements as well, we’re not going to really be able to get our hands around the aging issue.”¹⁵¹

We have to ask ourselves if we can afford to wait any longer for transformation of the supportability and acquisition policies and processes that support O&S activities and contribute to their costs. Reorganizations cannot compensate for continued reliance on inefficient processes supported by stovepiped, stand-alone legacy systems, and policies that hamper acquisition. “The problem that many companies face is that they spend too much time on incremental ideas, and nobody ever steps back to look at the big picture.”¹⁵² Are we too busy working single issues to see the big picture? The picture is a lot bigger than most would care to make it. Incremental changes have only limited value, and if we continue to pursue them without a quantum idea (that is, transformation) to hang them on, we may experience a train wreck as the F-35 is fielded and works its way through the bathtub curve of reliability to maturity. Our choices today will determine whether we enjoy success through transformation tomorrow or end up in a costly train wreck. The train wreck will take the form of significantly degraded aircraft availability or failure of a particular mission. Part of the solution to the aircraft support problem must be network centric—a system of systems.

The problems we have today are grounded in what we did yesterday. So, as a part of the solution, the Air Force must work to address and *prevent* aging aircraft problems. Incomplete LCC models that lacked fidelity with respect to O&S costs need to be refined to capture those costs. We must encourage industry to develop new technologies through R&D programs. We must invest in the testing necessary to develop more accurate R&M data to get more accurate LCC predictions. We must understand that if we design a system for a 20-year service life and fly it beyond that time, O&S costs most likely will increase. A reliability-centered maintenance concept may attenuate the increase but cannot eliminate it. It also must be understood that changes in usage can accelerate aircraft maturity significantly, which will drive O&S costs up and increase the need for modernization earlier in the weapon system’s life cycle. Accelerated usage caused by operations tempo may cause O&S costs to increase earlier in a weapon system’s service life.

Reorganizations cannot compensate for continued reliance on inefficient processes supported by stovepiped, stand-alone legacy systems, and policies that hamper acquisition.

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Reorganizations are of limited value if the new organizations lack the resources and training necessary to achieve the levels of efficiency we desire.

While efforts to make program managers responsible for systems from cradle to grave is admirable, it must be remembered that most program managers only lead their programs for a couple of years. Unless senior leaders focus on something other than cost, schedule, and performance, we will continue to field systems that require a lot of attention at both the beginning and end of their service lives in order to get the reliability and maintainability we expected to begin with.

The law of supply and demand affects acquisition and O&S costs. In today's post-Cold War environment, with DoD being such a small portion of private sector business, we can expect to pay more for smaller quantities of noncommercial standard items that are not produced in large quantities for the commercial and private sector. The law of supply and demand also dictates that a large, diverse fleet, made up of small quantities of aircraft by type, will cost more than a homogeneous population. Configuration control and change management are absolutely vital to controlling costs. We need to ensure the force structure is what it needs to be and program managers are fulfilling their obligations with respect to configuration control and change management.

The root of the real solution lies in growing the budgeting and obligating authority (OA) to fully support O&S and modernization costs of an aging and diverse fleet and a revolution in military affairs to achieve economies in processes and organization. It is not a cheap solution, but it may be the only option we have for ensuring the light at the end of the tunnel is not a train. If we cannot grow the budget and obligating authority, maybe Dorr's approach is the best—kill the F/A-22 in order to recapitalize.¹⁵³ Do we have other options that will not mortgage the future?

Reorganizations are of limited value if the new organizations lack the resources and training necessary to achieve the levels of efficiency we desire. Twelve years after the end of the Cold War and numerous reorganizations later, can we expect to achieve more efficiency through reorganizing again in the near future? The good news is that there are alternatives; the bad news is that they are not easy to do because they will require monetary investment and policy changes.

What about the importance of information technology to supportability with respect to effectiveness, efficiency, and optimizing system availability? The urgency of the fleet aging issue should make it clear that we must make replacement of legacy information systems with enterprise systems a priority so we can provide optimum weapon system availability, efficiently and effectively, without further delay. Can we incrementally solve the information system problem, or do we need to build the entire replacement system at once? Can we and should we approach a solution independently of the other services and DLA? Solving the information technology support problem will require tough choices.

We need an enterprise information technology system, encompassing all supportability functions, to achieve the greater levels of efficiency. We need to move from legacy information technology systems to an enterprise system before FY08. To continue to use legacy systems that

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were designed to support a resource-abundant military complex that no longer exists is inefficient at best. The Fleet Viability Board should advocate the effort, and the Aging Aircraft SPO should oversee the efforts of the Logistics Information SPO to ensure it gets the resources and support needed to transform supportability to an enterprise system.

Further streamlining of acquisition policies is necessary to enable us to enjoy the efficiencies and benefits associated with supply chain management. Although the Air Force began acquisition reform efforts in 1994 and the DoD continues to make changes today, reforms must continue if we are to achieve Agile Combat Support and Focused Logistics goals.

PPBS also must be reformed now. It is a legacy system that has outlived its utility as an effective and efficient financial management system. The goal of PPBS reformation should be to give the Services the flexibility to more effectively use monetary resources to optimize combat capability by using research and development, production, and modernization. The PPBS systems and products (or their replacements) need to take on the flexible character and strategic focus of financial systems used by large commercial businesses. This flexibility needs to flow to the Services and on to the depots and DLA to optimize efficiency and effectiveness.

The DoD must proactively plan and work to ensure continued access to strategic raw materials we rely on in the manufacture and repair of high-technology weapon systems. The DoD must do this by working closely with the Department of State while continuing to pursue development of technologies, permitting the reuse, recovery, and recycling of strategic raw materials. We must have the authority to develop relationships with commercial manufacturers to give us leverage when competing with the private sector's demand for strategic raw materials, like titanium, and for unique manufacturing processes. We also should work to decrease reliance on foreign sources through technologies, permitting the use of domestically available materials.

We need to ensure technology, training, and equipment issues are integrated into an all-encompassing game plan aimed at conquering the challenges of aging aircraft. Fostering development of new technologies through robust R&D funding has the potential to provide cross-cutting system enhancements and may even provide off-the-shelf solutions to technical surprises.

Are we investing enough in education and training for our maintenance and support personnel? Are they given the training at the right time in their careers? We must have people with the appropriate qualifications in positions critical to weapon system support and maintenance and provide them training. It must be understood that as new capabilities, information technology applications, and management philosophies, such as supply chain management, are implemented that new training requirements are created, and they need to be satisfied to ensure success. Training funds must be made available and protected. Development and fielding of interoperable support equipment has the potential to reduce the logistics footprint and reduce O&S costs.

We must have the authority to develop relationships with commercial manufacturers to give us leverage when competing with the private sector's demand for strategic raw materials, like titanium, and for unique manufacturing processes.

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Unity of effort, elimination of any duplication of effort, advocacy for programs and policy changes on Capitol Hill, and proper prioritization and use of resources are needed to ensure success.

Establishment of the JAAC to oversee aging aircraft efforts is possibly a step in the right direction toward avoiding stovepiped and fragmented solutions. The challenges associated with aging aircraft are common to the Air Force, Navy, Coast Guard, and DLA, so unity of effort is necessary to avoid duplication and gain efficiency. However, in addition to the JAAC's existence, the Secretary of Defense should ensure unity of the efforts of the Services and DLA. Unity of effort, elimination of any duplication of effort, advocacy for programs and policy changes on Capitol Hill, and proper prioritization and use of resources are needed to ensure success. DoD-level goals should be established to ensure implementation of the recommendations made in this study by the time the first F-35 is fielded in FY08.

Keith Johnson, high school band director and National Music Educator Lifetime Achievement Award winner—said, “A trumpet section is only as good as its last chair player.” Which aspect of the aging aircraft issue is to be the *last chair player* (for example, weakest link)? Does there have to be a *last chair player* in a nation as powerful and prosperous as ours? Can America support increased military spending now if it understands the consequences of not making the investment? What inefficiencies and levels of risk are we willing to accept, and how will they affect the availability and performance of our aging aircraft fleet?

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The Themes of US Military Logistics

From a historical perspective, ten major themes stand out in modern US military logistics.¹

- The tendency to neglect logistics in peacetime and expand hastily to respond to military situations or conflict.
- The increasing importance of logistics in terms of strategy and tactics. Since the turn of the century, logistical considerations increasingly have dominated both the formulation and execution of strategy and tactics.
- The growth in both complexity and scale of logistics in the 20th century. Rapid advances in technology and the speed and lethality associated with modern warfare have increased both the complexity and scale of logistics support.
- The need for cooperative logistics to support allied or coalition warfare. Virtually every war involving US forces since World War I has involved providing or, in some cases, receiving logistics support from allies or coalition partners. In peacetime, there has been an increasing reliance on host-nation support and burden sharing.
- Increasing specialization in logistics. The demands of modern warfare have increased the level of specialization among support forces.
- The growing tooth-to-tail ratio and logistics footprint issues associated with modern warfare. Modern, complex, mechanized, and technologically sophisticated military forces, capable of operating in every conceivable worldwide environment, require that a significant portion, if not the majority of it, be dedicated to providing logistics support to a relatively small operational component. At odds with this is the need to reduce the logistics footprint in order to achieve the rapid project of military power.
- The increasing number of civilians needed to provide adequate logistics support to military forces. Two subthemes dominate this area: first, unlike the first half of the 20th century, less reliance on the use of uniformed military logistics personnel and, second, the increasing importance of civilians in senior management positions.
- The centralization of logistics planning functions and a parallel effort to increase efficiency by organizing along functional rather than commodity lines.
- The application of civilian business processes and just-in-time delivery principles, coupled with the elimination of large stocks of spares.
- Competitive sourcing and privatization initiatives that replace traditional military logistics support with support from the private business sector.

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Lieutenant Colonel Douglas E. Fick, USAF

Absorption of new pilots into the Air Force has been a challenge for rated officer assignment personnel and is perhaps the primary driving factor toward integrating active and ARC units.

Path to Integration

Past, Present, and Potential Future of Integrating Reserve and Active Flying Units

Introduction

It's (transformation) happening today here, at Robins AFB [Georgia]. In the future, when other bases and other wings attempt to implement a Future Total Force initiative, those who follow will measure their success against the "Robins Model."¹

—Dr James Roche, Secretary of the Air Force

Dr Roche spoke these words to the men and women of the 116th Bomb Wing and 93^d Air Control Wing (ACW) to mark the end of their units as separate reserve and active organizations. The two wings integrated into the 116th Air Control Wing with a makeup consisting of both active and reserve members. This event was significant in that it was the latest in a series of attempts by the Air Force to merge elements of the active and reserve components. With a year of experience behind it, the Robins Model will be used as a roadmap to integrate other units.¹



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Causes of absorption mismatches are many and date back to the post-Vietnam era.

Early attempts at integration met with failure, resulting in nearly a decade's passing before any effort in this area was made again. The two components will meet the vision of Future Total Force only through a strong long-term commitment throughout the Air Force and Air Reserve Component (ARC).

The Absorption Issue

Absorption of new pilots into the Air Force has been a challenge for rated officer assignment personnel and is perhaps the primary driving factor toward integrating active and ARC units. According to Air Force Instruction (AFI) 11-412, "Absorption is the number of inexperienced crewmembers who can be assigned to a major weapon system per year."² Before delving into the complexities of the absorption problem and why the ARC provides assistance toward resolution, it may be beneficial to use an analogy to get an initial concept of absorption. In one aspect, an operational active component squadron can be viewed much like a factory. It takes in raw material (new inexperienced pilots not yet experienced in the applicable aircraft) and produces a product (the same pilot now seasoned and fully mission capable in the aircraft). The Air Force then uses the seasoned pilots to continue the training process or fill staff positions where their flying knowledge is critical.

Tools are required to perform this task. At its most basic, those tools are instructor pilots, other experienced pilots, and aircraft sorties. When the system is balanced, there is the right flow of new pilots to match the availability of instructors for initial training missions, the right mix of experienced pilots, and the capability to generate needed sorties. Problems arise when any one of the tools is insufficient.

Mismatches occur when there are too many inexperienced pilots or there are not enough instructors and experienced pilots. When this happens, inexperienced pilots do not have adequate access to tools to receive training on a consistent basis. This spreads out the process of seasoning, thus slowing the absorption of new pilots into the ranks of both experienced and instructor pilots. Compounding the problem even more is that flying is a perishable skill. Skill building must be done on a regular basis, or skills learned previously tend to erode. This further slows the Air Force's ability to season new pilots.

Causes of absorption mismatches are many and date back to the post-Vietnam era. In 1982, Master Sergeant Ed Martins, writing for the *Air Reservist*, wrote:

It's called an absorption problem. The Air Force does not have enough cockpits to train properly all the pilots coming into its flying units. They come from pilot training, instructor duty, and mission support areas. Putting these pilots into a limited number of cockpits would drive the experience mix toward unacceptably low levels.³

Pamela Kane, writing for the *National Guard Magazine* in 1981 stated:

In the early 1980s, the problems were fueled by the fact that many experienced pilots opted for the airlines or the Air National Guard (ANG) and Air Force

Reserve after the Vietnam conflict. Since the Vietnam drawdown, the need for active-duty pilots has diminished greatly. No war, no demand. Or so were the thoughts of the American public, which pressured Congress to limit military budgets. At the same time, the experienced pilots, like other well-trained servicemen, left the active Air Force and sought civilian pilot positions and the Air National Guard.⁴

The post-Vietnam era saw absorption challenges not only in experience loss but also in total number of sorties available. The situation did not improve in the 1990s.

With the dissolution of the Soviet Union, America's military force structure was addressed. It was believed the end of the Cold War would allow for a peace dividend, freeing up dollars by reducing military spending. During the 1990s, three separate review programs were implemented in an attempt to size the military for what was believed to be the level of threat for the start of the next century.

The first program of the 1990s ran from 1990 until 1993; this review process was called Base Force.⁵ The Air Force's principal aim throughout the Base Force initiative was to preserve its modernization and acquisition programs. Accordingly, early in the process of defining the Base Force, Air Force leaders accepted the fact that the Air Force's force structure would be reduced and, therefore, focused on shaping the ultimate force levels. The Base Force also necessitated a reduction in active manpower for the Air Force to approximately 436,400 by fiscal year (FY) 1997 (a 20.3-percent decline compared with FY90 levels) and a reduction in reserve end strength to some 200,500 (a 21.6-percent decline).⁶ The Air Force was willing to forego the force structure to keep highly trained people and fund future capabilities. The planned net result is shown in Table 1.⁷

The actual reduction closely matched the above figures. Active tactical fighter wings went from 24 to 16.1, and reserve fighter wings dropped from 12 to 11.5.⁸ It is likely this force would have been sufficient for future needs except for one unanticipated development—contingency operations. The RAND study, from which the data in Table 1 are pulled, states:

One of the Base Force's key premises—that the post-Cold War world would not be occasioned by large-scale, long-duration contingency operations—was cast in doubt by the post-Gulf War stationing of Air Force tactical fighter and other aircraft in Southwest Asia: a commitment that, despite predictions to the contrary, would remain through the end of the decade.⁹

The decision to cut the force structure, along with increased deployments, resulted in the same units and pilots being tasked constantly with contingency operations, reducing *training opportunities* and negatively impacting quality of life. The absorption equation did not improve in the mid-1990s with implementation of the Bottom-up Review (BUR).

The BUR was conducted in 1993 with the intent of accelerating and surpassing the force structure reductions planned under Base Force, increasing the total reduction from 25 percent to 33 percent. Additionally:

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The largest ongoing Air Force commitments, the ones causing greatest turbulence, continued to be associated with US operations in Southwest Asia and the Balkans.

The BUR redefined the meaning of engagement in an important way, giving increased rhetorical and policy importance to US participation in multilateral peace and humanitarian operations while setting the stage for an increased operational tempo and rate of deployment even as force reductions continued.¹⁰

Once again, the incompatible goals of increased operational tempo and force reduction would continue stresses initiated by the Base Force drawdown. Political decisions to keep a strong overseas presence saw slightly more than 40 percent of Air Force tactical fighter wings deployed outside the continental United States. The Navy successfully argued that deploying more than 25 percent of its carriers was not sustainable while maintaining adequate readiness levels and, thus, kept a relatively higher number of operational flying units than the Air Force. The Air Force did not press the case that, as with the Navy carriers, overseas presence needs and support to contingencies should be considered in determining the number of tactical fighter wings in the force structure.¹¹ If such an argument had been made successfully, the resulting increases in force structure would have eased the strain of limited time to train and a reduced personnel tempo. Given the fiscal constraints of a hard top line of \$250B for defense during the period, it is doubtful as to whether the argument would have fallen on willing ears.

The 1997 Quadrennial Defense Review (QDR) was the third and final attempt in the decade to bring strategy, forces, and resources into alignment. In many ways, the QDR and BUR were similar in limitations and objectives. The QDR was faced with the same top-line defense budget of \$250B; competing for these dollars were ongoing modernization efforts, continuing heavy deployment schedules, and eroding force readiness issues.¹² Additionally, while the BUR strategy was one of engagement and enlargement, the QDR strategy elements of shaping and responding had the same practical effect on Air Force units: they relied heavily on forward presence and crisis response capabilities. Both were concerned with ensuring near-term stability in regions of vital interest. The largest ongoing Air Force commitments, the ones causing greatest turbulence, continued to be associated with US operations in Southwest Asia and the Balkans.¹³

The QDR continued the trend toward end-strength reductions, but to a much lesser extent than either Base Force or BUR.

While Table 2 shows the Air Force drawing down from 372,000 toward a QDR goal of 339,000, most of the downsizing was from aggressive, competitive outsourcing (25,400).¹⁴ While manpower reductions were modest during the QDR, the real impact continued to be operational tempo and readiness issues.

By February 1998, the Chairman of the Joint Chiefs of Staff, General Henry Shelton, in testimony before the Senate Armed Services Committee, described an emerging picture of readiness problems driven by a high operational tempo and wrote:

There is no question that more frequent deployments affect readiness. We are beginning to see anecdotal evidence of readiness issues in some units,

particularly at the tactical level of operations. At the operational and strategic levels, however, we remain capable of conducting operations across the spectrum of conflict."¹⁵

Within the Air Force, the impact is best summarized by the following 5 May 1998 background briefing on military readiness:

As we go into '99, our concerns that continue with us in the Air Force are the tempo—we're at a very high tempo. The Air Force transition[ed] from a Cold War force of fairly good size, equivalent to about 36 fighter wings. We've reduced our force structure and completed that by about a third. We reduced our overseas force structure by about two-thirds. At the same time, our

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The net result of the 1990's strategy and budget decisions is that since FY97 the loss rate for pilots reaching the end of their initial active-duty service commitment has averaged close to 70 percent.

Service and Major Forces	FY90	FY97	Change
Army			
Army divisions	28	20	-8
Active	18	12	-6
Reserve	10	8	-2
Navy			
Aircraft carriers	15	12	-3
Active	13	11	-2
Reserve	2	1	-1
Battle force ships	546	451	95
Air Force			
Tactical fighter wings	36	26	-10
Active	24	15	-9
Reserve	12	11	-1
Strategic bombers	268	180	-88
Manpower (thousands)			
Active military	2,070	1,626	-444
Reserve military	1,128	920	-208
Civilian	1,073	904	-169
Total	4,271	3,450	-821

Table 1. Planned Base Force Changes to Force Structure and Manpower FY 90-97

	1988 Estimate	1999 Projection	2003 Projection	QDR Goal
Army	488	480	480	480
Navy	387	373	369	369
USMC	173	172	172	172
Air Force	372	371	344	339
Total Active	1,420	1,396	1,365	1,360
Selected Reserves	886	877	837	835
Total Civilians	770	747	672	640

Table 2. Planned DoD Personnel End-Strength Levels FY98-03 (in thousands)

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The Air Force is looking to increase retention rates of experienced pilots.

contingency-tasking operations have increased by a factor of four. That drives tempo. [T]he aging aircraft that I mentioned. We're concerned about that, as it continues on because of [the] need to replace not only parts but also engines and other expensive items to keep that fleet going as we move into our modernization period. We're right now forecasting about an 1,800 pilot shortfall by '02. That's from a baseline of about 14,200 on our requirement. . . . I would like to be able to say [that it's as bad as it's going to get on retention of pilots and other [personnel]], but I don't think we're going to get better.¹⁶

The net result of the 1990's strategy and budget decisions is that since FY97 the loss rate for pilots who are reaching the end of their initial active-duty service commitment has averaged close to 70 percent, the highest rate ever, except in periods of demobilization or drawdown. Also unprecedented is the loss rate for pilots who have reached their 15th year of service but are not yet eligible for retirement.¹⁷ The combined effect since FY97 is three pilots have left active duty for every two new pilots that the Air Force has trained.¹⁸ Pilots in these brackets are the experienced core of an operational unit; such an experience drain drastically slows the ability to season inexperienced pilots entering the unit. One solution the Air Force adopted was increasing the active-duty service commitment from 8 to 10 years, starting in FY97, but the net result will not take effect until 2007. The upward trend after 2007 is based solely on the Air Force's assessment that the 10-year commitment will have a positive impact on retention since those pilots will have from 11 to 13 years of total service before being eligible for separation. This would put retirement benefits only 7 or 8 years in the future for these pilots, making them more likely to finish a 20-year career to realize the benefits (Figure 1).

There are two major areas of concern that the pilot shortage causes. The first is the absorption equation; not enough experienced pilots are staying in to train the next generation of aviators. The second area of concern is filling key staff positions. The largest ongoing Air Force commitments, the ones causing greatest turbulence, continued to be

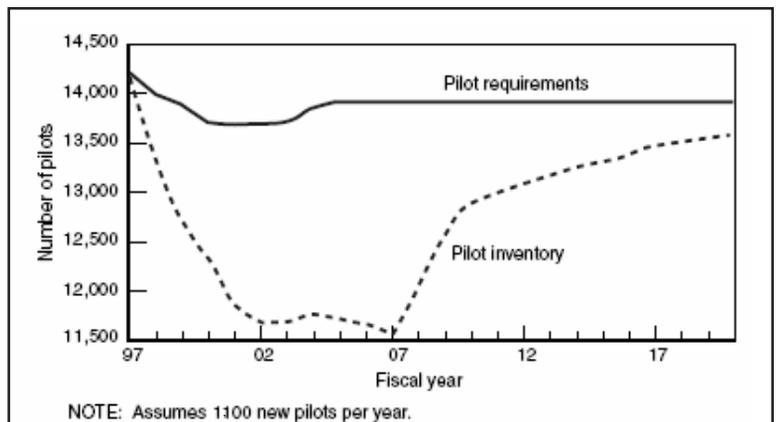


Figure 1. Pilot Requirements Versus Pilot Inventory²³

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associated with US operations in Southwest Asia and the Balkans—it cannot do both.²⁰ Because the absorption equation folds back on itself—production of experienced pilots becomes the tool for the next generation of training; the longer the lack of experienced pilots exists, the worse the situation becomes. As the RAND study states, it becomes a slippery slope with ever-decreasing experience levels in operational squadrons.²¹ Currently, the production rate is 330 pilots per year. This rate likely will take operational units into training circumstances where large numbers of assigned mission pilots are decertified from combat-ready status, pilots average too few sorties per month, and the training available to inexperienced pilots is inadequate. To support the needs of the Air Force, total training output must increase to 382 pilots per year.²² The Air Force has several other options to reverse this downward trend.

First, the Air Force could try to increase the number of sorties flown by operational units. More sorties would increase the training capacity of operational units, allowing more opportunities for inexperienced pilots to get consistent training. Training capacity is a function of two elements, the number of aircraft a unit has (primary aircraft authorization [PAA]) and how often each aircraft can be flown over a given period (utilization [UTE] rate). Increasing the PAA is prohibitively expensive; any aircraft purchased would compete directly for dollars with modernization efforts (such as the F-22 and F-35). Increasing UTE rates also poses problems. These issues include funding additional flying hours, maintenance manning to support the extra flights, parts supply problems, and aircraft age.²³ Additionally, without increasing the number of experienced pilots, the additional sorties would force the current pilots to fly more often. The ability to fly experienced pilots on extra sorties per month is limited by available flying days and required duties outside of flying, further limiting the utility of increasing the UTE rate.

The next option to balance the absorption equation is to decrease the number of incoming new pilots. While this will bring an operational squadron back into balance (training tools are equal to training requirements), it ignores the long-term pilot needs of the Air Force and is not sustainable for any extended period.²⁴

Third, the Air Force is looking to increase retention rates of experienced pilots. The Air Force will need to overcome factors such as the large pay disparity between military and commercial flying, the negative effects of multiple deployments, frequent moves, family turmoil, and other quality-of-life issues.²⁵ With the current downturn in airline hiring, caused by the economic slowdown after 11 September 2001, there is a temporary lull in job opportunities in the civilian sector. This will provide temporary attrition relief, but long-term market effects likely will return to pre-9/11 conditions.²⁶ Success in this area would have the greatest impact on absorption and overall pilot manning in the Air Force, but historically, finding a strategy for success has been elusive, as low pilot bonus take rates during the late 1990s have shown.

More cockpits and experienced mentors were needed, and the Air Force looked to the ARC for help.

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Comparisons between the mishap rates of the various Air Force components often are used as a yardstick of the level of professionalism and training within the component.

The last option is total force absorption. Unlike active component operational squadrons, which only bring in inexperienced pilots, reserve component squadrons have two sources for reaching pilot manning levels: inexperienced pilot applicants sent to pilot training by the reserve unit and recruiting experienced pilots from the active duty. Active component squadrons strive for a 65-percent experience level (a level last encountered in 1996)²⁷ but typically see rates in the 50-percent range. ARC squadrons quite often see 90 percent of their squadron experienced. For our absorption equation, a squadron with a 90-percent experience rate has the ability to absorb and train inexperienced pilots as long as the sorties are there to support the effort. This fact was not lost on the Air Force, and in 1981, the Air Force, Air Force Reserves, and ANG entered a program called Project Season.

Project Season

During the peak of the Vietnam conflict, Air Training Command was producing more than 3,000 pilots annually. In the post-Vietnam era, that number dropped dramatically; by 1978, less than 1,000 pilots were being trained each year. As the 1980s began, a serious pilot shortage had developed. The Air Force responded by increasing pilot production to 1,900 by 1981. This surge of inexperienced pilots into an active component operational squadron had the net effect of dropping experience rates to between 30 percent and 70 percent. With such low experience rates, the new pilots could not be absorbed into the system. More cockpits and experienced mentors were needed, and the Air Force looked to the ARC for help.²⁸

The ARC had two factors that made this a winning situation for both active duty and reserve. First, at the same time that the Air Force was looking to place inexperienced aviators with the ANG and the Air Force Reserve Command for seasoning, ARC was experiencing vacancies in pilot manning. The traditional source of manning for these units was from the pool of prior service pilots; by the early 1980s, this pool had dwindled because of years of low Air Force output. While ARC units were allowed to send a limited number of selected applicants through the Air Force training program, there were few slots available. Additionally, the long training cycle, from initial selection until completion of basic pilot training (typically 2 years or more), meant the flow would not be adequate to keep up with attrition (retirements and separations). Second, the experience rates in the ARC remained very high, allowing them to absorb inexperienced Air Force aviators without seriously impacting unit experience levels.²⁹

Out of these complementary goals, Project Season was developed as a 7-year training cycle, running from 1981 through 1987. Beginning in FY81, active-duty inexperienced pilots started seasoning with ARC units, and eventually, approximately 200 pilots would fly with the Guard. The program ran through FY87 when the last of these pilots returned to active-duty units, and the ARC-selected applicants (now qualified as inexperienced pilots) returned to the ARC unit to replace the active-duty pilots.³⁰

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Despite the initial win-win perception of Project Season, several factors quickly soured the program. During this timeframe, Lieutenant General Jon B. Conaway, USAF, Retired, was chief of the National Guard Bureau and director of the ANG. He made several observations regarding Project Season. The first was that the program came with no flying hours or maintenance support for the additional sorties required to train the inexperienced aviators. Additional training sorties were not a factor in units that were undermanned; excess sortie capacity existed in these situations. However, not all units that took Air Force inexperienced pilots were undermanned. They either had to reallocate sorties among the pilots or ask the National Guard Bureau for more flying hours. They then had to task their maintenance organizations to generate more sorties to meet the increased demand (without additional maintenance manpower from the Air Force to support flying the inexperienced Air Force pilots).

In addition, the Air Force charged any mishaps caused by Project Season active-duty pilots against the ARC with which they were flying. Comparisons between the mishap rates of the various Air Force components often are used as a yardstick of the level of professionalism and training within the component. With a much smaller total flying-hour pool, being charged with even one or two additional mishaps could have political consequences because of an elevated mishap rate. Conaway did not view either of these issues as showstoppers; the components dealt with them on a case-by-case basis.³¹ The critical factor came about when it was time for the Project Season pilots to return to the Air Force. Dr William W. Taylor of the RAND organization made the following observation:

A primary difficulty with the previous Project Season initiative was the result of the short (5- or 6-year) active-duty service commitment that the participating pilots incurred. When coupled with a liberal Palace Chase policy that was also in effect at the time, this made most of the pilots eligible to affiliate with the Guard or Reserve when they finished their initial operational flying tour. The young pilots who favorably impressed their Guard (or Reserve) unit leaders were heavily recruited to leave active duty and remain in the same unit. Conversely, the participating pilots who did not perform well during this initial operational tour were certain to return to an active unit because their Guard or Reserve unit was unwilling to keep them (even if they wanted to affiliate and were eligible to do so). This situation could have generated a negative performance bias in the group who stayed on active duty—a disproportionate share of them failed to distinguish themselves during their initial operational tour, whereas pilots who performed well were likely to respond to encouragement and separate from active duty.³²

There were several reasons why Project Season pilots left active duty in such large numbers. First, ARC offered lower deployment rates and the ability to homestead in one location. A typical active-duty fighter pilot career would consist of permanent changes of station once every 2 to 3 years and at least one remote unaccompanied tour. For many families, the ability to live a more stable life without multiple moves and extended separation was very attractive. Second, the major airlines started a large hiring spurt during the 1980s. Many Project Season pilots seized the

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opportunity to separate from the Air Force, gain a commercial pilot job, and then use part-time employment in the ARC as an income supplement during their initial, low-paying years with the airline. A program that started out with much promise ended up with the unofficial moniker of Project Treason.³³ The failure occurred partly because of bad timing but more so because the Air Force failed to understand the economic and lifestyle dynamics that came into play. Because of the failure of Project Season, it would be more than a decade before the Air Force would attempt another integration effort with the ARC.

Total Force Absorption Program

In 1999, 12 years after the failed Project Season program closed, the four-star Rated Summit (RS 99) again addressed the absorption issue. The Total Force Absorption Program (TFAP) initiative had (and continues to have) the ARC absorbing 50 active-duty pilots per year with 30 of them going to fighter units. Two key factors had changed that allowed the Air Force to make another attempt: 10-year commitments and the end of the Palace Chase program. The 10-year service commitment introduced in 1997, along with limiting when TFAP pilots are allowed to fly with the ARC, ensures these pilots have at least 3 years of service commitment to the Air Force prior to separation eligibility. By the time of separation eligibility, these pilots typically will have between 12 and 13 years of total time accumulated toward retirement. The Air Force views this as a strong incentive to remain with the active-duty Air Force since separating to the ARC most often means delaying retirement benefits until age 60.³⁴ Another key provision was to provide a TFAP concept for oversight, to include a mechanism that ensures participants are linked to active-duty units throughout their assignments with the ARC.³⁵ Although not explicitly stated, this linkage provision was likely the result of lessons learned from Project Season; lack of oversight during Project Season was blamed, in part, for the high number of pilots that left active duty for the ARC. Lack of mentoring about active-duty advantages and career opportunities, combined with easy separation options, were, at least partially, responsible for the Project Treason syndrome.

Within TFAP, there are two categories of pilots authorized to participate with ARC units: INEX pilots are on first operational flying assignments, and LIMEX pilots have completed mission qualification training but have not yet accumulated the hours required to be declared experienced.³⁶ In practice, INEX fighter pilots are not participating; only active-duty pilots who already have completed a minimum of 18 months of training (and often after their full initial 3-year operational tour) are sent to ARC units.³⁷

These pilots often achieve experienced status early in their ARC tour, minimizing the full absorption bonus that sending INEX pilots to ARC would give. Sending INEX pilots would maximize the effects of both absorption and ARC experience levels; by sending LIMEX pilots to the ARC, the Air Force is addressing a different issue than absorption. In addition to the absorption problem, active-duty units were finding

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themselves in a situation where INEX pilots and instructor pilots who were training them flew the vast majority of missions available to the unit. This left the LIMEX pilots with few sorties, and those that were flown often were adversary support for the INEX instructor pilot missions. Both quantity and quality of training were deficient, extending the amount of time it took the LIMEX pilots to reach fully experienced status and instructor status. Again, the problem was feeding on itself by slowing the whole aging process of fighter pilots; TFAP is seen as a way to work around the issue.

The Air Force put in place a linkage between TFAP pilots and an active-duty unit. In practice, these pilots still have limited contact on a once-per-quarter basis with the officer (usually an active-duty squadron flight commander) who writes their appraisal. TFAP pilots are supposed to fly with their active-duty unit to expose them to active-duty operational tactics, techniques, and procedures. In reality, often the ARC aircraft the TFAP pilot flies is of a different design block than the assigned active-duty aircraft; TFAP pilots cannot fly with their active-duty units because of block differences. If there is a mismatch between the ARC and active-duty missions, special compartmentalized security issues may even prevent the TFAP pilot from participating in mission planning and debriefing.

The TFAP concept of operations solution is to have a two ship of ARC aircraft (with an ARC supervisor pilot and the TFAP pilot) deploy to the active-duty unit.³⁸ This two ship would fly with the active-duty squadron, allowing the active-duty supervisor to evaluate the progress of the TFAP flyer. Unfortunately, no active-duty funding backs this concept. This author dealt with exactly this situation; deploying a two ship (with maintenance support) twice a year was cost-prohibitive, competing directly with other unit deployments and training schools. Additionally, while deployed, the impact to home-station flying has to be factored in. Less aircraft at the ARC unit during the week means less ability to meet the planned flying schedule. The other option is to have the active-duty supervisor deploy to and fly with the ARC unit.

One final long-term issue will bear watching. The linkage to active duty during the TFAP pilot's time with the ARC has been spotty at best. If this lack of visibility translates into lower promotion rates and less lucrative follow-on assignments, as compared to the same age group that remained with active-duty units, the integrated assignments to ARC components will come to be viewed as career-limiting choices. Such a view would have negative implications for the many other total force programs currently being implemented or proposed for future implementation.

Fighter Associate Program

The Fighter Associate Program (FAP) continues the concept of greater integration between the Air Force and Air Force Reserve (AFR) that began with TFAP. Although initially an arrangement between only the Air Force and Air Force Reserve, the program is set to include Air National Guard (ANG) units in the near future. There are several differences between TFAP

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The reserve associate program offers ARC pilots the opportunity to understand current active-duty challenges.

and FAP. The Fighter Associate Program brings the focus back to absorption, and the program, for the first time, sees aviators from the reserve component flying with active-duty squadrons, in addition to sending active-duty flyers to reserve units. The Fighter Associate Program continues to develop the way administrative control (ADCON) issues will be resolved; successfully setting the ADCON framework will be crucial to plans involving even larger scale integration between active-duty and ARC forces.

As of August 2003, the Fighter Associate Program entered the hiring phase for AFR personnel.³⁹ Under the Fighter Associate Program, there will be two types of programs: one will have reserve personnel participating in active-duty units; this part of the Fighter Associate Program will be known as reserve associate; programs where active-duty personnel participate with reserve units will be known as active associate units. One full-time support aviator from the ARC and three traditional reservist pilots will be assigned to reserve associate units. An active-duty base may have more than one such reserve associate unit (one per squadron).⁴⁰ In addition to aviators, the Fighter Associate Program, for the first time, introduces the concept of blending in AFR maintenance personnel. A maintenance unit will consist of two full-time support and four traditional reservists per squadron. The concept has two benefits. First, the extra maintenance manpower will generate the extra sorties required to support four additional pilots flying with the squadron. Second, AFR maintenance personnel tend to have higher qualifications than their active-duty counterparts, for much the same reasons that exist on the pilot side. The AFR recruits from maintenance personnel separating from the active-duty system capture many highly experienced maintainers. Additionally, the AFR Air Reserve Technician retirement system keeps personnel until the age of 56 (or older). The net effect is very experienced maintenance personnel. By blending AFR maintainers with active-duty maintainers, an experience transfer pays dividends, both short and long term, for the active duty. The Air Force Reserve Command will select the reserve associate pilots. The goal is to hire experienced instructor pilots to have an immediate impact on the absorption equation (Table 3).

Active Associate	Reserve Associate	Reserve Maintenance
Hill AFB, Utah	Hill AFB	Shaw AFB (2)
Homestead AFB, Florida	Eglin AFB, Florida	Eglin AFB
NAS Fort Worth, Texas	Nellis AFB, Nevada	Langley AFB
NAS New Orleans, Louisiana	Langley AFB, Virginia	
Whiteman AFB, Missouri	Shaw AFB, South Carolina (2)	

Table 3. Active and Reserve Associate Locations

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One experienced instructor pilot, along with one or two additional INEX pilots, will be assigned to active associate units. The experienced instructor pilot will act as both supervisor and mentor for the assigned INEX active-duty pilots.⁴¹ By reestablishing as an active-duty direct link, the Air Force is better positioned to prevent the issues seen during Project Season. The combined effect of the reserve and active associate units will leverage absorption capability. If there is a mismatch between the ARC and active-duty missions, special compartmentalized security issues may prevent the TFAP pilot from participating in mission planning and debriefing. Once the program expands to include the ANG, absorbing 382 pilots per year starts to become a reachable goal.

The FAP memorandum of agreement goes on to lay out the basics of ADCON, financial management, and status of resources and training reporting. With each integration effort, the Air Force and ARC are putting more thought into the critical components that make the program viable for long-term sustainment. Long-term sustainment will depend on how pilots who participate in the program are treated as they return to their parent component.

The FAP concept of operations sets standards concerning personnel actions to address this concern; pilots returning to active duty will receive ops-to-ops assignments and Squadron Officer School College slots at the same rate as active-duty pilots assigned to active-duty squadrons. This is a start, but there are historical examples that point to the validity of the *out of sight, out of mind* adage. For years, ARC squadrons have received rated active-duty lieutenant colonels to act as Air Force liaison officers between the ARC unit and the Air Force. In general, promotion rates for these officers have been very low, and the tour has been considered a retirement assignment. If active-duty experienced instructor pilots who participate in the active associate program have the same fate, a valuable opportunity will be missed. Instead of developing future active-duty leaders with a strong understanding of the ARC strengths and weaknesses, the active associate program will be either a dumping ground for pilots looking for one last flying tour prior to retiring or a place for the Air Force to put pilots it does not consider promotable. It will take strong program buy-in at the Air Combat Command plans and programs level, and that buy-in will need to be consistent through leadership changes until the program is fully integrated.

Reserve associate pilots will face a similar challenge. They will be out of the day-to-day operations at their home ARC unit for up to 3 years. If higher level leadership positions are not made available at an equitable rate, the program will not draw the type of pilots who would best serve the ARC and active duty. The reserve associate program offers ARC pilots the opportunity to understand current active-duty challenges. The ARC will realize the benefit of this understanding only if it sends its potential leaders to participate in the reserve associate program.

With each integration effort, the Air Force and ARC are putting more thought into the critical components that make the program viable for long-term sustainment.

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As a major employer of state citizens (with a large number of them registered voters), ANG units tend to have close affiliations with their elected representatives.

Base Realignment and Closure

The progression from Project Season through TFAP and FAP shows an ever-evolving vision of what the future total force will look like. The 2005 Base Realignment and Closure (BRAC) Commission will play a large part in shaping the Future Total Force concept. The 2005 BRAC Commission is likely to make deep infrastructure cuts, compelling the Air Force and ARC to match the remaining basing options against their training and operational commitments.

Various forms of BRAC have a long history, dating back to the early 20th century when Secretary of War Henry Stimson sought to consolidate his widely dispersed and inefficient army.⁴² Consolidation continues into the present era. There have been four recent BRAC commissions—1988, 1991, 1993, and 1995. In total, these commissions have reduced the Air Force infrastructure by approximately 20 percent.⁴³ After a 10-year hiatus, BRAC will be back in force in 2005. Secretary of Defense Donald Rumsfeld has stated that BRAC 2005 will cut as much surplus as the previous four rounds combined, to include at least 25 percent of its remaining real estate.⁴⁴ President George W. Bush's FY02 budget blueprint agrees with this level of reduction, indicating a 23-percent excess infrastructure in the Department of Defense and that new rounds of base closures will be necessary to shape the military more efficiently.⁴⁵

With the prospects of the mother of all BRACs looming, the National Guard Bureau is assessing future options. Brigadier General David Brubaker, deputy director of the Air National Guard, presented a BRAC 2005 briefing to the Adjutant Generals Association of the United States on 23 and 24 September 2003. Brubaker is the ANG representative on the Base Closure Executive Group; as such, he is the only ANG member to vote on closure issues. He has stated that with the potential depth of cuts in BRAC 2005 he does not foresee a scenario where the BRAC will spare ANG facilities. In his view, there may be force structure cuts reducing the bottom-line number of ANG people. In the past, the ANG has protected personnel by moving them within states, but this may not be an option this time. The ANG has units spread over every state, many states having multiple units with the same or similar missions. The scenario is ripe for both closure and realignment to optimize both infrastructure and force structure requirements.

The ANG has several options available to meet the challenges of BRAC 2005. The ANG Director, Lieutenant General Daniel James III, is looking to consolidate geographically separated units, collocate flying units and units with similar missions within the state, and blend base operation support by positioning ANG units onto active-duty bases, as well as having active-duty elements blend into ANG units.⁴⁶ Although James spoke in terms of the ANG, his statements apply equally to the Air Force Reserve since the scenario is similar but on a smaller scale.

James' third option of integration between active-duty and ARC components actually began with the integration of the 116th Bomb Wing and 93^d at Robins AFB in September 2002.

Robins and Beyond

In June 2001, Rumsfeld announced a reduction in the B-1 fleet to 60 aircraft. The plan was to relocate B-1s from the Georgia ANG at Robins AFB to Dyess AFB, Texas, and Ellsworth AFB, South Dakota. No follow-on mission was proposed for the Georgia ANG. What Rumsfeld had not considered was the strong congressional intervention that resulted. ANG units have strong state ties. As a major employer of state citizens (with a large number of them registered voters), ANG units tend to have close affiliations with their elected representatives. In the end, a General Accounting Office study was conducted to examine solutions other than eliminating 1,172 full- and part-time military positions in Georgia.

The result was the inactivation of the 116th Bomb Wing (Georgia ANG) and 93^d (active duty) and activation of the 116th Air Control Wing as a total force blended unit.⁴⁷ The 116th is the most aggressive attempt at active component and reserve component integration to date. One year into integration efforts, Colonel Bob Doehling, commander of the 116th, laid out many of the challenges facing total force integration.

Under United States Code, Title 10 (Armed Forces) and Title 32 (National Guard), commanders are not one and the same. The law regarding the Title 10 versus Title 32 chain of command is being addressed. In the near future, it is likely that a single designated commander will have administrative control across both titles, but for now, a Title 10 commander does not have administrative authority (appraisals, disciplinary action, and so forth) over Title 32 personnel. The same applies for a Title 32 commander and Title 10 personnel. This forced a situation in which the wing had dual tracks of administrative control. The wing commander administered to Title 32 personnel, and a separate chain of authority ran from the Title 10 vice wing commander to the Title 10 personnel. Coalition leadership at the national level often is difficult (Operations Desert Storm, Allied Force, and Iraqi Freedom are good examples of compromise coalition partnerships). Coalition leadership within a single military organization easily can create schisms with the potential to tear a unit apart.

One integration proposal put forth by the Virginia ANG would bypass this problem altogether. Several reasons led to the efforts of the Virginia unit to integrate with the 1st Fighter Wing at Langley AFB as it converts to the F/A-22. For much the same reasons that the Air Force elected to move Robins B-1s, high infrastructure costs associated with the F/A-22 (training facilities and specialized stealth maintenance equipment) make farming the F/A-22 out as individual squadrons cost prohibitive. Therefore, the Air Force is looking to locate F/A-22s at a small number of large bases to take advantages of economy of scale. Additionally, as James pointed out, as BRAC reduces the current fighter force by approximately 33 percent, properly positioned ANG units need to look at integration or face a loss of mission. Integration of Richmond and Langley would free up Richmond's 18 F-16s, fueling further integration efforts within the tactical air force.⁴⁸

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The Air Force is looking to locate F/A-22s at a small number of large bases to take advantages of economy of scale.

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Dealing with a younger workforce initially will be a challenge for reserve component commanders.

Although still in the early concept phase, Virginia would look to integrate by moving its entire operations group and maintenance group to Langley (without bringing any aircraft). Once there, they would divide approximately 32 pilots, 180 full-time maintainers, and 240 traditional ANG maintainers between the three active-duty squadrons and operate under the 1st Fighter Wing as an associate unit. This integration would increase the crew ratio from 1.25 to 1.50. This increase in crew ratio is essential to maintaining the likely high-operations tempo of the F/A-22, while taking advantage of the experience base of the reserve component unit. Administrative control would still fall to the Virginia operations group. By keeping administrative control within the reserve component, the two separate systems would function without some of the concerns mentioned above. As of this writing, it was uncertain what leadership positions within the three active component squadrons (both flying and maintenance) or at the wing-level reserve component personnel would hold, if any. As a major employer of state citizens (with a large number of them registered voters), ANG units tend to have close affiliations with their elected representatives. During a briefing at the Air War College, General John P. Jumper expressed concern along these lines when he indicated that preserving an ANG unit's identity as it associated with a larger Air Force wing was a major consideration to be worked out as total force develops.

The next issue to be resolved will deal with how best to mix leadership coming from very diverse backgrounds with very different career progressions when an integration model like Robins is carried out. With careers often extending until 56 years of age, ANG officers (and senior enlisted personnel) tend to hold jobs for much longer than their active-duty counterparts. At the highest levels, it is not atypical for an ANG commander to hold the position for 4 or more years; Air Force commanders rotate through positions at a much faster rate before either retiring or progressing into the higher ranks available across the Air Force. If an integrated wing has an ANG commander, there are two options. The first is to leave the ANG officer in command until follow-on positions open up or retirement. The disadvantage in this scenario is that there is no opportunity for leadership positions for active-duty officers. This would act as a strong disincentive to accept an integrated assignment for active-duty personnel. The second option is to rotate the ANG officer out of the command billet commensurate with active-duty rates. Unlike the Air Force, an ANG unit has few positions that such an officer can flow into. Most likely, the officer will be forced to accept a position of lower responsibility (often in the same unit because of Air Force specialty code constraints) or retire. Within the Title 32 technician system, an early retirement is not an option. A situation would then exist where an active-duty commander would have a former commander working for him. This scenario could have adverse effects on the order and discipline within the unit. A simplistic answer would be that there is only one commander as designated by legal orders, but human nature suggests many situations where singularity of

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command would be eroded. This erosion need not be through deliberate action and may be as innocent as unit members still perceiving the authority of the former commander as intact.

Another option is to designate either the active component or reserve component as the lead in any integrated wing. As the designated lead, that component would fill the commander positions, and the follow-on component would contribute lower ranking members to the mix, so career progression is not affected. While a viable option, this only works when the reserve component acts as lead at a reserve component facility. The Air Force would have the option to flow officers in the rank of major and below and enlisted personnel of staff sergeant and below through a tour with the reserve component unit before continuing their higher rank career progression within the active component. This would take advantage of the reserve component experience level and seasoning opportunities. If the active component were designated as the lead, reserve component personnel would be locked out of any integrated command positions. In this scenario, few options would exist within the state for follow-on leadership positions. Reserve component personnel would have limited career opportunities.

Since the lead-follow concept does not apply equally to both the active component and reserve component, it may not find favor except in scenarios where it can be applied on a small scale. The Fighter Associate Program (both active associate and reserve associate) is a good example where lead-follow works since both active component and reserve component pilots can flow back to their parent organization for follow-on assignments. When large-scale integration is anticipated, force management will become crucial. A *move after next* progression needs to be considered before installing a reserve component commander, vice commander, or even shop chief. Without having a viable 2-to-3 year follow-on position (or planned retirement), leadership opportunities could be unfairly denied to active component members.

Another issue that Robins must deal with is the demands of a low-density/high-demand (LD/HD) platform. The Joint Surveillance Target Attack Radar System has continuous missions around the globe and a high operational and personnel tempo to match. One of the historical recruiting attractions of the ANG has been limited deployments compared to the active duty. If ANG unit members (both full time and traditional) are tasked to deploy at rates approaching the Air Force, will recruiting suffer? It is still too early to determine long-term trends, but the incompatibility of civilian employment and constant military deployments are sure to take a toll on traditional members. To counter this eventuality, a larger ratio of full-time ANG members may be required. If that is the case, most of the traditional cost benefits of reserve component versus active component units will be lost. Even with additional full-time positions, a strong economy could make recruiting sufficient reserve component personnel difficult as potential recruits (both initial recruits and separating military) find job opportunities without the constant family separation that LD/HD missions require.

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The reserve component brings in new members, but these junior members tend to be traditional guardsmen for several years prior to competing for full-time positions. Dealing with a younger workforce initially will be a challenge for reserve component commanders.

Doehling’s briefing included a useful summary of the differences between the active-duty and ANG culture.⁴⁹ As Table 4 shows, an area that reserve component units traditionally have not had to contend with (on anything but a limited basis) is the relative youth of the active-duty members. The reserve component brings in new members, but these junior members tend to be traditional guardsmen for several years prior to competing for full-time positions. The net result is an older, more mature full-time force with only limited exposure (typically on drill weekends and deployments) to relatively young personnel. As Doehling points out, the ANG has few disciplinary issues in comparison to their active-duty brethren. Dealing with a younger workforce initially will be a challenge for reserve component commanders. Additionally, if integration occurs at a reserve component base, these young people may not have facilities typically provided on Air Force bases. The list includes commissaries, base exchanges, gyms, and housing. The increased costs associated with living off a local economy may be beyond the reach of junior enlisted members. Two solutions exist. First, limit integrated tours to more senior noncommissioned officers (NCO). The downside is that the reserve component level of experience would not be available to those who would benefit the most. The second option is to provide additional allowances to bridge the gap and either add or expand existing facilities located at reserve component bases to handle increased demands. Formal versus casual unit atmosphere is also a concern. Long-term working relationships are typical in the reserve component because of the length of careers and lack of permanent changes of station. This leads to a more informal working environment. Additionally, the Association of Civil Technicians acts as

Active Duty Culture	Air National Guard Culture
More formal unit atmosphere.	More casual unit atmosphere.
Significant number of disciplinary actions.	Few disciplinary actions.
Large group of underage personnel.	Rarely have underage personnel.
Dormitory living for single junior enlisted.	No one has to live in government quarters.
No UMD slot required for promotion.	Must hold UMD position to promote.
Frequent PCS enhances career.	No PCS likely during career.
EPRs responsibility growth in accordance with rank.	APRs emphasize potential for growth.
Primary worker is SSgt or below.	WG/WL employees are primary workers.
TSgts are supervisors not workers.	WG/WL worker frequently is a MSgt.
SMSgts are not assigned at shop level.	SMSgt assigned at shop level.
Nightshift supervised by junior ranks.	Nightshift supervision same as day.
Officers are primary supervisors.	Enlisted are primary supervisors.
Rank overages do not affect promotions.	Rank overages not authorized.
Excess personnel do not affect promotions.	Excess personnel affect promotions.
Active rank ratio is lower than ANG.	ANG rank ratio is higher than AD.
Separation from Air Force normally slow.	Separation from ANG very quick.

Table 4. Summary of the Differences Between Active-Duty and ANG Culture

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a union and represents nonsupervisory ANG personnel. Working relationships between wing leadership and union leadership can be critical in determining overall productivity and unit harmony. Working through union issues and the formal grievance process will be a cultural shift that active component commanders will need to master quickly. Both reserve component and active component leadership and personnel will have to come to terms with the unique nature of each other's culture for an integrated wing to succeed.

None of these cultural differences is in and of itself a showstopper toward integration. The majority of issues revolve around working the supervisory chain in a fair and equitable manner. The key will be getting the leadership equation right. If both the active component and reserve component provide officers and senior NCOs with leadership growth potential after their integrated tour, then total force integration is likely to succeed. In a decade, a large number of high-level leaders from both components will have intimate working knowledge of their component's strengths and weaknesses. If this occurs, the cultural differences likely will be lessened and the goal of a seamless total force much more probable. If either component fails to provide true leaders and only sends those they consider nonpromotable, then total force integration very well may go the way of Project Season.

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If both the active component and reserve component provide officers and senior NCOs with leadership growth potential after their integrated tour, then total force integration is likely to succeed.

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Logistics and the Warfighter

I think we can all agree that there is a relationship between the function of military logistics and the warfighter. What is that relationship, and is it correctly defined? In the early 1960s, there was a stated relationship between logistics and the weapon systems: military logistics *support* the weapon system. At that time, the subject of military logistics was fairly new and, with little ongoing research, very slow in providing greater understanding about it. Therefore, in that period, this definition of relationship seemed appropriate. It was not until the late 1970s that several advocates of military logistics came to the realization that logistics support of the weapon system was actually creating and sustaining warfighting capability. This warfighting capability was provided to the combat forces in the form of continuing availability of operational weapon systems (the tools of war). This new awareness set up another definition of the relationship: military logistics creates and sustains warfighting capability. While many heard the words, few realized their implications. The level of warfighting capability that logistics provides the combat forces determines the extent to which war can be waged. This, in turn, limits and shapes how the war will be waged. Warfighting capability is embedded in the design of all weapon systems. Advancing technology increases speed, range, maneuverability, ceiling, and firepower, all of which provide more lethal and accurately guided munitions, stealth, and other offensive and defensive warfighting capabilities. They will be embedded into the design of future weapon systems. It is the weapon systems that contain the warfighting capability of military forces. The strength of military forces is no longer measured by the number of men under arms. Today, military forces are measured by the number—and warfighting capabilities—of their weapon systems. The Department of Defense has yet to adequately define and manage the total logistics environment (those activities and resources required to create and sustain a warfighting capability). While it is said that armies travel on their stomachs, what is usually left unsaid is they perform on the basis of their logistics competency. Today, as most of you are aware, we have another, more recently defined relationship: military logistics supports the warfighter. We know military logistics creates and sustains the warfighting capability. We can assume the warfighter fights wars. It would, therefore, seem reasonable to suggest that in order for one to be a warfighter (a pilot in this case) he or she must have the capability to wage war. While weapon systems are designed and created to wage war, people are not. Therefore, to become warfighters, pilots must be provided with some level or amount of warfighting capability. I would submit that by providing the pilot with an operational weapon system, which allows him or her to utilize its warfighting capability, military logistics creates the warfighter. It does not support the warfighter; it creates the warfighter. This transformation occurs when a checked-out pilot starts the engine. At that point, the pilot is in control of the weapon system and its warfighting capability. The pilot is now the warfighter. Without the warfighting capability, which the weapon system provides, a pilot is a pilot. Military logistics creates and sustains the warfighting capability; by doing so, military logistics creates and sustains the warfighter.

Colonel Fred Gluck, USAF, Retired

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Dr Stephen Fought

The Air Force has a history dominated by bomber and fighter aircraft. However, technology finally reached its limit, and aerial refueling was needed to propel combat aircraft beyond the shores of the United States and the limits of forward bases.

Recapitalizing the KC-135 Tanker Force Structure

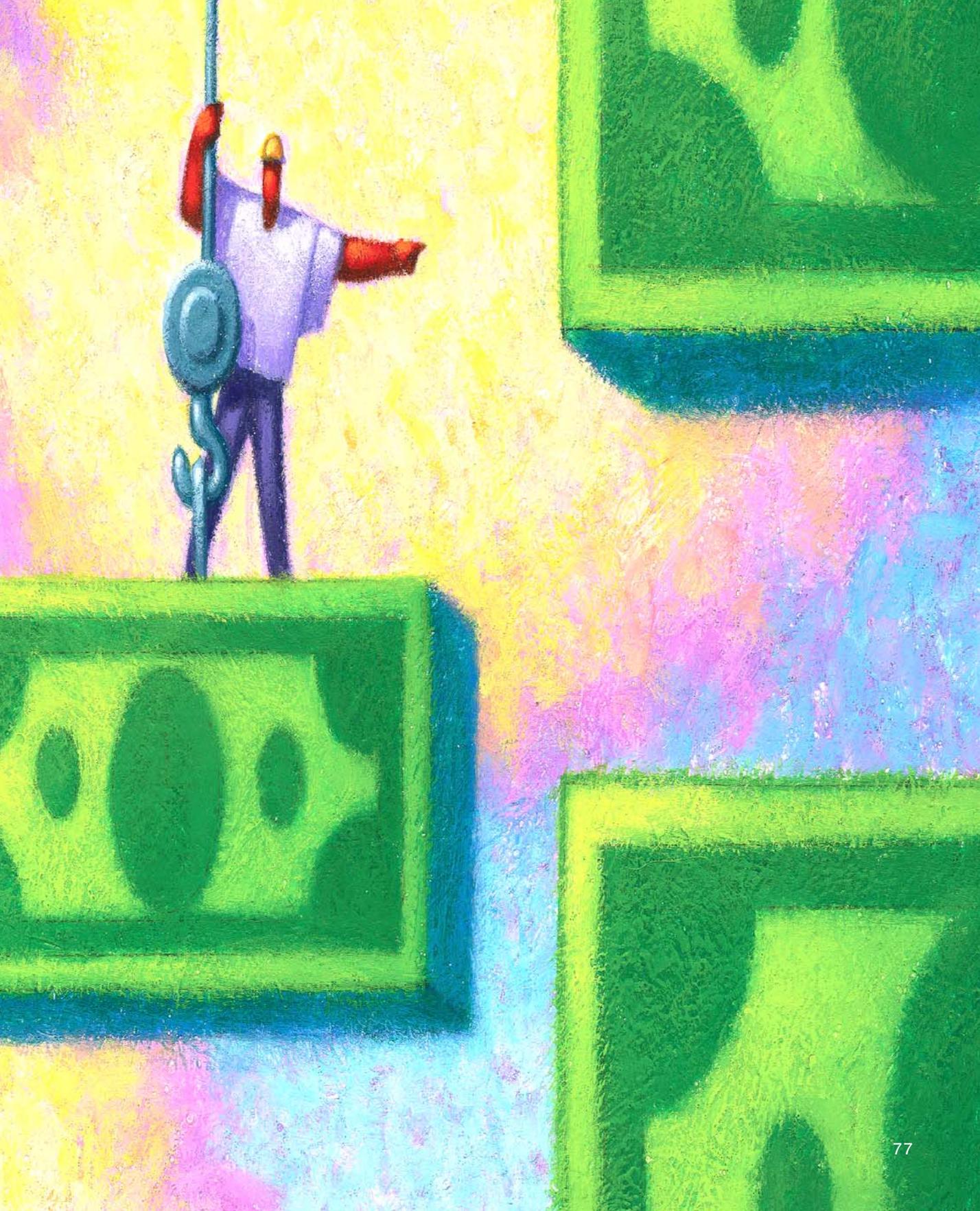
Introduction

The Air Force recognizes the need to begin replacing its large, aging fleet of KC-135s as soon as possible.

—Lieutenant General Stephen B. Plummer, Principal
Deputy, Office of the Assistant Secretary¹

The Air Force has a KC-135 force that is nearly 50 years old, and recent studies show that it is time for the recapitalization of this fleet. The present inventory of aircraft has gone through many upgrades and modifications, but all are still the basic A-model aircraft initially purchased by the Air Force in the late 1950s. The Air Force needs to replace this aged aircraft by designing, from the ground up, a tanker capable of responding to the threat environment of today and into the future.





Recapitalizing the KC-135: Tanker Force Structure

Aerial refueling found its way into Air Force doctrine and became an integral part of the National Military Strategy.

The Air Force has a history dominated by bomber and fighter aircraft. Despite the proven capabilities of aerial refueling during the birth of the Air Force, technology was directed at improving the reach of combat aircraft without regard to tankers. However, technology finally reached its limit, and aerial refueling was needed to propel combat aircraft beyond the shores of the United States and the limits of forward bases.

Aerial refueling found its way into Air Force doctrine and became an integral part of the National Military Strategy. As the national security expanded into more regions and encompassed more missions of vital and national interest, tankers were needed to expand the country's capability into a global strategy. The force structure that emerged was one that was limited by funding, emphasis, and old technology. However, today's Air Force concept of operations (CONOPS) challenges airmen to think differently about the threat of the future and the force structure needed to respond to these threats.

The tanker force structure was built out of old bomber systems and off-the-shelf airline technology. Little to no research and development was needed to build or buy an aircraft that only needed to pass gas to its receiver. While the mission of old only required this simple capability, time quickly outpaced legacy systems. A long-term reliance on old tanker weapon systems has revealed some shortfalls that no longer can be overcome with rebuilds, refurbishments, or replacements. Future trends in warfighting require a capabilities-based tanker, able to survive in today's combat environment, while responding across the full spectrum of operations.

The scope of this research does not look into budget issues associated with the recapitalization or procurement of force structure platforms. It serves as a think piece into the capabilities needed for the replacement of the KC-135. This research challenges the reader to look beyond the platform of the tanker and upgrades that the KC-767 can deliver. The Air Force needs a tanker able to deliver the capabilities that the joint environment requires to operate across the full scale of operations that the future holds. The tanker can no longer serve the Air Force. A newly designed tanker can offer capabilities that will make it a valuable national asset across all the Services.

The Need for Aerial Refueling

National Security Strategy

The National Security Strategy requires the endurance and flexibility that aerial refueling gives to receiver aircraft in order to operate across the entire spectrum of operations required by the National Security Strategy. Aerial refueling gives the United States the ability to respond across the full spectrum of operations, from combating global terrorism to humanitarian actions. Aerial refueling spans the gap between the robust nature of the regional commitment of the National Security Strategy and the limited bases available in the en route structure from which this strategy may be executed. Aerial refueling allows the US vision to become possible

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by using the distant bases, coupled with the global reach of the tanker, to extend to all regions of the world.

President George W. Bush outlined, in the National Security Strategy, a strategy that required the United States to respond to the higher end of the conflict spectrum, which includes conflicts stemming from terrorism and attacks against the United States and its friends.² Operation Enduring Freedom in Afghanistan has proven to be a new challenge for US forces in its fight against terrorism. Operations in the difficult terrain in the mountains surrounding the area of operations have proven to be a haven for fleeing terrorists. Without tanker support to keep fighter aircraft loitering above the battle area, time-sensitive targets easily would get away from an attack package limited by the amount of time they can remain airborne. Likewise, intercept aircraft defending the shores of the United States from attacks by rogue nations or terrorist groups would be unable to maintain a constant vigilance without the extension of their fuel given by orbiting tankers.

Additionally, the National Security Strategy has to respond to the lower end of the spectrum by addressing conflicts that arise from infractions of human dignity.³ US leaders often have worried over the implications in realpolitik when the United States was paralyzed in responding to humanitarian actions, particularly in Bosnia and Somalia. The administration was torn between the atrocities committed in these countries and the bloodshed of US soldiers that might be paid to preserve the peace. Airlift provided the United States the action it needed to maintain its credibility in the international arena, while preventing public deterioration because of casualties.⁴ Moreover, aerial refueling allowed the nation to reach out into these regions with the airlift of supplies, as well as fighter protection.

Finally, the National Security Strategy pledges to work with other nations to defuse regional conflicts.⁵ Each region of the world offers a unique and volatile challenge that will require operations from airlift to strategic attack. In the poverty-stricken continent of Africa, aerial refueling will play a major role in linking the European en route structure with the large geography of the southern countries in Africa. With Lajes, Azores, and Rota, Spain, being the two closest bases in the en route structure, an air bridge of tankers is needed to respond to the region (Figure 1).⁶ The United States already has long-term commitments in Korea and Iraq that require numerous aerial refueling assets to support operations. The National Security Strategy lays out a willingness to respond to Israel and Palestine, India and Pakistan, Indonesia, the Western Hemisphere, and Latin America. Again, with the concentration of the en route structure established along the east coast of Europe and the west coast of Asia, aerial refueling will be an exceedingly needed resource used to employ operations throughout the regions.

Air Force Doctrine

The way the Air Force is able to project power to achieve its National Security Interests is by applying its doctrine of aerial refueling. When

Recapitalizing the KC-135: Tanker Force Structure

The United States has to rely more and more on projecting power from its own shores or by choosing less-than-optimum locations that are farther away from the fight than desired.

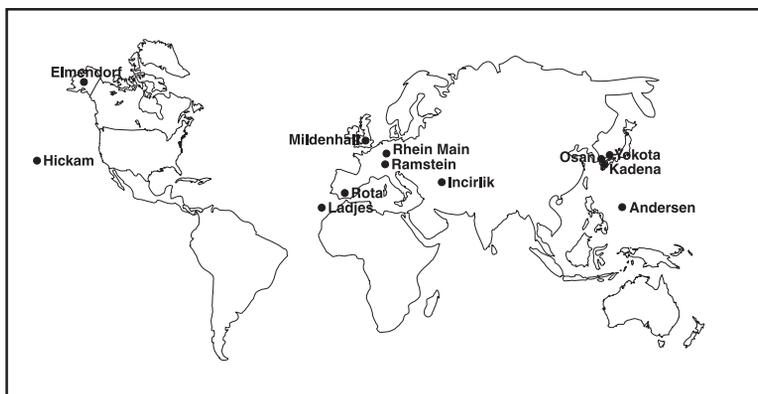


Figure 1. En Route Structure

reading Air Force Doctrine Document (AFDD) 2-6.2 on aerial refueling, one can see the numerous principles of airpower affected by the enabling and enhancing force of the tanker. AFDD outlines aerial refueling and its ability to increase mass, surprise, economy of force, flexibility, versatility, and maneuverability.⁷ Aerial refueling is this enabler and multiplier that AFDD describes, because of its benefits in affecting time, distance, and payload.

In the last decade, the United States has reduced the number of overseas bases that are accessible by heavy aircraft such as tankers. During Desert Storm, two of the six largest bases provided 58 percent of the airlift capability and access, because of the ramp space and runway length capable of handling the heavy weights of Air Mobility Command's (AMC) large aircraft.⁸ These two bases, Torrejon, Spain, and Frankfurt, Germany, have not been used since in the full capacity that they were used during Desert Storm. This reduction not only limits the compatible runways for all of AMC's large aircraft but also causes more aircraft to compete for a smaller pool of available forward operating bases. It is reductions like these, as well as the host nation's denial to access of airfields, that make aerial refueling vital to the Air Force mission. The United States has to rely more and more on projecting power from its own shores or by choosing less-than-optimum locations that are farther away from the fight than desired. However, aerial refueling provides that bridge and allows any US or coalition aerial refueling-compatible aircraft to increase the distance it can fly or the time it may remain on station. Because of this crucial contribution to the US warfighting capability, the country is not considered an island nation bound by its own shores and limited range aircraft.

The second doctrinal impact aerial refueling has is in the ability to increase the payload that receiver aircraft can carry. Because of limitations in thrust, runway length, or aircraft weight, some aircraft are unable to take off with the maximum amount of payload while carrying all the fuel required to accomplish its mission. This sacrifice in payload can mean

less cargo deployed to troops that need supply or kinetic weapons that are relied upon to *kill people and break things* in order to win wars. This means that fighter aircraft may have to sacrifice either the fuel they are carrying and reduce their flexibility by limiting their time over target or their payload and soften the lethal impact that it could have. However, the tanker can allow receiver aircraft to maintain high payloads and make up the difference with fuel by taking on gas in the air.

Moreover, tankers can deliver capabilities beyond AFDD. Recently, General John P. Jumper, Air Force Chief of Staff, outlined how the Air Force will tailor forces and employ them in response to a range of scenarios. Jumper's Task Force CONOPS of Global Strike, Homeland Security, Global Mobility, Space & C4ISR, Global Response, and Nuclear Response are areas in which future tankers should be able to span in order to become the tanker of the future. The next tanker force structure has to leverage its size and loiter time to serve all services a more robust C4ISR, while combining capabilities and doctrine to help the airlift community to deliver global mobility and global response. Additionally, future tankers need to leverage the lethality of combat air forces by increasing global strike capabilities to linger over the battle area with larger payloads. The next tanker cannot just be a replacement for the KC-135. Airmen need to think across doctrine, services, platforms, and organizations to field the next tanker.

History of Aerial Refueling

Pioneers of Aerial Refueling

In 1921, the idea of aerial refueling was born in the minds of daring men willing to brave dangerous aerial demonstrations to please watching crowds gathered below. One of the first recorded aerial refuelings was such a stunt. A lone man named Dougherty crept across the wings of a Lincoln Standard biplane with a 5-gallon gasoline can strapped to his back.⁹ He stepped out onto the awaiting wing of a JN-4 Jenny and poured the contents of his can into the Jenny's tank. History recorded the first aerial refueling of an airborne aircraft. Within the next couple of years, aerial refueling quickly evolved through trial and error. New methods of transfer were tested where hoses were used, instead of wing walkers, to transfer fuel. Endurance records were extended, fuel loads increased, and distance records were broken. However, it all came to a halt with the death of airmen in an aerial demonstration; the refueling hose of the tanker wrapped around the prop of the receiving aircraft.¹⁰ The idea of aerial refueling seemed to die down in the chapters of history. The initial interest The Fighter Associate Program (both active associate and reserve associate) is a good example where lead-follow works since both active component and reserve component pilots can flow back to their parent organization for follow-on assignments shown by the military was not shared by the fledgling airline industry. Commercial flights simply did not require the endurance that aerial refueling could provide to domestic flights. It was not until 1929 that the Air Corps brought back the revolution of aerial refueling and

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grabbed the world's attention; two young officers, Carl Spaatz and Ira Eaker, piloted their monoplane, *The Question Mark*, and smashed all endurance records. The aircraft remained airborne for 150.8 hours.¹¹ The famous demonstration of endurance in aerial refueling caught the attention of proponents of airpower throughout world.

The Early Years

The United States showed the advantages of aerial refueling, and the timing of this aerial refueling capability seemed to give the United States a benefit that could be used in the future. However, as US involvement in World War II came in the early 1940s, aerial refueling would take a backseat to the strategic bomber. The strategic bomber had the endurance required to execute its mission when deployed to the region in which it was used. However, fighter aircraft were still without the required range to escort bombers and fly long-range missions within the theater of operations. The United States had failed to build tankers and transfer receiver capability to the fighter or bomber. It was not until the end of World War II and the emergence of the Soviet Union as the foe for the United States that aerial refueling became the enabler the United States needed. To meet its new global mission to deter the Soviet Union, in 1946, the B-29 was converted into a tanker. B-29 tankers offloaded fuel to B-29 bombers via a hose that was winched from the bomber onto the tanker by a grappling line. By the time the first tanker was born, bombers with higher thrust were being built. Despite the invention of the more efficient flying boom, the KB-29 was unable to keep up with the faster bombers. The KC-97 tanker-transporter evolved from the KB-29 with a more efficient boom system and, more importantly, gave the United States a swing capability to carry cargo. The propeller-driven KC-97 soon found itself outclassed by bombers that were more powerful. The KC-97 had to descend while refueling or *toboggan*, and the later version, the KC-97L, included an extra engine under each wing to provide the KC-97 enough thrust to stay ahead of the receiver aircraft. The older technology of the KC-97 was soon replaced by the jet-powered KC-135.

Tankers of Today

In 1957, the first KC-135 was delivered to the Air Force and became an important part of the Strategic Air Command's strategy. When combined with the B-52 under the Single Integrated Operations Plan, the team could deliver nuclear weapons to the Soviet Union. The KC-135 was tied strictly to the strategic bomber force and was not used to refuel Tactical Air Command's fighter force until the Vietnam conflict. The KC-135 could refuel at higher altitudes and easily keep up with the B-52, enabling them to maintain 24-hour coverage of the sky. The same boom system used on the KC-97 was still in place on the KC-135. Even though the Navy had its own small fleet of tactical tankers, the KC-135 inventory quickly increased and became a readily available asset. The Navy wanted access to the KC-135 as a viable refueler of its fighter force. A drogue or basket was adapted to replace the boom tip while the aircraft was on the ground

to refuel Navy and North Atlantic Treaty Organization (NATO)-type aircraft with a probe-and-drogue refueling system. For the next 25 years, the KC-135 dominated the aerial refueling arena and went through many more evolutions and transitions. More fuel-efficient and quieter engines were installed, portions of the wing were replaced because of metal fatigue, and engine struts were replaced. The KC-135 already was becoming outdated before the first KC-10 reached the Air Force inventory. In 1981, the KC-10 was delivered to the Air Force. The KC-10 was born under the advanced tanker and cargo aircraft idea.¹² The KC-10 would not only be able to carry nearly twice as much fuel as the KC-135 but also could alternate between boom and drogue refueling while airborne. Moreover, the KC-10 provided Military Airlift Command a tremendous boost in its strategic airlift capability. One of the biggest advantages the KC-10 has over the KC-135 is that the KC-10 eventually evolved to a dual drogue system capable of refueling two Navy or NATO fighter aircraft at the same time from its wings. The KC-135 eventually developed a limited number of kits to trail two drogues from its wings. The KC-10 often was used in the reliability tanker role because of the massive amount of fuel it could carry and its ability to refuel all type aircraft regardless of its refueling system. Presently, the Air Force has not seen a new tanker since the delivery of the KC-10 more than 20 years ago and has a fleet that is nearly 50 years old.

Shortfalls

En Route Structure

The international en route structure that tankers are required to operate in does not provide an endless number of options when it comes to selecting airfields in which to deploy assets. Every country varies in the infrastructure it can afford to build or maintain. In many cases, nations rely on an antiquated airfield designed for World War II era aircraft. The runway either is unable to handle the weight of large tanker and cargo aircraft or the length of the runway is not able to afford these heavy aircraft the distance needed to build up speed to take off in the required length at the desired weights. Likewise, the countries that do have the capability to support tankers may limit their access because of disagreements in military use of their airfields or the top priority they put on commerce producing commercial-type aircraft. These limitations in the en route structure highlight limitations in the US tanker force that need to be addressed in the development of the tanker force structure.

With the current runway requirements for tanker aircraft as the limiting factor, the number of bases available within the en route structure is limited. The high tanker weights required to carry enough fuel to the battle often exceed the capability of many runways to handle the stress of the added weight. As in the case of air operations in Kosovo, US forces had to rely on an old NATO and former Warsaw Pact en route structure designed for much lighter fighter aircraft and were unable to use the numerous bases that were available. Major General Roger Brady noted that the number of bases close

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to combat operations and available to tankers were not readily available.¹³ Moreover, the United States does not control the development or suitability of another nation's airfield infrastructure. The few bases that the United States does maintain and that contribute to the economic hardship of modernizing are not available in enough numbers to accommodate the large expeditionary packages that the Air Force is accustomed to deploying. Until the time comes when alternative fuel sources or lighter composite materials are used widely in the aviation industry, tankers will have to learn to live with this problem for some time. However, runway limitations because of weight restrictions have not proven to be a sole limiting factor. The weight of an aircraft severely affects the amount of runway that is required. The length of the runway required to become airborne can limit access to airports to all but a few overpowered aircraft. In the future, the only airports readily available may be in austere locations.

Airline-type aircraft rarely are expected to operate in austere locations where support and airfield infrastructure are a problem. When they do reach out to these lightly serviced areas, they do so with smaller aircraft capable of operating on limited-length runways. The larger airline-type aircraft enjoy the luxury of modern international airports fully equipped with all the amenities afforded the high commerce demands of airborne transportation and do not have an incentive to operate on less-than-normal runway lengths. However, US tankers designed on airline prototypes or slightly modified versions, such as the KC-135 and KC-10, have to gain access to any airfield that brings them closer to the fight. The NATO standard 8,000-foot runway is not adequate for fully loaded KC-135s and KC-10s. Because of their heritage to the airline industry, tankers are stricken with the same runway requirements as the airline industry. This is just one example where commercial off-the-shelf aircraft are hindered by the requirements set by the civilian industry rather than military requirements. The development of the Boeing 767 seems to address the disparity between civilian and military specifications on runway length capabilities and does allow access to 2,000 more airfields because of reduced runway requirements.¹⁴ Nevertheless, it still does not give tankers the capability to land at unprepared or austere runways such as the military-driven requirements of the C-17.

Boom-Cycle Time

The problem of boom-cycle time or the rate in which a tanker can offload fuel to multiple receivers is a problem that has been with the tanker force since its inception. Despite the amount of fuel that tankers can carry, with only one boom, tankers only can offload a set amount of fuel within any given time. Limitations set by single-port refueling can reduce the flexibility of the entire force and the time required to respond to fleeting targets that are becoming more prevalent in a new threat environment.

Anytime a formation of aircraft needs to refuel, the limitation of a single boom is the one factor that creates inefficiencies in the aerial refueling

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process. This problem is not as prevalent when refueling large aircraft that are deploying or need to be extended to make the long flight across one of the oceans. However, it does affect small fighter-type aircraft that have to fly long distances or loiter for a long time. The limited duration of smaller aircraft causes them to have to refuel about once per hour. With only one boom on the tanker, each aircraft has to take its turn to get refueled, and while it is waiting to get gas, it is burning what gas it has in its tanks. When attack aircraft operate in packages, this waiting time often can be the limiting factor for the entire strike package. An example from a previous study sheds light on the problem with transferring fuel to multiple aircraft with a limited number of booms.

Three flights of four fighters each are airborne and burning fuel at an average rate of 8,000 pounds per hour (pph) or a total of 96,000 pph for the flights.

One tanker can transfer fuel at a rate of 60,000 pph to these notional flights of fighters, allowing each aircraft to cycle on and off the boom. In this typical example, only 60 percent of the tankers can be refueled and will require an additional tanker to refuel the strike package.¹⁵

This problem may be overcome by adding another boom. KC-10s already employ this concept with Navy aircraft by extending two hoses from the wings to speed up the transfer of fuel. Navy aircraft are expected to control their own refueling with regard to the tanker and are monitored by a boom operator within the tanker. If this concept were to be adopted with the boom system, a single boom operator could still be used. Currently, only single-boom operations are allowed because the boom operator has to fly the boom into the receptacle of the awaiting aircraft. On the older KC-135, the boom operator monitors the refueling envelope and disconnects the refueling aircraft if any boom limits are reached. However, on the KC-10, the boom system can be operated in an autonomous mode, and a computer that monitors the rate of closure and boom limits executes *disconnects*. Even though current technology still requires a boom operator to make the contact with receiver aircraft, new technological advances in an automatic boom operating system can make dual-boom operations a possibility. However, new developments in breakaway procedures have to be employed. The Navy already has operated under dual-refueling conditions, and the Air Force easily could adapt its own breakaway procedures from lessons learned in the Navy. Another advantage of dual-boom refueling is the reduction in required airspace. As strike packages expand, more tankers are added to refuel all the aircraft efficiently. For every extra boom needed, that many more tankers are required. Dual-boom refueling can offer a 2-to-1 reduction in tankers.

Single-boom operations reduce the flexibility of fighter aircraft. Current strike packages require the integration of many capabilities spread among different types of fighters. One strike package may have two or three types of aircraft integrated to provide defensive and offensive capabilities. If these packages are responding to a set time over target, the aircraft have a limited amount of time to refuel with the precoordinated tanker support. The problem becomes more pronounced when reacting to a time-sensitive

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target. Popup targets require minimal response times, and these times can be affected adversely by single-boom operations. If refueling is required, the time to cycle through refueling requirements can be cut in half with an additional boom. Until additional booms are added, another tanker will have to join the formation and contribute to an already growing airspace issue.

Getting Enough Gas to the Fight

Tankers are considered gas stations in the sky. As such, tankers need to have as much fuel available as possible. The ability to have more fuel available than is planned can cover any contingencies that may occur and can increase flexibility for any unplanned missions. To get the maximum amount of gas to the fight, tankers can leverage three capabilities. First, the more gas a tanker departs home station with, the more it will have when it reaches the planned aerial refueling route. This is a simple concept that the bigger the tanker is the more it can carry. As mentioned earlier, the KC-135 can carry approximately half of what a KC-10 can carry. Second, the less a tanker burns en route to the fight, the more it will have to give. The advantage of fuel-efficient engines is one the Air Force has pursued continually in the KC-135. Finally, the faster a tanker can offload fuel to a receiver, the less time the additional receivers spend burning fuel flying around in the refueling track.

The bigger a tanker is, the more fuel it can carry. The KC-10 can take the place of two KC-135s, both on the ground and in the air. On the ground, a single heavy tanker, such as the KC-10, has a smaller footprint than two KC-135s. Additionally, one KC-10 requires less maintenance and support while carrying more cargo than two KC-135s. The disadvantage is when a single KC-10 has a maintenance problem twice the aerial refueling capability is lost. Moreover, there are penalties that are extracted while on the ground. Because of its weight and associated runway requirements, the en route structure may not have the required fields to accommodate heavy tankers. In the air, a single heavy tanker burns less fuel than two smaller tankers carrying the same amount of fuel as a heavy tanker. Additionally, a single tanker requires less airspace to perform aerial refueling and is more maneuverable. Standard spacing for a refueling cell of tankers is 1-mile spacing between tankers. For every additional tanker added to a formation, the formation is spread out an additional mile. A formation of tankers that has to avoid thunderstorms or adjust its turn has to take into consideration all the other tankers in the formation. A single tanker or even a two-ship formation does not require all the airspace and precoordination that a large cell of tankers requires.

The less fuel a tanker burns, the more it can bring to the fight. One of the most prevalent ways to reduce consumption is to develop more fuel-efficient engines. Because of the limited en route structure, fighters are afforded the bases that are closest to the fight while tankers are expected to make the long haul to the aerial refueling tracks. In just getting to the refueling point, the tanker burns up precious fuel needed by receivers.

Technological advances in engine performance have driven numerous modifications to the KC-135 to increase its total available fuel. One of the most ignored fuels-saving technology by the tanker world is the design of the wing or aircraft itself. Commercial technological advances have shown numerous ways to improve aircraft efficiency. Preliminary analysis of blended wing bodies, like the B-2, has shown the ability to exceed the capability of conventional aircraft of the same size. A skin-friction reduction innovation, called microblowing technique, reduced the friction around the nacelle of an aircraft up to 70 percent.¹⁶ This reduction in the total amount of drag on an aircraft also reduces the amount of thrust required and total amount of fuel burned.

The rate fuel is transferred between the tanker and receiver via the boom or drogue needs to improve to reduce the time receiver aircraft spend awaiting and getting fuel. Refueling via a boom can enable the tanker to transfer fuel at approximately 1,000 gallons per minute.¹⁷ This capability is reduced on the hose-and-drogue systems installed on the wings of some KC-10s and KC-135s. Though two hoses seem to double the capability, a hose is only able to offload fuel at a rate that is half as fast as a boom. Despite having the added hose, two receiver aircraft only are able to transfer fuel at about the same rate as one boom. The problem is even more prevalent when only one drogue is available, which is usually the case since there are not enough dual hose kits to equip the entire force. For example, during the KC-10 deployment to Al Dhafra during Operation Southern Watch, only one KC-10 was equipped with wing pods. Even though advances should be made in transfer rates on a tanker, the receiver can be the limiting factor. For technological advances in the rate of output of fuel from a tanker, the receiver aircraft must be able to handle the higher transfer rates. With advances in technology to improve transfer rates on a drogue system, as well as a boom system, center-of-gravity problems may develop with the tanker during rapid transfer rates.

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Trends

Tankers Are Targets Too

The United States has the most formidable Air Force in the world with the best protection. Technological advances in stealth, early warning gear, and systems that defeat surface-to-air missiles have been protecting the country's combat air forces with resounding success for the last decade. Additionally, fighter aircraft can employ tactics such as high speed, high G-force turns, and steep approaches that aid in defeating these type threats in every environment, from combat missions to takeoff and landing. However, tankers do not have these capabilities and are very susceptible because of a lack of aircraft systems, as well as their slow speed and vulnerability during takeoff and landings.

A threat definitely exists, and adversaries will rely more and more on asymmetric weapons and tactics to bring down US airborne assets. First, soldier-launched missiles are present in sizable amounts and available to just about anyone with a reason to hate the United States. Stinger missiles

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*The future does not hold a
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were provided to the Mujahadeen by the Central Intelligence Agency during Afghanistan's resistance to Russian occupation of their land.¹⁸ Of these missiles, it is estimated that at least 30 of them are available and in the hands of Osama Bin Laden and his terrorist group, al Qaeda.¹⁹ If it is easy to understand that terrorists can get access to US missiles, how much more access do they have to Soviet missiles provided by nations such as Iraq, Iran, Syria, or North Korea?

Second, tactics to employ these missiles are simple to achieve and difficult to defeat. "You can't protect against somebody standing on a building or road and shooting off a missile," says Clair Brunavs, a spokeswoman for *Jane's*.²⁰ More recent events have proven the ability of rogue groups to employ shoulder-launched missiles effectively, such as the Russian SA-7. Several strategic and tactical airlift aircraft have been fired on during the landing phase into Baghdad International Airport. Moreover, an international carrier, resembling the size and weight of a KC-135, was struck by an SA-7 during the takeoff phase of flight.²¹

Finally, the future does not hold a better outlook for tankers. Smaller groups may not have the technology and infrastructure to research and develop weapons that can counter US systems. However, nation states that understand US capabilities and employment of air assets can develop the means to defeat US weaknesses while avoiding US strengths. Why should a foe be expected to face US strengths head on? China is just one example of such a state that may be a peer competitor in the future and is willing to invest funds to attack one of the Achilles' heels of the United States: large slow, less-maneuverable aircraft, such as the tanker. Additionally, it is no secret to the United States and the entire world that China is developing a new use for its over-the-horizon cruise missile to specifically attack the air-to-air refueling capability.²² China recognizes how reliant the United States is on its tanker force and aerial refueling to enable its bomber and fighter force to reach out and apply its deadly force. It is also highly possible that other countries that desire protection against the United States will be willing to either develop or purchase technology that will allow them to have this asymmetric advantage. Tanker aircraft are vulnerable now in both the low and high structure. Current technology limitations on surface-to-air missiles, combined with US intelligence, allow tankers to avoid known threat areas while in the high structure. However, in the low structure during takeoff and landing, tankers need the capability to identify threats with warning equipment and to counter them with technology, such as chaff and flares that are already installed on many airlift aircraft. Moreover, laser technology that deflects the course of hostile missiles would make tankers an even more difficult target to the enemy.

Network-Centric Warfare

With the advent of the air operations center, the need for getting the correct battlefield information to the decisionmaker and warfighter has become a trend that is highly dependent on sensor and communication technology.

The Committee on Appropriations submitted to the 106th Congress a report explaining a shortage in the type of assets needed in establishing a network-centric warfare capability. They reported deficiencies in low-density, high-demand assets such as electronic warfare aircraft, tactical collection and dissemination assets, and secure communications and command and control.²³

Tankers can provide this link between decisionmakers and warfighters if they are afforded the technology and are integrated in current doctrine. For years, tanker aircraft have been close to the fight. Fighter anchor patterns are part of AFDD and put the tanker on station as the gas station in the sky for as long as any other aircraft are flying. The Air Force is taking advantage of the loitering tanker and integrating it into network-centric warfare. Roll-on beyond-line-of-sight enhancement (ROBE) is the relay in the smart tanker concept that receives information from different locations and transmits it beyond visual range to the right person at the right time.²⁴ However, the tanker can go beyond ROBE and its capability of integrating the Joint Tactical Radio System (JTRS). Recent shoot downs of friendly helicopters and fratricide of friendly ground forces signal a need for identification of friendly forces. JTRS has a function that allows a vehicle that is being targeted to transmit a specific signal.²⁵ With ROBE already on board, the tanker can transmit this information to the appropriate aircraft quickly to prevent the unnecessary killing of friendly forces. Tankers are capable of combining capabilities of other battle management aircraft.

Likewise, the decision loop in the execution of combat forces relies intensely on information from numerous sensors in, on, and around the battlefield. Optical sensors on unmanned aerial vehicles, air-to-air radar sensors on E-3 airborne warning and control systems, and air-to-ground radar sensors on E-8C joint surveillance target attack radar systems provide battlespace awareness to decisionmakers and targeting information to warfighters in high fidelity. The capability of sensors and the advent of new ways to employ sensors have created a sensor race between the Services and major commands within the Services. Although the many sensors can be linked by systems and share information, information that is sent or received is limited by the lack of equipment on ground units or airborne aircraft. Additionally, because some of these systems are service parochialisms, many of the Services cannot get the information simply because they were not planned as a customer of the information. The outcome of the need for sensors and lack of a centralized command for sensor production has created numerous platforms.

The tanker can provide the capability to act as the platform with the sensors needed to service the battle area. First, tankers have the capability to loiter while they are serving as refueling points for fighter aircraft. Anytime a fighter is patrolling the sky, the air tasking order contains an anchor point or a reliability tanker for emergency refueling. Second, tankers have ample space within the aircraft to house communication, as well as sensor equipment. Palletized equipment can be moved on and off

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in module format, allowing the tanker to fulfill the airlift role while en route to an operational base or as a sensor and communication platform while in the tanker role during aerial refueling operations. Finally, tankers have large surface areas outside the aircraft and the capability to mount aerodynamic components that can serve as sensor devices.

More Airlift

The National Military Strategy, which the Mobility Requirement Study and Tanker Requirement Study is based on, has moved away from fighting two major theater wars to 1-4-2-1 strategy. A 1-4-2-1 strategy is the support of the homeland defense, deter forward in four separate geographic regions, swiftly defeat the efforts of an adversary in two of those regions, and win decisively in one of those theaters while supporting the other theaters. A new force structure to support the airlift of this strategy would require 302 C-17s, 52 C-5s, and the callup of Civil Reserve Air Fleet Stage III.²⁶ The Air Force has 67 C-17s, 118 C-5s, and 103 C-141s in both the active duty and reserve.²⁷ According to Air Force fact sheets, a C-17 can carry approximately 170,900 pounds of cargo, a C-5 can carry approximately 270,000 pounds of cargo, and a C-141 can carry 68,000 pounds of cargo.²⁸ Given the requirements of the new strategy and current inventory, it is obvious that the nation is unable to meet the new needs of a 1-4-2-1 strategy when one considers the total amount of cargo required by the strategy versus the total amount of cargo capable of being airlifted by military aircraft (Figure 2).

Tankers, while limited in carrying outsized and oversized cargo, have the capability to carry more than a C-141 and as much as a C-17. According to Air Force fact sheets, a KC-10 is capable of carrying 170,000 pounds of cargo, roughly equivalent to a C-17. Likewise, the KC-135 is capable of carrying 83,000 pounds of cargo, which is more than a C-141 and almost half of what a C-17 can carry. With more than 480 KC-135s and 59 KC-10s in the Air Force inventory, this gives the Air Force an additional 49 million pounds of cargo lift capability. However, it is impossible to use this entire airlift capability because of the requirements for tankers to fulfill

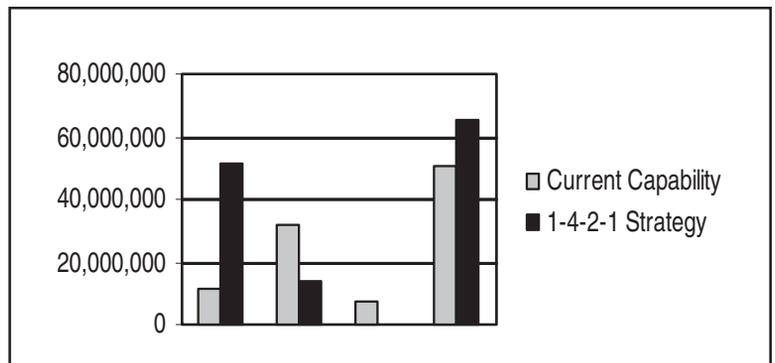


Figure 2. Airlift Capability

aerial refueling combat support and deployment missions. One of the lessons learned from Kosovo was not that the number of tankers was inappropriate but the planning and efficient use of tankers stretched the aerial refueling operations.²⁹ If plans that are more efficient or planning models can be utilized, the tankers can be used more effectively to augment the strategic airlift mission.

Tankers also can give the combatant commander the capability in airlift that is needed from AMC. Usually, the only airlift that the joint forces commander can have control of, through the joint forces air component commander (JFACC) and the air operations center, is tactical airlift by using the C-130 force. On specific occasions, the tactical control of strategic airlift aircraft will be moved to the theater. This type change of control was accomplished during the Kosovo crisis to move Task Force Hawk from Germany. This temporary change of control of the C-17s was considered a tremendous success, according to General Charles T. Robertson, Jr, former commander of AMC.³⁰ It was considered such a success that Robertson said, "It's something we're going to have to go back and write into the doctrine, as to how that's done."³¹ In the case of tankers, the aircraft are assigned to an expeditionary air-refueling squadron and are under control of the JFACC through the air mobility division within the air operations center. These tankers are available in numbers to provide the intratheater airlift that the joint forces commander requires. To use these assets to their fullest, JFACCs must develop an understanding that usually is held by the director of mobility forces, and the air mobility division must include into the planning of aerial fueling capabilities the airlift capability of tanker aircraft. Moreover, a tanker with the airlift capability of a C-17 to carry oversized and outsized aircraft would give the JFACC the ability to control the tanker force in the role of a strategic airlifter.

Recommendations

The need for the recapitalization of the KC-135 has become an issue of importance for AMC and the global reach capability for the Air Force. One solution has brought much discussion and controversy, the leasing of the Boeing KC-767. Much of this controversy has been over the politics in the process of leasing the proposed tanker, and less discussion has been over its capability. While leasing or purchasing the KC-767 will replace much needed capabilities in the short term, a better solution is to design and build a new tanker, KC-XX, capable of multiple roles across the full spectrum of operations, able to survive in the demanding environment of the future, and based on capabilities, not platforms. A newly designed KC-XX is the better choice to fill the needs of the Air Force. Though the KC-XX may not be appealing because of the price of new weapon systems, it may stand as an innovator to challenge the mindset of airmen.

One other solution, proposed by an analyst but not considered a viable alternative in this article, is the alternate to once again reengine the aging KC-135. Whereas this does provide additional capability for takeoff

The need for the recapitalization of the KC-135 has become an issue of importance for AMC and the global reach capability for the Air Force.

Recapitalizing the KC-135: Tanker Force Structure

Tankers must have full access to airfields around the world and be able to provide combat aircraft all the fuel they need in an expeditious manner.

payloads and fuel-burning efficiency, it does not address many problems with the age of the aircraft. Corrosion is one of the most pressing issues with the KC-135 and cannot be overcome with new engines. The corrosion of the airframe remains one of the elusive problems with the tanker. It is difficult to predict when and where corrosion will appear and what impact it may have on the aircraft. Catastrophic failure is one such impact that cannot be tolerated. Additionally, fleet-wide grounding because of corrosion would cripple the nation's ability to project power because of the major reliance on the KC-135 to provide the majority of the aerial refueling capability. Despite any solution—the KC-135 is already more than 40 years old—the tanker will remain in the inventory for many years. Moreover, the KC-135 already is showing signs of structural fatigue. The KC-135 is an old aircraft, and the condition of metal fatigue cannot be overcome with any remodifications short of a complete rebuild of the aircraft. The problem of age simply will get worse as time goes on, and reengineering the aircraft fails to address the sustainability of the aircraft as a future platform.

Full Spectrum Operations

The first criterion essential to future tankers is the ability to operate across the full spectrum of operations. By this, tankers must have full access to airfields around the world and be able to provide combat aircraft all the fuel needed in an expeditious manner. The Air Force needs a tanker that is not tied to a Cold War en route structure that has diminished over the years. Additionally, the need to respond to targets quickly, while loitering over regions, will require a more capable tanker.

An 8,000-foot NATO standard runway no longer may suffice for conflicts in the future. The KC-767 will allow access to more runways than the current inventory of KC-135s and KC-10s. However, it is still reliant on the NATO standard. Given the recent evidence of the United States in Iraqi Freedom to *go it alone*, access to these bases is already limited to a small pool of runways. The United States cannot expect to have access to other countries' major bases and runways forever. A newly designed tanker capable of the short-field takeoff and landing capabilities of a C-17 will allow a nearly unlimited cache of runways. Moreover, a capability to land and take off on matted runways would open up isolated areas of the world to tanker operations. However, by outpacing the capability of other nations to operate in isolated areas and on smaller runways, a divide in the coalition operations between NATO and United Nation forces only would increase and further complicate joint operations.

Tankers of the future need to be able to deliver more gas at a faster boom-cycle time to respond to fleeting targets. The Global War on Terrorism requires a new capability for combat aircraft to be available to respond quickly to targets at all times. Recent operations have proven this need to respond, and smaller conflicts like Kosovo will require this capability. The availability of airspace will make the capability to have large amounts of fuel airborne a problem as well. With all the information

gathering, early warning, and communication-laden aircraft in and around the fight, large tanker formations will not be able to use up valuable airspace. The Air Force needs more gas and fewer airplanes. Whereas KC-10 aircraft can provide this capability with the large amounts of fuel it can carry, the KC-767 only can carry roughly the same amount of fuel as a KC-135. While Boeing touts better fuel efficiency and maximum takeoff weight to deliver more fuel to the fight, it still will require two KC-767s to do the work of one KC-10 equivalent, as it did with the KC-135. Additionally, there have not been any improvements in the amount of fuel that can be delivered at one time. The KC-767 only has one boom. A concept tanker would be able to leverage multiple booms and provide the large amounts of fuel that a KC-10 can provide.

There are off-the-shelf aircraft available in the civilian community able to deliver large amounts of fuel. However, little has been done in increasing fuel offload and boom-cycle time. Any civilian aircraft would require modifications immediately to add multiple booms. This idea of multiple booms has not been engineered, and it is unknown whether the aerodynamics of civilian aircraft would allow advances in this area. A newly designed tanker could make multiple booms—or any other modifications—a forethought and would allow these types of new ideas to be engineered into the design of the aircraft. A large tanker with two booms could equal two KC-767s with its current boom technology. This would increase its capability and limit its exposure to enemy attacks.

Survivability

Tankers of the future must be able to survive in just about any environment. Of most importance is the capability to identify and protect itself during the takeoff and landing phases of flight. Another way to limit the exposure of tankers to attacks is to limit the amount of tankers that are together at one time. Large deployments to one base or large tanker formations are two examples of putting too many tankers together at one time. The global reach of tankers that the United States depends on is an Achilles heel that the enemy will be willing to attack to defeat US forces.

Recent developments in Iraqi Freedom have shown that the enemy has the ability and is willing to attack large air mobility assets. C-17 and C-5 aircraft with early warning and defensive measures were unable to defend against shoulder-launched surface-to-air missiles during the takeoff phase of flight. Even though both aircraft were able to land without incident and the attack did not deter further operations, valuable parking space was used by the broken jets and limited the capability at the base. Moreover, had the aircraft been shot down, operations may have ceased completely. Arguably, a KC-767 with a bolt-on defensive system of flares or chaff would be at least equally susceptible to enemy shoulder-launched missiles. A KC-XX would be able to capitalize on a design that could limit exposure to heat or infrared tracking missiles. Stealth technology and design used in fighter and bomber aircraft has proven to be successful in limiting heat signatures. Additionally, the KC-XX could incorporate fuel-

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Recapitalizing the KC-135: Tanker Force Structure

The KC-767 will continue to be vulnerable and create a large footprint.

cell sealing technology used in AMC's airlift aircraft. Airline aircraft do not have any need to survive in combat and currently use wet-wing technology, making them a target even for the lone rifleman on the outskirts of an airbase. Moreover, laser technology, proven to be able to take action offensively and redirect missiles, can be built into the aerodynamic design of a KC-XX. Bolt-on additions to a KC-767 would create drag and decrease any fuel saving efficiencies. Tankers that are bunched together make an even more inviting target for enemy forces.

The tanker's large footprint is amplified further when multiple aircraft cells are launched or when large packages are deployed to areas of hostility. The KC-767 will continue to be vulnerable and create a large footprint. The KC-767 does give a better increase in fuel efficiency from the KC-135. However, it does not offer a big enough savings to reduce the amount of tanker required in the air or the footprint on the ground. The KC-767, in its size and fuel savings, creates a 1.1 to 1 savings when compared to the KC-135. A KC-XX could be designed to offer twice the fuel of a KC-767. Even though a bigger aircraft creates a bigger footprint than a smaller tanker, a single KC-XX that is able to do the work of two KC-767s would make a smaller signature in the air and on the ground. A large cell of six KC-767s now would require three KC-XXs. This savings can be seen not only in the limited vulnerability to attacks but also in reducing airspace requirement in and around the area of operations.

Capabilities Based

The tanker always has been seen as a platform used to serve receiver aircraft. However, there are dimensions of tankers in time and space that can provide capabilities to more than one customer or service. The KC-767 is a better platform than its predecessor the KC-135, but it does little to provide capabilities to the joint warfighter. A KC-XX designed from the ground up with capabilities in mind can provide more than air forces with its service.

The tanker can leverage the ability of time to provide capabilities to the joint warfighter. The tanker can remain on station in the air for a long time. Normally, this capability is used to position a tanker in an orbit to await receivers. The KC-767 can depart with about the same amount of fuel as a KC-135 and, through greater fuel efficiency, arrive at the orbit with more fuel and remain on station longer. However, the KC-767 goes little, beyond providing power sources for add-on capability, to leverage the dimension of time. Because of the long loiter times a tanker is able to sustain, there are capabilities in command and control, sensor, and communication that could be leveraged by a KC-XX. Instead of making these capabilities a modification, many systems can be designed into the tanker and avoid engineering problems. The KC-135's upgrade is such a lesson that should be learned. Newly modified aircraft experienced problems with interfering electrons from existing wiring and systems that caused a delay in fielding the upgrade aircraft. The KC-XX can plan zones throughout the aircraft that will avoid compatibility problems while

optimizing the design of the aircraft for maintenance in the field. Airline aircraft do not have the design required to allow major maintenance on critical items within a short amount of time. Tankers also have a great amount of space within the aircraft that goes unused in many circumstances.

Although the primary role of the tanker is to get gas to the receiver, the tanker has a cargo capacity that can serve as a capability that all users can exploit. Airline-type aircraft used as tankers are limited in the oversized and outsized cargo they can carry. Moreover, they require specialized cargo-handling equipment that can reach the high deck heights of their load. Any extra equipment creates a longer logistics tail with more areas for maintenance problems. Additionally, these aircraft are not designed to offload cargo in combat environments and in a short time. A KC-XX can be designed with low-loading heights like the C-17 with the ability to accomplish timesaving combat offloading. Additionally, a KC-XX can have all the benefits of combat offloading through the aft end of the aircraft and not require support equipment. This capability will give theater commanders the ability to control these strategic-lift tankers operationally without having to work through the prioritization process used to schedule airlift. More important, all this strategic airlift capability could be used to offset the large requirements of a 1-4-2-1 strategy.

Build or Buy?

The final decision for the procurement of a tanker will come down to whether the Air Force should build a tanker from the ground up or buy a commercial-off-the-shelf (COTS) aircraft and modify it for military use. While it is natural to propose that the best solution to the tanker recapitalization is to build one from the ground up, the tanker of the future must meet Air Force fiscal constraints.

Before considering any solution, airmen should have an idea of what capabilities must be built into the tanker. Therefore, the first step is to conceptualize in the minds of mobility warriors the tanker of the future. The next tanker should be designed with all the capabilities and future requirements of a state-of-the-art aircraft. The advantage of designing the tanker that one could desire is that it serves as a baseline for a comparison of competing tankers. Additionally, it will convey to contractors the requirements and desires of the Air Force.

If operational needs and mission effectiveness are the criteria for building or buying the next tanker, it is likely that a more robust tanker that meets all the needs can be built rather than purchased. COTS aircraft can serve as a good platform that may be able to meet some performance requirements of the Air Force. However, if the capabilities outlined in this article were to be included, COTS aircraft would require major modifications and design changes to meet the requirements of the future tanker. Moreover, the airlift mission can serve as an example of how much more effective a weapon system can be when designed from the ground up. Nearly every strategic airlifter from the C-17 and back into airlift history has been fielded in this manner.

The next tanker should be designed with all the capabilities and future requirements of a state-of-the-art aircraft.

The next tanker will be a national asset that can correct some longstanding shortfalls.

Conclusion

It is hardly fair to compare the KC-767 to a notional KC-XX. The KC-XX is not constrained by a history and mindset of purchasing existing airline platforms to fulfill the role of aerial refueler. Since the advent of refueling, the role of the tanker has been to be there and offload as much fuel as possible. The KC-767 only looks to continue this single role, whereas the KC-XX can fill many other roles while acting in the tanker role. When one thinks of a combat package, only the fighter or bomber is what comes to mind. However, many times, the tanker is called to fly into enemy territory to rescue its receiver when a crisis has developed and the receiver has burned more fuel than was planned for the strike. This reliance on the tanker has made it an easy target of opportunity as a form of asymmetric warfare. So it is unfair to dream of a stealthy KC-XX equipped with offensive and defensive systems to combat a direct enemy attack; the KC-767 just cannot compete with such lofty ideas. While at it, why not invent a super tanker with a short-field takeoff capability able to deliver hundreds of thousands of cargo and carry a standoff precision-attack capability used to strike enemy targets that it has targeted through its own sensor-array system. The idea of the super tanker encroaches on other platforms and is unattainable. On the other hand, is it?

While the next tanker may not be the KC-XX described in this article, the future force structure must take advantage of a capabilities-designed tanker. The next tanker will be a national asset that can correct some longstanding shortfalls. Strike aircraft need gas, a lot of it, and they do not want to waste time getting it. Strapping a boom or drogue to an airliner will not continue to provide this capability. The next tanker must take advantage of future warfare trends and bring to the warfighter capabilities that leverage loiter times and cargo-hauling space.

The Air Force needs to at least take the first step and design a tanker to provide the capabilities that the joint environment needs. While it may not seem feasible to build the *Cadillac* of all tankers, can the United States weather another 50 years of a single role tanker that will need modifications continually to meet the requirements of the future? Operationally, the Air Force cannot afford the risks of not having a tanker designed for the future.

The future will hold a place for the tanker. However, the tanker of the future will not look like the tanker of the past. Air mobility pioneers need to take advantage of trends in warfare and look beyond the customer of yesteryear. Decisionmakers across all the Services can benefit from the capabilities a tanker can bring to communication, command and control, and sensors to link the warfighter on the ground, in the air, and on the sea to the decisionmakers in the theater of operations. The next tanker can no longer be seen as just an Air Force asset. The next tanker still can fill the role of gas passer, but new ideas on using this much-unused enabler can lead to new and better ways to fight wars.

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The F-15C is a viable platform that can be maintained operationally viable well into the next decade, given the commitment of senior leadership to support continuing upgrades.

Road to Maintaining Relevancy

The F-15C

Introduction

Since the dawn of manned flight, airpower advocates have taken great pains to espouse the effects of airpower and the overarching importance of air superiority. This concept has taken many forms and embraced numerous operational concepts, but the central theme in all discussions related to air superiority is the ability to defeat the enemy in the air. A more broad interpretation of the meaning of air superiority can be found in *Air Force Basic Doctrine*, where it is described as the ability to “provide freedom from attack as well as freedom to attack.”¹ It would seem that the former definition of air superiority has driven the decision to procure the F/A-22, and it would seem that we have lost sight of what Giulio Douhet advocated with respect to destroying the enemy’s “nest and eggs on the ground.”²



Road to Maintaining Relevancy: The F-15C

No other tactical aircraft in the Air Force inventory has this kind of logistics support infrastructure or formal inspection and modification program to keep it operationally and logistically viable.

Simply stated, it is just as desirable to destroy an enemy on the ground as it is to fight him in the air.

The F-15C is America's and, arguably, the world's premier air superiority fighter. There have been calls for its retirement because of its relative age, perceived structural fatigue, systems obsolescence, and vulnerability to third and fourth generation fighters that are being fielded by China and Russia. One of the most common reasons for retiring the F-15C is the inability to modify or upgrade it to meet the air superiority mission. Given the absence of a credible air-to-air threat to US forces conducting operations in the last 13 years, the F-15C has performed a necessary mission. At the same time, F-15C pilots have felt much like the Maytag repairman: they are there if needed, but they basically have not been needed. This consistent scenario has caused many in Congress and the other services to question the need for the F/A-22, given the needs of the Global War on Terrorism and emerging threats of terrorist groups who do not possess an air force. It is this emerging threat that may provide justification for retaining the F-15C in an air superiority role while we continue to develop the F/A-22 into a deep strike platform—a mission for which it is better suited and a role in which it can truly leverage its unique capabilities.

The F-15C, designed in the 1960s, has undergone numerous upgrades and modifications since being fielded in 1976. Each modification has enhanced the operational capability of the aircraft and, at the very least, kept it at par with the next peer competitor. This includes modifications, upgrades, and repairs to the avionics suite, engines, and basic aircraft structures. This is the only tactical aircraft in the Air Force inventory that has a programmed, scheduled visit (every 5 years) to a depot facility—the Warner-Robbins Air Logistics Center (WR-ALC)—for modifications, repairs, and structural enhancements. In addition, the aircraft has been upgraded consistently between these visits via field-level modification performed by active-duty personnel and contractors at the unit level. This aircraft has a robust logistics support system to keep it current in terms of operational capability and maintainability. No other tactical aircraft in the Air Force inventory has this kind of logistics support infrastructure or formal inspection and modification program to keep it operationally and logistically viable.

In recent history, air superiority was achieved at the outset of hostilities because of a lack of a credible air force or a distinct lack of will to fight. This, in turn, allowed the joint forces commander to shift focus quickly and concentrate air assets on a concerted bombing campaign that targeted both tactical and strategic interests simultaneously. As a result, this left the air superiority aircraft with very little to do over the balance of these conflicts. Much of this can be attributed to the skill and courage of American pilots and the superior performance of the equipment. Much has been made over the last 13 years about the superior technology embodied in the F-117 stealth fighter; B-2 bomber; and soon to be operational, F/A-22 fighter. While this technology is indeed critical, the

first operational loss of an F-117 to surface-to-air missiles during the air war over Kosovo proved that stealth technology alone is not a panacea for penetrating enemy defenses. In the case of the F/A-22, can we reasonably assume that the F/A-22, using essentially the same stealth technology and advanced avionics, will be able to defeat an advanced integrated air defense (IAD) system? Can the single aircrew do that, while simultaneously defeating an air-to-air threat, which is likely, while engaging a peer competitor (worst case scenario)? An alternative may be to allow the F/A-22 to strike deep, undetected, while the F-15C engages the air-to-air threat. This is an operational employment concept that is not part of this article but deserves mention here as a potential better use of this technology.

The central issue in this debate is whether or not the F-15C can be modified and retrofitted to keep it operationally viable and logistically supportable over the next 10-15 years while the F/A-22 is fielded and developed to reach its full potential. Utilizing the F/A-22 as an air superiority fighter is not taking full advantage of its unique capabilities, and thrusting it into that role prematurely will guarantee that it will never be used to its full potential. The F-15C is a platform that can be maintained operationally viable well into the next decade, given the commitment of senior leadership to support continuing upgrades. This will allow the F/A-22 development team to focus their efforts on enhancing the air-to-ground or deep strike capability of the F/A-22 through spiral development, a mission for which this aircraft is best suited.

Argument for Retaining the F-15C

The stated purpose of the F/A-22, as it is being developed, is to eventually replace the F-15C in the air superiority role. The official purpose of the F/A-22 program stated on the Air Force Web site is as follows:

The F/A-22 Raptor—developed at the Aeronautical Systems Center, Wright-Patterson AFB, Ohio—is the replacement for the F-15 Eagle air-superiority fighter and will become operational early this century. It combines stealth design with the supersonic, highly maneuverable, dual-engine, long-range requirements of an air-to-air fighter, and it also will have an inherent air-to-ground capability, if needed. The F/A-22’s integrated avionics gives it a first-look, first-shot, first-kill capability that will guarantee US air dominance for the next three decades.³

According to the Government Accounting Office (GAO), the purpose of the F/A-22 program is as follows:

The Air Force is developing the F/A-22 aircraft to replace its fleet of F-15 air superiority aircraft. The F/A-22 is designed to be superior to the F-15 by being capable of flying at higher altitudes for longer distances, less detectable, and able to provide the pilot with substantially improved awareness of the surrounding situation.⁴

What seems clear, from the quotes above and from the literature associated with this program, is that the addition of a ground attack capability seems to have been an afterthought at best or somewhat opportunistic at the very least. A case in point is the statement above

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Road to Maintaining Relevancy: The F-15C

The continuing development problems associated with the advanced technology embedded within the F/A-22 and the consistent production delays have put the entire F/A-22 program in jeopardy of being canceled outright.

(from the Air Force Web site) relative to the F/A-22 and its inherent air-to-ground capability. With respect to the F/A-22, this capability is neither inherent nor fully developed. The recent addition of \$166M to the developmental costs of the F/A-22 is attributed in large part to the development of an improved ground attack capability.⁵ This is supported further by the fact that the aircraft was not designated as an attack aircraft—that is, F/A-22—until September 2002. Finally, the statement that the F/A-22 will use its air-to-ground capability, if needed, fails to take into account the changing nature of warfare as we know it and fails to leverage the aircraft's ability to contribute not only to fighting a major peer competitor but also to the Global War on Terrorism. It seems clear that small-scale contingencies and actions to thwart terrorist organizations and rogue nations will characterize the upcoming decade. Even in the most likely scenario involving action against North Korea, it is unlikely the Air Force would face a formidable opponent in the air but would be faced instead with defeating a robust IAD system to facilitate deep interdiction and strategic attacks. In this scenario, it seems unlikely that the Air Force will encounter a peer competitor in the air superiority role and, therefore, could utilize advanced aircraft (F/A-22) to defeat an advanced IAD and conduct a strategic attack while allowing legacy systems to confront the air-to-air threats. The apparent lack of a current air-to-air peer competitor, as well as the unlikely development of one in the next 10 years, has been corroborated by the comments of numerous senior leaders (including the other services) visiting the Air War College, a few of which commanded air forces in recent conflicts around the globe. Assuming this assessment is correct, we can now make a case for prioritizing the development of the air-to-ground capability of the F/A-22. This also has implications for the F-15C.

The F/A-22 Will Not Be Ready

The continuing development problems associated with the advanced technology embedded within the F/A-22 and the consistent production delays have put the entire F/A-22 program in jeopardy of being canceled outright. At the very least, the late delivery of developmental test aircraft to Edwards AFB, California, and the late delivery of the operational test aircraft to Nellis AFB, Nevada, have caused a ripple effect across the entire program. While flight testing began in 1997, the flight test program has failed to meet its annual goals each year since then. In fact, the program was so far behind in 2002 that many of the tasks scheduled for 2002 had to be moved to 2003.⁶ Notwithstanding developmental and engineering issues, the late deliveries were caused, in large part, by production difficulties at the Lockheed-Martin Plant in Marietta, Georgia. More specifically, they were caused by the complexities involved with the production of the advanced materials and assembly requirements inherent in the advanced design of the F/A-22. These late deliveries have caused a significant slip in both the developmental and operational testing schedules. Ideally, a majority of the developmental flight testing and

evaluation (DT&E) would be completed before operational testing and evaluation (OT&E) begins. The DT&E provides the basis for the follow-on OT&E and allows the results of the former to be expanded and improved upon by the latter. In the case of the F/A-22, these programs are now running simultaneously, and they quite often are competing for the same resources. Amos saw this first hand as the 57th Aircraft Maintenance Squadron (AMXS) Commander at Nellis AFB. For example, the OT&E program called for the use of six aircraft to complete OT&E and tasked Nellis as the training ground for the pilots who were to be assigned as flight instructors at Tyndall AFB, Florida. Because of continuing problems with the embedded computer software of the avionics suite, a decision was made to divert the sixth aircraft from Nellis to be used by both Lockheed and Edwards AFB for conducting further static tests to identify and resolve this problem. Simply stated, the lack of technical data to support flying operations, an immature avionics suite, and less than a full complement of assigned aircraft have served to delay the development of this aircraft further. Additionally, the inability to train the initial cadre of instructor pilots will cause another delay, even if the technical issues are resolved in the near term. This only serves to highlight the fact that concurrent DT&E and OT&E are not the most efficient or productive means for aircraft development.

With the responsibility (57 AMXS) for supporting the first operational F/A-22 aircraft in the Air Force inventory, the lack of specific technical data for flight-line maintenance personnel severely handicapped efforts to support flying operations for this aircraft. Traditionally, the DT&E effort is where these tech data are developed, as they are the first users of the aircraft. Unfortunately, the fact that these two programs are running concurrently and continue to identify significant problems has not improved the development of this aircraft and has caused both Congress and the Government Accounting Office to question the wisdom of proceeding with low-rate production before testing is complete.⁷ A summation of the state of affairs in this area is best provided by Chief Ron Foster, 57 AMXS Raptor Aircraft Maintenance Unit Maintenance Superintendent, during a recent program review in October 2003:

- Limited amount of validated and verified technical data requires field service representatives (Lockheed) to write action requests for procedures to work aircraft.
- Numerous incomplete links and matches of tasks to form a completed maintenance task from start to finish—all Air Force specialty codes affected.
- Training detachment must have validated and verified technical data to conduct training classes. The training detachment has conducted limited training with what limited validated and verified technical data are available.

Because of the delivery delays discussed above and in a move in reaction to this situation, the Air Force pursued and obtained

The lack of technical data to support flying operations, an immature avionics suite, and less than a full complement of assigned aircraft have served to further delay the development of the F/A-22.

Road to Maintaining Relevancy: The F-15C

A reduced buy of aircraft, coupled with a low rate of production (20 per year), will necessitate retention of legacy systems such as the F-15C until sufficient numbers of airframes are available to assume the air-to-air role.

congressional authorization to begin low-rate production even before initial testing was complete. This caused numerous problems, not the least of which is the correction of numerous technical challenges discovered after the first lots of aircraft were produced. As an example of the magnitude of the problem, since 1986 when the F-22 program was first initiated, projected costs have increased 128 percent, and delivery time has increased 104 percent.⁸ The ever-increasing developmental costs experienced during the 1990s compelled Congress to establish a cost limitation (cap) for both developmental and production expenses in 1998. With respect to the developmental expenses, Congress has been willing to increase the cap for research and development but has limited the production costs to \$36.8B.⁹ This has been caused by numerous factors, such as production problems at the Lockheed plant, late delivery of the developmental test aircraft to Edwards AFB, and the resultant failure to complete critical developmental testing prior to low-rate production. As an example of the significance of the cost increases associated with this program, the Air Force had intended on buying 648 aircraft in 1991. Because of the unprogrammed developmental and production cost increases, it now can afford to buy 276, at best.¹⁰ This is caused, in large part, by the congressional cap on production costs of \$36.8M. More recent congressional testimony by Michael W. Wynne, Principle Deputy Under Secretary of Defense for Acquisition, indicated that a more accurate estimation of the number of aircraft the Air Force could afford under the current spending cap was closer to 225 to 235.¹¹ The original cost of this aircraft was projected to be about \$68M but now exceeds \$250M per copy and is rising every month.¹² Additionally, a reduced buy of aircraft, coupled with a low rate of production (20 per year),¹³ will necessitate retention of legacy systems such as the F-15C until sufficient numbers of airframes are available to assume the air-to-air role. At the current rate of production, it would take more than 15 years to field the 225 aircraft currently scheduled for production, and that would not replace all the 500+ F-15 aircraft in the Air Force inventory. While the Air Force would like to begin full production in 2006 (90/year), it is unlikely Congress will approve any such move until the technical issues have been resolved and the aircraft has proven it can perform. As with any major acquisition program, the success of the F/A-22 program is measured in terms of cost; schedule; and in this case, (aircraft) performance. It is in these areas that the F/A-22 has had significant challenges and indicates a need to maintain the F-15C in the air-to-air role until the F/A-22 is fully developed.

Too Many Performance Issues Remain Unresolved

In terms of performance, the aircraft has met several performance requirements, including supercruise, acceleration, maneuverability, radar observability, combat radius, and range in searching targets.¹⁴ Conversely, it has experienced numerous problems in critical areas, including avionics, airframe structures, aerodynamic instability, and

maintainability. Simply stated, the avionics suite, which is designed to provide the aircrew with increased situational awareness, is not fully developed and has experienced numerous and unexplainable failures and complete shutdowns. To be specific, the pilot is unable to operate the electronic warfare, radar, and communication, navigation, identification systems concurrently. These systems are at the very heart of what will make the F/A-22 the weapon of choice to strike deep and conduct strategic attack. Without these systems, the aircraft is of little use. These problems have caused the Air Force to extend the completion of the avionics testing to early 2005, and it has admitted it does not understand fully the cause or causes of the inability of the avionics to predict when it will be resolved.¹⁵

With respect to structural issues, the aircraft has experienced severe buffeting or fluttering of the vertical stabilizers or fins, which can lead to catastrophic failure. This condition is not unique to the F/A-22, and similar problems have been encountered on the F-15 and F/A-18. However, because of the unique application of composite materials in the vertical tail assembly and the higher demands placed on this assembly caused by the operating parameters of the F/A-22 (super cruise), a complete modification of the tail assembly was required. As a result, titanium was installed as a replacement for the carbon graphite used in the original construction. While initial high-altitude testing seems to indicate that this problem has been resolved, continued testing in the more rigorous low-altitude region has yet to be completed.¹⁶ In addition, the aircraft has experienced overheating of various aspects of the fuselage during high-speed testing. Continued overheating of any part of the fuselage not only reduces its radar evading characteristics but also severely undermines its structural integrity. While the Air Force seems to understand the nature of the problem and has a retrofit to correct it, it only adds to the amount of downtime experienced by the few available test aircraft and further delays critical testing, already woefully behind schedule.

In addition to the vertical tail problems noted above, the aircraft has experienced problems with the material in the horizontal stabilizer. During flight testing, the aircraft experienced separation of the materials in the stabilizer itself but, more ominously, in the materials of the pivot shaft. The pivot shaft allows the stabilizers to move up and down independently according to pilot commands. Initially, it was thought that this problem could be resolved through an improvement of the manufacturing process, but it now seems that a complete redesign will be necessary to correct this deficiency. Flight testing of the newly redesigned horizontal stabilizers is scheduled to begin in spring 2004.¹⁷

As stated earlier, there are significant problems with the logistical support of this aircraft. In addition to the lack of specific technical data to troubleshoot and repair this aircraft, the F/A-22 is not meeting the expected mean time between failure goals during operations. Air Force expectations, at this point in development, were for the aircraft to complete 1.67 flying hours between maintenance actions. As of November 2002,

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Road to Maintaining Relevancy: The F-15C

The IMIS terminal has not been programmed with the full range of troubleshooting software required to support flying operations.

the aircraft required five times more maintenance per flying hour than first projected and had amassed a record of .29 flying hours between maintenance actions.¹⁸ Amos' experience with this aircraft at Nellis AFB mirrors that result. As a matter of fact, the first aircraft arrived on 14 January 2003 (at least 3 months late) and did not fly again for more than 60 days. This was a result of the shortfalls in technical data and training mentioned previously, discovery of numerous manufacturing anomalies, and immaturity of the avionics suite, which limited both maintenance and flight training. This situation was exacerbated further by the late delivery of the subsequent aircraft, such that there were only three aircraft by July 2003, none of which were fully capable for maintenance or flight training. Additionally, the computer system used to both troubleshoot the aircraft and document maintenance actions, the Integrated Maintenance Information System (IMIS), is not fully functional. This system, which is the only Air Force interface to the onboard computer system on the aircraft, provides the only means for determining aircraft and aircraft system flight worthiness. In simplistic terms, the aircraft basically monitors itself, detects suboptimal performance, troubleshoots the problem, and provides the maintenance technician with both the problem and a recommended solution. This only can happen with the proper interface, which, for the maintainers, is the IMIS portable terminal they connect to the aircraft. As it stands right now, the IMIS terminal has not been programmed with the full range of troubleshooting software required to support flying operations. In many cases, the technician needs to consult with the Lockheed field service representative (FSR) to interpret the fault codes provided by the onboard systems. Worse yet, the FSRs do not have the capability to discern between grounding and nongrounding conditions. Nearly every fault code must be transmitted back to the Lockheed plant at Fort Worth, Texas, for evaluation by engineers, further delaying the repair process.

One final note worth mentioning is the fact that this aircraft was designed with its own unique support equipment. In particular, this aircraft uses aerospace ground equipment that is incompatible with that of North Atlantic Treaty Organization allies and with existing equipment in use in the Air Force. This equipment uses higher hydraulic pressures, voltages, and frequencies and is large and very heavy. This means that the aircraft will have a significant mobility footprint for some years to come, as needed support equipment to conduct contingency operations will not be readily available at bases other than those that have F/A-22s already assigned.

In summation, while it is undeniable that we need the F/A-22, it also is undeniable that we are pushing this aircraft to production before it is ready. Conducting DT&E and OT&E concurrently does not allow sufficient time to identify and resolve the myriad of technical issues that arise as a natural part of the test and evaluation program. Pursuing low-rate production before the testing phase is completed ensures large perturbations in both schedule and cost in terms of retrofits to correct deficiencies in production

aircraft and redesigns for aircraft on the production line. In both these cases, the desired product is delayed further from entering service, and the cost of the product per unit continues to grow. This is different from the spiral development of a system that first produces a few end items, tests them fully, integrates the improvements into the next lot, and continues with the testing and integration of the improvements through subsequent lots. The F/A-22 program has been described as the *big bang* approach,¹⁹ a program where you try to incorporate everything into the final copy, instead of improving a basic capability incrementally over time and through extensive testing. The bottom line is that the F/A-22 will not be ready in time to replace the F-15 in the next 10 years, and it is likely that the Air Force will be able to field only a small number of F/A-22 aircraft (225-235) because of budgetary constraints. That said, there is no question that a significant number of the 500+ F-15 aircraft in inventory will be around until 2020 or later to make up the shortfall.

What Is the Threat?

Up until September 2002, the Raptor was known as the F-22 air superiority fighter. Its sole mission was to gain air dominance over an adversary by defeating the enemy in the air. Few would doubt that it has the potential to be, by far, the most advanced air-to-air fighter in the world. Considering the expense to which this country has gone to provide that capability, it is unlikely that any other country on this planet has either the capability or the capital to produce anything that could rival it in the near future. While the expense has been astronomical, no one would second-guess the decision to produce that capability if it was what we truly needed. This has been the central question concerning this program over the last few years: what do we really need? The official Air Force position is that it needs 381 aircraft to meet the requirements dictated by the needs of the ten air expeditionary forces. Budget realities will dictate that the Air Force will receive a considerably smaller number of aircraft, somewhere in the 225-235 neighborhood, given the congressionally mandated production cost cap. If the cap is not removed, how many aircraft will we really need to do the mission, and exactly what mission will it need to perform? In an apparent move in reaction to the increased scrutiny of the F-22 program, in September 2002, the Chief of Staff of the Air Force quite appropriately redesignated the F-22 as the F/A-22, reflecting the changes in the National Security Strategy and the new threats posed by terrorism. Before the terrorist attacks on 9/11, the prevailing thought among F-22 proponents was that the aircraft was needed to counter emerging fighter threats in Europe, China, and Russia. These threats were illustrated by the development of the MiG-29C and the family of Sukhoi aircraft, which included the SU-27, 30, 33, 35, and 37. This also includes variants of these aircraft being built by China under contract to Sukhoi and the MiG corporations in Russia and, to a much smaller extent, the Eurofighter, Rafael, and Gripen aircraft being produced in Europe. While these aircraft do possess some superior aerodynamic characteristics, they cannot be

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Road to Maintaining Relevancy: The F-15C

The biggest threat to US forces in the next decade will be antiaccess and area-denial capabilities as they relate to the proliferation of advanced IAD systems.

produced in sufficient numbers, and they do not have the logistical support needed to make them a significant threat.²⁰ Second, they do not have the robust pilot training programs necessary to employ these weapon systems in sufficient numbers, and they do not possess as large an aerial refueling capability as the Air Force. The aerial refueling capability alone ensures that we can put more aircraft into the air, with more munitions, and can loiter longer over the battlefield than anybody else. This issue notwithstanding, a simple head-to-head comparison of fighter aircraft fails to take into consideration some additional factors that ensure air superiority for the Air Force for many years. An article from *Defense Weekly* provides a good synopsis of the Air Force concept of air warfare.

Christopher Bolkom, an aviation analyst with the nonpartisan Congressional Research Service, said the US system of air fighting includes great situational awareness thanks to AWACS [airborne warning and control system] and surveillance aircraft, digital communication, excellent missiles, intense pilot training, as well as the jet itself. This combination is more than enough to deal with an enemy boasting just a good airplane.²¹

During recent appearances at the Air War College, numerous Air Force general officers have admitted that, while these aircraft possess advanced aerodynamic capabilities, some of those capabilities, such as the ability to flip in midflight, were not particularly applicable in a tactical sense. Given the following assumptions are correct, is there a way to leverage the advanced capabilities of the F/A-22 to counter those threats that we see as particularly difficult to solve, such as the antiaccess threat posed by advanced IAD? Additionally, can we integrate the F/A-22 into the existing fighter force in a limited way so that it takes advantage of its advanced technology while allowing spiral development of the aircraft to continue in order to provide an even more lethal weapon system in the years to come?

Are We Properly Leveraging the Capability of the F/A-22?

Given the fiscal constraints imposed on the F/A-22 program in conjunction with the technological challenges encountered thus far, it is safe to assume that the F/A-22 will not be acquired in sufficient numbers to completely replace the F-15C for the foreseeable future. Additionally, given that the current and near-term projected air-to-air threat can be defeated using the Air Force concept of air warfare described previously, what unique capabilities does the F/A-22 possess that can be used in the current strategic environment? The biggest threat to US forces in the next decade will be antiaccess and area-denial capabilities as they relate to the proliferation of advanced IAD systems. The combination of stealth; super cruise; and an active, electronically steered antenna (AESA), with radar modes that allow it to find moving and stationary ground targets, position this aircraft to be the perfect answer to this threat, as well as for any emerging threats in the Global War on Terrorism. While this aircraft will possess an unmatched capability to penetrate and defeat advanced

IAD systems, it will, at the same time, have to trade off its capability to engage in air-to-air combat. As it stands right now, the F/A-22 can carry only two 1,000-pound joint direct attack munitions (JDAM) in its weapons bay (or eight small diameter bombs) and, in doing so, gives up its ability to carry the AIM-120, advanced medium-range, air-to-air missile (AMRAAM).²² It would be left with the ability to carry only two AIM-9, short-range, infrared-seeking missiles for self-defense. Since we are only into the second year of low-rate production and have, thus far, produced less than ten aircraft, we can use the lessons learned thus far on the F/A-22A and produce something even better that not only takes advantage of the technology resident in the Raptor but also takes it to the next level. A better solution may be to expand the air-to-ground capability of the current configuration while retaining the inherent air superiority aspects. One of the possible solutions to this puzzle is embodied in the proposed design of what commonly has been referred to as the FB-22. This aircraft is a delta-wing version of the original design that extends the bomb bay by 12 feet while extending the overall length by only 2 feet (eliminates the need for the horizontal stabilizers) and adds 4,000 pounds to the overall weight.²³ With these modifications, it gains the ability to carry up to 24 small-diameter bombs or 4 2,000-pound JDAMs, can carry up to 80 percent more fuel for greater range, and retains the ability to carry both the AIM-120 and the AIM-9 to engage air-to-air targets in the beyond-visual-range envelope.²⁴ In this scenario, it retains the ability to conduct both deep strategic attacks and defeat air-to-air threats simultaneously. This would seem to be the best solution for the future.

As it stands right now, the F/A-22, in its current configuration, provides limited utility at enormous expense. Shutting down the production of any commercial aircraft production line and canceling existing contracts entails significant costs, and in this particular case, we would waste the money already spent on research and development (\$35B).²⁵ As an alternative, Christopher Hellman of the Center for Defense Information, during congressional testimony, provided the following proposal that leverages the F/A-22 technology and would allow us to develop it into something we could really use.

Last year, I coauthored a paper that looked at various weapons programs and recommended alternatives to current Pentagon plans. As part of that paper, I recommended that the Air Force limit production of the F-22 fleet to a “silver bullet” force of a maximum of 120 aircraft.

A “silver bullet” buy will permit the Air Force to field one air wing (with training and attrition replacement). A force this size would allow the Air Force to learn about producing technically complex aircraft, permit the development of suitable operational tactics, and provide a sufficient force to perform any future missions that require the F-22s stealth characteristics and other improved performance capabilities.²⁶

In this scenario, we field the F/A-22 as currently configured (in reduced numbers) but continue to enhance the aircraft through spiral development and provide a near-term capability to defeat emerging threats. In the

The F/A-22, in its current configuration, provides limited utility at enormous expense.

Road to Maintaining Relevancy: The F-15C

The introduction of superior weapons into the field of battle does not always guarantee a positive outcome.

meantime, we take advantage of the lessons learned from the development of the Raptor and apply them to the design and construction of an improved F/A-22 or the FB-22.

While this seems to be the best solution for all concerned in the long term, it still does not address the ability of the F-15C to maintain its current superiority. Additionally, it does not address if the aircraft is supportable over the time period it will take to produce either significant numbers of the current F/A-22 or a combination of this aircraft and the FB-22. If the F-15C is not logistically supportable or if it cannot retain its lethality in the air-to-air arena, then the *silver bullet* position is not supportable.

Is the F-15C Still Viable?

While the introduction of an advanced aircraft such as the F/A-22 represents a quantum leap in technology and, as some would assert, a leap in capability, it does not, in and of itself, represent a panacea for the needs of the future. And it cannot pretend to answer all the questions of its detractors who assert that this aircraft is the wrong aircraft for the wrong mission. As we have noted throughout the history of armed warfare, the introduction of superior weapons into the field of battle does not always guarantee a positive outcome. With respect to airpower, the most vivid example of this point was the introduction of jet fighters into the European air war by the Luftwaffe. With the introduction of the Me-262 in late 1943,²⁷ the Luftwaffe certainly enjoyed a superiority that was unparalleled in the history of airpower. Yet, with sufficient time and unrelenting pressure from Allied fighters, the inherent weaknesses of this aircraft were discovered and eventually exploited. There have been those that contend that this aircraft was, in fact, defeated on the ground by the Germans themselves, by virtue of their failure to produce the jet fighter in significant numbers before 1944. While this is true to a great extent, the failure to produce significant numbers of this aircraft only masked an additional problem they would have experienced supporting jet aircraft in the field had they produced them in large numbers. With significant shortages of the specialized fuel for the jet engines, aircraft parts, and trained personnel to both fly and maintain these aircraft, it is doubtful they would have made much more of a contribution than they did. This situation is quite common anytime you field a weapon system that incorporates advanced technology that is leaps and bounds ahead of current expertise, especially when it requires specialized training, tactics, tools, support equipment, and personnel. Oddly enough, this brings us to the current situation we have with respect to the F/A-22—we will not be able to produce significant numbers of this aircraft (because of the congressionally mandated production cost ceiling discussed before). The materials and technology used in this aircraft will require highly specialized and experienced personnel to maintain and fly it (which we cannot produce because of a lack of aircraft). Manufacturing delays caused by a lack of experience (Lockheed Martin) in handling and manufacturing advanced materials associated with this aircraft (causing significant delivery schedule delays)

have contributed to a need to look at keeping the F-15C a viable platform until at least 2025.²⁸ So in a very real sense, the argument is not about whether or not the F-15C is still viable or not; the fact remains that we are going to have to keep it viable until we can develop the F/A-22 fully. Considering its progress thus far, that very well may be several years. Therefore, the more salient question should be, is the F-15C still supportable, and what will we need to do to keep it that way?

It Will Not Last Forever

In an article entitled “Close Air Support Criticisms,” considerable consternation and much debate were generated by an assertion in the *New York Times* that the Air Force was going to retire the A-10 aircraft.²⁹ Many reasons were cited for the purported need of the Air Force to retire the aircraft, including a sense of loathing for the close air support (CAS) mission, the price of needed upgrades to keep it relevant (upwards of \$1B), and the CAS mission could be performed by more than just the A-10. Of particular note was a comment in the article attributed to General Hal M. Hornburg, Air Combat Command (ACC) Commander, relative to keeping the A-10 viable, “While noting that the A-10 will serve for many years to come, it will not last forever.”³⁰ This comment is somewhat puzzling given the track record of numerous aircraft to not only fly for more than 35 years but also remain operationally effective and logistically supportable over that same time period. Some of these aircraft include the venerable B-52, KC/EC/RC-135, T-37, T-38, and U-2. While it is true that nothing lasts forever, the fact that the Confederate Air Force has kept some World War II aircraft flying for more than 50 years is indicative of what can be accomplished given the right amount of funding and leadership commitment. That is not to say that the B-17 is a viable platform in today’s combat environment, but the airframe itself can be sustained as long as it remains operationally effective. What has made the difference for the aircraft noted above and can keep any aircraft flying for an indefinite period of time is a commitment to a sustained, insightful, and comprehensive structural and avionics upgrade program that helps them maintain operational effectiveness and logistical supportability. To that end, what will the F-15C need to keep it *in the fight*? Any attempt to answer this question must address the problem in two specific areas: is the aircraft supportable from an engineering standpoint, vis-a-vis, can it remain operationally viable, and second, is it supportable from an economic standpoint?

Is the F-15C Supportable from an Engineering Perspective?

When drawing conclusions or determining the operational viability of the F-15C, the study was divided into two specific areas: structural sustainability and avionics operational effectiveness. With respect to structural sustainability, current force structure plans call for maintaining the F-15C operationally effective (viable) until at least 2025. During

Current force structure plans call for maintaining the F-15C operationally effective (viable) until at least 2025.

Road to Maintaining Relevancy: The F-15C

The F-15, unlike any other tactical fighter in the Air Force inventory, already has an established PDM interval (every 6 years) that drives the aircraft into the depot on a regular basis for modification, corrosion inspection, and paint.

several discussions with Wayne L. Davidson, Chief of Engineering in the F-15 System Program Office (SPO) at WR-ALC Engineering Division, he made it clear that the F-15C does not have any structural issues that would preclude it from flying well into the next 15 years. To that end, he provided the following via e-mail when asked to respond to the following question:

Can we keep the aircraft flying until 2025? Any showstoppers?

Answer: On the structure side, both analysis and fatigue testing indicate that the aircraft can get to 2025 at current usage rates and usage severity. There are no showstoppers on the horizon, just normal maintenance actions and sustainment. For the systems, there are no problems outside normal maintenance and replacements. Avionics can be maintained at the current capability as far as we can see. This status does not keep the aircraft up to date on threats or modernization to state-of-the-art electronics, so there is a bill to pay there in the future. Bottom line: no showstoppers for the backbone or operational things; modernization in avionics is necessary to remain viable.

Further discussion of some of the modifications needed to keep the F-15C operationally viable into the next 15 years will be discussed in the following sections. However, to give the reader a basic view of what the F-15 Engineering Division is looking at with respect to system and structural needs for the future, the following question was posed to Davidson:

What modifications will be required to keep the F-15 viable until 2025?

Answer: We have no plans to modify any structures or systems to reach 2025. We are doing some preferred spare upgrades in structures and in the electrical wires. Added here are some words from an e-mail sent to HQ ACC/DRA [Directorate of Requirements Air Superiority Division]-15 on this very subject:

To take the F-15C/D out to 2025, very few major efforts are required to keep the airframe sustainable. They are arc fault circuit breakers, rewiring, and vertical (stabilizer) replacements.

Normal sustainment activities must continue—such as PDM [programmed depot maintenance] and parts obsolescence, sustaining engineering, and so forth.

With respect to organic repair and modification capability at the depot (WR-ALC), Davidson stated that the air logistics center has more than sufficient capacity, facilities, and skilled manpower to handle the increased workload associated with an expanded PDM program that would incorporate many of the modifications provided here. One particular point that needs to be reemphasized is that the F-15, unlike any other tactical fighter in the Air Force inventory, already has an established PDM interval (every 6 years) that drives the aircraft into the depot on a regular basis for modification, corrosion inspection, and paint. While other tactical fighter programs must establish a separate modification plan, which includes separate funding lines and identifying a modification source (government depot or private contractor) each time they envision an operational need or encounter an engineering challenge, the F-15 is positioned to take advantage of an existing infrastructure, skill pool, and support plan.

With respect to obsolescence issues, Davidson provided the following:

So far, we are winning the battles with obsolescence. However, there is an obsolescence bill to pay now and until final drawdown is a reality. We estimate we are spending between \$10M and \$20M per year avoiding impact to mission capable rates. There are no industry support problems. Industry is on our doorstep daily, offering to help in any way you can imagine, from engineering to parts.

Therefore, from an overall perspective, the F-15C would seem to be sustainable and logistically supportable over the long haul. In addition, at least from a structural perspective, the aircraft is poised to conduct the lion's share of the air supremacy mission for the next 20 years.

In terms of maintaining the operational effectiveness of the avionics suite, there are numerous initiatives (in excess of 30) that will be required to keep the F-15C combat capable and viable into the next 20 years. As stated earlier, this article is not meant to provide a laundry list of everything that needs to be done to maintain combat capability. Instead, a review is provided of the priority modifications that are critical to keeping the F-15C operationally viable and synchronized with the needs of the Air Force through 2025. In that regard, the F-15 SPO has identified four avionics and avionics support modernization priorities for the fiscal year (FY) 2006 program objective memorandum (POM):

- F-15C support equipment
- AESA radar
- Advanced display core processor (ADCP+)
- Radar warning receiver³¹

With respect to the support equipment issues, there are three items that fall into the support category that are, nonetheless, critical to supporting the long-term health and viability of the F-15C. This includes procurement of an improved armament systems test set, which is quickly reaching its designed service life, and funding to address obsolescence issues until the new test set is fielded in FY08. In addition, a new tester will be needed to replace the programmer, loader, and verifier currently in use to load updated operational flight programs (which include threat updates for the radar warning receiver [RWR] system), known as the common aircraft portable programming equipment (CAPRE). The CAPRE is needed to support the installation of the ADCP+ and upgrades. Finally, continued support and development of the intermediate test stations used for troubleshooting and repair of avionics components will require considerable capital investment to keep the F-15C viable and, without sufficient funding, will render any intermediate-level repair capability at the base level almost nonexistent by FY08.

The AESA modification is probably the most important of the avionics upgrades needed to keep the F-15C operationally viable for the next 20 years. To understand why this modification is so important, the following is an excerpt from a recent brief the F-15 SPO provided to senior Air Force leaders:

Continued support and development of the intermediate test stations used for troubleshooting and repair of avionics components will require considerable capital investment to keep the F-15C viable.

Road to Maintaining Relevancy: The F-15C

The ADCP+ modification addresses obsolescence issues associated with numerous components, including the heads-up display and central computer.

What Is So Great About AESAs?

- Much more radiated power
- Instantaneous beam pointing
- Incredible reliability

Air-to-Air Advantages

- Much better detection of low observables
- 1.5 times better target acquisition range
- 1.2 times better radar identification range
- 2 times better number of simultaneous tracks
- 1.6 times better AMRAAM targeting range
- 2 times better number of simultaneous weapon quality tracks
- Improved AMRAAM accuracy

Air-to-Ground Advantages

- Multitask air-to-ground with air-to-air missions
- Increased SAR range and resolution—at least 2-3 feet at 85-95 NM
- Precise ground-moving target mode—multiple track, slow speed

Availability

- Ultra reliable
- No moving parts
- Few watts per radiator instead of kilowatts
- Many redundant parts (for example, LED brake lights)
- Thousands of hours between repairs³²

This modification will give the F-15C the *eyes* to see the enemy and the ability to engage them before the enemy even knows it is there and, coupled with superior C2 as provided by the AWACS, should give the F-15C a considerable advantage over any potential adversary for the foreseeable future.

The ADCP+ modification addresses obsolescence issues associated with numerous components, including the heads-up display and central computer. Essentially, it replaces three line-replaceable units (LRU), known commonly as black boxes, with just a single LRU. Additionally, it provides 5 times the amount of current computer processing and throughput and 12 times more memory, all crucial to supporting advanced weapon such as the AIM-9X. It is also programmed to have a 2,000-hour mean time between failures, critical to supporting expeditionary operations in an austere environment.³³

Finally, the RWR modification is designed to digitize the RWR suite and allow it to interface with the AESA radar outlined above. This modification will include upgrades to the entire tactical electronic warfare system suite, to include the internal countermeasures system, countermeasures dispenser, and electronic warfare system.

While this list of avionics modifications is not all-inclusive, it gives some indication of the magnitude of the effort to keep the F-15C operationally viable for the next 20 years. There are other issues that must be addressed as well, including engine sustainment issues, but at the present time, these do not represent a significant challenge in terms of

remaining ahead of emerging threats represented by near peer competitors. Additionally, the amount of money projected for engine safety initiatives (F100-100/220) in FY06 is only \$5M, and that pales in comparison to that programmed for the F-15E, F100-229 engine, currently \$15M.³⁴ Finally, this review was but a glimpse into what is needed in the future, beyond that which already has been funded and is being retrofitted into the F-15C, such as the Fighter Data Link and Joint Helmet Mounted Cueing System (provides AIM-9X capability). Having now reviewed the modification requirements, what will it cost to provide the enhanced combat capability represented by these modifications?

What Will It Cost?

As of the writing of this article, plans call for retaining 179 aircraft (F-15C) until at least 2025. As stated earlier, the F-15 is the only tactical aircraft in the Air Force inventory that has an established modification, corrosion, and paint program that drives the aircraft into the depot for periodic maintenance. The cost of this PDM visit is approximately \$2.8M per aircraft.³⁵ Incorporating the structural modifications outlined by Davidson will be an additional cost to the current PDM bill. Again, Davidson provides the following:

For information, the rewiring cost, including arc fault circuit breakers for 179 jets, is approximately \$320M. Vertical (stabilizer) replacement is approximately \$1.2M per aircraft. With the current plan to replace verticals during PDM, the \$1.2M would be added to the existing PDM cost, which is approximately \$2.8M. Total would be \$4.1M per aircraft.

As a reference, this would equate to approximately \$214M to replace the vertical stabilizers on the entire remaining F-15C fleet of 179 aircraft. Including the cost of the arc fault circuit breakers and rewiring, the projected cost of maintaining the structural integrity of the entire remaining fleet of 179 aircraft is approximately \$534M (320+214). This is a great deal of money until you compare it with the cost of a single F/A-22, which stands at approximately \$200M per copy. This is an important fact that should not go unnoticed; for the same amount of money it would cost to procure only three F/A-22 aircraft, we could modify the entire F-15C long-term fleet (179 A/C) with the needed structural modifications to keep it operationally viable for the next 20 years. This only takes into account the structural needs and does not account for the needed avionics modifications to keep it operationally viable over this same time period. Davidson was quick to point this out as well and provided the following comments.

Note this is at current capability. Does not include any enhanced capabilities such as AESA, air-to-ground, or digital EW [electronic warfare]. If you are looking at keeping the jet viable for current/future threats, then those items will need to be included.

Providing the enhanced combat capability represented by the avionics modifications described in the previous section takes both time and money. This capability cannot be procured overnight, and the entire fleet

Plans call for retaining 179 aircraft (F-15C) until at least 2025.

Road to Maintaining Relevancy: The F-15C

The F-15C can remain operationally and logistically viable well into the next 20 years.

of 179 aircraft could not be retrofitted completely until FY11. In terms of funding, the F-15 SPO provided the following funding estimates.

Decisions critical to mission viability of F-15 through 2025 will be made in the FY06 POM.

- More than \$5B in program cost estimates—30 different initiatives
- High-priority programs
 - Grounding Items (\$444M)
 - AESA (\$2.6B – \$3.1B)
 - ADCP+ (\$154M)
 - RWR upgrade (\$400M)
 - Modeling and simulation investment plan air-to-ground upgrade (\$36M)³⁶

Again, this review of both requirements and cost was not meant to provide the reader with a list of things that need to be done but instead was intended to provide a representation of the magnitude of the effort and an attempt to quantify what it will cost (in relative terms) and how that relates to the cost of the F/A-22 program. In keeping with the comparison drawn in the previous section between the cost of structural modifications needed to keep the F-15C viable and the cost of the F/A-22, we draw the same comparison relative to avionics requirements and the F/A-22. As noted above, current cost estimates to retrofit the entire remaining fleet of 179 aircraft is at least \$5B. The question raised here is, do we spend that same \$5B for 25 F/A-22 aircraft at \$200 a copy, or is the enhanced combat capability provided by a fleet of 179 F-15C aircraft a better or more prudent expenditure of the taxpayer's money? Including the cost of the structural requirements raises the total cost by another \$534M for a grand total of \$5.5B. If we do not foresee a near peer or peer competitor on the horizon for another 10-15 years, are there alternatives to buying upwards to 276 aircraft we may not need?

Conclusion

Without a doubt, in the absence of a near-peer competitor on the horizon and given the proper amount of funding, the F-15C can remain operationally and logistically viable well into the next 20 years. Conversely, while attempting to draw some logical conclusions and recommendations from this research, it became perfectly clear that the F/A-22 represents a quantum leap in terms of combat capability and technology. While it is a true step ahead, the technology embedded within this aircraft, not fully matured, needs to be developed and fully tested. Additionally, advanced technology fielded before it is fully developed, tested, and operationally exercised is of little value. This is certainly the case with the F/A-22, and while this aircraft could be truly revolutionary, it will never reach its full potential until we give the engineering and test

community a chance to get it right. Fielding this aircraft in an operational unit before it is fully developed only ensures it will not get the time and dedicated resources needed to work through the engineering challenges. As anyone who has been assigned to an operational fighter wing can attest, the number one priority is to complete the annual flying-hour program (FHP) and provide the required number of sorties to fulfill the requirements of the Ready Aircrew Program, also known as RAP (which measures pilot readiness). It should be noted that these two metrics, which are the measure of merit in the fighter world, are inexorably tied to one another and pose yet another impediment to developing this aircraft. For example, if the aircraft were not fully mission capable (one or numerous systems not available) because of engineering challenges, as is the case right now, it is possible to fly the correct amount of contracted flying hours but not meet the pilot training requirements set forth in RAP. But meeting the goals of the FHP without meeting the requirements of RAP only ensures that you will fly needless numbers of sorties of little training value and, once the engineering challenges are overcome, find yourself generating additional sorties to meet the RAP requirement. This is a never-ending spiral that lends itself to beating both aircraft and people into the ground trying to support a system that is not yet fully developed. This is why the F/A-22 needs to be procured in smaller numbers and allowed to be fully developed before deployed to a field unit.

Based on both research and personal experience with this aircraft at Nellis AFB, the F/A-22 or some derivative of it in its current configuration is, in fact, the aircraft of the future. However, acquiring any more than 120 aircraft is not prudent at this time. The best option to pursue is the purchase of a limited number of F/A-22 aircraft (*silver bullet* buy of 120) and assigning them to existing F-15C and F-15E units to develop them from an engineering standpoint, which gives an opportunity to develop the tactics and training, to include maintenance training, to fully leverage the capabilities of this aircraft. These aircraft could be assigned into squadrons of 18 primary aircraft, each with 3 attrition reserve aircraft, with one squadron going to each of the following locations: Langley AFB, Virginia; Eglin AFB, Florida; Seymour Johnson AFB, North Carolina; and Elmendorf AFB, Alaska. One squadron would remain at Tyndall AFB for pilot training (21 aircraft), and the remaining 15 aircraft would be dedicated to operational and developmental testing at Nellis, Eglin, and Edwards. This would provide an opportunity for significant spiral development of both air-to-air and air-to-ground missions and allow them to be tested properly and incorporated into the F/A-22 program. As noted earlier, this will give the opportunity to formulate, test, and refine a concept of operations for this aircraft and take full advantage of its unique characteristics. The reliance of third and fourth generation fighters on improved runways may provide the ability to destroy an opponent's air force on the ground even before it has a chance to use it. In this scenario, the F-15C could be used as a combat air patrol (high cover) for the F/A-22 as it penetrates (low level) enemy IAD and attacks enemy airfields. In the

The F/A-22 needs to be procured in smaller numbers and allowed to be fully developed before deployed to a field unit.

Road to Maintaining Relevancy: The F-15C

Purchasing fewer F/A-22 aircraft as they are configured ensures our destiny is not tied to an aircraft that may be ill suited for the needs of tomorrow.

final analysis, destroying an adversary's air force on the ground without a fight provides the best return on an investment in this technology.

This not only would provide the Air Force with the ability to fully develop the next-generation fighter properly but also would free up considerable funding to complete the modifications discussed earlier for the F-15C. Clearly, without a near-peer competitor on the horizon for at least 15 years, updating and improving the combat capability of the F-15C to meet the challenges over this same time period is the most prudent use of taxpayer money. Using this same timeframe to fully develop the F/A-22 will ensure that the aircraft will be ready to replace the F-15C when it is retired. Finally, while the aircraft is being tested and matured, we may find that derivatives of the current F/A-22, which can carry a greater payload such as the FB-22, may be better suited to fulfill the needs of tomorrow. As it stands right now, the F/A-22 has little more storage capability than the F-117, and we may find that we want or need additional payload capacity for the future. Purchasing fewer F/A-22 aircraft as they are configured ensures our destiny is not tied to an aircraft that may be ill suited for the needs of tomorrow. There is one additional issue worthy of mention here. First of all, the development of a long-range tactical missile, one that can be launched beyond both visual and radar range of opposing fighters, is crucial to the success of any aircraft we eventually employ. This concept, the ability to see your adversary before he sees you, and its influence on the success of air-to-air combat is steeped in history from the earliest days of World War I to Brigadier General Charles "Chuck" Yeager³⁷ right up to the current day. The true value of AWACS is the ability not only to see out in front of the fighters but also to vector them to the target, which, in effect, gives us the ability to see them first and give our fighters the advantage to shoot first. While stealth technology is, indeed, a huge advantage in combat, the loss of an F-117 over Serbia a few years ago demonstrated that technology is not a guarantee of success and, more important, proves that it does make aircraft invisible. Not only that, it must be remembered that stealth by itself will not shoot down aircraft. As the secrets of stealth technology begin to be revealed, as is the inevitable demise of all military technology, we must continue to develop advanced missiles and radar that will give us that first shot advantage. Any nation that fields an effective missile capable of being launched beyond both radar and visual range of an opposing fighter will have the upper hand in any future scenario, regardless of the type of aircraft it is launched from.³⁸

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Lieutenant Colonel Gerry Gallmeister, USAF
Colonel Steven R. Jones, USAF

The air expeditionary force and resulting force modules provide a process that focuses on our daily operational business and establishes a planning cycle for an expeditionary air force. Replacing the F-16 with the F-35 will reduce the number of C-17 loads by reducing the logistics footprint to deploy, reduce the need for additional spare parts because less parts operate the F-35, and allow other C-17 missions to support US and coalition force.

Reserve Forces

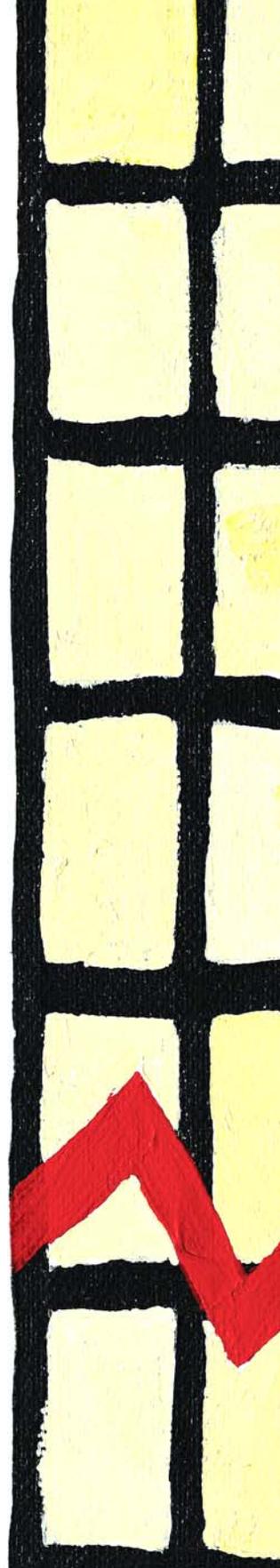
F-16 Block 30 Fleet

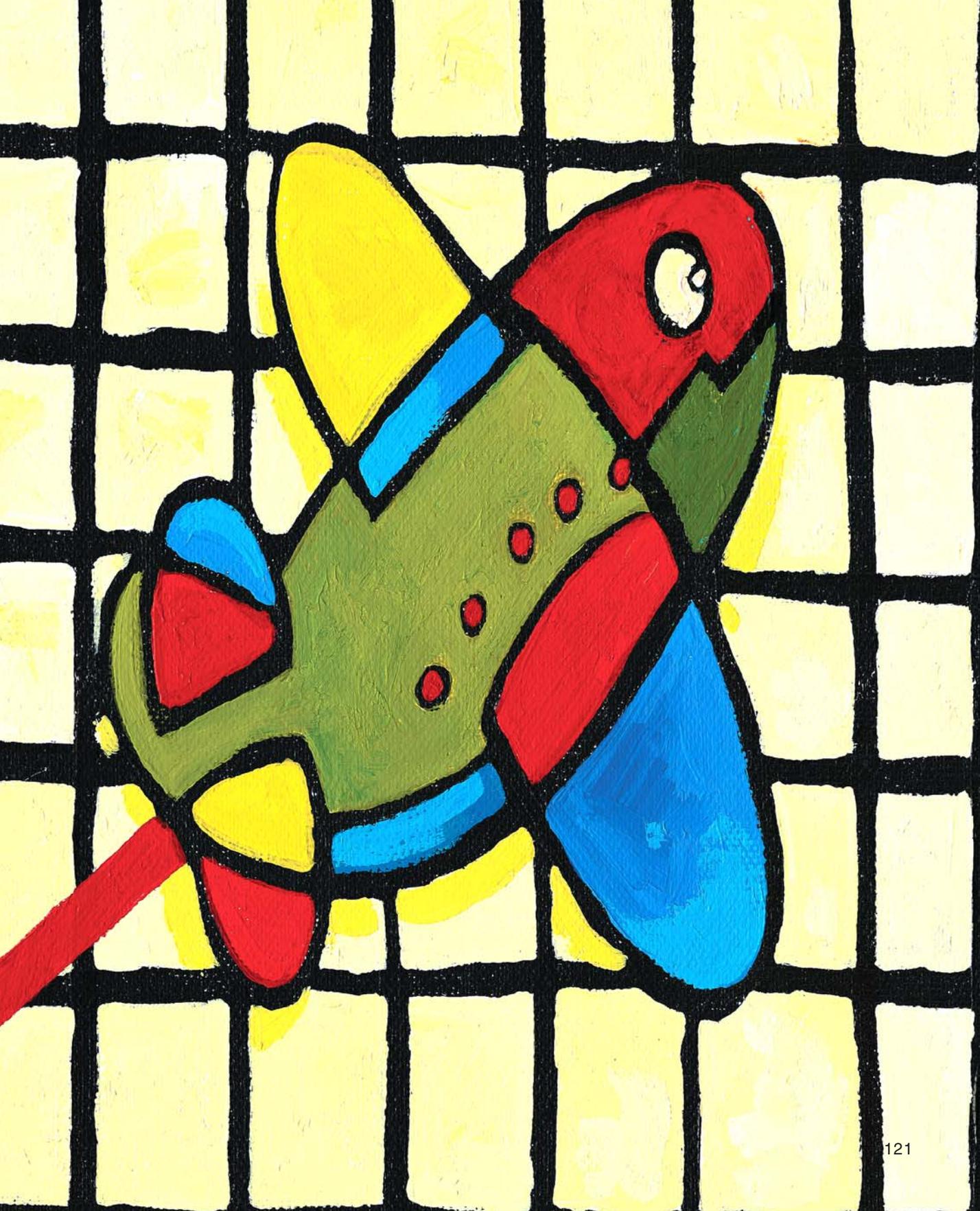
Introduction

The very serious responsibility for maintaining what we are given is based on the hard reality that we will never have all the equipment, supplies, facilities, and funds we require. On the battlefield, we will be short because of combat losses, accidents, [and] interruptions in the supply system, or just insufficient resources to fill all needs. Thus, a well-trained soldier must be taught to maintain and conserve what he has—in peace and in war.

—General John A. Wickham, USA

Air National Guard (ANG) and Air Force Reserve Command (AFRC) F-16 block 30 aircraft are mature aircraft nearing the end of their programmed life cycle. However, Air Reserve Component (ARC) leaders and maintenance managers have developed new enhancements to the aircraft, allowing it to remain lethal, relevant, and combat ready.





Reserve Forces: F-16 Block 30 Fleet

The F-16 block 30 fleet average for the ARC is nearing 4,000 hours.

In 2002, the Air Force designated the F-35A to be the replacement for the F-16, F-117, and A-10. The first scheduled deliveries are to begin in 2007.¹ This is of great concern and a problem for F-16 program managers because of the cost of maintaining this weapon system as it nears the end of its life expectancy. This disconnect of diminished F-16 service-life expectancy and full-scale production rates of the F-35, projected for 2012, create a dilemma for military planners in meeting the national security strategy.

In January 1999, the Department of Defense (DoD) pulled three ANG F-16C/D units out of deployments to Southwest Asia because they lacked precision-strike capabilities. Combatant commanders believe these aircraft did not have the capabilities considered essential for any air campaign: precision bombing, night vision, and up-to-date countermeasures.² This edict would prohibit nearly all the ARC F-16 block 30 aircraft from participating in air expeditionary force (AEF) rotations and challenge the ARC to step up; meet combatant commander requirements; and in turn, become the envy of the F-16 fighter community.

F-16 modernization efforts and the delayed fielding of the F-35 drive up the cost to the taxpayer. Future DoD budgets will compete primarily with two national priorities. The first is the War on Terrorism, and the second is an aging baby boomer population that is demanding additional and costlier social welfare programs. While this may seem to be a political concern in terms of national priorities, the Services will be competing with one another for limited resources in the 2012 to 2015 outyear budgets. Air Combat Command (ACC) will continue to be handicapped fiscally by Air Force absorption of cost differentials for overruns of new aircraft entering service and modernization programs for legacy aircraft to remain viable to support the War on Terrorism.

Relevancy of Air Reserve fighter forces is at the forefront of ANG and AFRC senior leadership concerns. The analysis and conclusion of this research will provide Air Force leadership and planners alike a beginning for debate to decide a course of action to fulfill the timing and delivery of the F-35 to ARC F-16 block 30 fighter wings.

Status of the F-16 Block 30 Fleet

General William Bergert, Commander of the Pacific Air Forces, stated, “The challenge is we have aging airframes, whether you’re talking about fighters, helicopters, tankers, airlifters, you go right down the list they are all old [and] I worry a lot about keeping airplanes flying, keeping the mission-capability rate up.”³

The F-16 block 30 fleet average for the ARC is nearing 4,000 hours. F-16C block 30 series aircraft include all 25, 30, and 32 airframes. Total aircraft is 604 with 382 in the ANG, 52 in the AFRC (block 30 only), 222 in the active component. All F-16C block 30 aircraft (less active-duty Luke AFB, Arizona, aircraft) are capable of carrying a Litening II laser-designator pod and Situational Awareness Data Link (SADL) location communication suite.

The average age of the ARC aircraft is 18 years. There are three Service Life Extension Programs (SLEP) planned for this aircraft. The first program is Falcon UP. This funded program will enhance the structural integrity partially and operate up to 3,750 flying hours. The Structural Life-Improvement Program (SLIP) is the emergency structural gap filler between the two major upgrades. The last planned structural program is Falcon STAR for the F-16 block 25 to 52 series aircraft. However, ACC and Ogden Air Logistics Center (ALC) planners are anticipating full funding of block 30 and block 40 aircraft. F-16 block 30 and block 40 upgrades may depend on F-35 delivery schedule.

Airframe Utilization

The average aircraft age in the Air Force fleet was 17 years in 1991, according to the Air Force Posture Statement 2002. In 2001, this rate increased to 23 years and is estimated to be 24 years in 2006. In keeping with the planned future aircraft acquisitions, this number continues to increase to 28 years in 2016 (Figure 1).⁴

ANG and AFRC F-16C/D block 30 aircraft have exceeded the initial recommended service life of 8,000 airframe hours. The current ANG fleet average is 3,886 airframe hours. In the late 1990s, the ARC recognized there was no follow-on replacement for the F-16 and reduced the annual flying-hour program in ANG and AFRC squadrons to 210 airframe hours per year. This number is a generalization with some fighter squadrons flying more to support spinup training and actual overseas AEF deployment rotations of Northern and Southern Watch.

However, over the last 2 fiscal years, the aircraft have flown an average 300 hours per aircraft, way beyond their programmed 210 flying hours used in support of contingencies at home and abroad.⁵ Fiscal year (FY) 2002 saw ANG and AFRC aircraft heavily taxed in support of Operation Noble Eagle. Combat air patrol flying conditions were favorable to slow

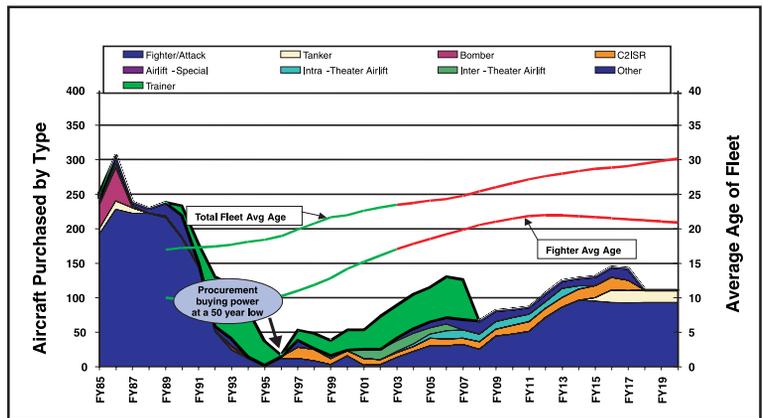


Figure 1. Aircraft Age Continues to Increase

Reserve Forces: F-16 Block 30 Fleet

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Reserve Forces: F-16 Block 30 Fleet

There are two primary reasons for the steep increase in the cost of depot maintenance for the F-16.

the effect of upper and wing-support bulkhead cracking caused by excessive wing root bending movement.

FY03 saw continued support for Operation Enduring Freedom (Afghanistan) and excessive use of F-16C aircraft supporting Operation Iraqi Freedom. These contingencies resulted in additional stress on the bulkheads and airframes alike. This was caused by excessive munition loads and heavy landings to deliver the payload during combat in support of close air support and air interdiction missions.

Simple calculation of 210 airframe and flying hours per year would mean the fleet would be able to support missions for another 19 years. At 300 airframe and flying hours, that number is reduced to 13 years or a 32-percent reduction. These numbers are actual flight hours. To receive a true meaning of the impact on the airframe, one needs to calculate using equivalent flight hours. Equivalent flight hours are the actual accounting of structural degradation that is determined from damage index data stored in the individual aircraft-tracking database, which is part of the aircraft structural integrity program.

Additional considerations for airframe utilization, while determining the state of the F-16C/D block 30 fleet, are depot cost to repair and comparison in the safety mishap trend of the ANG, which is an indicator on the health of the fleet.

Depot Cost to Repair

Rising depot cost and time to complete depot throughput on schedule drive up the cost to maintain legacy F-16C aircraft. There are two primary reasons for the steep increase in the cost of depot maintenance for the F-16. The first is structural cracks discovered during heavy depot maintenance to inspect for corrosion, and the second is the machining required to repair the cracks.

ACC's goal is to fly the F-16C/D to 8,000 hours with SLEP that includes Falcon Satellite Transponder Availability and Reservation (STAR) depot upgrades. Current funding is available to support F-16C/D block 25 to block 52 aircraft. Falcon STAR upgrades are scheduled for primarily assigned F-16C/D block 30 aircraft early in the program before the block 40 and block 50. The low rate of production and delays of F-35 schedule should ensure funding for all ARC F-16 block 30 aircraft.

The cost to submit one F-16C block 30 fighter aircraft for Falcon STAR input is approximately \$870K and takes an average of 150 days to complete the modification. This is nearly twice the cost to perform maintenance on SLIP at \$400K and 120 days with Falcon Up: a relative bargain at \$250K and 90 days to complete.

The total number of flying hours on the airframe drive the depot input. Cost factors to determine the economic break, even of an aircraft for input of long-term storage, should consider total cost of Falcon UP, SLIP, and Falcon STAR upgrade modifications, plus the total number of normal depot inputs, paint and corrosion maintenance, and flying-hour cost.

One option worth consideration is no depot submission of the F-16 block 30 aircraft. Funding planned for these programmed aircraft inputs should support heavy maintenance and Falcon STAR upgrades on lower airframe hours for F-16C/D block 40/50 as they transition into the ARC inventory.

Depot maintenance is the renewal of the aircraft. Cost to renew legacy equipment may not make economic sense. Purchasing the F-35 is an alternative to spiraling depot cost.

Safety Mishap Trends

The F-16 has proven to be one of the safest aircraft per flying hour in the Air Force. The ANG started flying the earliest version F-16A block 10 in 1984.

The ANG transitioned a large number of fighter wings from older and less maneuverable F-4s and A-7s to early model F-16A. During those transitional years of 1991-1994, the ANG experienced a large number of Class A mishaps. This was mainly the result of going from a moderate *G* performance, late 1950's design aircraft to the high *G* performance aircraft of the 1970s. In addition, the F-16 is a higher technology aircraft that requires pilot physical conditioning to perform up to nine *G* maneuvers and requires a greater understanding of aircraft systems.

In the last 10 years, the ANG F-16 mishap rate dropped from a high of 4.99 per 100,000 flying hours in FY94 to an all-time low of 1.38 per 100,000 flying hours in FY03. This rate, when compared to the active-duty rates of 4.07 in FY94 and 3.78 in FY03, shows a dramatic increase in ANG mishap prevention. The lowered rate for ANG mishaps is a result of operator and maintainer familiarity with the F-16C even during the high-operational tempo of overseas deployments and combat operations in the Middle East.

Engine failure is the leading reason for ANG F-16 class A mishaps over the last 10 years. Of the 32 class A mishaps, 14 were identified as engine failure. This 44-percent failure rate of all F-16 mishaps is alarming to aircraft maintainers but within acceptable overall class A mishap rates. The Pratt & Whitney (P&W) 220E engine had a better reliability rate during this period, with six motor failures, than the General Electric (GE) 110 engine, with eight motor failures. Table 1 shows the F-16 class A mishap breakout by year and date of accident, airframe and engine type, and reason for failure with the two leading indicators being engine failure and pilot error.

The analysis of these data identifies the need for continued reliability and increased emphasis on sustainment for both the Pratt & Whitney 220E and General Electric 110 engines. The ANG (with support from congressional funding and National Guard Reserve Equipment Account funding) has invested millions of dollars to upgrade Pratt & Whitney 200 engines to the more reliable and maintainable 220E configuration. This forward-thinking leadership decision in the middle 1990s has paid a great safety mishap dividend for ANG aircraft.

Engine failure is the leading reason for ANG F-16 Class A mishaps over the last 10 years.

Reserve Forces: F-16 Block 30 Fleet

ARC fighter squadrons are dependent on trickle-down legacy aircraft from the active forces.

Future options in the outyears (2010 to 2017) to support the F-16 Block 30 program include replacement of new engines. By 2010, the F-16 production line will shut down and so will the engine lines in favor of supporting the F-22 and F-35 aircraft programs. One alternative is to make capital expenditures to purchase additional engines while the production lines are still open, knowing that engines will be a major component in supporting the long-term sustainment of the F-16 fleet (Figure 2).

Sustainment Cost

ARC fighter squadrons are dependent on trickle-down legacy aircraft from the active forces. The only exception to this statement is F-16 block 50 aircraft assigned to the South Carolina ANG. History has shown that these aircraft systems lack funding to upgrade their capabilities to stay on par with the active Air Force.⁶

Funding to sustain and upgrade reserve forces aircraft will continue to be a problem in the future. Reserve forces leadership must aggressively seek out program funding to support the increasing combat capability requirements to support missions assigned to the air expeditionary force, Operation Noble Eagle.

A recent RAND study commissioned by the Government Accounting Office (GAO) assessed the sustainment funding for the F-16 as yellow, “because current and projected funding is not consistent with the Air Force’s stated requirements to sustain and replace the F-16 inventory.”⁷ Additionally, the study projected that potential shortfalls in funding for depot maintenance programs and modifications during the next 3-5 years will result in a backlog of not mission capable aircraft that may affect readiness and the Air Force’s ability to support deployment requirements for the Global War on Terrorism.

Electronic Warfare

In today’s air warfare environment, the biggest threat to all aircraft operating in the battlespace is mobile shoulder-launched missiles and surface-to-air missiles. The best way to defend and defeat this threat is by using electronic countermeasures. ARC weapons officers at the squadron level have been very successful in persuading leadership and programmers that self-defensive measures save money in terms of pilots and aircraft.

The F-16 block 30 has been upgraded and is combat-ready against known threats around the world. Relevancy continues by the use of SADL, radar-warning receiver antenna optimization, and enhanced ALQ-213 countermeasures using M-211/B flares. Aggressive testing by the ANG AFRC Test Center (AATC) keeps the block 30s ahead of the F-16 fleet and standard bearer for electronic-countermeasures development.

SADL is an off-the-shelf Army tactical radio that is jam-resistant and increases situational awareness blue-force tracking, preventing fratricide of friendly forces. Continuous improvement and testing allow ground forces to be tracked by SADL and imported to the Link-16 format by the transparent multiplatform gateway developed at AATC.⁸ This capability

to track ground and air forces self-designates block 30-equipped SADL aircraft as F-16C+.

Reserve Forces: F-16 Block 30 Fleet

The ALQ-213 countermeasure set is a preemptive and reactive mixture of covert and conventional flares. The purpose of this capability is a requirement to provide a cost-effective flare capable of defeating modern

2003 25 Sep 03 22 Sep 03	F-16B (P&W 220E) F-16C (P&W 220E)	Wire strike during SFO Second stage blade failure on A/G mission
2002 11 Sep 02 10 Jan 02	F-16C (GE) F-16C (P&W 220E)	Engine failure on A/G range Loss of control during rejoin
2001 26 Jul 01 12 Oct 00	F-16C (GE) F-16CG (P&W 220E)	Engine failure during A/A Engine failure during A/A
2000 31 Aug 00 17 Nov 99	F-16C (GE) F-16CG (P&W 220E)	Third stage blade failure in A/A MOA Mid-air during night intercept (1 A/C destroyed)
1999 18 Jun 99 17 Nov 98	F-16DG (P&W 220E) F-16C (GE)	Third stage blade failure on A/G range Engine failure during A/A
1998 13 May 98 22 Apr 98	F-16C (GE) F-16CG (GE)	Bird strike at low-altitude/high-speed ejection CFIT during night weapons delivery
1997 16 Sep 97 20 Jun 97 07 Jan 97 27 Nov 96 21 Nov 96	F-16D (P&W 220E) F-16C (P&W 220E) F-16A (P&W 220E) F-16D (GE) F-16A (P&W 220E)	Mid Air with F-16C during NVG rejoin GLOC during ACM engagement Spatial disorientation/task misprioritization Out of control, engine failure/oil starvation Low pressure turbine failure
1996 07 Jun 96 19 Mar 96 20 Jan 96	F-16C (GE) F-16C (GE) F-16CG (P&W 220)	Engine failure Number one bearing failure, misaligned front frame Fuel starvation, operator induced (failed P&V valve)
1995 13 Jul 95 25 Jun 95 15 May 95 05 Feb 95	F-16A (P&W 220E) F-16C (GE) F-16B (P&W) F-16CG (GE)	Low pressure turbine failure(BOAS, 3 rd , 4 th ?) Factory misaligned VSV's, HCF failure Loop clamp failure, failed to inspect at 200 hours Rabbit feature failed in the HPT
1994 01 Jul 94 12 Jun 94 30 Mar 94 28 Feb 94 07 Feb 94 29 Nov 93 09 Nov 93	F-16B (P&W) F-16A (P&W) F-16C (GE) F-16A (P&W) F-16CG (P&W 220) F-16A (P&W) F-16C (GE)	Bird strike at low altitude out of the MOA Rudder trim full right on takeoff Runway departure due to poor braking techniques G induced loss of consciousness Fourth stage FDT blade broken due to HCF Spatial disorientation High-pressure turbine shroud failure

The biggest threat to all aircraft operating in the battlespace is mobile shoulder-launched missiles and surface-to-air missiles.

Table 1. ANG F-16 Class A Mishap Breakdown (All Aircraft)

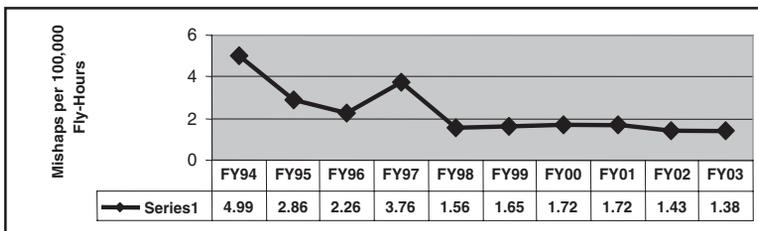


Figure 2. ANG Class-A Mishaps

Avionics modernization and keeping the ARC 434 F-16s relevant is a top priority for Congress, ANG, and AFRC leadership.

fielded infrared-guided air defense missiles. Desired dispensing coverage is up to 30 minutes and is adapted to fly on A-10 aircraft. Successful testing could lead to suspension of MJU-50/B flares, resulting in logistical cost savings.⁹

A 5 January 2004 press release from Headquarters Air Force Materiel Command (AFMC) announced a government and private industry partnership for the repair of ALQ-213 systems. This partnership is the result of acquisition reform *lightning bolts* first proposed by the Clinton administration. The partnership will team Warner-Robins ALC and Terma Corporation, from Denmark, for the repair, testing, and support of electronic warfare components for the ALQ-213 system.¹⁰ The result will be a reduced repair time from 68 to 14 days. Additional avionics components are considered for this type of outsourcing as vendors are no longer willing or able to compete for repair of aging components.

The ALR-69 radar warning receiver optimization effort is another ARC initiative that enhances a capability for all preblock 40 F-16, A-10, A/C-130, and HH-53. This set is a legacy system originally designed in the 1970s and upgraded in 1996. AATC recently tested the effectiveness of a new antenna optimization configuration. Installation included additional antennas and moving existing antennas for better detections. In addition, a 1553 bus was added to help supply audio and visual cues, allowing aircrews to identify radar threats and take appropriate tactical action.¹¹

Efforts made by ARC leadership and programmers, based on threat assessment, clearly demonstrate the countermeasure capability inherent in the F-16C aircraft. When measuring effectiveness, the aircraft can perform current-day mission requirements and defeat the enemy's surface-to-air capability. In today's limited funding environment, modernization of F-16 electronic countermeasure is money well spent to maintain optimization and the worldwide capability to combat our enemies.

Avionics Upgrades

One of the greatest costs to keep the F-16C/D block 30 aircraft viable is the continued cost of upgrading avionic suites to meet new mission threats and advances in technology. The first F-16 flight was in 1975 with design work and testing occurring in the late 1960s and early 1970s. Smaller computer chips with 64k capacity and limited reliability render most systems on the F-16 legacy equipment. Fortunately, commercial off-the-shelf technology can improve capability and reliability.

Avionics modernization and keeping the ARC 434 F-16s relevant is a top priority for Congress, ANG, and AFRC leadership. Fortunately, the ARC has been able to meet the combatant commanders' requirements of night vision, precision bombing, and up-to-date avionics by successfully pleading with Congress for additional funding to the ANG and AFRC equipment account. However, continued upgrades are not likely without congressional support because of siphoning of modernization dollars to support F-22 avionics shortfalls.

The ARC leadership deserves a great deal of credit for managing and providing support for the F-16 block 30 fleet. There are many great policy decisions to support this aircraft. One such decision was to allow the systems program office at Ogden ALC to manage the ARC's desire for spiral development of software capability upgrades (SCU). The software capability upgrade is managed professionally by a dedicated team to providing continuous upgrades and short-notice capabilities to the aircraft. Great dividends were earned by the decision to deliver global positioning system-guided munitions in less than 4 months in support of Iraqi Freedom.

The test facility for the F-16 block 30 fleet is the AATC. The types of tests performed at this facility are force developmental evaluations and operational, test, and evaluation. A few current avionics tests that will continue to keep the aircraft relevant and meet the combatant commanders' requirements are the Joint Helmet Mounted Cueing System (JHMCS-partnership with Greece), Modernized Programmable Signal Processor, Commercial Central Interface Unit, radar upgrades (APG-68v9), and SCU-5C (color). These tests are evaluations and may not have funding to support fielding of the project.

The focus of avionics upgrades is to modernize the cockpit and benefit from current technologies and continuous improvement of current systems. Programmed funding for most of these projects does not exist. These tests are merely demonstrations to determine the effectiveness of new technologies. The decision to purchase these capabilities is an Air Force corporate decision based on threat and cost savings. The pinnacle decisionmaking process is, when will the Air Force fleet viability board decide that is it no longer economically feasible to provide capital expenditure to support upgrading legacy aircraft in favor of purchasing the newer F-35?

The focus of avionics upgrades is to modernize the cockpit and benefit from current technologies and continuous improvement of current systems.

Structural Integrity

The number one problem concerning systems program office structural engineers at Ogden ALC, Ogden, Utah, is upper backbone bulkhead cracks. The second leading problem is under panel corrosion for aircraft located near or flying over salt water. Bulkhead cracks that are not properly repaired and sealed cause unrestricted fuel leaks. In addition, cracks developed in the upper backbone area will migrate to develop cracks in other locations along the mid section of the aircraft (Figure 3).

To understand how to repair these bulkhead cracks, one must know how they developed. Simplistically, bulkhead cracks develop because of increased aircraft usage (flying five to nine *G* design for preblock 40 aircraft), increased gross weight (overall and weight on the wings), and design (operational requirements documents called for a lightweight fighter). The bottom line is the load *exceedance* numbers are being experienced at weights heavier than design. A significant number of ANG aircraft have some sort of weight and maneuver restrictions because of upper bulkhead cracks.

Reserve Forces: F-16 Block 30 Fleet

An increased number of bulkhead cracks will limit or severely restrict the use of these aircraft for AEF deployments, combat missions, and local training missions, eventually rendering the aircraft noneffective and obsolete.

The design for ARC F-16C/D block 30 aircraft is 26,910 pounds gross weight on takeoff roll. Fortunately, original design specification allowed for some limited growth over early model block 10 aircraft with a gross weight of 22,500 pounds. Overall, this 4,410-pound increase did make a difference when determining the number, type, and location of bulkhead cracks.

The solution to repair bulkhead cracks that can await depot maintenance is a multiple structural improvement program called *Falcon UP*. This package is from the block 40 Falcon UP repair, minus three engineering change proposals and improved structural design. There is authorization for some field-level maintenance, with keen oversight from depot structural engineers, to repair some types of 341 and 357 bulkhead cracks (TCTOs 1832/1946). This repair is a banana patch and is a temporary repair with mixed results until the depot can replace the bulkhead or it is determined to divest the aircraft to the Aerospace Maintenance and Regeneration Center (AMARC) at Davis-Monthan AFB, Arizona.

There are five solutions recommended to slow the growth of bulkhead cracks for the block 30 aircraft that include accumulation of data gathering and passive changes to the way pilots operate the aircraft. Specific changes directed to fighter squadrons and maintenance personnel include using symmetrical loads (ballast) on outer wing stations 1,2,8,9 rotate aircraft to different locations; schedule aircraft with restrictions to support training missions; monitor the fleet; and ensure accurate data are used to determine degradation of the cracks.

An increased number of bulkhead cracks will limit or severely restrict the use of these aircraft for AEF deployments, combat missions, and local training missions, eventually rendering the aircraft noneffective and obsolete. With continued excessive use, flying more than 300 hours per aircraft, per year, and less than full funding for Falcon UP and Falcon STAR upgrades, the F-16 block 30 aircraft could be divested in less than 11 years—far short of the 2017 planned retirement.

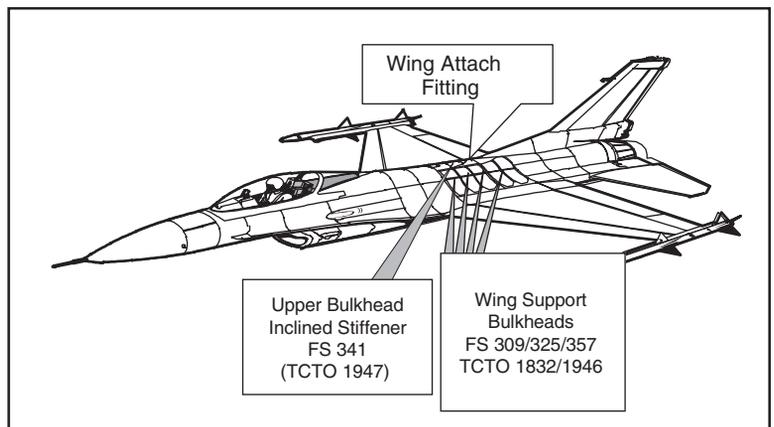


Figure 3. F-16 Structure

F-16 Aircraft Electrical Wiring

Reserve Forces: F-16
Block 30 Fleet

One of the biggest challenges for aircraft maintenance engineers and mechanics is troubleshooting electric wiring anomalies because of extensive use of kapton wiring. Critical flight control operations are dependent on 1970's era fly-by-wire technology using kapton wiring. The Air Staff and AFMC have increased emphasis on aircraft wiring for two different reasons as the average age of this aircraft becomes 18 years old.

Pilot safety and cost to operate provide the basis for concern. Findings of the TWA Flight 800 accident safety board concluded stray voltage from kapton wiring running through a fuel cell probably caused that accident. Conversely, the time spent troubleshooting aircraft wiring and *swapping out* black boxes is estimated to cost up to 10 percent or more of the total maintenance cost according to the Aeronautical Systems Center Aging Aircraft Division at Wright-Patterson AFB, Ohio. Obvious impacts include lower mission capability rates and higher cost-per-flight hour.

The Air Force approach to wiring problems is reactive and not proactive. A recent maintenance operational utility evaluation test—sponsored by the Aging Aircraft Division and conducted by AATC at Tucson, Arizona—concluded that commercial aircraft wiring testers and analyzers could not determine accurate distance to known fault.¹³ This finding demonstrated the difficulties placed on our technicians who troubleshoot electrical problems, find faults, and repair aircraft wiring. In addition, this test was the first successful demonstration, supported by Air Force research laboratories, to use voltage as a stimulus on military aircraft for detection of a downstream wiring anomaly.

The cost for fleet-wide replacement of kapton wiring during depot maintenance exceeds the cost for increased downtime to troubleshoot and reduce mission capability. Only when safety mishaps result in excessive fleet-wide downtime will kapton wiring be repaired or replaced.

Comparative Analysis: F-35 Purchase Versus F-16 Retirement

ACC recently solicited Boeing and Lockheed Martin for pricing information proposals to purchase additional F-15 and F-16 aircraft. The request was for as many as two fighter wings or 140 aircraft. This request by ACC was discovered by senior program and acquisition managers—F-16s and F-15s in service now will reach the end of their service life before replacement aircraft are fielded.¹⁴ The motivation to purchase more aircraft may have been risk aversion for any additional delays in the F-22 or predicted developmental delays of the F-35.

Cost differential absorption of underfunded Air Force programs such as the new KC-767 tanker lease and purchase causes ACC to tie up to \$200M per year for the next few years, fiscally handicapping the organization.¹⁵ The result of these types of actions may result in a delay of full production and slippage in the acquisition schedule.

The scenario for the Air Force to purchase 1,763 F-35A/B aircraft could reduce to half that amount or approximately 800 aircraft.¹⁶ The motivation

Any interruption in the F-35 production time line will have devastating consequences in the retirement schedule for F-16 block 30.

Reserve Forces: F-16 Block 30 Fleet

The Air Force should purchase the F-16C block 50 and keep the F-16 production lines open.

behind this idea will be the competing 3010 dollars to purchase advanced, remotely piloted vehicles; purchase of additional cargo aircraft to support the War on Terrorism; and funding the excessive cost of space vehicles. Money cut from halving the total production buy of the programmed F-35 is an offset savings of approximately \$31B. This funding line can sustain a variety of aircraft that may include upgrading F-16 block 50s, C-17 modernization, and F/A-22 avionics software modifications.

Reducing the total number of F-35s purchased would allow the shifting of research funds for the next generation of combat aerial vehicles. Congressional emphasis is on unmanned aerial vehicles (UAV) for the next generation of combat vehicles. This type of aircraft will compete for limited resources in the 2015 to 2020 outyear budgets. Thus, Congress and Air Force military program managers inadvertently may set up the scenario of not having enough 3010 funding dollars to purchase the full amount of 1,763 F-35 fighters. Not having enough 3080 funding dollars to modernize and extend the F-16C fleet because of a reduced buy of F-35s will drive early divestiture. Finally, having to raid F-35 test program dollars to fund Congress' desire for the next generation of UAVs is bad program management.

The Air Force should purchase the F-16C block 50 and keep the F-16 production lines open. The need to compete for dollars in a fiscally restrained environment would cease to exist because there would be a logical sequence of purchasing enhanced F-16s as the Navy did with the F/A-18E/F. This F-16 purchase would serve as an insurance policy with aircraft delivered from 2005 to 2010. The result, should Congress delay or cancel the F-35 (as in the case of the F-22, C-17, and others), would be a manned fighter stopgap until the F-35 or UAV is in full production.

F-35 Introduction

General John Jumper (Air Force Chief of Staff) recently spoke at the Air Force Association's Air Warfare Symposium stating, "The old age and variety of aircraft and systems in the Air Force inventory require new solutions such as the F/A-22 and the lease of 767 tanker aircraft."¹⁷ He further stated, "We have an issue with the age of our air and space systems," and "new CONOPS of other services would drive AF modernization."¹⁸

The fact that he did not mention the F-35 may have been a simple oversight or perhaps a calculated move to downplay procurement of the aircraft. The Air Force plans to purchase 1,763 of the aircraft by 2028 with the US Navy, US Marines, UK Royal Air Force, and UK Royal Navy slated to receive another 830, for a total projected of 2,593 aircraft with potential security cooperation participation sales to eight other nations of another 1,500 aircraft.

The Navy recently announced it would slash 409 aircraft from its order based on a recent decision to purchase 400+ F/A-18 E/F/G Super Hornet fighter aircraft.¹⁹ This decision increased the estimated cost of the program to \$5.1B, 17 percent more than budgeted.²⁰ The total estimated budget cost is now \$40.5B. Cost per aircraft is between \$40M for the Air Force

variant and \$50M for the Navy and Marine Corps model based on the assumption of purchases totaling 4,000 aircraft.

The F-35 is more than 2 years into a 10½-year system development. Like most new weapon systems of the modern age, delays and cost inflation are the norm. The manufacturer of the F-35, Lockheed Martin Aeronautics, proposed an aggressive production schedule based on its experiences in building the F/A-22. Lockheed Martin initially proposed to do too much, too fast, and at too low a price. This came at no surprise to GAO auditors who warned the Air Force of the pending trouble.²¹ A 1-year design schedule recently was approved to identify known risks and account for adjusted cost estimates.

There are two major problems with the F-35 that cause a delay in the program. The first problem is cost attributed to the Navy’s decision to buy less aircraft, and the second problem is the weight of the aircraft. DoD acquisition managers who oversee the F-35 program pledged to follow private business practices and make sure the needed technology was mature.²²

The required weight of the aircraft is 29,000 pounds. However, weight estimates are approximately 1,500 to 2,000 pounds more than design. Weight is a critical factor in designing fighter aircraft.

The first production F-35 was to roll out of the factory in 2005 with a low-rate production to 2009. However, that 1-year delay will result in 10 aircraft produced in 2006, 13 produced in 2007, 23 in 2008, and 24 in 2009, with a full production of up to 160 per year in 2013.²³ Figure 4 demonstrates the funding outlays to support all Air Force programs.²⁴ The

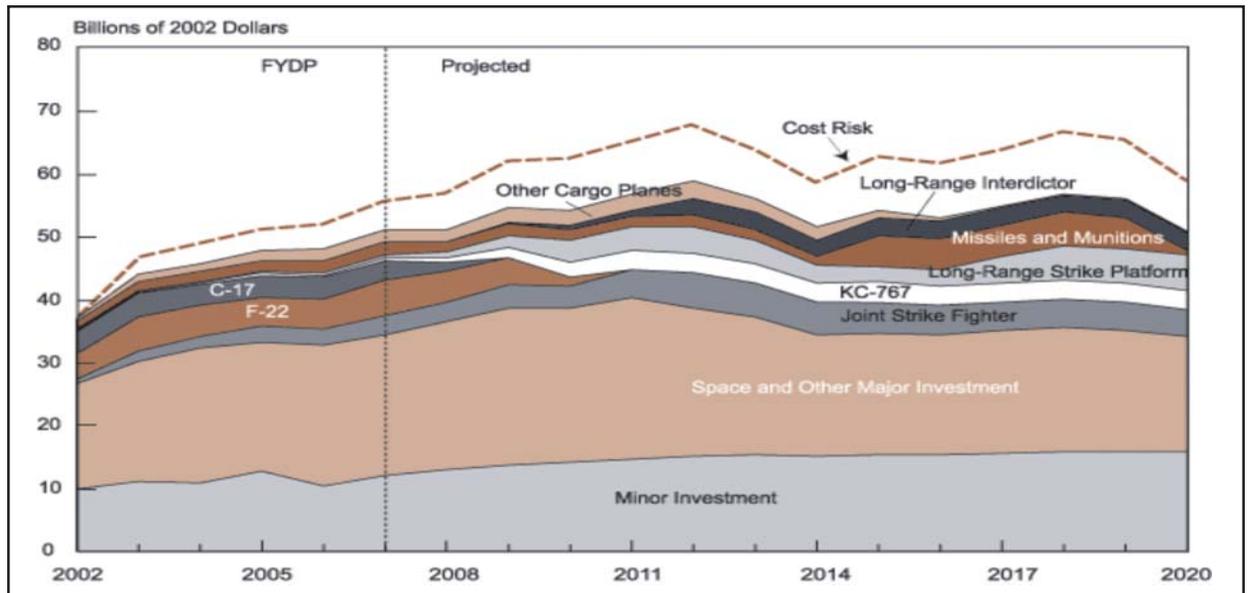


Figure 4. Air Force Investment

Reserve Forces: F-16 Block 30 Fleet

Reducing aircraft scheduled for depot funding, fewer modernization dollars, and vanishing vendors increase the cost to sustain the fleet and meet higher mission capable rates.

F-35 (joint strike fighter) shows up as a major funding stream for the near future. The Air Force version of the F-35 initial operational capability is 2013.

F-16 Programmatic Cost

The greatest programming cost is the Falcon STAR structural kit upgrade. The estimated cost per aircraft for kit installation is \$870K. The F-16 Independent Structures Review study had two goals: support the beyond Falcon STAR concept and help ensure maximum benefit to the aircraft fleet.²⁶

The simple reason for structural upgrades such as Falcon STAR are F-16 operational load factors exceeding F-16 design limits. The systems program office believes safety risks are low. The basis for this rating is dependent on the location and types of cracks on the bulkheads. However, 3 of the 13 Falcon STAR modifications are safety-critical, 8 are considered nonsafety structural, and the remaining 2 are nonsafety modifications for appropriate repair.

The independent review team looked into all aspects of alternatives to reduce usage severity of structural problems and perform comprehensive analysis on high usage or attrit aircraft. Findings remain consistent with projections of continued bulkhead fatigue, wing attachment fitting, and center fuselage upper skin. This will result in an exponential increase in cost for aircraft repaired at depot.

Falcon STAR modifications on F-16 block 30 aircraft remain uncertain. Current planning factors have money allocated for this project, to include kit proofing of a Duluth ANG block 25. The 8,000-hour design life of Falcon STAR for block 30 aircraft is a requirement just as it is for the block 40 and block 50 aircraft. In parallel, the systems program office is required to look into the possibility of flying the F-16 to 10,000 hours and the impact it will have on the airframe

Falcon STAR has 604 block 30 aircraft requiring modification at an estimated cost of \$226.5M. The program will start in 2004 and end in 2011 if funding is available. These aircraft represent a significant number of combat forces in the Air Force. Without this program, the F-16C/D block 30 will slowly attrit out of the inventory, further reducing mission capability and deployment readiness. Falcon STAR is essential to a viable combat force.

Cost to Retain F-16C

The ARC F-16C fleet continues to age with each passing year. Most aircraft in the inventory are 1983-1986 models, nearing a fleet average of 18 years with 4,000 airframe hours. The roadmap for ACC's sustainment plan has many detours leading to AMARC in Tucson. The problems lie with flying aircraft longer than originally planned, causing increased presence of fatigue cracking, corrosion, stress cracking, material degradation, and wear, which ultimately will lead to increased risk to flight safety.

Reducing aircraft scheduled for depot funding, fewer modernization dollars, and vanishing vendors increase the cost to sustain the fleet and meet higher mission capable rates. Aircraft engine availability and parts to repair them are the main reasons for decreased mission capability rates. Engine failure is the number one reason for destroyed aircraft over the last 10 years. General Electric and Pratt & Whitney engines are also aging, with parts becoming difficult to obtain and expensive to operate.

At the last Corona South meeting, Jumper asked, “Do we have a process in the Air Force for identifying when and which aircraft should be retired from our inventories because of age related factors?”²⁷ The result of that question is the Air Force Fleet Viability Board (AFFVB). The F-16C is not on the list for consideration to divest but is on the list to sustain and upgrade. However, that becomes an academic paradox if money is not available to upgrade the aircraft and remain viable. That may possibly lead to its early retirement. The AFFVB looks at and assesses viability of all aircraft in the Air Force inventory within the next 2 to 3 years and then reviews all aircraft fleets again once every 5 years.

The board primarily will look at two assessment areas: the cost of continued ownership and aging impacts. Ownership cost continues to increase in the block 30 fleet but not to the degree of the C-5 and KC-135. This cost will calculate the economic burden to provide the desired force capability using current assets and portion of total ownership cost from the board’s review forward. Aging impacts will focus on maintenance rates, system capability performance, and availability of airframes and engines. Ultimately, it will be the economic burden to sustain fleet systems and the total ownership cost beyond the recommended service life to keep the block 30 fleet in the Air Force.

Cost and readiness are factors used to retain the F-16 block 30 fleet. Without continued support from Congress, the fleet would have no role in AEF deployments and a limited role in support of Homeland Defense. Congressional budget add-ons are the lifeline for supporting the ARC fleet. While the cost to retain the F-16C seems to be high, the cost to replace the fleet with the F-35 is higher. Congress will not authorize F-35 expansion beyond the current production schedule, resulting in continued use of the F-16 block 30 for the next 10 years.

Operational Concept—Transformation Vanguard

Secretary of the Air Force James G. Roche recently stated, “Transformation is not a term; it is a philosophy—a predisposition to exploring adaptations of existing and new systems, doctrine, and organizations.” He also said, “Transformation is not outlining new programs or things to buy. Rather it is an approach to developing capabilities and exploring new concepts of operation that allow us to be truly relevant in an era in which we find ourselves, and for years to come.”

The director of the ANG, Lieutenant General Daniel James, wrote in the ANG vision statement that it should be a “ready, reliable, and accessible force that maintains its relevancy now and through the

Congress will not authorize F-35 expansion beyond the current production schedule resulting in continued use of the F-16 block 30 for the next 10 years.

Reserve Forces: F-16 Block 30 Fleet

The long-term benefit of reduced personnel turnover, a well-trained workforce, and reduced cost to operate aircraft are worth consideration.

millennium.” Vanguard has been a part of the ARC culture for many years by accepting older aircraft and maintaining them to remain a viable national asset. This mindset was less important when the ARC operated first- and second-generation fighters. With the F-16 and other third-generation fighter aircraft, this philosophy took on a new meaning and role in support of the expeditionary deployments of Operations Northern and Southern Watch of Iraq.

Participating in the expeditionary air force (EAF) legitimized the Reserve Component’s full partnership in the fighter community for the long-ago developed total force concept. The Air Force becomes more efficient by having highly skilled and mature military personnel. Older F-16C block 30 aircraft are the envy of active-duty Air Force and foreign air forces that operate the F-16 model. The ARC was successful in remaining ready, reliable, and relevant by engaging Congress and senior Air Force leadership to support precision engagement and network data links on their aircraft. The strategy to get out in front of Congress early paid large dividends in destroying enemy forces and infrastructure during Enduring Freedom and Iraqi Freedom.

To continue this strategic plan of relevance, the ARC must become a full partner in the fielding, employment, and AEF application of fourth generation F-35 aircraft. The researcher considers the F-35 more transformational to joint application than the F/A-22.

Employment Concept

The purchase of F-35 fighters allows a unique opportunity to improve sortie production, streamline maintenance actions, and decrease the deployment footprint. Air Force Basic Doctrine 1, 7 July 2003, describes Agile Combat Support as capability that concentrates, employs, and sustains US military power anywhere—at our initiative, speed, and tempo—that our adversaries cannot match.

ARC can offer many agile logistics support capabilities to the active Air Force. The success of the 116th Air Control Wing blended unit should be the template for force structure changes. The long-term benefit of reduced personnel turnover, a well-trained workforce, and reduced cost to operate aircraft are worth consideration.

Future beddown of F-35 aircraft, replacing the F-16, should consolidate at Air Force fighter wings that can support up to five, 24 primarily assigned aircraft squadrons. This economy of scale of concentrating aircraft has proven effective at Luke AFB, supporting as many as nine fighter squadrons. Blending active-duty, AFRC, and ANG personnel at one location with one type of aircraft provides built-in mentorship to new airmen and ready-reserve warriors to support overtasked and deployment-strapped active-duty personnel.

Consolidation of fighter aircraft is the most efficient means to support worldwide deployments with limited support equipment and constrained training assets. Consolidation reduces cost by not requiring large numbers of test equipment, duplicate facilities, and support persons. Centralization

of spare parts allows an efficient means to reduce transportation requirements, warehousing costs, and greater availability.

Employment concepts are a pillar for consideration for future transformation of fighter forces. Consolidation of the F-35 or legacy F-16C aircraft supports Air Force Basic Doctrine 1 Agile Combat Support.

AEF Application

This article would not be complete without a comparative review of the F-16/F-35 role in AEF force projection. Agile Combat Support is one of six pillars of Air Force distinctive capabilities. Prepackaged F-16 block 30 meet quick response, worldwide deployments in force modules of aircraft Groups of 6/6/3 for combat-coded ARC fighter wings.

A one-for-one replacement of the F-35 for the F-16 likely would have the same construct. The tradeoff for retiring some early model F-16 block 25 aircraft does not decrease the Air Force demand for ten air expeditionary forces in the EAF setup. The terrorist attacks of the World Trade Center and Pentagon disrupted the AEF cycle. Operation Noble Eagle activated ARC fighter wings in support of Homeland Defense. The net result of this activation would be the doubling or even tripling of annual programmed flying hours for Guard and Reserve squadrons.

The Noble Eagle flying-hour requirement caused additional aircraft structure fatigue and wear on the engines. This contingency may have reduced the availability of these aircraft in support of future 2005-2010 AEF rotations. The reducing of available aircraft before replacement by the F-35 could drive aircraft shortfalls, resulting in *loaning aircraft* from training or test wings.

The 1997 National Defense Panel recommended, as one of the characteristics for military planning for 2010-2020, a small logistics footprint that lowers the target signature of forces, lessens the strain on indigenous infrastructures, and reduces the demands on strategic airlift and sealift.²⁸ Reference literature provided by the F-35 contractor, based loosely on the operational requirements document, stated that the F-35 could deploy a squadron of 24 aircraft for 30 days using 18 C-17 equivalent loads.²⁹ The current estimate for the F-16 requires 28 C-17 equivalent loads for the same number of aircraft.

The estimated 46-percent savings in C-17 equivalent loads by purchasing the F-35 allows other US or coalition forces to increase the speed in which they can mobilize, deploy to the contingency location, and conduct operations either preemptively or reactively based on mission requirements.

The air expeditionary force and the resulting force modules provide a process that focuses on our daily operational business and establishes a planning cycle for an expeditionary air force. Replacing the F-16 with the F-35 will reduce the number of C-17 loads by reducing the logistics footprint to deploy, reduce the need for additional spare parts because less parts operate the F-35, and allows other C-17 missions to support US and coalition forces.

The air expeditionary force and the resulting force modules provide a process that focuses on our daily operational business and establishes a planning cycle for an expeditionary air force.

Structural integrity remains the primary concern of aircraft engineers and program managers.

James stated in the September 2003 issue of *Air Force Magazine* that funding is “a continuous and serious challenge” because “it is increasingly difficult to keep (ANG) legacy systems relevant, given the transformation of the Air Force to better, more effective technologies.”³⁰ James’ timely statement is a summation of the challenges the ARC fighter faces.

The researcher reviewed seven categories to modernize and maintain an aging aircraft fleet. These seven categories are grouped into two basic divisions, *state of the fleet* and *sustainment cost*, for determining the health of the F-16 block 30 fleet. Research identified some striking contrasts to the problem. The fundamental problem is aircraft design and the way the Air Force has operated the aircraft. The F-16 is a nine-*G* designed aircraft planned to last 4,000 airframe hours.

Most block 30 aircraft have met and exceeded the 4,000 airframe hours. The excessive use is identified by long sustainment missions such as those performed in Northern Watch and Southern Watch. Additional use by flying up 6-hour combat air patrol missions to support Noble Eagle and the same to support the Afghanistan and Iraq campaigns further accelerated the problem.

The worst damage to structural support was local training missions flying without wing tanks. After an extensive study into the leading reason for the high number of bulkhead cracks, it was determined that wing flex was a problem. Engineering analysis for the fix was to provide ballast in fully loaded wing tanks to prevent cracking.

A review of safety indicators determined the F-16 block 30 series is a safe aircraft and becoming safer. Catastrophic accidents have decreased over the last 10 years for the ANG. Engine failure has been the main reason for accidents over the last few years.

Sustainment cost is the leading factor to maintaining the aircraft. Four critical areas required review based on factors influencing cost and readiness. Structural integrity remains the primary concern of aircraft engineers and program managers. The decision to retain the F-16 block 30 fleet is one of necessity because of the delayed fielding of the F-35. The leading reasons to ground an aircraft are bulkhead cracks that have no economically feasible repair. The next reason is aircraft electrical wiring.

Kapton wiring is in all F-16C/D block 30 aircraft. This wiring has a limited life expectancy and breaks down after a period of 15 years, depending on climatic conditions and aircraft stress. Research identifies the cost to replace this wiring as currently not economically feasible in lieu of the remaining life expectancy of the aircraft.

Avionics and electronic warfare upgrades are modernization efforts led by the ARC to defeat the enemy’s latest capability. Programs that include the ability to deliver precision munitions and identify blue-on-blue network-centric tracking are but two examples that, in many ways, make the block 30s more capable than the newer F-16 block 40s and F-16 block

50s. Congress deserves partial credit for add-on funding to support ARC modernization efforts.

The second research question refers to the cost to retain or retire the F-16. The cost to retain has military and economic value because the alternative (F-35) will not be available in full production until 2010. Reducing the F-16 block 30 fleet based on structural integrity attrition (without F-35 replacement) positions the Air Force at great risk.

A strong argument to keep the F-16C/D block 30 can be made based on the fact the aircraft is modernized and remains safe to fly. There is no sensible argument offered to retire the aircraft when the demand for fighters is increasing and no replacement is available.

The final research question discusses the crossover point to keep F-16s or buy F-35s. This question is largely academic because Congress funds the purchase of new weapon systems based on guidance and studies inside and outside the Government. The researcher was surprised that purchasing new weapon systems is based on changing and current threats, not the Air Force's desire for new aircraft. Therefore, the crossover point for the F-16C/D block 30 fleet will be the decision to divest an aircraft because of structural damage and economic repair, nonfeasibility, or have no aircraft available for some time. The crossover point ultimately becomes a matter of programmatic actions of purchasing F-35s and divesting F-16 block 30s.

The Bush administration, Congress, and Air Force have five primary options to avert an upcoming termination of the F-16C/D block 30 fleet.

- Purchase new F-16C/D block 50 aircraft or F-15E to replace divested block 30 aircraft.
- Spend up to half the cost of a new F-35 to rebuild the aircraft.
- Accept risk and go to full-scale production of the F-35.
- Do nothing and wait for the F-35 to enter service.
- Reduce flying hours to stretch out life span of the aircraft to projected program termination in 2017.

All these options have advantages and disadvantages. Future Air Force leaders and programmers will discuss these options. The researcher recommends retention and continued modernization efforts given the current state of the F-16C/D block 30 fleet. The basis for this conclusion is developmental delays and problems in fielding the F-35 until 2010, the need for fighter aircraft to support Homeland Defense and Global War on Terrorism, and the current safety record and future trends, which indicate the F-16 is a safe aircraft to operate.

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Shaping Logistics—Just-in-Time Logistics

Geostrategic, economic, and technological changes will make support of air operations, both at home and overseas, increasingly dependent on the flexibility and responsiveness of the military logistic organization. This requires the creation of a highly integrated and agile support chain with global reach. The most promising strategy to achieve these aims is based on a joint management approach, teaming the public and private sectors, under long-term partnering arrangements. While it is probable that organic military maintenance capabilities will be retained, particularly to address life-extension and fleet-upgrade requirements, the alliance partners will largely determine the size and shape of the military logistic organization as part of their wider responsibilities for shaping the overall support chain. Success will be measured by a reduction in inventories, faster turn-round times, more rapid modification embodiment, swifter deployment of new technologies, a smaller expeditionary footprint, lower support costs, and greater operational output. This strategy requires more, however, than the application of just-in-time principles. It embraces commercial express transportation; innovative contracting arrangements including spares-inclusive packages; the application of commercial information technology solutions to support materiel planning and inventory management; collective decisionmaking involving all stakeholders; an overriding emphasis on operational output; and most important, a high level of trust between all the parties. These changes may well result in smaller organic military repair facilities and greater use of contractors at all maintenance levels, including overseas. Most important, it will require the military aviation maintenance organization to move away from an internal focus on efficiency and utilization to a holistic approach that puts customer needs, in the form of operational output, first and foremost. As with any new strategy, there are risks. The fundamental building block in determining a successful partnership with industry is trust. As one commentator has observed, “Trust is the currency that makes the supply chain work. If it’s not there, the supply chain falls apart.”¹ As support chains are more closely integrated and maintenance strategies are better aligned, the more vulnerable is the logistic organization to the impact of inappropriate behaviour. In the past, the risk might have been minimized and resilience enhanced by providing duplicate or alternative in-house capabilities backed up by large inventories. This is neither affordable nor compatible with today’s operational needs. In the future, therefore, the main safeguard will be the creation of an environment in which government and industry, both primes and subcontractors, can function coherently, effectively, and harmoniously.

Notes

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Air Commodore Peter J. Dye, RAF

Lieutenant Colonel Stephen M. Blizzard, USAF
Dr. Marsha Kwolek, Lieutenant Colonel, USAF, Retired

Deploying contractor employees to support military operations is not a new phenomenon. History shows that contractors supported military operations as far back as the 16th century.

Increasing Reliance of Contractors on the Battlefield

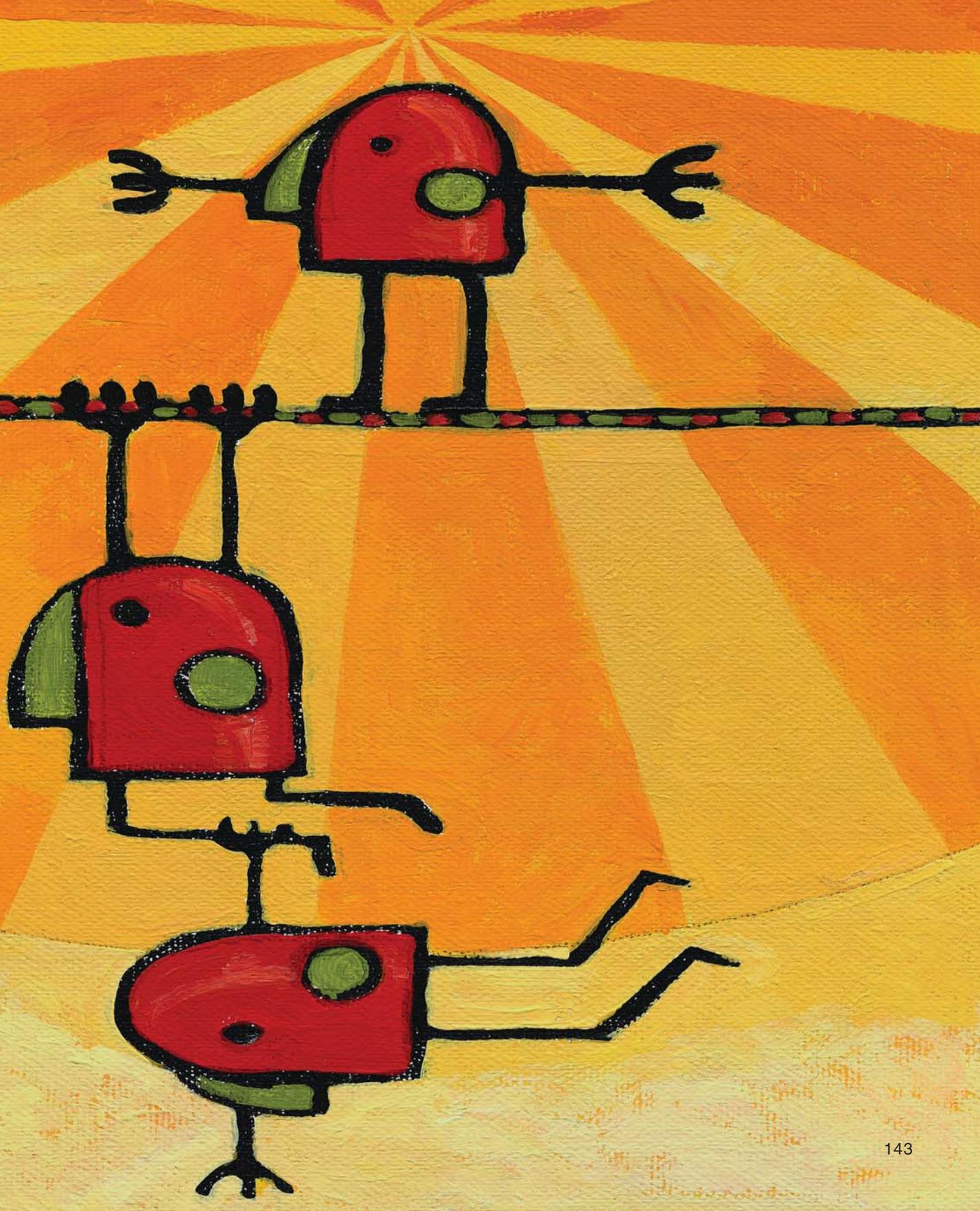
How Do We Keep from Crossing the Line?

Introduction

Contractors are no longer restricted to acquisition and logistics but are found nearly everywhere, and their presence on the battlefield is a reality.¹

Since the end of the Cold War, US Armed Forces have increased their reliance on support contractors in contingency situations. Factors that have led to this increased reliance include post-Cold War reductions in the size of military forces, increases in the operations and missions undertaken by the military, and increased complexity and sophistication of new weapon systems. The concept of civilian contractors supporting military operations is nothing new. Throughout history, contractors have deployed with the military and performed various logistical and support functions. What is new is the expanding use of





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contractors in operational roles traditionally performed exclusively by uniformed military personnel. These new contractor roles are encroaching on what could be interpreted to be direct participation in hostilities. The impact of this expanding role has blurred the distinction between contractors performing as civilians accompanying the force and contractors engaging in hostilities.

The Expanding Use of Contractors

Never has there been such a reliance on nonmilitary members to accomplish tasks directly affecting the tactical successes of an engagement.²

Joint Publication 4-0, *Doctrine for Logistic Support of Joint Operations*, defines three types of contractors used in contingency situations: theater support, external theater support, and systems support.³

Theater support contractors assist deployed operational forces under prearranged contracts through host-nation and regional businesses and vendors. These contracts provide goods, services, and minor construction—usually from the local vendor base or nearby offshore sources—to meet immediate needs of the local commanders. External contracts, such as the Army Logistics Civilian Augmentation Program and Air Force Capability Assessment Program, provide support for deployed operational forces that is separate and distinct from theater and systems support contractors.⁴ These may be US or third-party businesses and vendors. These types of contracts usually provide road and airfield construction, transportation services, mortuary services, billeting, and food services. System contractors support deployed, operational forces under existing weapon system contracts. These contractors “support specific systems throughout their system’s life cycle (including spare parts and maintenance) across a range of military operations.”⁵ For example, the F-117A stealth fighter, reconnaissance aircraft, and Global Hawk unmanned aerial vehicle rely on system contractors for maintenance and logistics support. Contractors must deploy with the military, since organic support is limited or nonexistent.

Since theater support contractors are used primarily for commodities purchase and traditional civilian roles, the nature of which has not changed, the focus of this discussion will be on external support contractors and system contractors.

Deploying contractor employees to support military operations is not a new phenomenon. History shows that contractors supported military operations as far back as the 16th century. Martin van Crevald notes in *Supplying War* that early commanders realized the need to furnish their armies with supplies beyond what they could plunder. Sutlers, with whom the army would sign contracts, helped supply the army with “the most elementary needs.”⁶

The US military has relied on civilian support during military operations since its existence. General George Washington’s Continental

Theater support contractors assist deployed operational forces under prearranged contracts through host-nation and regional businesses and vendors.

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Army relied on civilians for transportation, carpentry, engineering, food, and medical services. Civilians performed these services, freeing soldiers to focus on fighting.⁷ It seemed only logical to use civilians since these logistical functions were either “too menial for soldiers or were well-established or specialized in commercial industry.”⁸ This philosophy remained relatively unchanged throughout the history of warfare up to the Vietnam conflict. In the wars prior to Vietnam, contractors continued to provide basic logistics functions in support of soldiers, primarily in the rear areas away from the dangers of the battlefield.⁹

The contractor support philosophy began to change with the Vietnam conflict. *Business Week* referred to Vietnam as a “war by contract.”¹⁰ “More than ever before in any US conflict, American companies are working side by side with troops. One big reason is that military equipment has become so complex.”¹¹ “Specialists in field maintenance checking on performance of battlefield equipment dodged Vietcong attacks on military bases at DaNang and Pleiku.”¹² Contractors were no longer safely behind the lines of battle, and they were not performing only logistics and support functions.¹³ “There might have been a time in the past when the site of military operations was an exclusive club for those in uniform, but those days are waning.”¹⁴ Beginning with Vietnam, the tools the military uses in combat have become so complex that the military does not have—or could not afford to have—the expertise required to provide maintenance and technological support. This fact, coupled with the use of contractors for other logistical functions within the *zones of occupation*, has brought contractors perilously “within sound of the guns.”¹⁵

Since 1990, the trend toward using contractors in theater to perform support; logistics; and increasingly and more important, combat functions has increased and will continue to do so for the foreseeable future.¹⁷ Increasing contingency operations from Desert Shield and Storm to Somalia and Haiti to Bosnia, Kosovo, Afghanistan, and Iraq, coupled with military downsizing, privatization of many support functions, omnibus base operating support contracts, and the growing

War/Conflict	Civilians/ Contractors	Military	Ratio
Revolution	1,500 (est)	9,000	1:6 (est)
Mexican/American	6,000 (est)	33,000	1:6 (est)
Civil War	200,000	1,000,000	1:5 (est)
World War I	85,000	2,000,000	1:2
World War II	734,000	5,400,000	1:7
Korean Conflict	156,000	393,000	1:2.5
Vietnam Conflict	70,000	359,000	1:6
Desert Shield/Storm	5,200	541,000	1:100
Balkans	20,000	20,000	1:1

Table 1. Civilian Participation in Combat¹⁶

Increasing Reliance of Contractors on the Battlefield: How Do We Keep from Crossing the Line?

Since the end of the First World War, the American public has “historically demanded a peace dividend at the conclusion of each war or conflict.”

complexity of weapon system hardware and software has caused contractor deployments to grow.¹⁸ Table 1 provides a historical look at contractor deployment in theater.

The General Accounting Office (GAO) reported “nearly 5,200 contractor personnel voluntarily deployed to support the military forces during the Gulf War.”¹⁹ In Bosnia, “Our Army uniform presence was 6,000 supported by 5,900 contractors.”²⁰ The Brookings Institute estimates that the ratio of military to contractors in Operation Iraqi Freedom is 10 to 1.²¹ Currently, the military relies on contractors for the maintenance of 28 percent of its weapon systems. The Bush administration would like to see this figure rise to 50 percent.²²

The trend toward the use of contractors in a theater can be attributed to four factors: deep cuts in military personnel; greater emphasis on privatization of functions that can be performed more efficiently outside the military; increased reliance on contractors because of the growing complexity and sophistication of weapon systems; and the lack of core military expertise, training, and flexibility gained by deploying contractors into theaters that have congressional, legislative, or host country-mandated troop ceilings.²³

Since the end of the First World War, the American public has “historically demanded a peace dividend at the conclusion of each war or conflict.”²⁴ The end of the Cold War was no exception. The fall of the Soviet Union led US taxpayers to call for major cutbacks in defense spending in order to “reap the benefits of winning the Cold War.”²⁵ Since 1991, service force structures have been reduced by more than 30 percent, Department of Defense (DoD) budgets have dropped 40 percent, and weapon system acquisitions have fallen 70 percent.²⁶ Additionally, the United States has withdrawn two-thirds of the ground forces and three-fourths of the air forces formerly forward deployed in Western Europe, leaving a large gap in the logistics infrastructure available for overseas operations.²⁷ These cuts occurred without any reduction in operational requirements.

In fact, since the end of the Cold War, US military commitments abroad have increased greatly. The operations tempo of all the Services has increased significantly over the last 12 years while operating with one-third fewer forces. For example, the Air Force has more than 35,000 airmen deployed, performing various missions around the world.²⁸ Thirteen years ago, the average was around 2,000.²⁹ “The Army has had a 300-percent increase in mission commitments during the last several years, and they do not appear to be tapering off.”³⁰ This increase in commitments has not gone unnoticed by Congress. In his statement before the Senate Armed Services Committee, Senator Carl Levin noted:

Our military forces are stretched thin. Over 180,000 are fighting the war in Iraq or supporting it from Kuwait and other Persian Gulf states. Another 10,000 are conducting combat and stability operations in Afghanistan. At the same time, we are helping maintain the peace in Liberia, Bosnia, and Kosovo. And of course, we have thousands of troops deployed in South Korea, dedicated

in war plans to the defense of that nation in a region that is becoming ever volatile with the North Korean drive to develop nuclear weapons. We read in the paper this morning that thousands of National Guard and Reserve troops in Iraq and the Gulf area are going to have their tours of duty extended to a year.³¹

The Guard and Reserves have had their numbers reduced by nearly 48 percent while performing 13 times more man-days a year than previously done.³² Furthermore, the DoD civilian rolls have been cut by more than 300,000 since 1989.³³ These budget and manpower reductions are forcing the DoD to look at demilitarizing core functions, those previously performed exclusively by military personnel, via privatization or contracting out to stretch limited dollars and free up military personnel for warfighting duties.³⁴

Contractors have been used to fill the void created by the drawdown in troop strength. Use of contractors in support and logistics functions has allowed commanders to better utilize military forces in combat positions. The immense budgetary pressures, both inside and outside the DoD, demand that we get *more bang for the buck* in order to deal with the increasing military commitments. The drastic cuts in military spending, competition between funding modernization and other internal service programs, and a steadily declining military infrastructure and readiness have led Congress to order the DoD to develop ways of cutting costs without cutting (and in some cases increasing) services (doing more with less). To do this, the DoD has turned to reengineering, competitive sourcing, and privatization of increasingly military functions.³⁵ Office of Management and Budget Circular A-76 mandates that the Government obtain commercially available goods and services from the private sector when it makes economic sense to do so. Those functions, termed *commercial activities*, are the only functions eligible to be performed under contract.³⁶

However, every commercial-type function is not automatically a contracting candidate. There could be several valid reasons to exempt an otherwise commercial activity from being performed by contract and, conversely, valid conditions to convert a government function into one that is contractor-operated.³⁷ The Government is allowed to perform an otherwise commercial function if the function is determined to be a core capability. A core capability is defined as:

A commercial activity operated by a cadre of highly skilled employees, in a specialized, technical, or scientific development area, to ensure that a minimum capability is maintained. The core capability does not include the skills, functions, or full-time equivalent (FTE) that may be retained in house for reasons of national defense, including military mobilization, security, rotational necessity, or patient care or research and development activities.³⁸

Previously, the Services defined core functions as “those requiring military or organic capability because it was combatant in nature, required potential deployment into harm’s way, or required the capability to be expanded (surged) in times of crisis.”³⁹ For example, instead of taking a

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Today, the focus is moving away from specific tasks toward a big picture approach of looking at service core competencies.

Increasing Reliance of Contractors on the Battlefield: How Do We Keep from Crossing the Line?

The operation and maintenance of state-of-the-art systems require technical expertise neither available in the military nor cost-effective for the military to develop in house.

function-by-function approach, one can look at the issue from a broad Air Force core competency approach of “Air and Space Superiority, Precision Engagement, Information Superiority, Global Attack, Rapid Global Mobility, and Agile Combat Support.”⁴⁰ Using this approach, functions previously exempt from privatization or contracting—such as aircraft and munitions maintenance, communications, weapons calibration, and weapon system software maintenance—are now prime candidates.⁴¹ The main advantage in using contractors to perform these missions is their lower cost. The GAO estimates that the average civilian support employee costs about \$15K less than a comparably graded military person.⁴² The Air Force estimates that it has saved \$500M annually through privatization. DoD-wide cost savings were projected to be between \$7B and \$12B annually by fiscal year 2002.⁴³

The preeminence of advanced technology and cutting-edge weapon systems is further exacerbating the military’s reliance on contractor support. The high-tech weapon systems used to such devastating effect in Afghanistan and Iraq are so complex that combat units in the field have no choice but to depend on contractors to maintain and, in some cases, operate them. Many weapon systems—such as the F-117A stealth fighter, M1-A tank, Patriot missile, and Global Hawk—are contractor-dependent.⁴⁴ The operation and maintenance of state-of-the-art systems require technical expertise neither available in the military nor cost-effective for the military to develop in house.⁴⁵ For example, a new Marine Corps truck was designed to be at least partially contractor supported because the limited number of assets made contractor support more cost effective. Similarly, the Army’s Guardrail surveillance aircraft is entirely supported by contractors because it was not cost-effective to develop an organic maintenance capability.⁴⁶ In the latest Iraqi conflict, the military used recently fielded systems or systems still under development that had unique technical requirements for which the Services could not develop timely training courses or train personnel. For instance, contractors recently deployed with the 3^d Infantry Division to Iraq to support the high-tech digital command and control systems still under development. Similarly, when the Air Force deployed the Predator unmanned aerial vehicle, contractor support was required because the vehicle was still in development, and Air Force personnel had not been trained to maintain the Predator’s data link system. With limited expertise in these new high-tech weapon systems, the military is forced to rely on contractor support in operational situations.

Finally, the use of contractors is beneficial in areas where countries impose *force caps*, limiting the number of military members allowed. For example, DoD has limited US troops to 15 percent of the North Atlantic Treaty Organization forces in Kosovo, and the Philippine Government limited the number of US troops participating in a recent deployment to 660.⁴⁷ Since contractors are not included in most force caps, they have been substituted for military personnel to meet mission requirements usually met by using military personnel. In Bosnia, for example, the Army

used contracted security guards to provide gate and base perimeter security. In Kosovo, the Army replaced its firefighters with contractors. There are several other examples of the military's relying on contractor support to perform traditionally military functions and maximize the limited combat forces in an area. As a result of the military's increased

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Service	Balkans	Southwest Asia	Central Asia
Weapons and systems support	X	X	X
Intelligence analysis	X	X	X
Linguists	X	X	X
Base operations support	X	X	X
Logistics support	X	X	
Prepositions equipment support		X	
Nontactical communications	X	X	
Generator maintenance	X	X	X
Biological/chemical detection systems		X	X
Management and control of government property	X	X	X
Command, control, communications, computers, and intelligence	X	X	X
Continuing education	X		X
Fuel and materiel transport	X	X	X
Security guards	X	X	
Tactical and nontactical vehicle maintenance	X	X	
Medical service		X	
Mail service	X		

Table 2. Selected Services Provided by Contractors in Deployed Locations⁴⁹

The use of contractors to perform noncombat duties is advantageous to commanders in terms of freeing up uniformed military personnel to project combat power.

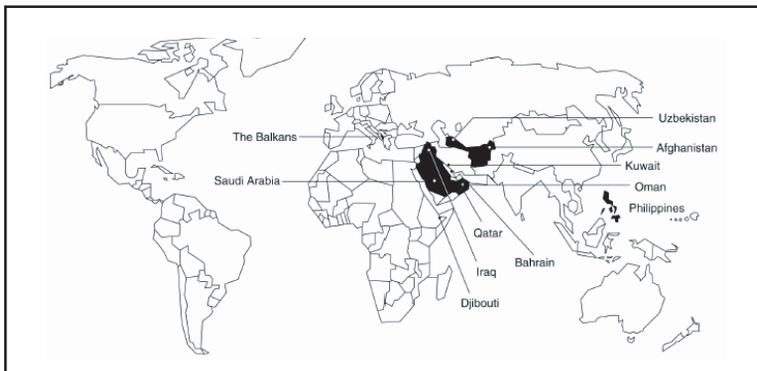


Figure 1. Selected Countries Where Contractors Are Supporting Deployed Forces⁴⁸

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The evolving trend toward employing contractors directly into military operations could lead to serious consequences.

reliance on contractor support, contractors are providing a wide range of services (Table 2) at deployed locations around the world, as shown in Figure 1.

Deployment Issues

The citizen must be a citizen not a soldier...war law has a short shrift for the noncombatant who violates its principles by taking up arms.⁵⁰

The use of contractors to perform noncombat duties is advantageous to commanders in terms of freeing up uniformed military personnel to project combat power. However, while working to build a cohesive total force, commanders must remember that, while contractors provide many functions formerly performed by military members and commanders often become comfortable with their support contractors (almost to the point of referring to them as *my people*), contractors are not military members. As such, contractors deployed in theater present the commander with a myriad of potentially complex issues. One of the most important issues a commander faces is the question of what duties a civilian contractor should perform for an armed force in theater, termed *nexus to combat*. The line between allowable combat support roles and unallowable military combat roles is also an important issue.⁵¹

The increasing scope in which the US military is continuing to employ contractors to perform functions formerly performed exclusively by military personnel is moving dangerously closer to this line. The evolving trend toward employing contractors directly into military operations could lead to serious consequences. Commanders must take extreme caution in using contractors in roles that could be interpreted as mirroring combatant roles. Commanders usually have the ability to issue orders and exert command influence over personnel assigned or attached to their unit. However, since contractors are not military personnel, a commander's abilities to do this are limited, even as they direct contractors to perform legally assigned functions.⁵²

In past conflicts, the philosophy regarding intheater employment of civilians was "the closer the function to the sound of battle, the greater the need to have soldiers perform the function because of the greater need for discipline and control."⁵³ The Vietnam conflict started a trend where increasing reliance on contractors and the changing nature of conflicts positioned them closer and closer to the sound of battle.⁵⁴ The increased reliance on contractors and today's nonlinear battlespace have contractors performing roles formerly performed exclusively by military members in areas "physically and functionally closer to the battlespace than ever before."⁵⁵ In addition to traditional support-type functions, contract personnel now perform actual mission tasks such as inter- and intratheater airlift and maintenance of vital weapon systems—such as the Joint Surveillance Target Attack Radar System, Patriot, Global Hawk, and Predator—and operate and support intelligence and information systems.⁵⁶ This evolution of contractor roles in battlefield operations puts employees

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at risk of crossing the line between lawful noncombatants and unlawful direct participation in hostilities under the Law of Armed Conflict (LOAC).

LOAC is “that part of international law that regulates the conduct of armed hostilities.”⁵⁷ The purpose of LOAC is to limit the effects of conflict, protect combatants and noncombatants from unnecessary suffering, safeguard the fundamental rights of combatants and noncombatants, prevent the conflict from becoming worse, and make it easier to restore the peace when the conflict ends.⁵⁸ LOAC applies to armed conflict even when a state body has not been declared.⁵⁹ However, many LOAC provisions of LOAC are not binding under international law “during intrastate ‘civil wars’ or conflict between nonstate actors” as frequently experienced in military operations other than war scenarios like Operation Enduring Freedom.⁶⁰ It is US policy to follow the provisions of LOAC, even in situations where it may not be binding under international law. Chairman of the Joint Chiefs of Staff (CJCS) Instruction 5810.01A, *Implementation of the DoD Law of War Program*, states that military forces will “comply with law of war during all armed conflicts, however such conflicts are characterized, and, unless otherwise directed by competent authorities, will comply with the principles and spirit of the law during all other operations.”⁶¹

LOAC is derived from two main sources: “Customary international law arising out of the conduct of nations during hostilities and binding upon all nations” and “treaty law arising from international treaties (also called conventional law) that only binds the nations that have ratified a particular treaty.”⁶² LOAC treaty law is divided into two areas: Hague Law (from the treaty negotiations conducted at The Hague, Netherlands), concerned with means and methods of warfare, and Geneva Law (from treaty negotiations held at Geneva, Switzerland), which is concerned with protecting persons involved in conflicts. LOAC classifies persons involved in armed conflict as either combatants or noncombatants.

Article 4, Geneva Convention III, Treatment of Prisoners of War, 12 August 1949, prescribes the following conditions to combatants: that of being commanded by a person responsible for subordinates; of having a fixed distinctive sign recognizable at a distance, of carrying arms openly, and of conducting their operations in accordance with the laws and customs of war.⁶³ Persons who do not meet the above description are classified as noncombatants. DoD contractors are, therefore, noncombatants. Reasons contractors cannot be considered combatants and cannot bear arms against an enemy are as follows:

- Contractor is not subject to the military commander’s internal discipline system (Uniform Code of Military Justice [UCMJ]).
- Contractor “is not trained to conduct operations in compliance with armed conflict.”⁶⁴
- Contractor “is not subordinate to a field commander.”⁶⁵

It is US policy to follow the provisions of LOAC, even in situations where it may not be binding under international law.

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The danger of contractors' being attacked while performing their duties is very real as documented in Desert Storm, United Nations peacekeeping missions in Angola, and antidrug operations in Colombia.

LOAC historically has recognized the right of noncombatants to be on the battlefield and to “even be aboard combat aircraft, vessels, and vehicles on operational missions. They may provide technical support and perform logistics functions.”⁶⁶ However, contractors are not exactly noncombatants in the true sense. They are something in between; they are “civilians authorized to accompany the force.”⁶⁷ In this status, contractors are entitled to “some but not all protections afforded combatants and some but not all the protections afforded to noncombatants.”⁶⁸ As such, contractors cannot be targeted deliberately as individuals, but they can be targeted as a part of a system. If the system (or function) is targeted and contractor personnel are wounded or killed, LOAC will regard them as legitimate collateral casualties.⁶⁹

The Air Force and the Army realize the danger civilians face from uncertainty under LOAC.

Civilians who take part in hostilities may be regarded as combatants and are subject to attack and/or injury incidental to attack on military objectives. Taking part in hostilities has not been clearly defined in the law of war but generally is not regarded as limited to civilians who engage in the actual fighting. Since civilians augment the Army in areas in which technical expertise is not available or is in short supply, they, in effect, become substitutes for military personnel who would be combatants.⁷⁰

Therefore, if a contractor is performing F-117A maintenance and the enemy decides to bomb the fighter maintenance facility, any collateral injury to or death of the contractor resulting from the attack is considered legitimate. The danger of contractors' being attacked while performing their duties is very real as documented in Desert Storm, United Nations peacekeeping missions in Angola, and antidrug operations in Colombia.⁷¹ More recently, during Iraqi Freedom, two contractor employees from EOD Technology, Incorporated, were killed by an improvised roadside explosive device as they were returning from assisting the Army Corps of Engineers defuse bombs and destroy munitions left over from the old Iraqi regime.⁷² As of November 2003, 9 civilians working for the Government had been killed, 29 had been wounded, and many have had close calls.⁷³

To avoid LOAC violations, contractors must take great care to ensure they do not conduct themselves in a manner that is inconsistent with their status. According to LOAC, only the combatant has the *honor* to conduct war and deliberately kill the enemy (direct action). A noncombatant or “civilian authorized to accompany the force” who engages and kills the enemy could be seen as a murderer.⁷⁴ If a soldier kills in war and is captured, he is considered a prisoner of war (POW) and must be treated accordingly. A noncombatant who kills and is captured can be subject to trial and punishment as a criminal. As long as contractor employees do not violate LOAC, they are entitled to POW status if captured.⁷⁵

LOAC becomes nebulous when defining direct participation in hostilities. Direct action in warfare is considered those circumstances that, by their nature, are likely to cause some sort of physical harm or destruction of property. Direct action also includes “functioning as a guard,

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lookout, or intelligence agent for an armed force.”⁷⁶ Therefore, a strict interpretation of *direct part in hostilities* on the part of other members in the international community could render the contractor Global Hawk pilot or F-117A maintainer as an *unlawful* combatant subject to prosecution for war crimes.⁷⁷

The current use of more than a dozen private military companies in Iraq should be cause for concern. Armed contract employees guard Baghdad airport, man checkpoints in the same manner as military soldiers, provide armed protection for the Coalition Provisional Authority, and train Iraq’s police. “Some soldiers said privately that the soldiers for hire walk around Iraq with their weapons in full view as if they belong to a coalition army.”⁷⁸ In this situation, one taking a strict interpretation of LOAC could determine these contractor employees to be taking a direct part in hostilities.

The above example brings to mind two additional considerations in the LOAC area: whether to allow the contractor to wear a military uniform or carry weapons. Decisions on both of these areas must be made with the consideration of protecting the contractor’s noncombatant status since the wearing of uniforms and the carrying of weapons can create the appearance of being a combatant.

In accordance with LOAC, combatants must distinguish themselves from noncombatants in order to protect the noncombatants. Wearing a distinctive military uniform usually does this. However, in today’s environment, contractors frequently wear military-type uniforms in performance of their duties. In this case, the uniform may include “utilities, chemical warfare protective clothing, and similar combat outerwear.”⁷⁹ The commander’s decision to allow contractor employees to wear a military uniform is based on the determination that “there is an actual or threatened outbreak of hostilities, involving war, major civil disturbance, or the deployment necessitates the wearing of uniforms in specifically defined geographic areas.”⁸⁰ While commanders may allow contractors to wear military uniforms, Air Force policy generally advises against issuing military garments (for example, BDUs) to contractor employees. Exceptions to this policy may be made because of compelling reasons such as a need for chemical warfare gear when the contract requires the Government to issue the equipment rather than forcing the contractor to purchase and provide it to their employees. Caution must be used, however, since wearing the uniform exposes contractor employees to the risk of being accused of being an unlawful combatant. To help reduce this risk, commanders must ensure that if contractors wear the uniform they wear markings (for example, distinctively colored patches, armbands, and headgear) clearly identifying themselves as civilians.⁸¹ Commanders should ensure contractor employees understand the possible risks, in terms of LOAC, associated with uniform wear.

The *legality*, under LOAC, of civilians carrying weapons is not clear. Army Field Manual 100-21 allows civilian use of firearms for self-defense provided three conditions are met: commander approval; contractor

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Contractor employees cannot be placed in the position where they appear to have a direct supervisor and subordinate relationship with a military commander.

company policy, which approves carrying of firearms by its employees; and the employee's volunteering to carry the firearm.⁸² By carrying sidearms, contractor employees run the risk of being seen as unlawful combatants. In some areas, such as Iraq or Bosnia, the line between self-defense and direct participation in a military action could be extremely narrow and could depend upon through whose lens the contractor employee's actions are viewed. Aside from contractor status concerns, the commander should review the status of forces agreement to ensure there are no host-nation prohibitions against arming civilians for self-defense.

The 2002 Rome Statute of the International Criminal Court (ICC) has increased the risk of contractor employees being tried on an individual basis for LOAC violations. The ICC is the first permanent, independent court capable of investigating and bringing to justice individuals who "commit the most serious violations of international humanitarian law; namely, war crimes, crimes against humanity, genocide, and once defined, aggression."⁸³ Even though the United States has not ratified the ICC, more than 139 countries have ratified it.⁸⁴ Thus, it is possible that contractor activities could be interpreted as crossing the line between lawful support and unlawful direct action, inviting indictment in the ICC. Therefore, it is incumbent upon the commander to ensure contractor employees are not engaging in activities that would compromise or create the appearance of compromising their status as noncombatants.

As discussed earlier, in combat situations, commanders generally feel more comfortable having direct command and control of the personnel assigned to them. Since contractor personnel are not under the direct control of the commander but governed by the contract, command and control over contractor employees continues to be a key challenge to deployed commanders.⁸⁵ Since contractor employees are not military members, they are, by definition, not subordinate to the commander or subject to the commander's internal discipline system, known as the UCMJ. Contractor employees are only subject to the UCMJ during a declared war, something we have not had since World War II. Lack of command and limited direct control over the contractor can provide challenges to the commander.

The contractor's effort is governed by the terms and conditions of the contract. As such, the contractor cannot be under a commander's chain of command and cannot be ordered to perform functions outside the scope of the contract. Additionally, contractor employees cannot be placed in the position where they appear to have a direct supervisor and subordinate relationship with a military commander (or any government employee for that matter). Only the contracting officer or the contracting officer's representative may direct the contractor within the scope of the contract, and only the contracting officer can make changes to the contract.

The use of private military companies in Iraq creates a serious command and control issue, especially where commanders have instituted strict rules of engagement for forces under their command. Unless this rule of engagement or some condition requiring the contractor to follow the local

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commander's rule of engagement is included in the contract, contractor employees will not be obligated to operate within the rules of engagement. In this situation, soldiers "worry that the private-sector soldiers might not be constricted by the same rules of engagement and that any rogues among them could kill or hurt Iraqis and bring reprisals on all foreign forces."⁸⁶ One coalition military commander, when asked, "What are the rules of engagement for the private companies? Are they civilian, or are they military?" replied, "I don't know who they are, and I don't want to go anywhere near them."⁸⁷ This type of situation should be of grave concern to commanders who have private military companies operating in their area of responsibility since the ability to control their actions directly will be limited if not nonexistent.

Another issue that causes concern is the fact that contractor employees may refuse to enter what they consider to be a dangerous situation. In this situation, the commander does not have the authority to order a contractor employee to perform. This proved problematic in Iraqi Freedom where contractor *no shows* led to an Army unit's "living in the mud, heat, and dust since the unit had no core support capability and had shifted to reliance on contractor support."⁸⁸ This point drives home a major concern voiced by Army Field Support Command officials, "You cannot order civilians into a war zone. People can sign up for that, but they also can back out."⁸⁹ Contractors' leaving the theater at one time meant no hot food or limited support services. Now, because of the military's increased reliance on contractors, it could mean the loss of a core competency task such as aircraft maintenance or the loss of mission effectiveness of an entire platform like Global Hawk or Predator.⁹⁰

In this situation, it is up to contractor management to take action against the employee and make adjustments to continue performance. If the contractor does not perform, the only recourse the Government may have is to terminate the contract for default and remove the contractor from the theater. This does the commander who is trying to execute a combat mission little good. In anticipation of this type of contingency, it is imperative for the commander to plan for a contractor's default by providing military to perform the function in the interim until the contracting officer can find another contractor.⁹¹

Since contractor employees are not military personnel, they are not, unless Congress has declared war, subject to the UCMJ. Without a declaration of war, contractors, like any other US citizen who is visiting a country (a tourist for example), are subject to the laws of the country.⁹² An exception to this rule would be if contractor employees were covered under the status of forces agreement between the US Government and the host nation. The lack of applicability of US law or UCMJ, coupled with the hesitation of some host nations to prosecute Americans for certain offenses (especially if committed against other Americans), creates a situation where the contractor employee may be immune from prosecution despite the commission of a serious crime. In addition, in a country with no government, like Somalia, a contractor in a country supporting US

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efforts “could murder, rape, pillage, and plunder with complete legal unaccountability.”⁹³ In these instances, there is little the commander can do other than seek remedy under the contract.

To compound this issue, there is little common understanding among the Services as to the Government’s responsibility to contractor employees in the event of hostilities.⁹⁴ Guidance on the use of contractors to support deployed forces varies widely.⁹⁵ Commanders often have contractors supporting several different services, under several different contracts, each with different requirements and contract terms and conditions, operating within their area of responsibility. A recent GAO audit found that no overall DoD guidance regarding the use of contractors to support deployed forces exists. At the service level, only the Army has developed comprehensive guidance and formulated policies and doctrine for using contractors in deployment situations. Army regulations and field manuals provide comprehensive and detailed direction to commanders, contracting personnel, and contractors on their roles and responsibilities.⁹⁶ However, the other services have not matched the Army’s fidelity in developing guidelines for using contractors in deployment situations.

Additionally, where there is guidance, at either the joint or service level, it is inconsistent and, in some cases, contradictory. These differences and contradictions can complicate the ability of the commander to execute that guidance and cause great confusion.⁹⁷ The rules regarding force protection of contractor employees provide an excellent example. Joint Publication 4-0, Chapter V, describes force protection as the responsibility of the contractor, unless stated otherwise in the contract.⁹⁸ Army Field Manual 3-100.21 places the responsibility for contractor force protection on the commander.⁹⁹ Air Force policy states that force protection, commensurate with that provided to DoD civilians, may be offered under the terms and conditions specified in the contract and in accordance with host-nation laws.¹⁰⁰ The need for clear guidance is obvious in order to allow commanders to focus on the task at hand, not the rules they need to apply for contractors in their area of responsibility.

The above discussion, while far from comprehensive, identifies areas of concern associated with the increased reliance on contractors in deployment operations.

Potential Alternatives

The closer the function to the sound of battle, the greater the need to have soldiers perform the function because of a greater need for discipline and control.¹⁰¹

There are several possible solutions for alleviating the concerns created by the contractor’s quasi-combatant status, mitigating the risks of using contractors in an inappropriate manner, and resolving command and control issues: curtailing or eliminating the use of contractors in roles that could cast doubt as to their status under LOAC, temporarily discontinuing the usage of contractors while attempting to clarify their

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quasi-combatant status under LOAC realizing the risks involved and pressing ahead in the hope that no contractor employee is captured and put on trial as a war criminal; or turning those contractors who perform questionable roles into combatants.¹⁰²

The United States could decide not to use contractor support in roles where there is a possibility of crossing—or being interpreted by others as crossing—the line between indirect and direct participation in hostilities. This approach likely would be politically and publicly unacceptable. Eliminating contractor support in certain functions would decrease military effectiveness. This is because of the complexity of the systems employed in battle and the increased reliance on contractors to perform support functions. If contractors were taken out of these positions, the mission would be impacted since there would be limited to no military people available to perform those functions. Transferring positions back to the military also would be cost prohibitive.¹⁰³

The United States temporarily could suspend contractor participation in questionable functions while attempting to sponsor changes to international law, clarifying the contractor's quasi-combatant status. The length of time required to present the US case, coordinate with the world community, and negotiate to get other countries to agree would make this alternative unattractive in the short to medium term.¹⁰⁴

Another alternative simply could be to use the complexity of the law as an excuse to continue with business as usual and hope no contractor employee is captured, accused, and tried as a war criminal (that is, hope for the best). The problem with this alternative is that the United States prides itself on its support and adherence to international law and the conventions upon which LOAC is based. Taking this approach could expose the United States to embarrassment and criticism if a case went to trial and, thus, lower its standing in the international community. It would be difficult to expect other countries to take the *high ground* in terms of international law, in general, and LOAC, specifically, if the United States did not. Contractors would be leery of this approach since, if one of their employees were accused and convicted of war crimes, it could reflect badly on their standing in the international community and would be bad for foreign business. The companies and their executive leadership could run the risk of being held criminally or civilly liable for any damages attributed to their employees' contract performance. Additionally, it could be considered unethical to expect contractor employees to bear the personal risk associated with this approach. Also, contractor employees would be unlikely to go along voluntarily with this position once they understood the risks.¹⁰⁵

Given the difficulties associated with the previous alternatives, perhaps the best approach would be to “turn questionable civilians (in this case contractor employees) into combatants.”¹⁰⁶ There are two approaches to doing this: requiring contractors to hire employees with military obligations and the sponsored reserve concept.¹⁰⁷

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Sponsored reserve is enacted through a contractual agreement between the Government and the contractor and requires a specified portion of the contractor's workforce supporting a contract be members of a military reserve component.

The Army Materiel Command already is exploring the possibility of including contract language requiring the contractor to hire retirees and reservists for potentially dangerous tasks.¹⁰⁸

For very dangerous situations, the contract may require the contractor to hire personnel with a military obligation, including retirees, individual reservists, and members of troop program units. The military chain of command can bring those personnel onto active duty through temporary active-duty tours or mobilize them involuntarily to ensure continuation of essential services. Of course, such action risks loss of contractor personnel to a callup or mobilization for other duties. Activation or mobilizations are last resorts. They will be used to ensure continuity of essential services, when civilian employees are evacuated.¹⁰⁹

Many contractors already are looking to do this on their own to avoid a potential breach of contract in the event employees choose to terminate their employment rather than perform in a dangerous environment.¹¹⁰

While this may go a long way in solving the concerns previously noted, there is a new, creative, and more promising concept that takes this a step further: sponsored reserve.¹¹¹ Sponsored reserve is a nontraditional method that strikes a balance between maintaining needed military capacity and gaining the efficiencies of privatization and the skills available in the commercial marketplace.¹¹²

The sponsored reserve concept originated from the British *Regular/ Reserve Forces Mix Study* of 1992. The study recommended exploring the feasibility of using civilians with reserve status for operational support functions. The results of this study led to the passage of the 1996 Sponsored Reserve Act, which required defense contractors to have a specified number of employees participate as military reservists. Service-specific implementation regulations were finalized in 1999 following in-depth coordination with industry and trade union representatives.

Sponsored reserve is enacted through a contractual agreement between the Government and the contractor and requires a specified portion of the contractor's workforce supporting a contract be members of a military reserve component.¹¹³ Under this arrangement, sponsored reservists are mobilized and deployed to a contingency operation as uniformed military members vice contractor employees.¹¹⁴ Military commanders, not the contractor, are responsible for determining suitability of an individual to serve under sponsored reserve. Sponsored reservists are assigned either to active duty or reserve component units for training and deployment. Military commanders establish military requirements for the sponsored reservist. When a sponsored reservist is on active duty, the military commander assumes responsibility for work products and services. In peacetime, this responsibility falls on the contractor.¹¹⁵

The use of sponsored reserve personnel is appropriate under the following conditions: reserve component personnel are an acceptable alternative to active-duty personnel, it is acceptable for civilians to perform in peacetime, it is cost-effective for civilians to perform the task rather than active-duty personnel, and it is likely that civilians who perform the task will be deployed.¹¹⁶

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Under the British model, the terms and conditions of service for sponsored reservists are the same as those that apply to a normal reservist but are amended to reflect the commercial basis of the relationship. Sponsored reservists undertake the same training required by their parent force and are subject to the same disciplinary acts when serving in active status. They are provided the necessary military training (including basic military training for employees with no previous military active-duty or reserve experience) to enable them to be called out for any level of operation, but the extent of their training is related specifically to the contracted service they provide.¹¹⁷ Additionally, callup conditions for sponsored reservists are independent of those for ordinary reservists in that they are called up specifically to accomplish the task for which their employer is on contract.

The sponsored reserve concept offers advantages to all parties: government, contractor, and individual employee.

The advantage to the contractor may be entry into lines of business previously unavailable to them or expansion in the scope of existing business. The advantage to the employee may come in the form of additional pay, benefits, and job opportunities, as well as the protection that serving in a military status provides in a foreign theater or combat zone. The advantage to the military is the ability to deal with force reductions, privatization, and recruiting/training/retention challenges while retaining a military presence and status to seamlessly support peacetime, contingency, and wartime requirements.¹¹⁸

Under sponsored reserve, the issues identified previously become moot, since contractor employees will be in active military status while deployed in theater. Contractor employees who perform aircraft maintenance functions in peacetime could perform the same functions in active military status during contingency operations. Therefore, rather than having the problem of determining the status of these employees, they clearly would be combatants. This type program also could alleviate other predeployment concerns, such as vaccinations and chemical warfare training.

Sponsored reserve presents another advantage in that when employees are called up to active status for deployment they provide the same services under operational circumstances as that contracted out to their employer under peacetime conditions. Using the above example, if it is the employees' day-to-day job to provide maintenance services under a contract with the Government and they are called up to active military status to perform this function in support of a contingency, there is, theoretically, no void created if the employees are not physically present in the employer's location. Therefore, long-term deployments would be less stressful on the employer and the employee in terms of lost production and potential loss of employee benefits.¹¹⁹

The British currently have several sponsored reserve units providing a variety of functions. The Mobile Met Unit provides meteorological support to United Kingdom (UK) and allied forces operating in contingency locations where indigenous meteorological support is

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deemed inadequate to support the mission. The members of this unit are civil service employees in peacetime and special members of the Royal Air Force (RAF) Reserve.¹²⁰ A Halliburton-led consortium, FASTTRAX, provides heavy equipment transporter services to the British Army, mainly transportation of the Challenger main battle tank, in both peacetime and conflict scenarios. This contract frees up 92 heavy equipment transporter crews for other functions within the British Army.¹²¹ Vosper Thornycroft Shipbuilding employees provide integrated logistics support for the Royal Navy's newest multirole hydrographic and oceanographic survey ships, *HMS Echo* and *HMS Enterprise*. The sponsored reserve concept has allowed the Royal Navy to recruit hydrographic and oceanographic specialists and highly focused personnel that otherwise might not have been available.¹²²

One of the more interesting British uses of sponsored reserve is the proposed plan to have a contractor provide the next-generation RAF air-refueling and transport capabilities. Under this plan, the contractor will be able to use "dual civil/military registered aircraft" for its private revenue-earning operations when not required by the RAF. The contractor will employ aircrew and maintenance personnel as sponsored reserves, enabling them to be converted to military roles when required.¹²³ This plan, if incorporated, could free up air and maintenance crews for combat aircraft or other direct combatant roles.

The sponsored reserve concept has drawn interest from the Air Force as a potential tool to help mitigate critical manpower shortages. The Air Force Directorate of Strategic Planning currently is conducting a test program, based on the British model, to validate the effectiveness of the sponsored reserve concept within the Air Force and identify policy and legislative changes that would be needed to incorporate sponsored reserve.¹²⁴ The test program's goals include:

...developing appropriate policies for future implementation, analyzing adjustments to US law that would have to be made for the most effective implementation of the concept through coordination of specific test memorandums of agreement and using the test as a tool to further enhance public-private partnerships.¹²⁵

There are numerous challenges that must be resolved before the Air Force can implement sponsored reserve. The Air Force will have to determine the best method to integrate sponsored reserve into the present Air Force Reserve structure. Specifically, the Air Force will either have to establish a traditional Air Reserve Technician relationship with a commercial sector employee vice a government civilian employer or develop some other method.¹²⁶ Contracting and legal issues, such as the proper employee monetary and nonmonetary (benefits) compensation method (that is, contractor pay all compensation ala the British approach or some other combination), contract terms and conditions that would specify the relationship between them, and the responsibilities of the parties under sponsored reserve will need to be developed. If the commercial contracts involved require union membership, the concept

must be discussed and negotiated with labor unions, and any issues must be resolved.¹²⁷ Resolution of these issues could prove challenging but not insurmountable and should not, in theory, prevent the sponsored reserve concept from being adopted.

The Air Force identified the following skill sets as initial candidates for sponsored reserve under the test program: intelligence; space and satellite operations; information operations; unmanned aerial vehicle, unmanned combat aerial vehicle, and airborne laser operations; logistics and base infrastructure support; air traffic control; and engineer, science, and computer specialists.¹²⁸ As demonstrated in the RAF next-generation air-refueling and transport capabilities, the Air Force could explore the use of sponsored reservists to perform tanker and transport aircrew and aircraft maintenance duties in the future.

The increased reliance on contractor employees to perform tasks traditionally performed exclusively by military members, coupled with the nonlinear nature of today's battlefield, has created a situation where contractor employees are performing functions that cause them to encroach upon a thin line between combatants and noncombatants. In this type situation, contractor employees need the same type protections provided to military personnel under the Law of Armed Conflict. The ability of the commander to have direct command and control of personnel under this direction is crucial. Converting contractor employees, who are performing functions that call their LOAC noncombatant status into question, into active military personnel seems to be the best method to allay both concerns. The sponsored reserve concept shows great promise as the best method to accomplish this conversion.

Conclusions

Deploying contractors in the battlefield creates a unique set of issues for the commander. The increased reliance on contractor employees to perform functions formerly performed exclusively by military personnel and the nonlinear nature of the modern battle constantly put contractor employees in harm's way and have caused the line between contractors acting as civilians accompanying the force and civilians as combatants to narrow. The growing demands on the US military, increasing complexity and technology of weapon systems, and requirement to reduce the tail-to-tooth ratio to maximize the number of military people performing combat functions ensures more military functions will result in even more reliance on contractor personnel and a further narrowing, if not actual crossing, of the line.

It is extremely important for commanders at all levels to understand the status of civilian contractors under the Law of Armed Conflict and take special care to ensure the line is not crossed. Contractor employees who are performing roles functionally similar to those normally performed by military personnel in a hostile area, while wearing uniforms and openly carrying weapons, run the risk of being seen as taking a direct role in hostilities. This could lead to several untenable personal risks, including

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increased targeting, physical harm, or indictment as a war criminal under the Law of Armed Conflict. The former two concerns have been seen in Iraqi Freedom as former regime loyalists, and other opposition fighters deliberately have attacked and killed contractor employees without regard for their status under the Law of Armed Conflict.

The increased role of contractors on the battlefield has created a command and control concern for commanders. Generally, the closer to an area of conflict, the more control commanders need to have over forces in their area of responsibility. Currently, unless specifically spelled out in the contract, the commander has either limited or no authority over the actions of contractor employees. The recent employment of professional military companies in Iraq highlights this concern as their employees perform combat-type functions absent the direct command and control of local military commanders and their specified rules of engagement.

The alternatives for alleviating these concerns range from limiting the reliance on contractors to ignoring the problem inherent in using them in questionable roles. Perhaps the best alternative is to turn contractor employees who perform questionable functions into combatants. The sponsored reserve concept seems to be the most promising method to make this conversion. Deploying contractor employees into theater in military status renders the LOAC status and command and control issues moot. This concept has been implemented successfully by the United Kingdom and currently is being tested by the Air Force. Air Force implementation of sponsored reserve will no doubt be challenging, as many legal, contractual, and military policy issues will have to be overcome. However, the benefits provided by alleviating the concerns noted in this article and erasing the line between noncombatant and combatant will prove beneficial.

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Using contractors in military operations is not a new phenomenon. In fact, contractor use by the United States began prior to the Revolutionary War. During the Revolutionary War, the United States used contractors to move supplies to the front line.

Contractors in Contingency Operations

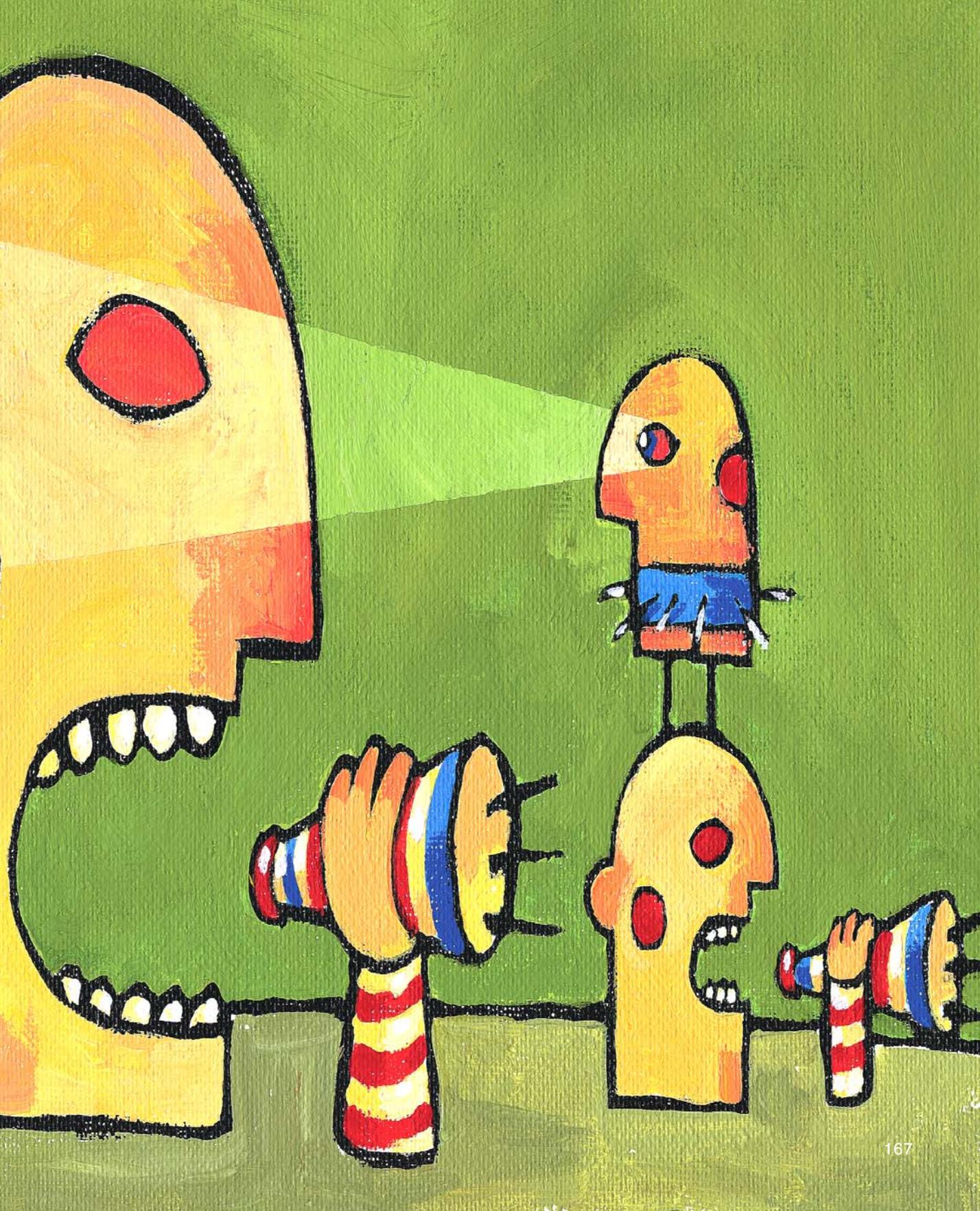
Panacea or Pain?

Introduction

The Department of Defense (DoD) has become increasingly reliant on contractors to accomplish the mission. Declining budgets and the reduction in force structure stemming from the peace dividend from the end of the Cold War forced the DoD to seek less expensive and more efficient ways of doing business. More and more, contractors are being called on to perform tasks historically performed by military personnel.

A myriad of factors addressed in the forthcoming pages drives continued reliance on contractors. One reason, often touted, is that contracting out operations saves money. On





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the surface, this seems to be true, but is the United States really saving money? Is the military required to *prove it*?

Background

Using contractors in military operations is not a new phenomenon. In fact, contractor use by the United States began prior to the Revolutionary War. During the Revolutionary War, the United States used contractors to move supplies to the front line.¹ Since then, contractors have filled important support roles in every conflict with US involvement, including Operation Iraqi Freedom. Table 1 shows civilian and contractor support levels in US conflicts, up to and including operations in Bosnia. Although figures are not yet available, the number of contractor persons providing support during Iraqi Freedom is sure to be a staggeringly large number. During the first Gulf War and again in Iraqi Freedom, the United States relied extensively on host-nation support contracts. The military, either directly or through host-nation support contracts, contracted for such items as cooks, water delivery, construction labor, and truck drivers. During Iraqi Freedom, third country national contractor persons numbered in the thousands in Kuwait alone.²

As the reliance on contractors has grown, the types of tasks contractors are being called on to perform are increasing as well. Contractors are finding their way into every facet of operations. Where the United States once relied on contractors solely for logistical support, contractor personnel now maintain and operate systems supporting the combatant commander. In some cases, contractors are being called on because they provide an expertise not organically possessed within the military. In other cases, they are being called on because they provide services faster, less expensive, and with less overhead than the military. Regardless of the reason, as contractors become more and more integrated into operations, the lines between combatant and noncombatant status are being blurred.

As the role of the contractor has expanded, the contractor's proximity to the battlefield has decreased. In the modern warfare era, there no longer is a distinctive line between battling forces. As a result, the contractors may find themselves close to the forward edge of the battlefield conducting activities, whether intentional or unintentionally.

As the reliance on contractors has grown, the types of tasks contractors are being called upon to perform are increasing as well.

War/Conflict	Civilians	Military	Ratio
Revolution	1,500 (est)	9,000	1:6 (est)
Mexican/American	6,000 (est)	33,000	1:6 (est)
Civil War	200,000 (est)	1,000,000	1:5 (est)
World War I	85,000	2,000,000	1:2
World War II	734,000	5,400,000	1:7
Korean Conflict	153,000	393,000	1:2.5
Vietnam Conflict	70,000	359,000	1:6
Desert Storm	9,000	400,000+	1:5
Bosnia	300	3,000	1:10

Table 1. Contractors and Civilians on the Battlefield³

Contractors who are supporting military operations are deployed globally, including the Central Command Area of Responsibility, providing support across Iraq. Contractors face the same dangers that military personnel encounter in the Middle East. During the conflict, they faced the potential for Scud attacks. Since our move into Iraq, contractors have suffered firsthand from attacks.

Even when the contractor is not fully deployed to the forward edge of the battlefield, the Global War on Terrorism poses a new threat to the theater of operation. Force protection issues have taken on increased importance with the deployed commanders. Their worries are not limited to the enemy's fielded forces and their inherent threats; now contemporary warfare and the threat of insurgencies bringing the battle to the rear area is a reality. Rear locations, once considered safe havens for troops to rest and relax, are potentially as dangerous as the front lines. This danger is not limited to troops: Americans and those who support American efforts are now targets. In many cases, the contractor poses a *softer* target to terrorists and is targeted specifically for that reason. News reports from Iraq indicate terrorists are actually targeting contractors and nongovernmental organization personnel because they are easy marks. During the last year, contractors were captured and killed supporting US military operations in Central America and the Middle East.

Contractors present multiple challenges to combatant commanders. Their status while deployed supporting contingency operations presents a real problem. The nature of the tasks contractors perform often blur the line between combatant and noncombatant status. Additionally, only a few status of forces agreements exist between the United States and countries around the globe that specify the status contractors will enjoy while deployed with forces. For those countries in which contractors are not covered by a status of forces agreement, the question arises as to the military's responsibility to ensure contractors understand the law and, more important, follow the law. Further, combatant commanders bear responsibility to account for contractors deployed to their areas of responsibility—unfortunately, responsibility does not constitute adherence.

Contractors also present challenges and concerns to forward-deployed commanders. Depending on the contract agreement, the deployed commander may have responsibility for providing force protection. If not specifically stated, do contractors have a right to the same level of protection? If so, who is responsible for providing the support? Depending on the service, the answer varies. Can a commander compel contract employees to perform if they refuse?

A myriad of factors addressed in the forthcoming pages drive continued reliance on contractors. One reason often touted is contracting out operations saves money. On the surface this seems to be true, but is the United States really saving money? Is the military required to *prove it*?

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Why Is the Military Increasingly Reliant on Contracts?

The need for additional manpower supporting the Global War on Terrorism, coupled with tight defense budgets, is moving outsourcing and privatization from the virtue to the necessity category.

Although not a new phenomenon, contractors are prevalent in all phases of military operations. In the wake of 11 September 2001, the Air Force requested an end-strength increase of 7,000 persons.⁴ Secretary of Defense Donald Rumsfeld rejected these plans stating the Air Force should contract out those jobs that could be outsourced and use the savings to satisfy newly identified requirements.⁵ The need for additional manpower supporting the Global War on Terrorism, coupled with tight defense budgets, is moving outsourcing and privatization from the *virtue* to the *necessity* category.⁶ Everywhere the United States deploys forces, there is likely to be a contractor assisting in one form or another. As discussed, the military has not gone to war without contractors providing support. Blurring the line between military and civilian, they provide everything from logistical support to battlefield training, as well as advise the military at home and abroad.⁷ In some cases, contractors perform traditional military roles in parts of the world the military no longer has the strength to perform the duties.⁸ One of the main reasons for using a contractor is saving the United States from using troops in positions not requiring warfighting skills so those troops can focus on positions requiring warfighting skills.⁹ Additionally, in the Air Force's case, the air expeditionary force (AEF) construct provides air force personnel with deployment lengths of 90 days. Contractors represent a steady workforce to provide continuity at deployed locations. Certainly, a multitude of reasons exists for using contractors versus possessing an organic capability. The following discussion focuses on four dramatic reductions in uniformed personnel strengths in the DoD: the need to refine the tooth-to-tail ratio, thereby improving the cost effectiveness of the DoD; increasing complexity of fielded systems; and internally or externally mandated limitations on troop strengths participating in contingencies.¹⁰

Troop strengths since the late 1980s have decreased dramatically, while the operations tempo has increased. As part of the peace dividend from the end of the Cold War, the DoD reduced its uniformed force by more than 700,000 active-duty military persons and its civilian workforce by more than 300,000.¹¹ Despite the fact that the Cold War ended, the operations tempo and likelihood of military deployments for the military actually increased. Since the end of the Cold War, the military has deployed with a frequency nearly five times higher than before.¹² The Guard and Reserve are not immune to this trend—their strength decreased more than 1 million, while the number of man-days served per year continues to increase.¹³ The mission continues to grow while personnel available to accomplish the mission steadily decreased. Increased reliance on outsourcing proves to be one of the few reasonable alternatives.

Reduction in personnel forced the DoD to recognize the need to refine its tooth-to-tail ratio. During the mid-1990s, Vice President Al Gore's *reinventing government* initiative placed further emphasis on outsourcing

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and privatization.¹⁴ A report by Business Executives for National Security stated there is an acute need for DoD to fix the way it manages its service and support infrastructure. While the military continues to reduce and reorganize its fighting forces, spending on support functions has remained stable or even grown. Nearly 70 percent, roughly \$160B annually, of the defense budget is going to areas considered the *tail* or support portion of the military.¹⁵ With such a large percentage going to support, that leaves limited dollars for the primary purpose of the DoD, fighting and winning wars—the *tooth*. Many of the functions accomplished by uniformed personnel could be accomplished easily by contractor personnel with little to no degradation in service. The 2001 Quadrennial Defense Review stated that the contractor-to-soldier ratio will continue to rise, and contracting out battlefield services will become a standard operating procedure for the military.¹⁶ With the number of contingencies the military finds itself involved in with a limited number of troops to draw from, the logical outcome is contracting out heretofore inherently military functions. During a recent interview Rumsfeld was asked whether contractors hired under the Army's Force XXI concept would be on the battlefield. He responded that combatant commanders decide employment of assets; however, because of the type of work, some contractors likely will be on or near the battlefield.¹⁷

The ability to downsize has been, at least partially, mitigated by the growing lethality of weapon systems. From an air perspective, a mission that might have taken multiple sorties to accomplish before can be achieved with a single sortie using precision-guided munitions launched from technologically advanced and complex platforms. In fact, using the B2 bomber during Iraqi Freedom, the Air Force was able to attack multiple targets with a single sortie. These advancements are not limited to the Air Force; all the Services are experiencing such technological advances. These advancements reduce the number of military in theater but may increase the number of contractors.

The growing complexity of these advanced weapon systems has led to further reliance on contractor support closer and closer to the battlefield. In many cases, we do not have enough of these low-density, high-demand platforms to develop an organic repair capability. In other cases, increasingly sophisticated military software and hardware have fueled outsourcing. Development of an organic repair capability would take years; by which time, the software and hardware and, therefore, the repair capability would be obsolete.¹⁸ Further, some systems, such as a new truck being fielded by the Marine Corps, were designed and implemented with contractor support planned as the principal means of repair.¹⁹ The military is making a conscious decision to allow contractors to perform all services associated with a system, from cradle to grave.

In addition to repairing equipment, contractors increasingly are being called on to operate systems.²⁰ During the first Gulf War, contractors flew side by side Air Force personnel on joint surveillance aircraft and target attack radar system aircraft, providing much needed technical support on

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There are three broad categories in which contractors provide support: systems support, external theater support, and theater support.

the newly fielded platforms.²¹ All these trends leading to increased reliance on contractors also lead to the potential of placing contractors in harm's way.

Finally, the necessity to use contractors often is driven by the need to keep force strength below mandated levels. These force strength restrictions can originate from Congress, the President, or the host nation. During Vietnam, Desert Storm, and Kosovo, contractors allowed the military to deploy more firepower while staying below congressionally mandated limits.²² In essence, you keep the numbers down while contractors make up the difference.²³ The host nation can and has placed limitations, by way of a status of forces agreement, on the number of military forces deployed to a contingency.²⁴ The use of indigenous support contractors reduces the need to deploy support functions while the indigenous support does not count against the total number of forces deployed to a region. This allows for deployment of larger numbers of fighting *tooth* forces without increasing the need to deploy support *tail* forces. An added incentive to hiring indigenous contract personnel is that local manpower often is considerably cheaper than military support or US-provided manpower. In addition, hiring local contract personnel provides economic stimulus to the local host-nation economy.

Types of Contracts

According to Joint Publication 4-0, there are three broad categories in which contractors provide support: systems support, external theater support, and theater support.²⁵ In most cases, these contracts are let on behalf of the DoD to benefit using new or existing contracts. However, during Operation Southern Watch and the buildup to Operation Iraqi Freedom, the DoD relied heavily on contracts let by the Government of Kuwait on behalf of the DoD.

System Support Contracts

System support contracts are fairly straightforward. These type of contracts provide life-cycle support for weapon and other systems fielded by the DoD. The types of systems being maintained include vehicles, aircraft, computer systems, and a command and control infrastructure. This support can be provided at the home base or can be for maintenance and support of equipment deployed forward.²⁶ Historically, weapon system developers would build a system, deliver it to the military, and then walk away. Now, the contractor is just as likely to build the weapon system and then remain with it to provide follow-on maintenance. One author attributed the growth of contractor-provided maintenance to a growing reliance on civilian technology adapted for military use. Complexity, combined with finite production runs, has made it uneconomical for the military to develop an organic repair capability.²⁷ Whatever the case, the DoD is seeing a large increase in system support contracts.

External Support Contracts

External theater support contracts normally are contracts established and managed at the service level to provide support at deployed locations

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prior to the troops actually deploying. Services contracted via external support contracts include such items as roadbuilding, building airfields, channel dredging, stevedoring, transportation services, billeting, and food services.²⁸ These contracts provide support before, during, and after the deployment. They are an excellent means of allowing our overburdened soldiers, sailors, and airmen to return home after the contingency is won but before the need for follow-on support is complete. The Army, Air Force, and Navy each have indefinite-delivery, indefinite-quantity (IDIQ) contracts for support services and can call on the contracts as needs arise.²⁹

The Army's IDIQ contract is the Logistics Civil Augmentation Program (LOGCAP) with Kellogg Brown and Root (KBR).³⁰ Recent work completed by KBR on LOGCAP was the establishment of an entire base camp in both Somalia and the Balkans.³¹

In preparation for Iraqi Freedom, KBR erected Army force-provider tent cities at the aerial port of debarkation and sea port of debarkation. These tent cities were erected in minimal time and provided the Army with much needed billeting and messing close to the port operations. In addition, KBR provided billeting and messing facilities at nearly every forward-deployed location in Kuwait.³²

The Air Force IDIQ is known as the Air Force Contract Augmentation Program or AFCAP. AFCAP is a multiyear contract with readiness management support. Readiness management support has provided power generation and engineering support, built refugee camps in Kosovo, completed airfield upgrades in Ecuador, and provided backfill for deployed air traffic controllers.

The Navy IDIQ civilian augmentation program is called Construction Capabilities (CONCAP).³³ The multiyear contract with KBR has been used for dredging, communication facilities, and other activities that allow the Navy to stay within its force structure ceilings, as well as free Navy personnel for contingencies.³⁴

LOGCAP, AFCAP, and CONCAP support joint US operations around the world, freeing military forces for those activities that actually require uniformed personnel. These contracts are very expensive, and the commander should ensure costs are controlled.³⁵ This is a task normally relegated to the contracting office; however, it is important. On the other hand, if the contractor is the only source of the service needed, it may not matter what the cost is.

Theater Support Contracts

Theater support contractors provide contracted goods and services to the deployed commander via contracts let through a deployed contracting agent.³⁶ Contracting officers deploy before and during the operation to procure goods, services, and minor construction from sources such as local vendors or nearby sources.³⁷ Theater support contracts are designed to meet the immediate needs of the deployed commander.³⁸ As a requirement surfaces, the deployed contracting officer can respond rapidly by using a locally established contract agreement or by way of one-time purchase

AFCAP is a multiyear contract with readiness management support.

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There is an increased reliance on contractors to perform mission critical tasks.

orders. In either case, the contract is intended to satisfy the need and provide the commander maximum flexibility.

Host-Nation Contracts

During both Operation Desert Storm and Iraqi Freedom, the US military relied extensively on contract-let host nations via host-nation support agreements using host-nation contracting agents. These agreements permit the acquisition of goods and support from and by the host nation.³⁹ During Desert Storm, Saudi Arabia provided billions of dollars in support for items such as food, water, transportation, housing, and fuel. The United States would identify the requirement, and Saudi contracting officials would let a contract to satisfy the requirement.

During Iraqi Freedom, the United States relied on a similar arrangement with Kuwait. At the conclusion of Desert Storm, Kuwait and the United States established the Defense Cooperation Agreement (DCA), providing for a US presence in Kuwait for the purpose of military exercises. The DCA established the type of support the United States would provide, as well as the support Kuwait would provide, and how that support would be funded. The type of support provided by Kuwait was similar to the support provided by Saudi Arabia during Desert Storm. Just like the Saudis, the Kuwaitis negotiated some contracts on behalf of the United States, while in other cases, they allowed US contracting officers to let the contract and provided reimbursement via an account known as the Burden Sharing Account.⁴⁰

Host-nation contracts covered the entire spectrum of support and provided the same benefits US contracts provide with the added benefit of using someone else's funding to provide support for our military. An important aspect was local contracting personnel familiar with the contracting practices unique to the Middle East let the contracts. These host-nation contracts were not without their problems.

Problems Associated with Contracting Support

As discussed earlier, there is an increased reliance on contractors to perform mission critical tasks. Simply stated it is impossible to deploy without them. While military personnel take an oath to support and defend, contracting personnel do not. They deploy but cannot be compelled to perform. In most cases, their only allegiance to the effort is to the corporate entity they are representing. Once Scuds start flying, the military commander cannot compel the contractor to perform. Although providing functions crucial to the combat effort, they are not soldiers. Private contractors are not obligated to take orders or to follow military codes of conduct. Their legal obligation is solely to an employment contract, not to their country.⁴¹

When Contractor Personnel Refuse to Perform

The loss of mission-essential contractors can have a serious effect on the mission and potentially put military personnel in danger.⁴² During the Persian Gulf War, a very small number of contractors working in Saudi

Arabia left the country from fear that chemical weapons might be used.⁴³ Many civilian contractors refused to deploy to particularly dangerous parts of Iraq at the conclusion of the heavy battle portion of Iraqi Freedom. There are reports that soldiers had to go without fresh food, showers, and toilets for months. Even mail delivery fell weeks behind.⁴⁴ Unfortunately, the compunction of a contractor or contract employee to serve in the war zone cannot be measured ahead of time, so the commander must plan for this potential outcome.⁴⁵ It is not clear that we do this well. In fact, the Government Accounting Office (GAO) reports most combatant commanders do not do this at all.⁴⁶

In the case of military members who refuse to perform, the commander can take specific Uniform Code of Military Justice (UCMJ) actions against them. This is not the case for the contract personnel. They are not bound by or held to the UCMJ. In fact, the commander does not have jurisdiction over the contractor. The contracting officer assigned to the deployed location holds the responsibility for contract personnel. The contracting officer can notify the contracting representative of a person's refusal to perform.⁴⁷ In addition, the contracting officer can terminate the contract for failure to perform; however, if the contract is for mission-critical support, by terminating the contract, a much larger problem is created.

Dangers Posed to Contractors and by Contractors

Joint publication 4-0 states that contractors are responsible for force protection of their personnel unless contract terms place the responsibility within the DoD.⁴⁸ Regardless of where the responsibility is placed contractually, the media reports it as a US casualty, a US captive, or a US wounded without respect to who is at fault. The danger to civilians who work in the Persian Gulf was driven home in late January 2003 when two contractors from Tapestry Solutions, Inc, a San Diego firm hired by the DoD to install computer software, were ambushed in Kuwait.⁴⁹ A Brown and Root mail clerk was killed in Baghdad when a bomb detonated under his truck.⁵⁰ The military is placing contractors in harm's way, and contractors are suffering casualties. In the case of the Tapestry Solutions contractor, they were traveling from Camp Doha, Kuwait, to Kuwait City. They were not following Camp Doha policy concerning force-protection measures. They were not wearing body armor or a protective helmet. In addition, the contractors were traveling alone as opposed to the two-vehicle policy stipulated for off-post travel by the Camp Doha commander. By not traveling in a two-vehicle convoy, they provided a soft target to the terrorists. From the graphic photos displayed on the front page of the *Kuwait News* and on the Internet, it is clear that a properly worn Kevlar helmet most likely would have saved the contractor's life.

Contractors also face the risk of capture. The United States currently has three military contractors who have been held in captivity in the Colombian jungle since 13 February 2003.⁵¹ The Revolutionary Armed Forces of Colombia captured them after their plane was shot down. This contractor was providing military training and intelligence operations in support of counterdrug operations in the region.

The contracting officer assigned to the deployed location holds the responsibility for contract personnel.

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The threat of terrorism has raised concerns about whether it is wise for the military to use foreign workers at overseas installations.

More recently, the threat of terrorism has raised concerns about whether it is wise for the military to use foreign workers at overseas installations.⁵² This is particularly true in recent operations in Iraqi Freedom. Many of the third country nationals were from Egypt, Iran, India, Afghanistan, and other countries with heavy Islamic influence, as well as countries known to have a high number of anti-American factions within their country. In Kuwait, an effort was made to mitigate the risk by having the Kuwait Minister of the Interior, as well as the Intelligence Directorate of the Minister of Defense, conduct simultaneous background checks on the third country nationals. The Minister of the Interior was concerned with ensuring the third country national was in Kuwait with the proper identification, as well as ensuring the third country national did not have a criminal record either within Kuwait or in the country of origin. In the case of the Intelligence Directorate, it ensured the third country national did not have a heretofore-undisclosed terrorist affiliation. The United States, for its part had differing methods of ensuring control of third country nationals. The Air Force limited the access the third country nationals had to critical areas of the base. Third country nationals could work outside the perimeter of the base unimpeded; however, any third country nationals working on base were kept under the constant surveillance of military escorts. The Army, on the other hand, checked the third country nationals as they entered the post and then allowed the third country national unescorted access to the post.

Finally, the status of forces agreement negotiated with the host nation by the State Department discusses the protection provided US personnel serving within the host nation. However, only 5 of the 109 status of forces agreements in effect have any provisions for contractors. As a result, a myriad of issues arises concerning contract personnel. These include who has criminal jurisdiction should a contractor commit a crime, whether the contractor is subject to customs charges, how long contractors may serve in a country, as well as whether they are subject to country taxes.⁵³ Although not a major concern of the deployed commander, these factors can lead to increased contract costs, as well as risk to the contractor.

Host-Nation Contracts

Although the host-nation support contracts provide incredible flexibility, they are not without problems. First among these is the fact the Federal Acquisition Regulation (FAR) does not apply. Some feel this is not necessarily a bad thing; however, the purpose of the FAR is not to tie the commanders' hands but rather to ensure the military gets the goods and services it contracts for at a fair price, from a reputable source. Although one would hope that host-nation negotiated and funded contracts are for a fair price and from a reputable source, that is not a guarantee. In addition, the terms and conditions of the contract could prove to tie the military's hands or, even worse, be at cross purposes with the United States.

The Defense Cooperation Agreement between the United States and Kuwait stipulated Kuwait would provide food for forces deployed for

Operation Southern Watch. During the preparatory phase to Iraqi Freedom, US Army and Air Force host-nation support personnel, working out of US Army Forces, US Central Command (ARCENT) FWD/S5, negotiated an extension of this contract to apply to all deployed soldiers. Further negotiation resulted in an agreement to include all military forces in the term *soldier*. However, the catering contract for US forces specifically excluded *nonsoldier personnel*, to include civilian employees and contractor employees.⁵⁴ The treatment of this portion of the contract, by both contracting personnel and the contractor, varied by deployed location within Kuwait, as well as by the military service interpreting this clause. The Army required contract and civilian personnel to sign for meals and reimburse the catering contractor.⁵⁵ The Air Force, on the other hand, did not require reimbursement. This was because the Air Force contract between deployed contract personnel and the Air Force was written such that the Air Force would provide meals for deployed contract personnel. At both Air Force locations within Kuwait, DoD civilian and contractors were not required to sign or pay for their meals. When the issue was raised by services personnel at Ali Al Salem AB, base legal personnel assigned to Ali Al Salem and ARCENT/S5 personnel agreed it was a problem, but neither could reach a reasonable solution to fix it. Although identified as an issue, the problem was not resolved by the start of the war.

Another problem with these contracts is the fact they were let by another government. The other government spelled out the requirements, and performance is managed and monitored by the another government. As long as the contractor is providing the goods and services the United States desires, there is no problem; however, who has the stick should the contractor not perform? For example, at one location in Kuwait, the host-nation contractor was charging the Air Force for repair of contractor-provided equipment—equipment the contractor was required to fix per the contract with the host nation. The deployed contracting officer unwittingly let a contract directly with the contractor for repair of contractor-furnished equipment. When asked why the contracting office was doing this, they stated, “That’s the way it’s been done for the last three 90-day deployments.” This was not only a waste of US dollars but also fraud on the part of the contractor.

Recommendations

The DoD needs to improve its visibility over contractor personnel at deployed locations, and deployed commanders need visibility of all personnel they are responsible for. It is irrelevant whether responsibility is as a result of chain of command or contract. The important issue is visibility. Visibility is important so the commander can adequately address force protection issues as well as support issues. The deployed contracting officer should maintain a database of all contract personnel with access to the deployed location and the deployed commander’s responsibility with respect to the contract employee. In the case of host-nation support contract employees, the deployed commander’s responsibility simply may be to

During Iraqi Freedom, host-nation contractor performance varied significantly between locations.

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The DoD, in concert with the Department of State, needs to ensure contractor personnel deployed in support of a contingency are covered by a status of forces agreement.

provide access to the worksite. On the other hand, in the case of contractor personnel deployed from the United States in support of fielded systems, the commander may be responsible for all support necessary for the contract personnel, to include force protection.

The GAO has cited combatant commanders twice for failing to develop a contingency plan should contractors refuse to work. As stated earlier, this is not a what-if exercise—the DoD has experienced contractor personnel’s refusing to work both in Desert Storm and Iraqi Freedom. Combatant commanders, as well as the Services, need to develop plans to ensure continuity of service should the contractor refuse to work. In addition, they need to analyze the impact of losing a capability should the contract personnel refuse to perform. Such a loss of sensitive equipment and systems would have a degrading effect on the deployed commander’s ability to perform the mission.⁵⁶ In the case where the impact is too costly, the service should consider bringing that system support back into the force.⁵⁷

The DoD, in concert with the Department of State, needs to ensure contractor personnel deployed in support of a contingency are covered by a status of forces agreement. Leaving contract personnel to fend for themselves could prove to be problematic, as well as costly. Getting contractor personnel to deploy to locations where they are not covered by a status of forces agreement may be even tougher. As stated earlier, 5 out of the 109 status of forces agreements the United States has contain provisions for contract employees.

According to the GAO, the amount of guidance concerning contractors deployed forward varies considerably by service. The GAO stated the Army does the best job of providing published guidance to the deployed commander and contracting officer, while the Navy and Air Force fall short.⁵⁸ Although there is a joint publication on the issue, there need to be service-specific publications for deployed commanders. This doctrine needs to cover the responsibilities of the forward deployed commander with respect to contracts. The doctrine should cover all aspects of the care and feeding of contractor personnel and who will assume responsibility.

The short duration of AEF cycles also was cited as a problem by the GAO, a problem this author experienced firsthand in Kuwait. Ninety days did not seem to be enough time for the contracting officer to become acquainted with the nuances of all the contracts the contracting officer was responsible for, let alone the host-nation contracts. The Air Force acknowledged the issue and had extended contracting personnel to Iraqi Freedom.⁵⁹ In addition, the Air Force should consider staggering the deployment and redeployment of contracting personnel serving under the contracting officer. Although this approach is counter to the AEF rotation plan, it would serve to ensure there is continuity at the deployed location.

The DoD needs to develop standard procedures for dealing with host-nation support contracts and contractor personnel. Host-nation contracts provided a significant portion of base support during Desert Storm and

Iraqi Freedom. However, how well deployed forces understood the process and could work with host-nation contractor personnel was mixed at best. The Army seemed to have a better grasp on the issue, whereas the Air Force, at least in locations in Kuwait, did not seem to have a clear understanding of host-nation contract responsibilities. As a result, there were many cases where the Air Force contracting officer let duplicative contracts for a service contracted for by the host nation. In some cases, the contractor was being paid by the host nation and the United States for the same service. There were many reasons cited for the duplicative contracts, the most prevalent was the contract was set up before the current batch of contractor personnel rotated in for their 90-day rotation.

Conclusions

Since the Revolutionary War, the United States has relied on contractors on or near the battlefield. Although the DoD has experienced ebbs and flows in the use of contractors, reductions in force structure and budgets have put the DoD in a position where it is increasingly reliant on contractor support to achieve the mission. Where the contractor once was called on to perform support tasks such as long-haul trucking and mess hall support, they are now being called on to perform tasks in direct support of the mission. The increased reliance on contractors has increased their presence near and on the battlefield. Their presence has created a myriad of issues the DoD is still coming to grips with.

First among these issues is the status contractors enjoy while serving in the forward-deployed location. As stated earlier, there are only a handful of nations that include status of contractor employees in their status of forces agreements with the United States. The State Department, in tandem with the DoD, needs to address these issues with the countries where we are most likely to serve.

Second, the service doctrine needs to change to place increased emphasis on the status of forward deployed contractors. The Army has a head start on the other services, but its doctrine could serve as a boilerplate for the Navy and Air Force. This doctrine should address such issues as the force protection forward-deployed commanders will afford deployed contractor personnel. In addition, it should address the authority the forward-deployed commander has over deployed contractors should they fail to comply with published guidelines.

Third, combatant commanders should comply with the findings and recommendations put forth by the GAO to identify those critical missions currently contracted out that are so critical as to warrant developing an organic capability.

Fourth, the Services need to develop a methodology to determine whether contracting out is actually saving the military money and manpower. The Office of the Secretary of Defense should establish an office for analyzing whether the combatant commanders are actually saving by using contractor support.

Reductions in force structure and budgets have put the DoD in a position where it is increasingly reliant on contractor support to achieve the mission.

Contractors in Contingency Operations: Panacea or Pain?

The combatant commander needs to develop a tool to keep track of contractor personnel in the area of operation.

Fifth, issues regarding host-nation support contracts need further clarification as well. The DoD has relied on these type of contracts during both wars with Iraq. No doubt they will be used in the future.

Finally, the combatant commander needs to develop a tool to keep track of contractor personnel in the area of operation. This may be as simple as an off-the-shelf database. The importance is not the methodology but rather the fact combatant commanders are accounting for contractor personnel deployed to their area of responsibility.

Contractors have become an integral part of the mission. The DoD is more reliant on contractors than ever before. The push to downsize the military and privatize functions means government contracts are a growth industry. The DoD needs to address issues regarding contractors on the battlefield.

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Logistics Stuff—Five Things to Consider

- The operations/logistics partnership is a target for our enemy—protect it. We always must try to think of an enemy’s looking for the decisive points in the partnership. What we want to make strong, they will try to weaken. Where we want agility, they will want to paralyse us. What we can do to our enemy, we can do to ourselves by lack of attention. So all concerned with operations and logistics must protect and care for the partnership and the things it needs for success. This includes *stuff*, information, and people. Also, we must not forget the corollary is just as important: the operations/logistics partnership of the enemy is a target for us; we must attack it.
- Think about the physics. Stuff is heavy, and it fills space. Anything we want to do needs to take account of the weight that will have to be moved, over what distance, with what effort. Usually this all comes down to time, a delay between the idea and the act. If we think about the physics we can know the earliest time, we can finish any task, and we can separate the possible from the impossible. It is crucial to determine the scope of the physical logistics task early in any planning process. Planners must know how long things take and why they take that long.
- Think about what needs to be done and when—and tell everybody. Once we have given instructions and the stuff is in the pipeline, it will fill that space until it emerges at the other end. The goal is to make sure that the stuff coming out of the pipe is exactly what is needed at that point in the operation. If it is not, then we have lost an opportunity—useless stuff is doubly useless, useless in itself and wasting space and effort and time. Moving useless stuff delays operations. Also, priority of order of arrival will change with conditions and with the nature of the force deploying. For example, the political need to show a presence quickly may lead a commander to take the risk of using the first air transport sorties to get aircraft turn-round crews and weapons into theatre before deploying all the force protection elements.
- Think about defining useful packages of stuff. Stuff is only useful when all the pieces to complete the jigsaw are assembled. Until the last piece arrives, there is nothing but something complicated with a hole in it. It is vital to know exactly what is needed to make a useful contribution to the operational goals and to manage effort to complete unfinished jigsaws, not simply to start more. Useful stuff often has a sell-by date. If it arrives too late, it has no value, and the effort expended has been wasted. The sell-by date must be clear to everyone who is helping build the jigsaw. And it is important to work on the right jigsaw first. In any operation, there is a need to relate stuff in the pipelines to joint operational goals, not to single-service or single-unit priorities. It is no good having all the tanks serviceable if the force cannot get enough aircraft armed and ready to provide air cover or ensuring that the bomber wing gets priority at the expense of its supporting aircraft.
- Think about what has already been started. The length of a pipeline is measured in time not distance. There will always be a lag in the system, and it is important to remember what has already been set up to happen later. Constantly changing instructions can waste a lot of energy just moving stuff around to no real purpose. Poorly conceived interventions driven by narrow understanding of local and transitory pain can generate instability and failure in the system.

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No matter what the *moniker*...the use of contractors to support military operations is not a new concept. The range of support is endless—materiel management, supply support and maintenance, sanitation facilities, transportation, minor construction, aerial and seaport support. As the use of contractors expands, the DoD must proceed cautiously.

Extending the Force

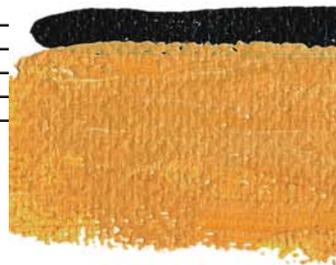
Contractor Support to the DoD: How Can Employment be Optimized?

Introduction

You will not find it difficult to prove that battles, campaigns, and even wars have been won or lost primarily because of logistics.

—Dwight D. Eisenhower

Logistics is the difference between winning and losing a war. More and more, the Services must look at better ways to provide needed logistics to the battlefield and to those activities that enable and support the nation's warfighting capabilities. Given the environment of shrinking military forces, the Department of Defense (DoD) must seek other alternatives to bring what it needs to the fight. The use of DoD civilians and the use of civilian contractors represent two means of accomplishing this. "The DoD components shall rely on the most effective mix of the total force, cost, and other factors considered, including active, reserve,





Extending the Force— Contractor Support to the DoD: How Can Employment Be Optimized?

*Responding to the needs of
the operational commander
is the role of the theater
support contractor.*

civilian, host nation, and contract resources necessary to fulfill assigned peacetime and wartime missions.”¹ Truly a *growth industry*, civilian contractors have become the most wide-ranging *force multiplier* available to commanders.

They have been referenced as many things: private military contractors, contractors on the battlefield, and contractors in the joint theater. No matter what the *moniker*, the use of contractors to support military operations is not a new concept. The range of support is endless—materiel management, supply support and maintenance, sanitation facilities, transportation, minor construction, aerial and seaport support. As the use of contractors expands, DoD must proceed cautiously.

Background

Types of Contractors

Prior to any further discussion, a definition of contractors is appropriate. These contractors may be on the battlefield, near the battlefield or elsewhere overseas, or in the States providing some form of support to the mission. The Army divides contractors into three distinct categories based on the type of support provided: theater support contractors, system support contractors, and external support contractors. Generally speaking, each category demands slightly different planning requirements and considerations.

Responding to the needs of the operational commander is the role of the theater support contractor. Downloading aircraft, light construction, and security augmentation represent the types of services these contractors can render. Workforce composition is mostly host-nation because of the nature of the services.

System support contractors offer cradle-to-grave services (or life-cycle management) of large vehicles, aircraft, and other major weapon systems. Their technical expertise generally falls within the realm of logistics, training, or maintenance support functions. The technical nature of their work, coupled with the complexity of today’s fielded systems, has begun to bring system support contractors closer to hostile fire.² The growing use of mission-essential system contractors is cause for concern. Frequently, these contractors do not augment organic support capabilities for a given system; rather, they are the only existing support for that system.³ Given the significant role the system support contractor plays in the life cycle of a piece of equipment or system, the trend (of bringing system support contractors closer to the line of fire) most likely will continue.

In contrast to both system and theater support contractors (who provide services on a day-to-day basis) is the external support contractor. These contractors really act more as *enablers* to the commander. Military forces may take advantage of external support contractors via the Logistics Civilian Augmentation Program (LOGCAP) for the Army, the Air Force Civilian Augmentation Program (AFCAP), the Navy’s Construction Capability, plus contingency contracting and other such preplanned contractor support augmentation.⁴ These:

...contractors provide prioritized contingency planning for logistics augmentation, engineering, and construction services. Combatant commanders and service component commanders determine planning requirements in the projected area of operation. This contractor support is then integrated into tactical plans.⁵

Although not as obvious, the Civil Reserve Air Fleet invoked by the US Transportation Command and war reserve materiel (WRM) fall inside this category.⁶ Contractor use, as outlined in the preceding text, has numerous historic forerunners.

Historic Examples of Contractor Use

Contractors have been used successfully in numerous historical situations, as well as present-day situations; documented use dates as far back as the Revolutionary War. In what has proven extremely prescient, Robert Morris, Superintendent of Finance in 1781, stated, “In all countries engaged in war, experience has sooner or later pointed out that contracts with private men of substance and understanding are necessary for the subsistence, covering, clothing, and moving of any army.”⁷ When the government’s own internal supply system, (Commissary Department) supporting the Revolutionary War was unable to deliver food and other supplies during the winter of 1779-1780, contractors became the last resort and the ultimate solution.⁸ Morris “established a system of contracting private vendors to procure, deliver, and issue necessary rations when and where they were needed.”⁹ Other examples abound.

Contractors were instrumental in the buildup of arms during the War of 1812. “More than 520 furnaces and forges were contracted for the manufacture of heavy artillery.”¹⁰ Two separate contractors, Whitney and North, manufactured nearly 42,000 muskets. Contractors were used to augment the production of munitions for the war.

Vietnam reflected one of America’s largest uses of contractors as its solution to the President’s mandated troop ceilings. The Army was able to increase its combat soldiers in the theater by *trading off* support soldiers. Flowing civilian contractors into the theater to fulfill support requirements made such tradeoffs possible, while providing a hedge against eroding the warfighting force structure. Trading support troops for combat troops, which came of age in 1965, is destined to become a recurring theme.

Looking only at 1965, history reflects that more than 35 American companies employed some 2,000 people working alongside the 200,000 American troops in Vietnam. From an economic perspective, this translated to \$45M in expenditures, which does not include an additional \$500M invested in harbor and airfield construction projects. “At the height of the Vietnam conflict, more than 70,000 contractors supported the war effort.”¹¹ In past wars, as indicated in Table 1, civilians (both contractors and deployed civilians) have matched up to 39 percent of military representation.

Extending the Force— Contractor Support to the DoD: How Can Employment Be Optimized?

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Extending the Force— Contractor Support to the DoD: How Can Employment Be Optimized?

Desert Storm and Desert Shield saw many positive uses of contractors.

Present-Day Examples of Contractor Use

More recent military engagements—such as Operations Desert Shield and Desert Storm, Allied Force, Enduring Freedom, and Iraqi Freedom—have derived huge operational benefits from the use of contractors. In Desert Shield and Desert Storm, “One American in 50 deployed to the Persian Gulf was a civilian; the Bosnian conflict included civilians at a rate of 1 in 10.”¹² “Since 1992, contingency contractors have been alerted and deployed on contingency missions in Somalia, Rwanda, Haiti, Italy, and Bosnia to provide a broad range of combat support and combat service support to US and allied forces.”¹³ Finally, contractors played key enabling roles in Enduring Freedom and Iraqi Freedom and will continue to contribute during postwar operations in Iraq.

Desert Storm and Desert Shield saw many positive uses of contractors. Records indicate more than 1,000 contractor personnel were deployed to airbases, on aircraft carriers, and to other military facilities throughout the Gulf region. They assisted military technicians in diagnosing problems and repairing battle-damaged weapon systems.¹⁴ As they have been used in the past, these contractors provided the support infrastructure that allowed the rapid buildup to accommodate an additional 200,000 troops. Contractor efforts proved instrumental in facilitating military campaign successes.¹⁵ Table 2 illustrates the contractor *footprint* during Desert Shield and Desert Storm.

Similar to Desert Shield and Desert Storm, Iraqi Freedom employed an enabling force of 9,200 contractors to support 541,000 military members.¹⁷ During Iraqi Freedom, the United States Air Forces in Europe (USAFE), the Air Force component of the European Command (EUCOM), made extensive use of AFCAP to provide beddown services for 31,000 persons across various deployment sites. The use of contractors has continued and even increased in the Iraqi Freedom post-hostilities environment with a customer base reaching out to include not only US troops but also multinational divisions, the Coalition Provisional Authority, and the Iraq

Conflict	Civilians	Military	%
Revolutionary War	1,500	9,000	16.7
Mexican/American War	6,000	33,000	18.2
Civil War	200,000	1,000,000	20.0
World War I	85,000	2,000,000	4.3
World War II	734,000	5,400,000	13.6
Korean Conflict	156,000	393,000	39.7
Vietnam Conflict	70,000	359,000	19.5

Table 1. Civilian Contributions by Conflict

	Air Force	Army	Navy	Total
Contractor Personnel	154	3,898	5,126	9,178

Table 2. Contractors Deployed for the Persian Gulf War¹⁶

Extending the Force— Contractor Support to the DoD: How Can Employment Be Optimized?

Survey Group. As of February 2004, Army contingency contractors in the Central Command area of responsibility alone accounted for more than 12,000 contractors and 166 companies providing 47 dining facilities; 13 ice plants; laundry and bath services; postal and morale, welfare, and recreation services; and facilities management. To date, DoD has provided more than \$3.6B to accommodate these services. In Kirkush, Iraq, the DoD is making extensive use of private security firms to guard key installations and train the new Iraqi Army.¹⁸

As part of their role in Iraq, these contractors have made sacrifices similar to their US military brethren they are there to support. In the course of providing their services in theater, as of February 2004, US contractors had sustained more than 53 casualties (13 killed in action, 13 nonbattle deaths, and 27 wounded in action).¹⁹ The number of contractors employed by the DoD continues to grow. It is valuable to highlight the impetus behind their presence.

Why the Shift?

The DoD has been forced to seek nonmilitary means of meeting its requirements for a variety of reasons. The most significant drivers include increasing limits on force structure; increasing high operations tempo to support peacetime missions; decreasing budgets; evolving and advanced technologies, which demand extremely high technical skills sets; and DoD's push to fund more modernization efforts by using savings generated through more efficient support operations. There is a common thread among the above-listed drivers. It is that limited and decreasing resources (manpower and money) are the real bottom line behind today's shift toward increasing usage of contractors. However, each driver merits a closer look.

Congressionally directed limitations on force structure have played a huge role in DoD's growing reliance on contractors. The management philosophy of *doing more with less* is not realistic; as long as requirements grow despite the application of manpower caps in specific areas of engagement, there must be a means to continue to provide needed support. For example, manpower caps during the Vietnam conflict forced more use of support contractors to do the support functions, while the military manpower was dedicated to combat functions.²⁰ Host nations may also impose limits on the military manpower allowed in a particular theater. The use of contractors provides an extremely valuable workaround for sourcing needed manpower.

Increasing peacetime missions (high-operations tempo) have consumed a significant share of the existing force, compelling DoD to seek other viable manpower alternatives. The ongoing US engagement in Bosnia has become a steady-state environment heavily dependent on contractors. By and large, these services are rendered through LOGCAP. Brown and Root Services Corporation (BRSC) has established itself as a worldwide provider of military services. To support Bosnia, as well as troops in Hungary and Croatia, BRSC employs more than 1,000 civilians working alongside 5,500 local nationals. Together, they have built 33 camps and delivered cooking,

Congressionally directed limitations on force structure have played a huge role in DoD's growing reliance on contractors.

Extending the Force— Contractor Support to the DoD: How Can Employment Be Optimized?

The last contributor to increased contractor use is the DoD push to outsource or privatize functions.

laundry, sanitation, and mail services.²¹ By 1998, the US military force commitment in Bosnia was capped at 7,800. Consequently, the number of contractor persons (US and local nationals) now exceeds the number of deployed military forces.²²

The power of the purse will continue to play heavily in every aspect of military operations. Decreasing budgets and the accompanying reductions in force structure have played a dramatic role in bringing more contractors to the fight. All the Services have felt the crunch of the peace dividend anticipated at the end of the Cold War. America expected and Congress delivered shrinking defense budgets forcing the DoD to cut 73,000 (33 percent) active-duty authorizations by 1999.²³ The post-Cold War reductions were, indeed, necessary, but did we cut too deeply? In one way or another, we have had to continue providing a high level of capability. Substituting contractors to stay below set thresholds is simply *smoke and mirrors*.

At the same time that the resources were shrinking, operational commitments were growing across all the Services. In the last several years, the Army has experienced a 300-percent increase in mission commitments.²⁴ In 1989, the Air Force may have had about 2,000 airmen deployed on any given day; 10 years later, that average came closer to 12,000.

Advanced technology and the accompanying need for a broader skills bank has led to increased reliance on contractors. Interestingly enough, even during the Vietnam conflict, the complexity of military equipment was a major driver in bringing American companies in to work shoulder to shoulder with the troops. *Business Week* called Vietnam a *war by contract* wherein:

...specialists in field maintenance, checking on performance of battlefield equipment, have dodged Vietcong attacks at military bases at Da Nang and Pleiku....This is because many of the electronic systems are now so complex and specialized that even in peacetime, the Armed Forces have found it cheaper to have civilian contractors actually build, maintain, and operate the complicated systems.²⁵

In other cases, contractors supplement the force by providing skills sets that are either no longer available or in limited quantities within the military.

The last contributor to increased contractor use is the DoD push to outsource or privatize functions. Essentially, this means DoD replaces military capability with commercial capability wherever it is practicable. The goal is twofold; it is to first improve efficiency and then to redirect the (expected) savings toward higher priority modernization efforts.²⁶ The DoD believes the Services can do a better job of tapping the expertise of the more effective and efficient commercial firms, shifting the resulting savings to the Services' bottom lines.²⁷ Thus, cost savings is normally one of the reasons cited for increased use of contractors, but this concept must be approached with caution.

In theory, expected savings can range from 9 percent to about 30 percent, largely brought about by the contractor's ability to control wages.²⁸

Workers are hired at prevailing wage rates, which tend to be cheaper than the US wage structure allows. A 1997 logistics management study found LOGCAP more economical when analyzing military spending in Bosnia. The study concluded that the contractor (Brown and Root in this case) used 6,766 employees at the cost of \$462M to do the equivalent work of 8,918 troops and \$638M.²⁹ At first look, the contracting option seems cheaper. In reality, however, each contract is different and is impacted by outside forces that may or may not allow such savings. The intheater presence of the contractors creates a need for corresponding increases in force protection, oversight and support, and backup capability that must still be provided by the military. In the overall equation, these factors will negate a portion of the anticipated savings. Such economic implications will feed into the list of issues that must be considered when assessing the DoD's use of contractors.

Issues Analysis

Truly, today's use of contractors (and civilians) is reflective of the DoD Total Force Policy, which embraces all resources—active-duty personnel, reservists, civilians, contractors, and even host-nation support—to support national defense.³⁰ An analysis of the viability of DoD's continued and increasing use of contractors reveals an endless set of issues awaiting full resolution. Brigadier General (sel) Dave Gillett was the director of Logistics for USAFE during the *hot* buildup and beddown of forces supporting Iraqi Freedom. He had firsthand experience using contractors to meet mission requirements both in peacetime and during times of war. When questioned regarding the successful (or unsuccessful) use of contractors in the European theater, he pointed to numerous considerations related to current-day employment of contractors. Among those are “their status under Geneva Convention, our ability to give them anthrax and other inoculations and...pay. In short, it's (the use of contractors) not a problem, but there are issues to work through every time.”³¹

Legal Concerns

Legal concerns are at the bottom of many of the difficulties encountered in using contractors in a contingency environment. In 1999, the Air Force Inspection Agency (AFIA) completed an assessment of the processes and guidelines for use of contractors in support of contingency, as well as peacetime, operations. As AFIA found a lack of understanding of legal implications across the Air Force, legal issues are far from dead. They continue to be vetted across DoD and the Services. There are numerous issues; however, this article discusses three broad areas of concern: contractor status under Geneva Conventions rules (combatant versus noncombatant status), applicability of the laws of armed conflict, and contractor responsibilities (what they can and cannot do).

The Geneva Conventions identify three personnel categories covered by the laws of armed conflict: combatants, noncombatants, and illegal combatants. Noncombatants include authorized civilians accompanying

Legal concerns are at the bottom of many of the difficulties encountered in using contractors in a contingency environment.

Extending the Force— Contractor Support to the DoD: How Can Employment Be Optimized?

Contractors may perform services that contribute so directly to the warfighting effort that it becomes difficult to draw a clean line between the categories.

the force, the category the Geneva Conventions assigns contractors. But does the enemy recognize this categorization? Unfortunately, there are no guarantees an enemy will honor the protections afforded these different categories. Several factors work against a *clean* categorization.

“There are those who hold a firm belief contractors on the battlefield assisting the war machine are just as liable as combatants. Therefore, there is often no moral distinction in targeting an armed combatant versus a civilian involved in arming or feeding the combatant.”³² The United States suffered the same dilemma in engagements such as Vietnam or even present-day Iraq where the risk of *making the wrong call* could prove deadly.

Furthermore, contractors may perform services that contribute so directly to the warfighting effort that it becomes difficult to draw a clean line between the categories. Examples abound of contractors performing questionable roles. From aboard the Joint Surveillance Target Attack Radar System aircraft during the first Gulf War, contractors transmitted targeting data directly to the *shooters*. Thirty-four contractors accompanied combat units into Kuwait and Iraq during the 100-hour ground war engagement.³³ The Navy also employs contractors aboard its oceanographic vehicles that perform antisubmarine operations. The impossibility of drawing the line between combatants and noncombatants in this case has led the Navy to start replacing these contractors with blue-suiters lest the contractors become illegal combatants.³⁴ Nonmilitary members who participate in hostilities and become illegal combatants are subject to trial as war criminals.

Last, the increased reach of enemy artillery, for example, may create combatants far beyond the forward line of battle. As a case in point, long-range artillery and missiles on the Korean peninsula could reach and kill private sector personnel at least 53 miles behind the battle line.³⁵

As noncombatants, contractors receive prisoner-of-war (POW) protection granted under Geneva Convention rules. This is true as long as the contractors have not jeopardized their status as noncombatants by performing direct combat functions.³⁶ Commanders must be on the lookout for actions that nullify the contractors’ noncombatant status. Examples include issuing military garments such as BDUs, issuing firearms (except under uniquely dangerous conditions), or assigning direct combat operations duties.³⁷ These actions may blur the contractors’ status as noncombatants and jeopardize their safety.

Specific examples challenging the POW status of contractors already exist and also raise the question, What is America’s recourse and responsibility when contractors are taken prisoner? The water is further muddied when the capture is not the result of an active engagement. One example concerns three American contractors currently being held by the Revolutionary Armed Forces of Colombia (RAFC). They were captured on 13 February 2003 when their plane crash-landed in RAFC territory. Newspaper accounts suggest one other contractor was executed along with a Colombian soldier.³⁸ As of February 2004, these prisoners were still in the custody of the RAFC.

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There is a lack of clarity interpreting the laws of armed conflict regarding contractors. In December 2003, the Air Force General Counsel issued a memo offering guidance on this matter; however, coordination is still incomplete as of this writing.³⁹ Clearly, military members are legal targets at any time or place during periods of conflict. Contractors and civilians have to be the *trigger puller* to make them legal combatants. Because some contractors are permitted to bear arms for defensive purposes, discriminating between those who are and are not legal targets is a problem that still awaits resolution.

An associated hazard to becoming the trigger puller occurs in the event there is a mistake. When the military makes a valid and proven mistake (that is, bombing friendly forces), it is not treatable as a war crime; however, the laws of armed conflict afford no such protection to contractors or civilians.⁴⁰

Contractor responsibility is a sensitive area referring to what contractors can (will) and cannot (will not) do; elements for discussion include *refusal to go* and *refusal to perform*. The military is bound by oath to perform; in contrast, a contractor legally may refuse to go into a war zone once hostilities break out. The DoD has:

...no capability to ensure continued contractor support for emergency-essential services during mobilization or hostilities, no central oversight of contracts for emergency-essential services, no legal basis to compel contractors to perform, and no means to enforce contractual terms.⁴¹

Differences between wartime and peacetime environments feed into the legal and contractual issues regarding civilians. What works well in peacetime could be a tremendous liability for the commander in a wartime environment. Visualize a contractor who has noncombatant status in a combat zone—from a legal perspective:

...contractors providing essential services are expected to use all means at their disposal to continue to provide such services according to the terms and conditions of the contract during periods of crisis until appropriately released or evacuated by military authority. To be relieved of responsibility, civilian contractors simply have to resign their positions.⁴²

Without a formal declaration of war, the commander has no recourse when facing such resignations. If that contractor is a provider of a mission-essential service, the potential for increased risk to the military and mission degradation pursuant to the loss of such services is high. This is clearly a cause for concern at all levels of command.

Commanders must have a plan and be ready to react in the event of a contractor's refusal to go. On the positive side, this type of refusal has been rare. When war broke out in the Persian Gulf (the first Desert Storm), US contractors did not leave Saudi Arabia, and some even chose to stay on the front lines with US troops.⁴³ But there are no guarantees.

Many sources highlight the famous tree-cutting incident in the demilitarized zone in Korea as a harbinger of the challenges ahead. In August 1976, North Korean soldiers attacked a group of American soldiers who were cutting trees. The ensuing deaths of two soldiers and increased

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There have been many shortfalls revealed regarding visibility and control of contractors who support DoD operations.

alert status (Defense Condition 3) led to hundreds of civilian requests for immediate transport out of Korea.⁴⁴ This incident presents a cautionary example of what could happen under adverse circumstances. Associated with refusal to go, failure to perform is another negative aspect of contractor responsibility.

Failure to perform is serious and may require high-level intervention. For example, when the fuel supply contractor in Bahrain, who guaranteed adequate fuel deliveries to support a 1997 air (space was not included at the time) expeditionary force deployment, advised at the last minute that it could only meet one-third of the requirement, the Air Force had to engage the US Embassy to solve the remaining fuel shortfall.⁴⁵ Finally, a complete failure to show threatens the mission or causes poor quality of life in some cases. As reported by David Wood of Newhouse News Service, one such failure occurred in Iraq in late July 2003. Even though the Army had contracted for modular barracks, showers, kitchens, and other support items, its soldiers were “using ramshackle plywood latrines and living without fresh food or regular access to showers and telephones” because of truancy of the contractor. The contractors refused to enter some of the more hostile areas in Iraq. According to Peter W. Singer of Brookings Institute, contractors “can walk off the job any time they want, and the only thing the military can do is sue them later on.”⁴⁶ Contractors provide a growing proportion of essential services for the DoD. Today, they legally can perform any function except armed combat, command and control, and contract administration on behalf of the Services.⁴⁷ Contractors provide a wide range of services for military missions; the DoD must have responsive and reliable contractor performance to ensure mission success.

Managerial Oversight

The pervasiveness of managerial oversight makes this issue one of concern to many commanders in theater as well as to planners at higher headquarters. For purposes of this article, managerial oversight refers to visibility and central control within the theater of operations, contractor discipline and accountability, integration into deployment planning, and contractor responsiveness to the needs of the commander.

There have been many shortfalls revealed regarding visibility and control of contractors supporting DoD operations. No central mechanism exists for the Services to track contractors in any particular deployment, and frequently, commanders have no easy way to sort through contractor questions and issues.⁴⁸ Even during Iraqi Freedom and in support of operations plan (OPLAN) 1003V, “commanders had limited visibility and understanding of all contractor activity supporting their operations.”⁴⁹ With the contracting officer (or representative) providing the main link between the warfighter and the commander, that commander loses a great deal of positive control regarding conditions and provisions of performance.⁵⁰

Contractor discipline and accountability represents a top priority for the commander when it comes to ensuring successful mission

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accomplishment; yet, the commander has limited insurance in this area. US law, international law, as well as applicable host-nation laws (status of forces agreements), govern contractors; however, unless there is a declared war, they are not subject to the rules of the Uniform Code of Military Justice. According to Darrell Phillips of the Air Force Staff Judge Advocate School, the only disciplinary mechanism currently available is the Military Extra-Territorial Jurisdiction Act of 2000, which applies to civilians, military family members (dependents), or others accompanying the forces (to include contractors). Unfortunately, this act is limited to felonies, punishable by 1 year or more, and simply calls for the return of the alleged violators to the United States for judicial disposition. Therefore, it does not provide a flexible set of disciplinary options for the commander. As of 2 February 2004, the DoD General Counsel was working to implement guidance for this act and had placed its product out for comment.⁵¹

The lack of legal options for lesser crimes or violations poses a problem, for the commander can neither compel contractor performance nor punish misconduct. Discipline of this sort is the responsibility of the parent contractor. The commander's only recourse is to work punishment through the contracting officer, to include sending the violator back home to be adjudicated.

The commander also has no legal means of asserting jurisdiction or demanding release of contractors who have been arrested by the host nation.⁵² This, again, presents a precarious situation for the commander in terms of carrying out the mission and protecting the workforce.

Contractor discipline is cause for concern among the military forces, as well as US officials. In a recent example, active-duty service members expressed concern regarding private contractors who provide security in Kirkush, Iraq (post-hostilities Iraqi Freedom). Northrup Grumman's subsidiary, Vinnell Corporation, currently is providing security for key installations, as well as training for members of the new Iraqi Army. At issue is the perceived lack of control over the actions of these private contractors. "These contractors bear arms, and soldiers have reported seeing these 'soldiers-for-hire' walking around with their weapons in full view as if they belong to a coalition army."⁵³ The soldiers, themselves, are concerned that these contractors are not bound by the same rules of engagement as the military forces and may carry out acts that will invite reprisals on all legitimate combatants in the area.

On the positive side, as of February 2004, regulatory guidance promises to make it easier for commanders to have direct control over contractor relationships. The Army has issued more stringent guidelines, and the DoD currently is drafting a guidance package or rulebook governing contractor activities in hostile environments. Responsibility for rulebook development on behalf of the DoD currently rests with the Joint Staff Logistics Division (J4). With a plan to begin staffing across the Services and combatant commanders by March 2004, the goal is to fill policy gaps related to:

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*A key managerial
consideration is how to
integrate contractors into
theater deployment plans.*

...integrating contractors into operational planning, maintaining contractor visibility within theater, effectively deploying and redeploying contractors; providing force protection for contractor personnel; and addressing other government support requirements (for example, protective equipment, weapons issue, uniforms, medical and mortuary coverage, insurance requirements).⁵⁴

The DoD guidance is expected to mirror the already published Army guidance.⁵⁵

The new Army guidance calls for contractor acknowledgment and acceptance of the risks incurred when working in conflict zones. Other elements of the predeployment criteria set forth require contractor familiarity with host-nation laws, international treaties and licensing requirements; completion of requisite security checks; compliance with all medical screening directives; development of a plan for replacing employees lost to injury, death, or other circumstances; and most important, commitment to abide by combatant commander's orders regarding military operations, force protection, health, and safety. Furthermore, the contractor must replace persons who are not in compliance with the predeployment criteria.⁵⁶ These last aspects of the guidance will help mitigate shortfalls in the area of deployment planning.

A key managerial consideration is how to integrate contractors into theater deployment plans. A first step in this integration is to ensure applicable contracts include a provision for deployment into the battlefield environment alongside the supported unit. Failure to plan ahead dramatically increases costs when contractors have to deploy unexpectedly to a potentially hostile environment. On the positive side, operational planners are spending more time integrating external and theater support contractors into force deployment lists. In the past, contractors sometimes have been left off these lists or sent to the theater without the knowledge of headquarters planners.

Headquarters planners have a tremendous responsibility in ensuring they meet requirements set forth in Joint Publication 4.0, *Doctrine for Logistic Support of Joint Operations*. Plans should provide for predeployment contract requirements regarding immunizations, force protection training, weapons familiarization (where applicable), and specialized equipment (chemical gear) training.⁵⁷

Another managerial issue is the contractor's ability to respond to mission needs in a timely manner. Based on USAFE's Enduring Freedom and Iraqi Freedom experience with AFCAP, contractor-provided services were less responsive to the needs of the commander. It all comes down to obstacles created by contracting out the work versus having DoD-owned and controlled forces do the work.

The Air Force Civil Engineer Support Agency (AFCESA) conducted a hot-wash on how AFCAP measured up when providing what EUCOM needed. In support of Iraqi Freedom, EUCOM required WRM billeting, industrial and flight-line assets, extensive construction materials and projects, vehicles, and so forth to support beddown efforts in the European

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theater. These were quick-turn requirements. The AFCESA assessment found successes in AFCAP's ability to provide an abundance of construction materials, vehicles in place prior to troop arrival, and procurement representatives on site to respond to local needs. On the other hand, as reported by the commanders in the field, the frustrations were many. The AFCAP system proved cumbersome and was slow to handle the cancellation of requirements as a result of no access to Turkey. This drove a significant loss of time and money to the government. Furthermore, AFCAP field personnel lacked security clearances and had authority limited by the terms of the technical orders, minor scope changes were not possible at the deployed locations, and contractor work hours and base entry requirements (for security purposes) prolonged construction periods.

From an overall perspective, on the one hand, deployed wing and engineer commanders were disappointed that the AFCAP process was not as responsive as having Air Force military contracting officers directly work requirements.⁵⁸ On the other hand, according to Lieutenant Colonel Don Gleason (the civil engineer at the forefront of making AFCAP work for USAFE), "There were a lot of positive comments on AFCAP and many things that need tweaking/redoing to make it even better."⁵⁹ Joint Pub 4.0 requires that logistics (which includes contractor performance) be responsive and capable of meeting the operational and sustainment needs of the Armed Forces across the full spectrum of military operations.⁶⁰ AFCESA will continue to work these issues to make AFCAP more responsive to the needs of the commander.

Another aspect of responsiveness involves the country access and permissions available to contractors compared to that available to the Government. Lack of access could present another stumbling block, particularly in countries such as Hungary where the US Government does not enjoy (or require) a longstanding operational relationship. Operation Joint Endeavor, the December 1995 deployment of US and Allied peacekeeping forces, presents an example in which the US Government needed a logistics base in Hungary. There was no existing status of forces agreement; therefore, the Government worked to obtain an omnibus agreement for country operations.⁶¹ Unfortunately, that agreement did not include provisions for contractors to bring an outside labor force into the country, and there were no agreements regarding permits for minor construction, wash rack operations, or other basic operational requirements. Ultimately, the Government had to intervene to gain needed contractor access, but by then, there was a resulting delay in providing the infrastructure required to support the operation. Contractors impact other operational support areas such as force protection.

Force Protection

Force protection (that is, protection of contractor personnel) and security are among the toughest issues impacting military-to-contractor relations. In today's environment, everyone is a target and must be protected. Upon authorization by the theater commander, contractors have the option of

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carrying Government-issued sidearms for their protection. For those contractors who choose to bear arms, the military must provide adequate training. On the other hand, these same contractors have the right to refuse to bear arms, leaving military forces with the responsibility of providing them security. These and other such security aspects may detract from the commanders' mission performance, as they must then add contractor security and escort to their long list of other operational concerns. "In Somalia, contractors required a military escort nearly all the time. At various times, as many as 12 to 18 soldiers and 6 vehicles were assigned to each contractor's convoy."⁶²

In most cases, the Services will opt not to authorize civilians to arm themselves. Such was the case for some Army elements during operations in Haiti, Somalia, and Saudi Arabia and in Bosnia from August 1999 to March 2000.⁶³ While this lack of authorization increases the requirement for routine force protection, the balancing factor may be the diminished likelihood of an international incident. Contractors do not receive sufficient routine weapons training, and they are not well grounded in the rules of engagement; left on their own, this chemistry could create a volatile situation. Further doctrine and guidance in this and other areas will improve military-to-contractor operations.

Doctrine

Just as doctrine is a key issue for the military, it is critical to contractor management and for future mission successes. In 1999, AFIA found a lack of adequate doctrine and policy across the Air Force.⁶⁴ But, because the Army has suffered the *lion's share* of personnel cuts and has had to shoulder the ever-increasing burden of peacekeeping missions, it finds itself relying on civilian support more extensively than the other services. Therefore, the Army's doctrinal guidance (in the form of Field Manual 100-10-2, *Contracting on the Battlefield*, and FM 3.100.21, *Tactics, Techniques, and Procedures for Contractors*) offers the most thorough treatment of this subject.

Even so, Army sources have found shortfalls within their own doctrine. Of great concern is the question of a termination plan for contractor use. Is there a plan to transition back to military-provided (organic) services, or does the Army intend to support current and future systems with contractors?⁶⁵ And what is the plan for contractors to transition from peacetime to wartime or post-hostilities operations?

The Air Force is now getting on board in terms of providing guidance to the field. The Deputy Chief of Staff for Installations and Logistics is using Focused Logistics Warfighting (wargames to zero in on the concerns of combatant commanders as well as the Services. In the arena of contractor support integration, the concerns suggested:

...contracts are being established by numerous acquisition communities that result in the free flow of materiel, personnel, and equipment into the theater without visibility or control by the theater. Increased contractor personnel generate additional requirements for base operating support, force protection, legal status...and integration into deployment and operation planning.⁶⁶

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One positive outcome so far has been the formation of a joint working group to develop planning templates for use by contracting officers, planners, and contractors.

In addition, the Air Force has created a deskbook supplement, *Contractor Support in the Theater of Operations*, 28 March 2001, to provide guidance on generic contract language for use in theater. Even though the deskbook is informational and not directive, it provides direction on a wide range of important considerations for building effective contracts for theater support. Essentially, it is a checklist covering force protection, equipment operation, management issues, vehicle and equipment operations, risk assessment, clothing issues, legal assistance, work hours, passports, status of forces agreements, training, next-of-kin notifications, and contractor deployment issues.

Finally, on 1 January 2001, the Air Force issued a policy letter “providing consistent and uniform guidance” on the use of US contractor personnel who augment Air Force contingency operations.⁶⁷ The policy letter promulgates the Air Force policy to “integrate increased commercial support to the Total Force wherever appropriate while preserving our core uniformed USAF competencies.”⁶⁸ Alongside the rest of the components of DoD, the Air Force logistics community will continue to look at improving contractor support doctrine and guidance for future operations. As DoD works improvements in this area, it should set its sights on financial implications of contractor employment.

Financial Implications

Ironically, the major driver for using contractors in the first place (budgetary considerations) is also a potential liability of their use. Using contractors for DoD support has several financial implications. These include the required logistics tail to support the use of contractors, increased contract overhead costs, and the need for required backup capability in the case of mission-essential services.

Contractors come with their own required *logistics tail*, which becomes the responsibility of the unit they are supporting. The unit must furnish materiel such as transportation, mortuary affairs, force protection, billeting, messing, individual weapons, and training in basic military skills.⁶⁹ To operate in the military operational setting, contractors will need training in a variety of areas. Critical training elements include biological and chemical defense, indoctrination on local laws and customs, command policies and procedures, rules of engagement, and weapons training.⁷⁰ Expanding these functions to accommodate the additional burden of contractor support may further tax an already stressed warfighting force and distribution system. The Air Force General Counsel currently is working to implement DoD direction to provide contractors medical care and extended legal assistance (currently, they are entitled to receive powers of attorney but no other legal services).⁷¹ While the contractor must reimburse DoD for some of these services, in many ways, this type of support to the contractor is competing with already limited manpower and

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monetary resources. Providing these services places an additional burden on the supported command; yet doing so provides a major building block for contractor effectiveness and survival in theater.

While peacetime contracting provides a fairly steady state in terms of costs, wartime contracting presents the issue of escalating costs driven by proximity to a war zone. Civilian insurance is a prime example. In preparation for Iraqi Freedom, the Army contracted with BRSC to provide support services at agreed-upon contract rates. As the conflict approached, however, insurance rates for civilians skyrocketed by some 300 percent.⁷² Ultimately, this unanticipated increase was rolled into the cost of the contract. Such dramatic price increases push the limits on constrained resources and play havoc on requirements planning. A second or third order impact is the effect on each service's ability to defend price variances to the Pentagon and Congress.

In the area of essential services, there is yet another cost to contractor support. For do-or-die services provided by a contractor, the commander must ensure there is backup capability in the event the contractor cannot meet its commitments. This not only encumbers the military force structure but also negates some of the benefits of initiating a contract service. The Air Force policy letter states, "In the event contractors are not able to perform their assigned tasks, uniformed military augmentation must be available and integrated into planning."⁷³

However, the military augmentation may be easier said than done. A case in point is that of providing force protection. When taking forces into an area of operation, force protection is one of the first priorities. Within the military, force-protection personnel represent a stressed career field (there is a shortage). Yet, noncombatants (that is, contractors) cannot provide rear area security. Generally, other support personnel augment the security force functions at overseas locations. However, "as military support functions become more privatized (contracted out), the resources available for augmentation of the security forces dwindle."⁷⁴ No matter how it is treated, the augmentation issue becomes a cost of trading support troops for contractors. Readiness is another area that must be considered when evaluating the use of contractors.

Readiness of the Contractor

How does one determine the readiness level of a contractor? Under LOGCAP and AFCAP, contractors are required to be ready to deploy in 72 hours to provide initial support within 15 days of the start of an operation.⁷⁵ Within the military, there are various inspections and monthly readiness assessments and ratings to determine readiness. In the case of contractors, it is a virtual *crap shoot* as to whether they are ready because no mechanism exists to assess or ensure they will be ready when the time comes. While a contractor's failure to deliver may cause a loss in revenue, the loss to the military could be much more.

Another aspect of contractor readiness is the individual physical ability to survive and perform under contingency conditions. In general, military

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forces must meet fitness standards and maintain some degree of physical readiness. Some studies indicated contractors who were arriving in theater were not in good physical condition and lacked physical stamina.⁷⁶

The idea that contractors may need to maintain some degree of surge capacity to support emergent war efforts also presents problems. Cost is only one side of the issue; the other is the contractor's willingness to even do so.

In some circles, there is concern that contractors may be rendered unready to perform as a result of enemy intervention. If a US adversary threatens a contractor's international corporate interests, will the contractor ignore the threats and fulfill the terms of the contract, or will that contractor give in and put military capabilities at risk? The corporation could decide that losing the DoD contract and the resulting lawsuit far cheaper than the loss of vital business interests elsewhere. "A potential adversary's ability to disrupt or delay the military's ability to project and sustain forces by successfully threatening US corporate interests directly supporting those forces may prove to be a troubling Achilles' heel in the coming years."⁷⁷ Another aspect of readiness is that of the US forces themselves.

Readiness of US Forces (Are We Hollowing Out the Force?)

Continual and rapid technological change has made it uneconomical to keep soldiers technologically capable of maintaining, troubleshooting, and employing sophisticated weapons. This is driving the military to rely on contractor support at least during the initial fielding of a system and possibly for its life. In the past, DoD required that the Services retain organic capability to sustain key weapon systems. This is no longer the case. There are implications here for the loss of these skills in the military (organic capability).⁷⁸

In 1991, the DoD Inspector General concluded, "If contractors leave their jobs during a crisis or hostile situation, the readiness of vital defense systems and the ability of the Armed Forces to perform their assigned missions would be jeopardized."⁷⁹ With the downsizing of the forces, the Services can no longer rally manpower to fill in the gaps left by deficient contractor performance.

The above statement represents a critical concern with erosion of the force structure and disappearing capabilities. In some cases, contractors represent a skill set that is either no longer available in the military or is disappearing from the military forces. This poses a problem when those skill sets directly support combat functions.

There is room for improvement and recommendations in all areas of interest related to contractors.

Recommendations

The legal community is seeking to clarify some of the numerous contractor-related legal concerns. Work also has been done in the logistics community. In terms of contractor performance, a great deal can be settled through writing better contracts. In essence, you get what you ask for. Help

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As part of theater planning, the financial management community should conduct mandatory economic analysis on each major contract.

is on the way. The Air Force Installations and Logistics community issued guidance on the minimum essential elements of a viable contract for theater services, and the DoD General Counsel issued a memo in November 2003 providing guidance on what should be in a good statement of work. The draft language is out for coordination and subsequent inclusion in a Defense Federal Acquisition Regulations Supplement (DFARS).⁸⁰ Senior leadership should give priority to rapid coordination, dissemination, and implementation of guidance originating out of both communities.

There are several recommendations to help mitigate shortfalls in the managerial oversight area. First, Air Force Installations and Logistics and DFARS guidance will go a long way in producing contracts that will better direct contractor operations. Better OPLANs that incorporate contractors and address host-nation restrictions, government-provided support to the contractor, and command relationships will chart a definitive course for an improved operational environment that includes contractors. Such a plan must also address backup operations in the event a contractor does not or cannot perform. A plan for more effective use of the Reserve Component may offer some relief in this area. Finally, planners must ensure the terms of the contract include disciplinary options available to the commander.

In considering force protection of contractor personnel, commanders should first conduct a risk assessment with consideration to the entire operational environment; then they must determine if the benefits of contractor use outweigh the associated risks. Is mission accomplishment still possible? The risk assessment must consider contract costs, situation, location, potential for hostilities, risk-to-mission accomplishment, and physical risks to the contractors.⁸¹ The political environment must also be a factor. If the risk assessment yields a yes response regarding contractor use, the ensuing contract must provide adequate coverage for problem issues.

The area of doctrine has been a point of focus across DoD. A central clearinghouse is needed to sift through, consolidate, and standardize the joint operations guidance. DoD needs a unified guidance package that is interoperable. A part of that focus on guidance should be a capture of lessons learned.

Financial issues will require tough decisionmaking based on strong analysis of total costs involved in a contract. As part of theater planning, the financial management community should conduct mandatory economic analysis on each major contract. This analysis must quantify and evaluate direct and indirect costs, as well as seek out the hidden costs of each contractual agreement. This administrative step will require top-down support to get the necessary buy-in. Tougher still is the needed follow-on—Congress and the DoD must get on board to allow force structure and funding adjustments that consider financial impacts as part of the total picture. Here again is another case where well-conceived contracts up front can reduce expensive surprises later on. This will improve with experience.

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Better and more comprehensive contracts can address contractor readiness. Training is a key element of readiness. An out-of-the box solution would be to incorporate (as a minimum) annual contractor training with the deployed unit as a term of the contract. The training should include operational readiness exercises. This inclusion will reinforce the integration of contractors into operational planning and provide critical training on both sides of the equation (military and contractor).

The Services and DoD must exercise extreme caution to ensure continued military readiness against the increasing use of contractors. Contractors must remain a supplemental force versus a replacement force. To make this possible, DoD must take a fresh look at mission-essential skills and services and continue to grow and retain them. This will, of course, require relief from external forces such as Congress; however, it must be aggressively pursued. Table 3 summarizes the issues and recommendations.

Conclusion

Concern over the degree to which DoD uses contractors is growing but is not new. In 1958, in a 6 October letter to his Deputy Chiefs of Staff, General Curtis E. LeMay (Vice Chief of Staff) wrote, “The growth in use of contract services by the Air Force has become a matter of genuine concern...focused particularly on what missions and jobs have been, can, and should be performed by contract services.”⁸² In the near term, DoD must function within the given force structure and budgetary constraints; it is no longer affordable to maintain a military force capable of meeting all the nation’s defense needs. Therefore, the DoD must continue its use of contractors to fill the capability gap. The key to the future will be to provide all tools necessary to leverage contractor contributions to the fullest. This means solving the issues related to legality, management, force protection, doctrine, finances, and readiness. Ultimately, the DoD will be able to employ its Total Force (active duty, reserve component, civilians, and contractors) with full flexibility and readiness. If the DoD gets it wrong, the result could be degradation of mission accomplishment or (more

Concern over the degree to which DoD uses contractors is growing but is not new.

Issue	Recommendation
Legal	Completed Guidance
Managerial Oversight	Completed Guidance, OPLAN Integration, Better Contracts/SOWs
Force Protection	Risk Assessment and Better Contracts/SOWs
Doctrine	Completed Guidance and Central Repository
Financial	Better Contracts and Economic Analysis
Contractor Readiness	Training and Inclusion in OREs
Military Readiness	Balanced Force Mix, Use of RC, Preserve Core Competencies

Table 3. Recommendations for Improved Use of Contractors in DoD

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*The DoD must remain ready
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seriously) the loss of the next major campaign (with the accompanying loss of life). The DoD must remain ready and able to carry out its mission—contractors will help DoD to get there!

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Because there is much to be learned from others who are pursuing the outsourcing and privatization requirement, it is essential to consider the overall effectiveness of outsourcing across the Department of Defense.

Outsourcing Network Control Centers Benefits and Drawbacks

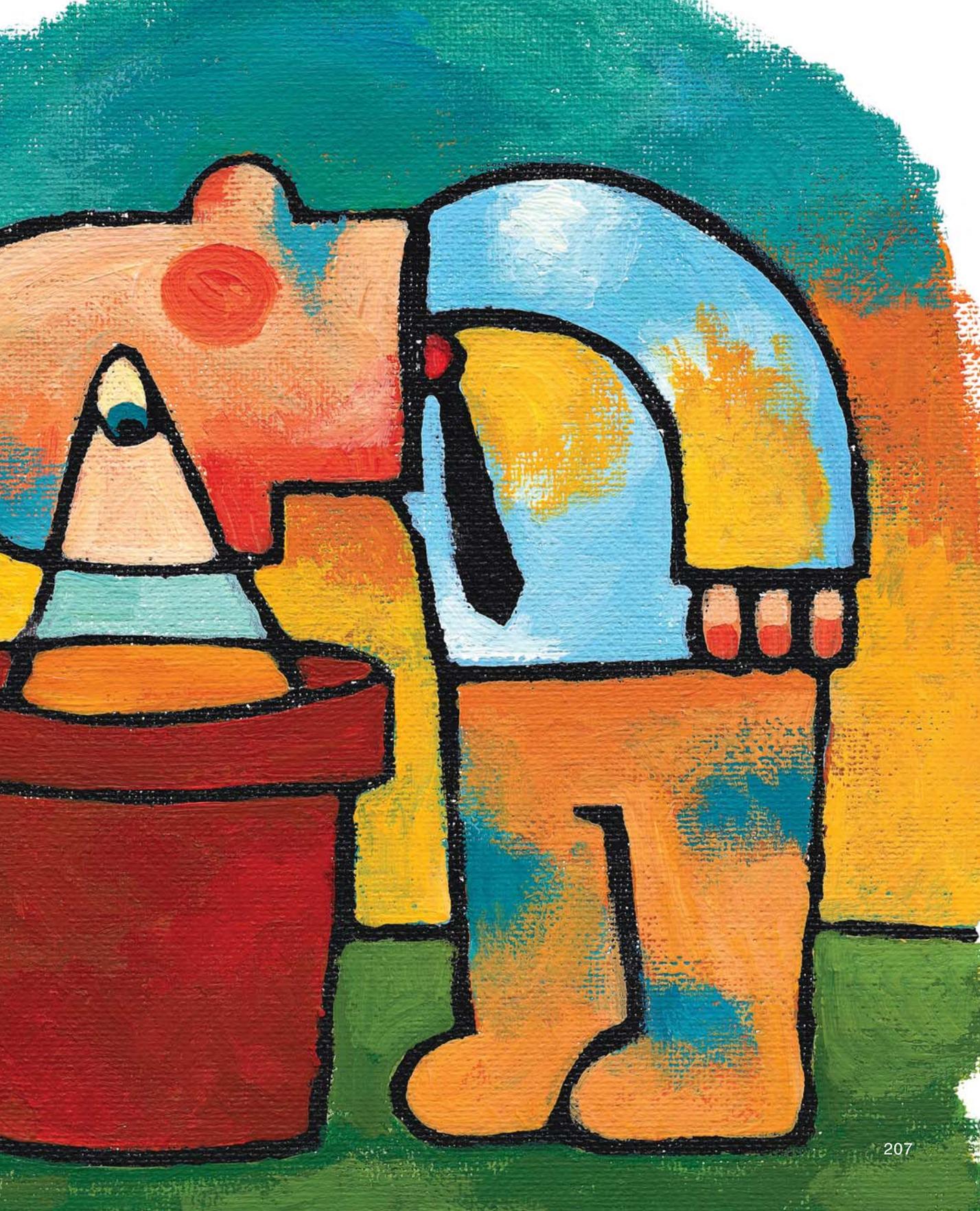
Introduction

The capability to collect, process, and disseminate an uninterrupted information flow, while exploiting or denying the adversary's ability to do the same, will be critical to success in future military operation.

—F. Whitten Peters

In 2002, *Government Computer News* reported that government officials at the Air Force Information Technology (IT) Conference considered it unlikely that the Air Force would outsource many of the *blue suit* positions in the communications and network operations field. Air Force officials considered these positions to be too critical to the Air Force's warfighting capability.¹ In that same year, William Murray of EnterpriseSystems reported





Outsourcing Network Control Centers: Benefits and Drawbacks

that Air Force officials were rejecting the idea of wholesale outsourcing of its network control centers (NCC) as an unnecessary security risk.² But in April 2003, John Gilligan, the Air Force Chief Information Officer (CIO), testified before the House Armed Service Committee of the House of Representatives that one of the Air Force's future challenges is the retention of personnel with IT skills needed to support net-centric operations. He also stated that in order to free up military and civilian IT professionals for higher priority mission requirements the Air Force is fully open to "evaluate commercial-like information technology functions for possible outsourcing."³

Outsourcing of Air Force network control centers actually began in 1998 as part of an Air Staff-directed requirement called Project Jump Start. The purpose of this project was to build a list of potential functions for possible outsourcing and privatization (O&P) to support Quadrennial Defense Review (QDR) initiatives.⁴ According to a May 2003 Air Force Inspection Agency report, 3 of the 16 Air Force major commands (MAJCOM) had "either totally outsourced or were near completion of outsourcing" before implementation of the aerospace expeditionary force (AEF) and before the Global War on Terrorism. To comply with the Department of Defense (DoD) mandate to outsource network control centers, other MAJCOMS are subject to do likewise. Although Federal agencies have been encouraged to outsource since 1955 and it has been gradually implemented by previous administrations, the current accelerated push of the outsourcing and privatization trend is driven by President George W. Bush's management agenda. That agenda calls for outsourcing jobs that are not considered inherently governmental, jobs that can be done by commercial companies. The stated objectives are to cut costs and improve performance. According to the President's report, the DoD has completed more than 550 initiatives and realized a 34-percent reduction in cost, and savings are expected to rise to a total of \$11.7B by 2005.⁵ The General Accounting Office (GAO) had even greater projections for the future of DoD's outsourcing initiatives.

In April 2003, the GAO reported a forecasted increase of 143 percent in IT outsourcing between 2002 and 2007.⁶ According to GAO-03-371, "a United States General Accounting Office report to the Subcommittee on Readiness and Management Support, Committee on Armed Services, US Senate," DoD spent more than \$6.2B in acquiring IT services during fiscal year (FY) 2001.⁷ The DoD IT budget for FY03 was \$27.7B, and although \$27.9B was requested, the same amount has been approved by Congress for FY04.⁸ Since there does not seem to be a real reduction in IT costs, either the savings generated was not in the area of IT or the decision to outsource IT needs to be reexamined. Several questions come to mind. How effective are Air Force outsourcing initiatives? Is there a reduction in the size of government? Are there really cost savings? What will be the consequences in terms of military readiness as we move more to a joint network-centric operation? The answers to these questions are yet to be realized and, as will be shown in this article, continue to be the basis for

The current accelerated push of the outsourcing and privatization trend is driven by President George W. Bush's management agenda.

the different views as to why network control centers should or should not be outsourced. The bottom line is that outsourcing network control centers has not proven to be a standard solution in remedying the issues of manpower, training, readiness, and the rising cost of information technology

Because there is much to be learned from others who are pursuing the outsourcing and privatization requirement, it is essential to consider the overall effectiveness of outsourcing across the Department of Defense.

OMB Circular A-76 Process

Overview of the OMB Circular A-76 Process

The policy requiring the Government to use the private sector when and where possible dates back to 1955. The policy is rooted in the belief that the Government should not compete with its citizens. To formulate this policy, in 1966, the Office of Management and Budget (OMB) mandated that agencies use the private sector to obtain goods and services (OMB Circular A-76). Circular A-76 was revised in 1979, 1983, 1996, 1999, 2000, and again in May 2003, but the objective stated above has remained constant. “In 1979, OMB supplemented the circular with a handbook that included procedures for competitively determining whether commercial activities should be performed in house, by another Federal agency through an interservice support agreement, or by the private sector.”⁹ This policy consisted of three phases. First, governmental organizations were to determine which functions were considered to be inherently governmental. “An inherently governmental function is a function which is so intimately related to the public interest as to mandate performance only by government personnel.” A similar requirement was established by the Federal Activities Inventory Reform Act of 1998, which directed that all agencies provide annual inventories of positions considered to be noninherently governmental. In 2001, the DoD listed approximately 413,000 commercial-type positions in its inventory. The second phase requires agencies to rely on the commercial sector for all goods and services not considered inherently governmental that could be purchased or produced from a commercial source. OMB required agencies to set their goal for outsourcing at 5 percent in FY02 and increased that goal to 15 percent in FY03. The ultimate goal is to outsource 50 percent of the commercial-type positions recognized in an organization’s inventory. Third, using a competitive process designed to promote efficiency and enhance productivity, agencies were to use savings realized to fund future modernization efforts. In DoD’s A-76 competitive process, the contract is awarded based on *best price* versus *best value*. To ensure that the effort to convert from government (in-house) performance to contractor support was worthwhile, the Government established a threshold that savings must be at least \$10M or 10 percent of the personnel costs of in-house performance.¹⁰ One of the primary reasons for doubting the figures reported as realized gains is because of the factors used in the A-76 cost-estimating software model.

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COMPARE was designed for commercial activities considered being service oriented with low-skilled workers, low complexity, low risk, and many potential commercial sources.

Cost Estimating Model COMPARE

The government cost estimate is developed using a software model called COMPARE. According to Major Chris E. Greiman, in a thesis from the Air Force Institute of Technology, COMPARE is a viable model, but there are significant limitations. “Specifically, the standardized cost factors used in COMPARE are increasingly insufficient in providing a level playing field on which decisionmakers can make informed comparisons.” Initially, COMPARE was designed for commercial activities considered being service oriented with low-skilled workers, low complexity, low risk, and many potential commercial sources. Network control centers are service providers, with many commercial sources, but the remaining criteria do not apply. IT professionals are highly skilled, NCC-associated tasks are often highly complex, and the lack of service is likely to present a high risk of mission failure. Another limitation of the COMPARE model is its ability to weight the associated risk versus the cost of outsourcing. Unlike public-private competitions, the COMPARE model places concerns for a bidder’s strengths, weaknesses, and *risk* secondary to the lowest cost to the Government. With the current trend toward network-centric warfare, there is clearly inherent risk in blindly outsourcing all IT support functions. But in an effort to generate more savings, DoD has complicated the O&P process by extending its range of viable candidates beyond those that fit into the commercial activities criteria stated above, making competitions more difficult to conduct fairly within the constraints of the A-76 costing model.¹¹ Looking beyond the COMPARE cost-estimating model, there are other factors that have been identified as contributing to the lack of faith in the validity of the effectiveness and the cost savings generated by O&P.

Cost Saving as a Result of Outsourcing

The biggest driver toward outsourcing Air Force network control centers has been the potential to reduce labor cost while obtaining the expertise needed to maintain information superiority. During Lieutenant General William J. Donahue’s speech on his perspective of electronic commerce, he challenged DoD officials to reconsider the decision to outsource and privatize IT functions. He stressed the view that government employees were not inefficient and questioned why DoD would outsource a job being done at \$35K to \$60K a year and buy back the same service from a contractor for \$150K per year.¹² Donahue’s figures, however, do not factor in other costs associated with government salaries, such as retirement benefits, overhead, and so forth. Despite these costs, the results reported after the competitive process usually show the contractor’s cost to be cheaper. According the RAND Corporation, there are reasons for the disparities in cost estimates. There are flaws in the competitive process that usually skew cost estimates in favor of outsourcing.

In a RAND study conducted in 1997, five DoD activities that had been outsourced were reviewed to compare the actual cost of implementation versus the expected cost cited during the competition. RAND found there

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were four factors that adversely affected the competitive process. First, when civil service employees are transferred to lower grade positions, initially, they do not take a cut in pay. These costs are not figured when evaluating the costs of contracting or in calculating the savings generated by outsourcing. In actuality, this cost either should be added to the contracting cost or subtracted from the savings generated. Second, contract costs are often viewed as lower than the most efficient organization, government in-house bid, but over time, the contract cost increases because of an expansion in the scope of the work to be performed. Third, the majority of the installations reviewed lacked personnel with experience in developing performance work statements and in-house bids. Fourth, during the competitive process, the contractor and the Government do not use the same labor schedules. The contractor usually uses the lowest local Department of Labor (DoL), rates and the Government is bound by the Federal Wage System, which tends to exceed the DoL rates.¹³

As an example, Maxwell AFB, as required by the A-76 process during the privatization of its support functions, determined its in-house cost estimate based on what was considered its *most efficient organization*. This cost then was used as the basis for competition with the private sector. Initially, the Air Force ruled that the in-house workforce was the most cost-efficient, but DynCorp Technical Services LLC protested, and the GAO later reversed the results. GAO ruled that the Air Force did not conduct the required cost comparison properly and the private sector had demonstrated it would be more productive and save money. The award to DynCorp was a 5-year \$200M contract, which impacted 814 Air Force employees.¹⁴ During this process, other contractors were hired at \$3.4M to write the performance requirements outlining the workload to be accomplished as described by Air Force instructions (AFI). Because of the ambiguity of the instructions and DynCorp's interpretation, there are several functions that the contractor has refused to do without contract modification and additional pay.¹⁵ In an interview to gather information for this report, Maxwell's contracting personnel acknowledged a cost increase has been granted since the contract was awarded. This increase was due to additional routine tasks originally left out of the bidding process but included in the MEO assessment. Although this is just one example, it waves a red flag that more attention should be given to this process.

Would the results be different if studies were conducted with the initial cost of civil service employees transferred to lower grade positions, an all-inclusive performance work statement, the crisis response cost factored in, experienced government personnel developing in-house bids, and consistent labor rate schedules being used by the contractor and the Government? Would the contractor's bid still be lower than the MEO? There is a possibility that the results would be the same, but these discrepancies should not be dismissed. With cost being the determining factor versus the best value, A-76 studies' results warrant more attention before blindly outsourcing other network control centers and IT support functions. The role of the contractor cannot be disputed, especially in

The majority of the installations reviewed lacked personnel with experience in developing performance work statements and in-house bids.

Outsourcing Network Control Centers: Benefits and Drawbacks

Outsourcing and privatization of network control centers has become a widely accepted practice in private industry and in government.

bringing expertise needed to implement and support the rapidly evolving capabilities of information technology. But DoD's decision to outsource IT support functions has been made and solely driven by anticipated cost savings, without regard to the inherent risk to the National Defense Strategy.

Air Force Strategic Decision to Outsource Network Control Centers

Government should be market-based—we should not be afraid of competition, innovation, and choice. I will open government to the discipline of competition.¹⁶

—Governor George W. Bush

Dr Ernest Eugster, manager of the Advanced Technology Solutions group at Random Access, in June 1995, identified network outsourcing as key to successful reengineering. He pointed out that outsourcing of a network operation was not the solution for every organization but recommended every organization give the concept consideration. In his view and considering the contractor is indeed more competent, outsourcing is an avenue to provide “instant expertise in building, integrating, and running a network.”¹⁷ It is evident that government officials only heeded the second part of Eugster's advice. Since 1995, outsourcing and privatization of network control centers has become a widely accepted practice in private industry and in government. The need to maintain information superiority, emergence of information warfare, the rapid changes in technology and its rising cost, and the inability to retain the expertise required, compelled Air Force leaders to follow the lead of private industry, and they identified network control centers for outsourcing. There have been numerous claims of success in some of America's top-performing companies, but the verdict is still out as to its success across DoD. High-level support in favor of outsourcing and privatization, however, has provided little room for alternatives.

As a result of outsourcing, a cost comparison study conducted within DoD between 1978 and 1994 showed a savings of about \$1.5B per year and a 31-percent reduction in annual operating costs.¹⁸ It is not surprising that many senior Air Force officials saw outsourcing and privatization as the right way to go and the A-76 competitions as the vehicle to get them there. In 1996, John White, Deputy Secretary of Defense, viewed outsourcing and privatization as an effective and efficient means to perform Air Force support activities. During that same year, at the Fall Corona, Air Force senior leaders set in motion plans to outsource and privatize, to the maximum extent practicable, jobs that were not considered mission essential and inherently governmental. In 2000, F. Whitten Peters, Secretary of the Air Force stated, “Every time we conduct A-76 competitions, we figure out better ways to do business.” General Michael C. McMahan, director of Air Force Manpower and Organization, saw outsourcing as an opportunity to free up military personnel from

nonwartime functions and generate funds for quality-of-life programs. Although the outsourcing trend has had plenty of support from the top, there are dissenting views as to its effectiveness and cost savings.

However, the difficulty in estimating savings was acknowledged in a December 2000 report by GAO, according to Matthew French of *Federal Computer Week*. French states that the GAO could not fully justify the \$290M cost savings reported by the Pentagon in FY99 because of the limitations in baseline cost data.¹⁹ In 2001, Pete Aldridge—Under Secretary of Defense for Acquisition, Technology, and Logistics—began to express concerns to the OMB of being too confined to using a narrowly defined A-76 approach to achieve its transformational goals. Christopher J. Dorobek of *Federal Computer Week* reported that Aldridge, representing the Pentagon, was looking for exemptions to the Bush administration’s outsourcing goals, which, as directed by OMB, were to “compete 15 percent of the Federal jobs considered commercially viable by the end of fiscal 2003.”

Pentagon officials seem to be changing directions with regard to outsourcing and are looking for alternative solutions. They recognize the need to generate savings, but they do not think relying solely on manpower reductions is the way to achieve their goal.²⁰ But until the Bush administration changes its guidance, agencies are locked into outsourcing and privatization of functions not considered inherently governmental, and Air Force network control centers are caught up in the plans.

Benefits and Drawbacks of Competitive Outsourcing and Privatization

Benefits of Outsourcing

There are many inside and outside DoD that emphasize the benefits derived from outsourcing IT and network control centers. The most common benefits cited are lower cost, greater efficiency and innovation, more troops dedicated to combat missions, reduced IT training cost, higher levels of technical expertise, and a solution to the recruiting and retention of IT professionals. NetworkWorldFusion reported that Sheryl Glore—chief of Implementation and Standards at Patrick AFB, Florida—is one person that views contract services as the best method of acquiring high-caliber technical people and maintaining a sense of continuity. Glore, according to NetworkWorldFusion, “can’t risk her IT infrastructure to staff turnover in her department, which supports—literally—rocket science and other applications over a satellite WAN.”²¹ Despite the overall claims of lower cost, greater efficiency and innovation, and higher levels of technical expertise, there are still risks that should be considered in the decisionmaking process of outsourcing. Even in the private sector, doubts are beginning to creep in as to the benefits of outsourcing IT versus other mission requirements. Some network executives believe “in-house staff and tools are better equipped to address a specific company’s IT concerns.”²² Addressing needs can be especially difficult in combatant situations, and it is important that the DoD determine a balanced mix of contractor and military personnel expertise in the IT arena.

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Outsourcing Network Control Centers: Benefits and Drawbacks

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In Donahue's perspective on electronic commerce, he expressed concerns on the across-the-board shortage of IT professionals. He pointed out that the biggest challenge faced by the Air Force was not just recruiting pilots but recruiting, training, and retention of the people in the IT world. Donahue shared the view that there can be cost savings in some areas of outsourcing IT but does not share the view that outsourcing will provide higher levels of technical expertise. He stated that the private sector recognizes the value of the Air Force's high-caliber people, and once they are trained, they are actively recruited by the private sector.²³ The Air Force can take some of the responsibility for the mass exodus of its best IT professionals.

In the 1999 report "Retention of Computer Network System Administrators in the Air Force," written by Majors Joseph E. Buder, Amanda W. Gladney, and James B. Nazar from the Air Command and Staff College, the nature of the exodus problem is highlighted. The authors gathered inputs of network professionals from around the globe, focusing on the nature of retention issues and the continued need for enlisted system administrators. These conclusions highlighted an exodus that stemmed from pay, benefits, training, and being overworked. Although airmen knew that the pay for their skills was substantially higher (two to three times greater) in the civilian sector, they were "most frustrated with the workload, lack of training, and perceived lack of support from their leadership."²⁴ Before the .com bust, both government and commercial sectors suffered from the inability to recruit and retain qualified IT professionals. Today, sources are more plentiful, and outsourcing may be a remedy for the retention problem and training, but what will be the effect on DoD's mission of maintaining information superiority?

Drawbacks of Outsourcing

In addition to the benefits of outsourcing, there are some serious drawbacks that could have a negative impact strategically on national security. First, outsourcing poses information command-and-control capability issues in a combat environment. Even if the outsourcing and privatization of network control centers proves to be efficient in saving costs, this strategy could be ineffective in the execution of an integrated defense system. The Air Force needs to ensure that a certain number of military persons are equipped to perform outsourced tasks, because the same technical expertise required during peacetime will also be needed once troops are deployed.

As the United States Air Forces in Europe (USAFE) Director of Communication and Information, during 2001, Colonel John W. Maluda identified information technology as being the heart of information superiority. In his view, information technology is the *guts*, the *machinery* that makes information flow. As such, he suggests "the Air Force should manage its IT infrastructure as a weapon and effectively arm communications and information warriors to operate, maintain, and safeguard that weapon system."²⁵ In 2002, the Air Force Space

Outsourcing Network Control Centers: Benefits and Drawbacks

Command's Deputy Director of Communications and Information stressed the need for retaining military IT professionals and expressed concerns that once IT expertise has been outsourced to the commercial activities, "getting blue suiters back may be next to impossible."²⁶ Knowing the importance of information superiority to our National Military Strategy and joint operating environments, his concerns are highly justified. The Department of Defense is a very complex organization with interdependencies and interrelationships between offices that can lead directly to the battlefield. Lack of experience in network operations, if needed in combat operations, can affect how we conduct information warfare and maintain information superiority. With the constant change in technology and platforms, military personnel must perform these tasks during peacetime to maintain a competent skill level. In the August 2001 issue of *Intercom*, journal of the Air Force Communications and Information Community, Master Sergeant Douglas Kaufman reported:

The process of licensing network professionals cannot be looked at lightly or any differently than we would a munitions technician handling explosive material. DoD has now mandated O/PTN for information systems, and networks are equal to a weapon system and must be handled as such. The Air Force cannot afford to manage network professionals in any other way.²⁷

When network control centers are outsourced, military members' skill levels will diminish over time, with the introduction of new systems. The O/PTN process is a series of steps required to achieve professional certification status in network operations and system administration functions. This process consists of more than 350 hours of computer-based training modules, but it takes actual hands-on experience to become proficient. This is not an easy task, and network professionals must renew their certifications annually.²⁸ The Air Force needs to determine the criticality of outsourcing its NCC functions, especially in deployed situations, because once the Air Force has lost this expertise in military members, it will be difficult to recapture it. In the event the Air Force continues to outsource IT functions, implications must be weighed in having contractors integrated into the total force mobilization concept currently being considered as a component of the DoD transformation framework.

This brings us to the second drawback, which is incorporating these contractors into the battlefield operations. Before a commander can deploy a contractor into a combat environment, a determination must be made that a military member is not available or capable of performing the task. As a result of outsourcing, there is a strong possibility that eventually there will be a very limited pool of military personnel with the skill set required to configure and maintain communications and information systems. To prevent delays in deployment, commanders need to review new and existing contracts to ensure that services required during a crisis are identified in the contractor's statement of work. Adding a crisis-related task after a contract has been awarded most likely will come with a high price tag and erode any cost savings originally calculated. Provisions also

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Outsourcing Network Control Centers: Benefits and Drawbacks

Interjecting the reliability and survivability of contractor support into a battle zone could be an additional burden to a combatant commander and a costly venture for the Department of Defense.

will have to be made to train contractors on the standards of conduct, cultural awareness, and protective gear. Contractors will have to ensure proper immunizations are received and be made aware of the status of forces agreements, the Geneva Convention, and their legal status as noncombatants under international law. Commanders who are considering deploying contractor personnel will need the guidance of their staff judge advocate and the contracting officer.²⁹ Because contractors are neither combatants nor noncombatants, special considerations have to be put into place. It should be noted that a contract may be in place with provisions to cover deployments, but contracted personnel cannot be forced to go into combat environments. The civilian agency that has the contract can be held responsible for providing the expertise required, but the contract is made with the agency and not the individual hired by the agency. In a time-sensitive situation, getting replacements for individuals who choose not to enter combat zones could jeopardize the effectiveness of the mission. Taking all the above into consideration, interjecting the reliability and survivability of contractor support into a battle zone could be an additional burden to a combatant commander and a costly venture for the Department of Defense.

The third drawback to outsourcing is the omission of required routine base-level functions. These omissions often are caused by oversight and sometimes caused by lack of experience in writing statements of work. Omissions—in addition to high deployment rates, downsizing, and outsourcing—could affect the base's mission by forcing commanders to take the workload *out of hide*. Regardless of the reason for the exclusion, once the contract is awarded, government personnel authorizations are eliminated, and there are no personnel available to complete the additional workload. This poses a problem that only can be resolved by reengineering base functions or amending the contract. With amending the statement of work to include the additional task, come an additional cost and a reduction of the savings anticipated. The issue then involves finding the funds for the contract modification, which could be difficult and may even be cost prohibitive. If the task is essential to the mission, it becomes a *must pay* expense, and funds may have to be cut from other programs to cover this bill. Once again, this could severely impact the organization's mission of getting timely and reliable information to decisionmakers.

The fourth drawback—and perhaps the most highly criticized—is the A-76 competition process itself. In 2001, Congressman Robert A. Underwood and Congressman Ciro D. Rodriguez, a member of the Armed Services Committee in the House of Representatives, testified before the Commercial Activities Panel in regard to the A-76 Public-Private Competition process. Rodriguez noted the inconsistencies and difficulties during the Lackland AFB, Texas, competition, which sparked protest, first, by Lackland AFB employees and, later, by the private firm. There were numerous decisions made by the Air Force, which were later reversed. With all the problems that surfaced during this process, Rodriguez requested

an investigation by the DoD Inspector General. According to Rodriguez's testimony, the:

DoD Inspector General's report determined that the Air Force did not achieve supportable results from the Lackland competition. Specifically, the report stated that the independent review officer and source selections evaluations of the MEO's proposal were flawed and the appeal process failed to assess the merits of issues in the government employees' appeal.³⁰

A few of the flaws identified and summarized by Rodriguez are as follows:

- The lack of equal appeal rights for government employees. The MEO employees can appeal only once. The private bidders, however, have numerous appeal options, including access to Federal courts.
- The inordinate amount of time involved in forming and carrying out a competition has a very negative impact on the morale and productivity of current government workers.
- Cost of preparing Lackland A-76 costs the government more than \$5.5M, a majority of which was spent on developing the MEO. Spending millions to run a competition is not the most efficient use of taxpayers' money.³¹

Underwood also noted inconsistencies in the A-76 process during the outsourcing of the Public Works Center, a unit in the Naval Activities Section of Guam. In his testimony, he identified problems with a contractor hired by the Navy to develop the in-house MEO, repeatedly understating the level of work within various functions of the performance work statement. Miscalculation of the workload in the request for proposal could account for the disparity in the MEO bid of \$607M and the contractor's bid of \$321M. Underwood pointed to the disparity in bids as a glaring "testament of the Navy's inadequate effort to assist the local workforce and the inherent weakness in the A-76 process." In his conclusions, Underwood proposed that the GAO conduct an indepth study of the A-76 process, because, in his opinion, the anticipated money to be saved was not realized.³²

Another shortcoming, according to a panel review headed by David Walker, chief of the GAO, is that the A-76 process does not determine the best value but, instead, is based only on the lowest cost. To meet the objectives of outsourcing, improving efficiency and effectiveness in performance, the competitions should seek the best provider in terms of quality, innovation, flexibility, and reliability.³³

The benefits and drawbacks identified above are both worthy of consideration when making decisions to outsource information technology to meet future challenges. In a time of limited resources, transformation, and emerging capabilities of network-centric warfare, outsourcing cannot be discounted as a means to meet future challenges. In a 1997 article written by J. Michael Brower, a programmer analyst assigned to the Army secretariat from 1991 to 1997 in the Information

Underwood proposed that the GAO conduct an indepth study of the A-76 process, because, in his opinion, the anticipated money to be saved was not realized.

Outsourcing Network Control Centers: Benefits and Drawbacks

Information superiority is critical to achieving America's strategic objectives, and the chance of not having governmental IT professionals is a risk that can be avoided.

Management Support Center, he stated that despite the risk, outsourcing is here to stay. But he also believes outsourcing is best applied on a case-by-case basis and not across the board. His following quote best sums up this section's benefits and drawbacks of competitive outsourcing and privatization.

The twin silver bullets of outsourcing and privatization are purported to be the saviors of future defense budgets, as private contractors tout their ability to produce goods that retain quality while cutting costs. But this ammunition should be examined carefully before use, for its effects are likely to be devastating to the defense industry's labor force, and estimated savings may evaporate once large segments of the industry are turned over to the private sector.³⁴

Information superiority is critical to achieving America's strategic objectives, and the chance of not having governmental IT professionals is a risk that can be avoided. Before continuing down the path of outsourcing Air Force network control centers, more research should be conducted to determine the overall effectiveness and efficiency of the A-76 process and the decision to outsource information technology.

Effectiveness and Challenges of DoD Outsourcing IT As a Whole

Following the lead of the commercial business sector, whose outsourcing efforts initially expanded rapidly, DoD senior officials have come to view outsourcing as a means to save costs as they move toward transformation and modernization of the Armed Forces. At this time, the DoD has invested a substantial amount of time and money in outsourcing and privatization, but the results continue to be mixed in regard to management effectiveness and cost savings. In a *Government Computer News* (GCN) article dated 6 October 2003, OMB asserts the competitive sourcing is making progress, and they are confident "the savings and service benefits expected from this effort will soon follow." The DoD is so convinced, GCN reports, that it has plans to compete 67,800 positions ranging from administrative support to information technology.³⁵ During his testimony to a Senate Subcommittee in July 2003, Sam Kleinman, vice president of the CNA nonprofit research and analysis organization, also purported that there is overwhelming evidence in DoD that public-private competitions have saved money. He reported that in total, "DoD has competed over 100,000 positions in 2,300 competitions," and savings have been realized without regard to who wins (in-house or private firm).³⁶ Yet, according to an article in the August 2002 issue of GCN, several years following A-76 competitions and a blue-suit reduction of 65 percent, savings are up to a third less than promised by vendors.³⁷ Despite conflicting claims, there are surveys that support the need for some outsourcing but indicate, at the same time, that cost savings should not be the determining factor.

The results of a survey conducted by DoD personnel, published in the spring 2002 issue of the *Acquisition Review Quarterly*, on the effectiveness of DoD outsourcing and privatization efforts, show DoD has fallen short

Outsourcing Network Control Centers: Benefits and Drawbacks

in achieving its goals. This survey was sent to more than 1,300 DoD members and focused on “determining and understanding the factors involved in justifying outsourcing decisions, including the tangible and intangible benefits of outsourcing.” Without regard as to whether personnel were actually involved in outsourcing initiatives, the surveys targeted Air Force A-76 commercial activity program managers, base commanders, and group commanders. Of the 1,300 surveys sent out, the response rate was about 18 percent. Eighty-seven percent of those responding believed there was a need for change within DoD. When asked if the outsourcing policy was the right way for DoD to meet its goals, 57 percent of all respondents disagreed, and 30 percent agreed. Sixty-four percent of commanders disagreed, and only 28 percent agreed. The response of commanders whose facilities have been outsourced revealed that 65 percent disagreed and only 21 agreed that the DoD was headed in the right direction. When asked what the important issues were when conducting A-76 studies, the response from participants as a whole, 96 percent selected the impact on mission performance, 91 percent selected impact to personnel, and 88 percent selected impact on cost. Commanders asked the same questions responded with 98 percent agreeing with impact on mission performance, 91 percent agreeing with impact on personnel, and 85 percent agreeing with impact on cost. Note that the sample population was small and skewed toward installation commanders’ survey responses, The message received “indicated a high degree of dissatisfaction with A-76 and other cost-based outsourcing initiatives.”³⁸ In the commanders’ view, the impact to mission and personnel is more important than cost. Additional polling should be done to validate these results.

The GAO report issued in April 2003 suggests that the DoD needs to leverage the knowledge gained on IT service projects by capturing and disseminating lessons learned in a systemic manner across the department. The GAO, using proven practices of leading commercial companies, issued a guide in November 2001 to improve the DoD acquisition processes for outsourcing of IT services. These practices were organized into seven phrases: “(I) determine sourcing strategy, (II) define operation model, (III) develop the contract, (IV) select the provider(s), (V) transition to provider(s), (VI) manage provider(s) performance, and (VII) ensure services are provided.” The study was conducted to determine how well organizations adhered to the established guidelines for outsourcing. Kirtland AFB, New Mexico, command, control, communications, and computer services were used as one of the five organizations participating in the study. The study found that Kirtland had an overall compliance rate of 76 percent in using the seven practices. This was the lowest score out of the five organizations reviewed. Of the seven phases, Kirtland’s lowest scores were in the following areas: completed 50 percent of the requirements of phase one, determining sourcing strategy; 64-percent success in phase three, developing the contract; and a 73-percent achievement rate in phase six, managing providers’ performance. The major factor influencing Kirtland’s poor compliance rate in these areas is that the Air Force already had made

The GAO report issued in April 2003 suggests that the DoD needs to leverage the knowledge gained on IT service projects by capturing and disseminating lessons learned in a systemic manner across the department.

Outsourcing Network Control Centers: Benefits and Drawbacks

Outsourcing network control centers, however, has stretched the criteria of commercial activities and the intended purpose of the A-76 process.

an executive decision to conduct a public and private competition following the OMB Circular A-76 policy. The decision was made to use the lowest price versus best value without regard to risk. Using the A-76 policy to determine tasks considered noninherently governmental, the Air Force made the decision that network control centers fit the criteria. Outsourcing network control centers, however, has stretched the criteria of commercial activities and the intended purpose of the A-76 process. Although GAO acknowledges that using the above framework does not guarantee success in outsourcing projects, there is a consensus among the leading commercial activities studied that these practices are the most critical to IT outsourcing projects. “In addition, not implementing or only partially implementing particular practices can produce negative consequences or add risk to a project.”³⁹

Because of the concerns of the inappropriateness of outsourcing Air Force network control centers and network operations and security centers (NOSC), the Inspector General gave the approval for the Air Force Inspection Agency (AFIA) to conduct a review to determine its effectiveness on network operations. The concerns are based on the possibility of not having “enough experienced, knowledgeable communications personnel to man network operations centers and meet AEF requirements,” as we move more toward joint network-centric operations. “The team conducted 280 interviews at 44 units on 28 base installations, 8 major commands, Headquarters Air Force Reserve Command, Headquarters Air National Guard, and Headquarters Air Force.” The findings of the AFIA review are as follows:

- Outsourcing initiatives resulted in stressed communications career fields and shortfalls in NOSC skill levels and skill mixes.
- Lack of standardization in the areas of server consolidation, performance metrics, and initial statements of work resulted in a negative effect on operations and services.
- Nonstandard hardware and software configurations created additional learning and training requirements.
- Performance metrics did not communicate Air Force network operations.
- Initial NCC statements of work were deficient.⁴⁰

To further evaluate the effectiveness of outsourcing and privatization of network control centers, criteria will have to be established to capture performance data using consistent guidance and software. In other words, standardization across Air Force network control centers must be established. With the effort underway by MAJCOMs to consolidate servers, standardization may be the avenue to optimize performance.

The results of the surveys show that the savings anticipated from outsourcing have fallen short of the goals, but there is evidence that some cost savings have been realized. The question is how much? Until there are changes made to the competitive outsourcing and privatization

process, the real amount of savings will not be known. Results from these surveys have also brought to the forefront concerns of outsourcing's impact to NCCs personnel and the Air Force mission. Out of the commanders of network control centers outsourced, only 21 percent agreed that the DoD was headed in the right direction. In selecting important issues during A-76 studies, 98 percent of the commanders selected the impact to the mission, and 91 percent selected the impact to personnel. The impact on cost came in third with an 85-percent rating. AFIA's review on the inappropriateness of outsourcing Air Force network control centers identified several areas that need to be addressed before the overall effectiveness can be assessed and performance optimized.

Conclusion

Despite the disbelief of many government people that the Air Force would outsource its NCCs wholesale or outsource *blue suit* positions in the communications and network operations field, the trend is moving in that direction. It is evident that Air Force officials do not consider these positions to be critical to the Air Force's warfighting capability or that outsourcing of these centers is a security risk. The need for transformation of the DoD is accepted widely, and most government personnel recognize outsourcing has an alternative to provide the much needed additional expertise in information technology. As discussed in this article, there are problems in classifying tasks that are inherently governmental. Once functions are identified, there is a failure to factor in the associated risk to national defense. The chief focus is currently on cost savings versus best value. As with any initiative, there are pros and cons (benefits and drawbacks) and outsourcing is no exception.

Future challenges of the Air Force, however, include the retention of personnel with IT skills needed to support net-centric operations. Seen as a means to free up military personnel for higher priority mission requirements, senior Air Force officials have made the decision to outsource all IT-related functions. The value of contractor support in the IT environment cannot be disputed, but without qualified government IT professionals, contractors will have to be incorporated into the total force mix and prepared for the battlefield environment. Putting contractors into a warfighting area poses a host of additional concerns for combatant commanders that could jeopardize the mission.

Outsourcing Air Force network control centers actually began in 1998 as part of an Air Staff- directed requirement called Project Jump Start. The purpose of this project was to build a list of potential functions that would be feasible for O&P to support QDR initiatives. With the stated objectives of saving costs and improving performance and the Bush administration forecasted increase of 143 percent in IT outsourcing between 2002 and 2007, the decision needs to be reevaluated. Many are still questioning the effectiveness of outsourcing IT. There is still the need for a consistent and appropriate process to track and measure the cost and effectiveness once an activity has been outsourced. There does not seem to be a reduction

It is evident that Air Force officials do not consider these positions to be critical to the Air Force's warfighting capability or that outsourcing of these centers is a security risk.

Outsourcing Network Control Centers: Benefits and Drawbacks

The consequences of outsourcing in terms of military readiness as we move more to a joint network-centric operation can have a substantial impact on our national security strategy.

in the size of the Government, only a change in the suit. Some military have been freed of performing daily IT-related functions, but they now have the added responsibility of overseeing contractors on the battlefield. The consequences of outsourcing in terms of military readiness as we move more to a joint network-centric operation can have a substantial impact on our national security strategy. But there are some benefits, and the Air Force's decision to outsource network control centers will stay the course until DoD's policy changes.

With the ongoing transformation of DoD, the decision to outsource network control centers and its impact on our national security objectives will have to be evaluated and integrated with other operational concepts. The proposed cost savings will have to be weighed against the inherent risk.

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40. *Outsourcing Network Control Center and Network Operations and Security Center Function.*

Lieutenant Colonel John E. Cannaday, USAF
Colonel Steven C. Suddarth, USAF

The Government has used contractors for various purposes as far back as the Continental Congress' *secret committee of trade* for procuring gunpowder, clothing, and medical supplies from overseas sources.

Contracted Procurement Services

Is It Time for Contracting to Get on the Bandwagon?

Introduction

*Our military culture must reward new thinking, innovation and experimentation....
Every dollar of defense spending must meet a single test: it must help us build the
decisive power we will need to win the wars of the future.*

—President George W. Bush

In the Department of Defense (DoD) Transformation Planning Guidance, Secretary of Defense (SECDEF) Donald Rumsfeld stated, "There will be no moment at which the Department is 'transformed.' Rather, we are building a culture of continual





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The vision is to migrate from a tactically minded workforce with narrow skill sets to one steeped in multiple skills, using technology and business practices to benefit its customers.

transformation....” This statement suggests more than evolutionary change or application of best practices and implies thinking in new ways, specifically, revising how the military organizes, trains, and equips its forces. From an organizational standpoint, the Transformation Planning Guidance promotes policies, practices, and procedures that advance an entrepreneurial approach to developing military capabilities, one that encourages people to be proactive, not reactive. Organizational transformation entails alternative thinking about acquiring access to the most skilled and capable human resources for major weapon system programs, small and large dollar procurements, and the requirements of current and future warfighters.

With a focus on transformation and accelerating delivery of goods and services to the warfighter and its support elements, Air Force contracting is in the midst of its own renovation. It focuses on people, processes, policy, and technology. Through initiatives in each of these areas, the vision is to migrate from a tactically minded workforce with narrow skill sets to one steeped in multiple skills, using technology and business practices to benefit its customers.

In parallel with this transformation effort, Air Force and DoD organizations are recognizing significant legal and policy flexibilities related to using contractors as part of the procurement workforce. Based on experiences drawn from other organizations, senior leadership should consider the consequences of widespread use of contractors and assess the potential strategic impact. The Air Force should draw a distinct line between procurement tasks contractors can perform on its behalf and those that should remain the responsibility of civilian or military personnel; established boundaries should take into consideration the dual mission of protecting the public dollar and guiding the Government’s business transactions.

The law of *unintended consequences* intimates that government actions through legislation and regulation have effects that are unanticipated or *unintended*.¹ This axiom is a natural side effect of personal or institutional decisionmaking, where partial or complete lack of relevant information leading to a decision drives an errant outcome. History is replete with examples of policy decisions gone awry as a result of failure to perform a comprehensive outcome analysis. An example is the effect government downsizing has had on the proliferation of the Services’ spending in DoD. Paul Light refers to this as the *shadow government* phenomenon resulting from reductions in the Federal workforce, with an ensuing increase in contractor personnel to make up for lost government workers. Between 1991 and 2001, DoD civilian and military persons *decreased* by 42 percent (1,523,148 in 1991 to 878,683 in 2001).² In the same period, dollars spent on services *increased* by 7 percent (\$51.5B spent in 1991 to \$55.3B spent in 2001).³ While the increase in services dollars may seem insignificant compared to the decrease in personnel over the same period, one would expect a sizable decrease in services considering the commensurate reduction in organization size and support services

required (in the case of the Air Force, 30 of 50 overseas bases closed, reduction of major commands from 13 to 8, and active wings reduced from 205 to 100).⁴ Susan Harvey, in her article “Service Contract Management: No Place for Amateurs,” cites a 156,000-position reduction between 1995 and 2001 and questions where the tasks associated with these civilian jobs reside. Determining a clear answer to this question eludes the Services and has caused considerable consternation in Congress. Harvey suggests that a large portion of these positions were not eliminated but simply shifted to contractor support.⁵ Others have argued that military downsizing (24 percent since 1992) continues to affect today’s remaining uniformed workforce because additional duties have not decreased and are allocated to a smaller force, heaping additional stress on the units that are required to keep up with the tempo.⁶ These illustrations reflect outcomes not originally anticipated by decisionmakers yet are real results that demand a response from senior leadership. To pin down the scale of these problems, the Vice Chief of Staff of the Air Force commissioned a study entitled Personnel Load. Its purpose is “to measure average workweek hours across a wide range of Air Force specialty codes.”⁷ Once determined, a quantitative measure can help senior Air Force leaders identify the workforce stress points and begin taking steps to alleviate them. However, this is reactive to the situation and is indicative of a lack of foresight when the original manpower cuts were made. Senior Air Force contracting leaders need to get ahead of a large-scale use of contracted procurement services (CPS) to avoid unintended consequences that are detrimental to the Services’ acquisition system and, most important, to the warfighter. Proactive measures demand an appreciation of the implications of contracted procurement services in the future, beginning with an understanding of the public policies and operating constraints associated with this subject.

Key Areas in Determining the Proper Use of Contracted Procurement Services

No one can know how big the Federal civil service would be if all inherently governmental jobs were pulled back in or how small it could become if all commercial activities were pushed out.

—Paul C. Light, *The True Size of Government*

The use of contracted procurement services in government contracting organizations requires consideration of three key areas: determining *inherently governmental* policy as stated in Office of Federal Procurement Policy (OFPP) 92-1, organizational conflicts of interest; and Defense Workforce Improvement Act mandates. Each of these areas establishes personnel limits or requirements on those who perform the contracting function or are subject to the contracting process. Review of these areas reveals space for careful interpretation and judgment when considering whether contractors are appropriate for an organization’s contracting needs.

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The term inherently governmental is defined by policy as “a function that is so intimately related to the public interest as to mandate performance by government employees.”

Relative to inherently governmental functions, what establishes boundaries and clarifies the basis upon which certain functions may or may not be contracted out? The term inherently governmental is defined by policy as “a function that is so intimately related to the public interest as to mandate performance by government employees.”⁸ These functions include those activities that require either the exercise of discretion in applying government authority or value judgments in decisionmaking. Aside from the military disciplines, “Governmental functions normally fall into two categories: (1) the act of governing; that is, the discretionary exercise of government authority, and (2) monetary transactions and entitlements.”⁹

When judging whether a task is inherently governmental, there are no absolutes except in the most obvious cases. The decisionmaker must take into account all Federal directives and guidelines and render the best judgment.¹⁰ Notwithstanding the details of the policy and functions listed as inherently governmental, 92-1 recognizes that each agency has within its discretion the right to make a final determination on whether a function is inherently governmental. For example, the term inherently governmental normally does not involve functions such as “gathering information for or providing advice, opinions, recommendations, or ideas to government officials.”¹¹ In the case of contract specialist duties, does this then allow a contractor to perform the functions of a government representative in preparing a contract for contracting officer signature?

In setting forth its policy on services contract management oversight, OFPP sets forth a test in the form of two questions:

- Is the requirement for a function listed in OFPP Policy Letter 92-1, *Inherently Governmental Functions*?
- If the function is not listed in OFPP 92-1, do any of the factors in the totality of the circumstances analysis discussed in section 7(b) of Policy Letter 92-1 indicate that the function may be inherently governmental?

A yes to either question is a trigger for determining a position inherently governmental. The policy further reinforces the need for continuous management review of services and actions not considered inherently governmental functions but with the potential to become so if not properly managed. It requires that contracting officers review “monthly progress reports...to detect whether the contractor may be performing inherently governmental functions.”¹² Thus, services that fall within the potential bounds of OFPP 92-1 require greater management scrutiny of contract scope and performance. Congress has reinforced the need to scrutinize individual positions within the Office of the Secretary of Defense (OSD), albeit for different reasons, through the Federal Activities Inventory Reform (FAIR) Act, which requires a corporate inventory of all OSD positions for potential commercial application.¹³

The *DoD Inventory of Commercial and Inherently Governmental Activities* is a key to delineating inherently governmental positions. The

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inventory is conducted on an annual basis and identifies DoD positions subject to competition or direct conversion. This document and its governing guidance present detailed descriptions of the categorization of each authorized position within DoD. In addition, it provides insights into OSD's relatively narrow definition of inherently governmental. In the case of contracting, the guidance for completing the inventory directs that each position be assigned one of 17 codes, depicting the nature of the position with respect to private commercial availability. Code E (Civilian Authority, Direction, and Control of the DoD), for example, is assigned when the position is vested with "the authority to obligate Federal funds or to commit the department to take or not to take action by direction, order, policy, regulation, contract, authorization, or otherwise."¹⁴ The inventory guidance designates contracting officers as defined in Federal Acquisition Regulation (FAR) 2.1 within the Code E category; the code's description makes a clear statement that this code applies to positions that are delegated responsibilities through secretaries of the military departments.¹⁵ This is an important distinction. Contracting officers are delegated specific authority (that is, a warrant) to bind the Government in contractual arrangements; a warrant from senior leaders within the contracting chain documents this authority with set parameters and duration of effect. When determining whether a contract specialist is inherently governmental, the lack of a warrant differentiates this position from a contracting officer and, therefore, is considered, by some organizations, outside the inherently governmental category.

The fiscal year (FY) 2002 inventory shows that 96 percent of Air Force contracting positions are considered inherently governmental or exempt from competition. The term exempt from competition refers to activities that are commercially available but present specific risks to operational missions or other organizational functions such that contractor performance is not appropriate and, therefore, is exempt from potential A-76 or outsourcing activity.¹⁶ The Services vary widely in the percentage of positions they categorize as inherently governmental or exempt from competition (Table 1). The Army, Navy, and Marines classify 70 percent, 95 percent, and 83 percent of their contracting positions in these two categories, respectively. Defense agencies, as an aggregate group, show 93 percent of their positions classified as inherently governmental or exempt from competition.¹⁷

Disparate service and agency interpretations of these terms and the duties and tasks that constitute government-only responsibilities will generate wide variations in contracted procurement services allowed by the Services. Tasks or duties that comprise positions classified by the Air Force as inherently governmental or exempt from competition should not, by definition, be eligible for contracting out. CPS contracts that include such duties seem disingenuous and call into question the veracity of the inventory submittal and its strict compliance with the FAIR Act. A lack of consistency in how Air Force contracting positions are categorized could have far-reaching implications, potentially resulting in a forced

The term exempt from competition refers to activities that are commercially available but present specific risks to operational missions or other organizational functions such that contractor performance is not appropriate.

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Service Categories	Army	Navy	Air Force	DoD Agencies
Commercial Activity	30%	5%	2%	7%
Exempt from Competition	7%	11%	23%	3%
Inherently Governmental	63%	84%	76%	90%

Table 1. Percentage of Contracting Authorized Positions by Categorization

Work tasks associated with personnel positions declared inherently governmental (or exempt from competition) in the DoD inventory should not be contracted out.

reassessment of whether certain contracting positions are, in fact, “intimately related to the public interest as to mandate performance by Government employees.”¹⁸ To summarize, work tasks associated with personnel positions declared inherently governmental (or exempt from competition) in the DoD inventory should not be contracted out. To do so is duplicitous and inconsistent with the integrity of an agency’s data submittal. Once an OFPP 92-1 determination is made, contracting organizations should consider whether potential conflicts of interest exist and how best to address these in a contractual relationship.

FAR 2.101 states that organizational conflict of interest (OCI):

...means that because of other activities or relationships with other persons, a person is unable or potentially unable to render impartial assistance or advice to the Government, or the person’s objectivity in performing the contract work is or might be otherwise impaired, or a person has an unfair competitive advantage.¹⁹

Organizational conflict of interest takes many forms; however, the Federal Acquisition Regulation has crystallized the concept to four rules.

- Situations in which a contractor is providing technical advice and systems engineering to the Government bar the contractor from participating in contract requirements derived from the assistance provided.
- Contractors who participate in preparation of work statements and specifications for the Government cannot compete for the work covered by these documents.
- Contractors who provide services that entail evaluation of offers for products or services considered for purchase cannot participate in the competition for the same products or services.
- Contractors who have access to proprietary information must enter into an agreement with the contractor whose information they have access to, detailing the methods used to protect the information from unauthorized disclosure or use.

Rules 2, 3, and 4 come into play in contracted procurement services. The central role of the contracting function revolves around review,

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evaluation, and assessment of contractors' proposals and documents. In addition, contracting personnel have access to the most sensitive proprietary information, to include pricing data, trade secrets, and technical data. As a result, contracted procurement services must include organizational conflicts of interest. Key determinants of potential or actual organizational conflicts of interest are discerned through OFPP 93-1, which provides eight questions designed to ferret out conflicts.²⁰ For example, the question, "Will the work, under this contract, put the contractor in a position to influence government decisionmaking—for example, developing regulations—that will affect the contractor's current or future business?" might reveal OCI potential. An affirmative answer to CPS contractor personnel who are performing functions such as policy development or price analysis and contract negotiation might necessitate additional OCI provisions to restrict the contractor from participating in projects in which they have direct decisionmaking influence. An astute contracting officer must remain attuned to the variety and depth of influence a contractor has on procurements and policy for an organization.

Other issues may involve the degree to which contractors are isolated from certain work to avoid the appearance of a conflict of interest. For example, if a contractor has employees assigned to a division within a contracting unit that has cognizance over service and supply projects the contractor wishes to bid on, is there a conflict of interest that will bar the contractor from participating? Where is the line drawn to avoid the appearance of a conflict?²¹ Where does appearance begin and real organizational conflict of interest end? Is the organizational conflict of interest mitigated as long as the contractor's employee is not assigned to these projects? These are significant issues a contracting officer must reconcile when using contracted procurement services. The application of OCI rules is a contracting officer decision on individual CPS contracts; broader strategic issues come into play when considering acquisition personnel qualification standards associated with the Defense Acquisition Workforce Improvement Act (DAWIA).

Review of the provisions of DAWIA shows no recognition of potential contractor participation in the DoD acquisition field. The act prescribes specific requirements related to the roles and responsibilities of the SECDEF and, more expressly, the Under Secretary of Defense for Acquisition acting on behalf of the SECDEF in organizing and training the acquisition workforce. DAWIA's concerns are threefold: standards of education and training for DoD acquisition professionals, establishment of acquisition positions and the qualification criteria associated with the positions, and establishment of an acquisition corps to ensure the most highly qualified people occupy acquisition positions of greatest responsibility and consequence (cost, schedule, and performance) to DoD. Enacted in the early 1990s when Congress recognized the need to improve the professional qualifications of DoD's acquisition workforce, DAWIA identifies core education, experience, and training requirements for acquisition professionals in DoD. Requirements for specific occupational

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“A person may not be employed by the Department of Defense” unless the individual meets the requisite requirements stipulated by the act.

codes establish competency and skill levels for each acquisition position. Training requirements are categorized by certification levels necessary to occupy defense acquisition jobs under the Acquisition Professional Development Program (APDP). To illustrate, a contract specialist position within the Air Force requires a Level 1 certification with minimum standards of a baccalaureate degree, 24 semester hours in business-related course work, a year of contracting experience, and four required course completions in introductory contracting areas, pricing, and negotiation.²²

DAWIA is a key consideration in the use of contracted procurement services because the act does not apply to contractors. DAWIA baselines the minimum criteria for qualified contracting personnel to occupy DoD acquisition positions. It states that the SECDEF will designate acquisition positions and these positions will include “all acquisition-related positions in...procurement, including contracting.”²³ When one CPS user was asked how DAWIA fit into the evaluation scheme for hiring contractor personnel, he stated, APDP-like qualifications were considered, but they could not hold contractors to DAWIA since they were not subject to the law or privy to the infrastructure (for example, Defense Acquisition University [DAU] courses) developed to implement DAWIA. Section 1723 further levies on the SECDEF that each DoD acquisition position be assigned “education, training, and experience requirements...based on the level of complexity of duties carried out in the position.”²⁴ Throughout DAWIA, reference is made to employees—an assumed reference to military or civilian personnel. When describing the core General Services 1102 series for contracting professionals, the act states “a person may not be employed by the Department of Defense” unless the individual meets the requisite requirements stipulated by the act.

Two primary issues arise when considering the implication of DAWIA and contracted procurement services:

- Whether contractors can or should be permitted to participate in the APDP. This issue is more long-term and assumes continued growth of contractor support in the contract specialist area and a gradual depletion of qualified ex-government personnel (that is, former military or Federal civil service personnel). However, expansion of contracted procurement services eventually will create an inconsistency in the experience, training, and education requirements to which DoD is accountable to Congress.
- Whether the use of contracted procurement services violates DAWIA. If Congress’ intent was to establish a foundation of training, experience, and education for those executing acquisition responsibilities for the Government, should these same requirements be enforced on contractor personnel? Enforcement of DAWIA is doable given the number of former government employees serving in the private sector; however, it potentially could limit the resource pool if requirements for fulfilling acquisition roles for DoD are limited to APDP criteria alone. In addition, there is still the matter of continuing

learning requirements for DoD acquisition personnel and whether they apply to CPS contractors. The Under Secretary of Defense (Acquisition, Technology, and Logistics) has levied mandatory requirements for civilian and military personnel to achieve at least 80 hours of continuing learning over a 2-year period.²⁵ The Air Force's Web site on continuous learning states it "applies to all individuals on DAWIA acquisition-coded positions."²⁶ Since contractors do not occupy acquisition-coded positions, is continuous learning a mandatory requirement for CPS contractor personnel? Note that professional organizations such as the National Contract Management Association have certification requirements that require examinees to pass a comprehensive test on the contracting profession and at least 60 hours of continuous professional education over a 5-year period to maintain their certification.²⁷ However, this is a voluntary organization to which private contractors are not bound for purposes of professional development. The question for contracting organizations is whether a dual standard for continuous learning is acceptable, and if so, is the purpose of DAWIA compromised as a result? Use of contracted procurement services on a broad scale will dilute DAWIA. Contractor accountability for continuous learning and basic training standards will fall on each contract as delineated in its terms and conditions. The onus for enforcement of these requirements is then placed on the contracting organization sponsoring the CPS contract.

As with any service contract, government personnel establish the minimum qualifications required to fulfill the services desired. DAWIA and its standards must be taken into account by organizations that hire contractors to fulfill key acquisition roles. Inherent in this process is an assessment of DAWIA requirements to ensure that any future CPS workforce maintains the professional standards mandated by Congress.

The three areas present both tactical and strategic issues for future use of contracted procurement services. At the tactical level, CPS users will wrestle with these issues and devise individual solutions for each contract. Strategically, the Air Force must grapple with consistency in determining which contracting positions are inherently governmental or commercial but exempt. The Services must establish OCI ground rules for barring CPS contractors from competing for contracts managed by organizations using contracted procurement services. Finally, enforcement of DAWIA and continuous learning requirements in relation to CPS contractors must be considered.

CPS Today: Scope of Use and Advantages and Disadvantages

He knows the water best that has waded through it.

—A Danish Proverb²⁸

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The Air Force must grapple with consistency in determining which contracting positions are inherently governmental or commercial but exempt.

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The AFMC Directorate of Contracting polled its organization to gauge the extent to which contracted procurement services were being used in the command.

Background

In fall 2003, the Air Force Materiel Command (AFMC) Directorate of Contracting polled its organization to gauge the extent to which contracted procurement services were being used in the command. AFMC provides a good read on Air Force-contracted procurement services because it houses the largest contingent of Air Force contracting professionals executing and managing a diverse cross section of contracting types, dollar values, strategies, and complexity. The survey concerned whether contracted procurement services were being used, for what purpose, and whether there were any specific tasks or prohibition of tasks involved in their CPS service requirements. Of the approximate 130 divisions polled, 21 reported some activity that constituted CPS services. Offices answering in the affirmative included the 311th Human Systems Wing; Electronics Systems Center; Aeronautical Systems Center; Warner Robins Air Logistics Center; Air Force Research Lab at Kirtland AFB, New Mexico; and Materiel Systems Group. The DoD and other Federal agencies also were contacted, to include the National Reconnaissance Office, National Geospatial Agency (NGA), Missile Defense Agency, Department of the Interior, Defense Contracting Command—Washington (DCC-W), Army Materiel Command, and Pentagon Renovation Program. A standard set of questions was posed to representatives of each organization. Agency responses often led to further discussion and areas beyond the immediate scope of the interview questions. Several consistent findings were reflected in responses to the questions.

- Most agencies have focused their CPS efforts in the area of contract closeout. Some organizations have expanded into contract specialist positions, and a lesser proportion of work falls into the categories of source selection facilitation, procurement analyst tasks, price analysis, and administration.
- Workforce percentages for organizations using CPS range from 10 percent to as much as 75 percent of the total contracting workforce.
- The primary explanation for using contracted procurement services is to fill staffing voids resulting from longstanding position vacancies.
- Agencies are sensitive to the inherently governmental aspects of contracted procurement services and do not allow contractors to sign documents obligating dollars for the Government.
- No organizations polled have internal policies and procedures related to contracted procurement services.
- Government contracting officer and CPS contractor relationships have both positive and negative consequences.
- Most agencies did not anticipate expanding their CPS utilization in the future; however, several had just initiated or expanded their numbers of CPS persons over the last year.
- A clear majority of the offices using CPS report positive experiences with contractors and relatively few negative consequences.

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Each of these findings reveals a noteworthy aspect of contracted procurement services and provides lessons to leaders on the best use of contracted procurement services.

Current CPS Use: How and Why

The most common use of contracted procurement services throughout the contracting community is contract closeout. Contract closeout is typically a low-priority item for most contracting organizations, and as a result, a buildup of physically complete contracts awaiting final reconciliation and payment is pervasive. As of 30 September 2003, the Air Force had 2,130 contracts exceeding the established time-line limitation for closeout.²⁹ Within AFMC, 32 of the 76 contractor persons who perform contracted procurement services are dedicated to contract closeout. Even after eliminating the backlog of closeout actions, some offices continue to retain this function as contracted procurement services to maintain closeout currency and eliminate the risk of building a future backlog. In addition, there is reluctance on the part of management personnel to allocate government resources toward this area of contracting. A representative from the Department of Energy stated that contract closeout is the least prioritized task in his office and invariably was deferred until the agency initiated a get-well plan using CPS contractors.

Contract closeout ideally is suited for contracted procurement services. The process is generally serial with go/no go decisions contingent on successful completion of the previous step. Little, if any, analysis is required to establish whether to proceed; rather, the contract specialist throughout most of the process acts as a gatekeeper to ensure final deliverables of documentation and payment are completed by various parties with interests in the contract (for example, contractor, program office, and Defense Finance Accounting Service). Closeout typically requires little integration with active contracts and rarely affects decisions made for future contracts. The potential for conflict of interest is minimal. By their nature, expired contracts hold little influence in future contract strategy and award decisions. This is an area that is clearly administrative in nature and falls outside the scope of inherently governmental functions.

The Army has confined its limited use of contracted procurement services to the closeout and administrative functions; however, use of contractors is starting to expand into the area of source selection. For source selections, the contractors are used to process proposals, provide price analysis, and ensure responsiveness to the government's solicitation. Use of contracted procurement services in source selections is not standard practice in the Army but rather applied on a case-by-case basis as required staffing dictates for individual cases.

In addition, the National Reconnaissance Office (NRO) has employed procurement analysts in its Director of Contracts office since 1995. The NRO, along with several other offices, is using contractor personnel to perform contract specialist duties such as preparation of solicitation documents, evaluation of cost proposals, contract writing, and routine

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A majority of the organizations polled cited fill a government need or requirement temporarily (or permanently) as a reason for using contracted procurement services.

contract management duties such as invoice payments and drafting modifications.

Within AFMC, it is clear the use of contracted procurement services is in its infancy; a mere 76 contractor persons are performing full- or part-time contracted procurement services in comparison to its 2,372 contracting personnel.³⁰ The 311th accounts for 34 (18 percent of its contracting staff) of the 76 AFMC CPS persons; these contractors are used for contract closeout, invoice payment tracking, and other administrative duties. The Missile Defense Agency counts contractors as 29 percent of its contracting workforce. The Pentagon Renovation Program has the highest percentage of contractors—a 3:1 ratio of contractor-to-government personnel. The high variance in the proportion of contractors in the offices polled seems to indicate a variety of reasons for using CPS services; however, this is not the case.

CPS Demand Is One Dimensional

In general, Federal service contracts serve one or more of the following purposes:

- Perform special skills not available in the Government.
- Temporarily fill a government need or requirement.³¹
- Permanently fill a government need or requirement (for example, A-76).
- Overcome a lack of in-house expertise.
- Reduce costs or demonstrate cost effectiveness.
- Increase productivity and efficiency.
- Improve service quality and customer satisfaction.
- Improve accountability.
- Move noncore operations to another party.
- Facilitate innovation and introduce new work practices and introduce cultural change.
- Share risks with another party.³²

A majority of the organizations polled cited fill a government need or requirement temporarily (or permanently) as a reason for using contracted procurement services. The other nine reasons listed did not apply to the contracting offices polled. Why this singular focus on manpower shortage? A recent *Federal Times* article asserts that expanded Federal outsourcing and government downsizing from the early 1990s resulted in an explosion of service contracts. In parallel, DoD's downsizing resulted in not enough contract management personnel to oversee the in excess of \$135B in service contracts.³³ Steve Kelman points out that the DoD, Department of Energy, and National Aeronautics and Space Administration expend 46 percent, 94 percent, and 78 percent of their budgets on contracted products and services.³⁴ In 2001, the total number of contracting persons was approximately 6,751 as compared to an FY95 total of 7,199 (6.3 percent decline).³⁵

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However, during the same period, total contracting actions increased from 2.9 million in FY95 to 3.1 million in FY01, and dollars expended on contracts during the same period showed an upward trend, \$39.6B in FY95 to \$43.6B in FY01—a 6.5-percent and 9.2-percent *increase* in actions and dollars. These numbers reveal workforce demands that are increasing with a reduction in personnel. The impact is mitigated by the increased use of the Government Purchase Card (GPC); however, normalizing for GPC dollars still reflects a 6.7-percent increase in dollars obligated from FY95 to FY01 (Figure 1).

Both NGA and the NRO attribute their use of contracted procurement services to the lack of available Federal workers to meet their requisite security standards. One source, when considering the potential expansion of contract services, stated, “Yes, we have no choice, too much work and not enough cleared *govies* to work it.”³⁶ The DCC-W currently is using approximately 23 contractor persons in “executing the DoD Executive Agent mission of providing administrative contracting support to all DoD activities within the National Capital Region.”³⁷ The primary impetus was to overcome a deficit of more than 30 vacancies in the organization; contracted procurement services are viewed as a temporary solution until the deficit situation is rectified. However, organizations that originally entered into their arrangements with temporary intent can fall prey to a permanent reliance on contractors once the relationship is established. For example, the NRO procurement analyst contract originally was written to assist in developing the organization’s acquisition policies and procedures over an 18-month period; however, 10 years later, the contractual relationship is still in existence. Other organizations within the DC area also cite the lack of available Federal contracting personnel to fill their authorizations.

Recent congressional inquiries have identified the civil service application process as a key factor in the Government’s lack of success in recruiting highly qualified personnel from private sector sources. One respondent to a survey conducted on the difficulties associated with

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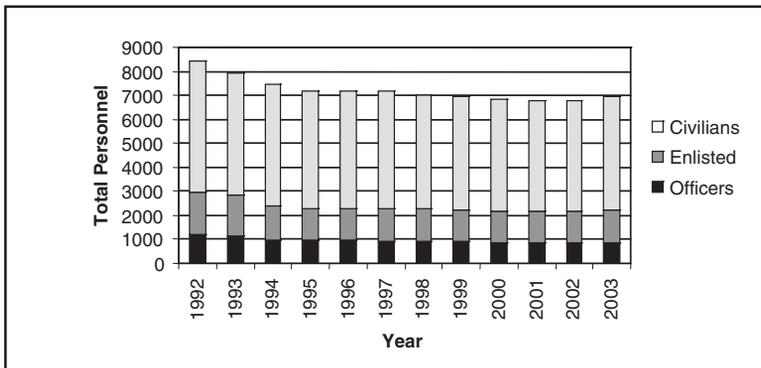


Figure 1. Air Force Contracting Personnel Trends Since 1992

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The Air Force is betting on the National Security Personnel System, signed into law in November 2003, to fix its personnel management problems.

pursuing Federal employment stated, “In my case, I have become fed up with the process and have decided to pursue opportunities in the private sector.”³⁸ This is a simple example of the impediments the Federal hiring process can impose on recruiting quality candidates. As referred to earlier, contracted procurement services is used to fill voids in hiring Federal contracting professionals. Rather than continuing to pursue qualified candidates for vacancies, contracting organizations are soliciting contractors to fill the vacuum—essentially, contractors become hiring agencies for the Government. The question then becomes, is this treating the symptom rather than the illness that pervades the civil service hiring system? Rumsfeld explained why a greater number of contractors than civil servants were deployed in Operation Iraqi Freedom when he stated, “More than 80 percent of civilians deployed in the theater of operation were contractors. Why? Because outdated regulations prevent the department from moving civilians to new tasks quickly. Thus, managers are forced to turn to contractors to do what DoD civilians could and should be doing.”³⁹ Rumsfeld goes on to state, “On average, it takes 5 months to hire a Federal employee.” Based on data gathered thus far, this is the situation with contracted procurement services. Inflexibility or lack of responsiveness contributes to the Government’s hiring system woes and is causal for the expanding use of contracted procurement services.

The Air Force is betting on the National Security Personnel System (NSPS), signed into law in November 2003, to fix its personnel management problems. Along with a *pay for performance* approach to compensating civilian employees, the NSPS is intended to instill flexibility and efficiency in personnel recruiting and hiring.⁴⁰ Whether this system will make a difference in addressing the concerns that have led to the use of contracted procurement services thus far in the Air Force remains to be seen. NSPS implementation is in its initial stages. Congress and the President have directed, by statute, a pilot program, consisting of an automated workforce management system, to cure the ills of the Services’ hiring difficulties by accomplishing the following:

- Substantially reduce hiring cycle times.
- Lower labor costs.
- Increase efficiency.
- Improve performance management.
- Provide better management reporting.
- Enable that system to make operational new personnel management flexibilities granted under the civilian personnel transformation program.⁴¹

If hiring is truly the sole reason for its use, contracted procurement services may be short lived if a fluid, flexible, and responsive personnel system resulting from NSPS implementation remedies the difficulties with fully resourcing contracting organizations.

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CPS Advantages and Disadvantages

In addition to determining the organizational problems that CPS contracts are designed to solve, input received from CPS users and other research sources expose a myriad of advantages and disadvantages. Awareness of CPS lessons learned will help the Air Force improve its use of contracted procurement services and determine whether contracted procurement services are an appropriate contract mechanism for its institutional use. Current CPS users reveal the following disadvantages:

- Workplace relationships often are impacted by a trifurcated workforce composed of both Federal, civilian, and contractor employees. Situations can arise wherein a pay disparity between the two groups produces a natural barrier to teamwork and esprit de corps. Widespread use of contractors in junior positions within the workforce such as journeyman contract specialist positions ultimately could impact the ability to recruit civil servants to compete for future senior level civil service positions. This potential drawback assumes that contractors would, in the main, choose not to enter the Federal workforce at senior level positions unless significant pay incentives were offered.
- Increased use of contractors places an additional burden on contracting officers and supervisors to perform contractor quality assurance oversight and management. Essentially, a contractor workforce adds an additional personnel management system to the civil service and military (officer and enlisted) systems. Organizational management complexity is increased. A byproduct of such a workforce is contracting officer time and attention drawn away from contracting skills toward quality assurance and performance evaluation of contracted procurement services. The extent to which a contracting officer can supervise, mentor, and advise contract specialists is reduced when upwards of four personnel management systems are in play. An undesirable, but perhaps necessary, alternative is to empower government contract specialists to oversee CPS contract specialists; however, the contracting officer remains responsible to validate each contracting action executed. This alternative places the contract specialists in a position of authority over contractors and may distract them from on-the-job training and experience vital for producing a contracting officer.

In congressional testimony, the US Inspector General, Gaston Gianni, stated, “Several concerns have been expressed, in general, as to whether there is proper oversight of the proliferation of contractors in the Government.”⁴² Gianni characterizes contractor oversight as lax and further states that expanding competitive sourcing in the Government heightens the importance of overseeing the effectiveness of contracting activities.⁴³ From this statement, it seems imprudent to allow contracted procurement services to such a degree that large CPS contract-specialist contingents provide day-to-day contract oversight.

Awareness of CPS lessons learned will help the Air Force improve its use of contracted procurement services and determine whether contracted procurement services are an appropriate contract mechanism for its institutional use.

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The role of the contracting office is marginalized in reality and in appearance when a significant portion of its workforce mirrors the system for which it is supposed to be the honest broker.

The continuing expansion of industry personnel in the government workforce increases the importance of contracting oversight. The Bush administration is seeking to conduct private versus public sector competitions on 226,000 positions as part of its FY05 budget.⁴⁴ Clearly, the march to greater outsourcing and expansion of contractor support to DoD operations will continue into the foreseeable future. Contractor oversight is a core mission requirement for the contracting function, and expansion of contracted procurement services runs counter to smart business practices.

The role of the contracting office is marginalized in reality and in appearance when a significant portion of its workforce mirrors the system for which it is supposed to be the honest broker. As the DCC-W began to build its contractor contingent, some offices initially requested *not* to have contractors work their projects because they were concerned about OCI issues and appearances. DCC-W denied the request with the provision that, if the contractor were a potential bidder on a project, its employee would not be involved as a specialist.

Throughout the Government, the requirements definition process, source selection evaluation and conduct, market research, and other phases of the acquisition process have been contracted out. At what point should senior leaders draw the line on industry participation in the selection and management of its fellow contractors?

One individual interviewed stated that using contractors in junior contracting positions for specified purposes such as contract closeout and administrative work is satisfactory for those immediate tasks. However, similar to any situation where contractors reside with government representatives, duties and responsibilities can start to overlap, and contractor personnel may be asked to expand their work beyond what is assigned in their contract or task order. One response received from an outside agency stated, "With support contractors doing the work, I've seen journeymen contract specialists fall into that trap thinking that all they have to do is task the contractor. Of course, this doesn't happen in every case, but it is something to watch."⁴⁵ This scenario is worrisome under any circumstance; however, in a situation where issues of inherently governmental functions and prudent expenditure of public monies are at stake, the potential consequences are significant. Congress has encountered frustration with government organizations that have allowed such a large proportion of their workforce to be contracted out that it becomes difficult to hold any government person accountable. The Energy Department, for example, has 20,000 Federal workers diluted by a contractor workforce of 140,000. Congress has found it difficult to enforce its mandates on the public decisionmakers with so much responsibility heaped on the private sector.⁴⁶

In 1998, the Army finalized its Contracting XXI Blueprint and specifically dismissed the idea of contracted procurement services for typical contract specialist duties. The report rationalized that contract specialist duties were a mix of both inherently and noninherently

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governmental tasks and found it impractical to attempt to divorce the tasks.⁴⁷ Additionally, there was concern that the dynamics of the workplace could lead to *personal services*—a type of contractual relationship only permitted by statutory authority that “by its express terms or as administered, makes the contractor personnel appear to be, in effect, government employees.”⁴⁸ This is a pervasive concern throughout Federal agencies as contractors become more embedded in the work areas with civilian and military personnel. While there may be concerns about de facto *personal service* risks, this concern alone is not enough to dissuade requiring organizations from fulfilling a legitimate need. It is common for the lines between contractor and government personnel to become blurred in work areas where a daily mix of Federal and contractor personnel takes place. This becomes a management issue to ensure proper safeguards are in place to identify contractor personnel and prevent real or potential conflicts of interest from occurring in day-to-day contract management. This management dynamic increases the complexity of operating in a dual environment of contractors and government personnel.

The Army did acknowledge that certain administrative, information technology, contract closeout, and training functions could be performed by contractors and did not fit into areas prescribed by policy as inherently governmental. Its recommendations further stated, “Contractor personnel may be used to supplement government personnel during peak workload periods,” the contracting function was determined predominantly inherently governmental and not subject to contracting out, and *peripheral support functions* could be contracted out on a test basis.⁴⁹

Another inherent drawback of contracted procurement services is the disparate motivations and loyalties that contractor employees carry with them as they perform daily tasks on the Government’s behalf. Both military and Federal civilians take an oath that declares that the individual will “support and defend the constitution of the United States.” Contractor personnel are under no such obligation, and while US citizens clearly carry a patriotic sense of responsibility, the point above serves to illustrate the differing motivators at work between government and private sector entities. There is some risk that situations could arise wherein divided loyalties between the company and the customer (Government) result in decisions (or recommendations) being made by a CPS contractor that are counter to the best interests of the Government. Anthony Downs calls this the “law of self-serving loyalty: officials are loyal to the organization that controls their job security and promotion.”⁵⁰ This is fairly intuitive but reinforces a potential peril when government or contractor loyalties come into play. A fictitious (but possible) example might be a contractor employee under pressure to complete negotiations and a contract modification by a certain date. Perhaps the contractor’s measure of performance (officially or unofficially) hinges on closing the deal within a certain number of days. Will the contractor feel greater pressure to shorten the time line by compromising on issues related to price or performance to meet established deadlines? Under other conditions, might contractor

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Contractors offer the flexibility to innovate without sacrificing manpower

employees artificially lengthen procurement action lead time to ensure continued employment or contract workload? The potential for workload manipulation or neglect is not confined to contractor personnel and represents the worst case scenario for both government and contractor personnel dynamics, but the added dimension of divided loyalties and conflicting pressure (that is, government versus contractor chain of command) is reason for concern. As mentioned above, the current number of contractors serving as contract specialists is low, but the potential for abuse of discretion expands as the pool of contractors swells. This is a highly variable risk based on the degree of authority given to the contractor by the contracting agency; however, without codified boundaries, the discretion is left to each individual contracting officer.

Morale issues associated with CPS proliferation also present a potential disadvantage. The National Commission on Public Service stated, “While we see many virtues in the competition that outsourcing can bring, we also are concerned that when competitive sourcing is perceived as unfair or for the purpose of reducing the government workforce it breeds mistrust and undermines employee morale.”⁵¹ In addition, one source noted that transitioning contractors to do tasks previously performed by government employees can have what Light terms a “toxic poison for morale” when fears of a reduction in force are generated.⁵² This effect can be short term, depending on the strength of the organization’s transition plan and ability to communicate the plan to its employees. In the case of DCC-W, it was necessary to allay concerns by reinforcing that contractors were envisioned as a temporary fix for a short-term staffing deficit.

Juxtaposed against the drawbacks, what are the potential advantages to using contracted procurement services? First, contractors offer the flexibility to innovate without sacrificing manpower. Contracting mechanisms allow for expansion of provided services during surge periods or for addressing unique projects or policy issues. To illustrate, the recent significant reduction in Air Force acquisition regulations places a greater premium on best practices and contracting officer discretion and flexibility. In some cases, it is necessary to detail unit personnel to modify longstanding practices and provide training on the new flexibilities. This situation is ideal for use of a contractor to assist in business practice reengineering.

Contractor use in government contracting expands the number of resources available to apply toward acquisition issues and policies. Contractors hired as policy analysts bring alternative perspectives to the issues of the day. A contractor employee’s corporate chain of command and support structure are available for working issues. When the Government hires contractors, it hires the organizational structure that supports those corporate employees. Boeing employees, for example, will have both vertical and horizontal support from their corporation. Thus, an issue related to policy or procedural changes can be vetted through the day-to-day availability of private contractor personnel. As mentioned above, conflict of interest becomes an obvious concern, and measures

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and procedures would have to be in place to preclude the potential for abuse or access to acquisition sensitive information. However, consideration of contracting issues on a generic basis (for example, changes to the procedures for conducting market research) typically does not involve the potential for providing a competitive advantage to a contractor's company.

The use of contractors allows for increased flexibility to deal with labor-intensive surges in mission requirements during finite periods of time, such as a major source-selection activity. Typically, source selections require a significant concentration of effort on a single contract requirement. This can drain a small contracting organization of resources normally allocated to manage several contracts. In FY02, the contracting squadron at Schriever AFB, Colorado, conducted six source selections totaling more than \$500M. Thirteen contract specialists and officers were devoted to these procurements, depleting the unit's workforce for day-to-day contract management by 17 percent; these contract specialists and contracting officers normally managed three or more contracts each (depending on complexity). Contractors who specialize in the conduct of source selections or in contract management would, in this situation, reduce the manpower drag on the squadron and provide a more effective and stable contract management function.

A Notional Policy

Whether a policy is right or wrong does not come into it, what matters in the end is that which the policy is designed to achieve. Therein lies the only real source of legitimacy as effectiveness.

—Wayne Parsons⁵³

One definition of policy in *Webster's Dictionary* is "the method by which any institution is administered; system of management." Policy establishes boundaries to enable individuals, teams, and organizations to operate. Wayne Parsons states:

The question of when an issue becomes a political or policy problem turns upon the idea of the objective versus the subjective nature of reality. A problem has to be defined, structured, located within certain boundaries, and given a name. How this problem happens proves crucial for the way in which a policy is addressed to a given problem.⁵⁴

The CPS problem is characterized by the need to balance the advantages contractors provide in the way of flexibility, breadth of knowledge, and specialization against the perception of the *fox guarding the hen house* and the real potential for abuse of discretion by untoward contractor or government personnel.

One challenge in formulating a policy and the boundaries associated with contracted procurement services is determining what distinguishes the value of having a government-only contracting function protecting the public interest and supplying and equipping the warfighter. There are numerous ways to frame a value-added description, and this article, with

Policy establishes boundaries to enable individuals, teams, and organizations to operate

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The Air Force essentially has declared the contracting function core to the its mission.

its limited scope, does not present the complete answer. However, one approach is to recognize where government contracting professionals are essential in dealing with complex procurement activity involving senior leader decisionmaking in acquiring critical products and services. The topic of inherently governmental positions surfaces again in this context.

The Air Force has declared, in its annual submittals, that more than 96 percent of its contracting positions are inherently governmental or exempt from use of commercial sources. Confronted with its submission to the DoD Inventory of Commercial and Inherently Governmental Activities, the Air Force must stay consistent with this judgment that virtually all its contracting positions are denied to contractors. The Air Force essentially has declared the contracting function *core* to its mission. This is logical given the importance of the contract management function in light of the growth of contractors in so many other facets of DoD business: civil engineering, information technology, audiovisual, training, base operations, and support. Kelman states that organizations, such as the DoD, that spend a large portion (46 percent) of their budgets on contracted products and services should view contracting management as a core function.⁵⁵ The Army, in laying out its blueprint for the future, stated the following.

The IPT considered the following activities or capabilities as *core* to a contracting office: developing and planning contractual requirements, solicitation of proposals, evaluation of proposals, pricing, contract administration, policy development, and career-field management. The following activities or capabilities were determined to be noncore (in whole or part): administrative office management functions, data tracking and collection, ADPE support, contract closeout, conference planning and support, and training.⁵⁶

The Comptroller General in the capacity as chairman of the Commercial Activities Panel has related inherently governmental functions as core responsibilities and not subject to contracting out.⁵⁷ Accepting the concept of contracting as a core mission responsibility, how might contracting organizations judge whether CPS is appropriate for certain tasks?

Dr Wendell Lawther, in his article “Contracting in the “21st Century: A Partnership Model,” describes the contract administration function in terms of three specific factors:⁵⁸

- Complexity and uncertainty about service delivery
- Knowledge and understanding required to implement the contract administration function effectively
- Contract management prior to contract administration

The author draws distinctions between these factors by applying a low-, mid- and high-complexity descriptor. He presents a number of characteristics related to each of the factors stated above to draw an assessment table for determining levels of complexity aligned against particular contracting scenarios (Table 2).⁵⁹

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Using Table 2, one can assess whether a contracting action fits within certain criteria for determining the complexity of the action. The primary areas that distinguish levels of complexity in the Lawther model are the degree of control the Government places on the contractor in areas such as product development, service delivery, price negotiations, government oversight, and the amount of potential contract change anticipated.

Low	Mid	High
Contractor has maximum discretion to choose delivery means.	RFP describes services and scope of work in more detail.	Public-private partnership should be created, requiring all participants to be considered as equals.
No equipment or personnel restrictions specified.	SOW may specify equipment and restrict personnel.	RFP provides general goals and results, inviting bidders to specify service delivery means.
No description for service delivery means in the bidder response.	Contractor discretion to choose service delivery means is limited.	Competitive negotiations are expected.
CA knowledge about service delivery means can be minimal.	CA will have sufficient understanding of service delivery means.	Long-term negotiations are expected.
CA activities are minimal, using sampling or management-by-exception approach.	CA must check that milestones are met and deliverables are of appropriate quality.	CA staff need to work as a team, involved in all aspects of contract management.
Contract negotiations are minimal.	Performance measures are needed to ensure contract performance.	CA and contractor jointly will choose specific service delivery means, expecting that these may change over the life of the partnership.
No change orders are needed.	Conflict-resolution skills are more necessary.	Education and training of CA is a continual process.
	Need for service may change over life of contract, leading to change orders.	

Table 2. Assessment Criteria for Low-, Medium- and High-Complexity Contract Actions

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A key concern in establishing CPS policy is the potential to tie the hands of contracting officers and unit leaders by being overly prescriptive

If these factors are accepted as true areas that distinguish contracting complexity, then decisions can be made about where different types of contracting actions fit within this continuum. For example, an order placed for commercial off-the-shelf computer hardware, given the criteria stated in Table 2, falls in the low-complexity column. Contrast that scenario with a contract for a multibillion-dollar missile defense system that, when assessed against the complexity criteria, clearly falls in the high category and presents the greatest potential for military failure or monetary loss if not properly managed. This scenario requires contracting personnel throughout the process to be involved in decisions that are “so intimately related to the public interest as to mandate performance by government personnel.”⁶⁰

Lawther’s complexity scenarios provide one method to determine appropriateness of CPS use. A key concern in establishing CPS policy is the potential to tie the hands of contracting officers and unit leaders by being overly prescriptive. Kelman calls this “rules, objectification, and hierarchy” and warns against instilling a system that is rule-bound and rips the potential for creativity from decisionmakers.⁶¹ The methodology described to determine appropriate CPS use provides criteria by which a variety of contracting organizations can apply CPS guidance consistently without having to adhere to an overly narrow policy. Having established a basis for determining complexity and potential risk associated with varying contract programs and projects, senior leaders can set about defining a policy that ties complexity and risk with the concept of contracting as a core to the Air Force mission.

The following is a notional policy statement to apply to such an approach:

Contracted procurement services: the use of private-sector contractors to procure goods and services for the Government or perform other functions in direct support of the contracting function.

Contracted procurement services are limited to the following:

- (a) Contract specialist duties, as defined in FAR 2.1, for purchases determined low complexity according to the criteria provided by the agency head.
- (b) Price analysis wherein a government contract specialist or contracting officer is controlling decisions related to the instant procurement, whether in a competitive or single source procurement. CPS price analysts are prohibited from conducting fact-finding or negotiations with an offeror.
- (c) Policy development unrelated to specific contract actions and procurement analysis as approved by the head of the contracting activity.
- (d) Other support functions within a contracting organization but unrelated to advising, making recommendations, or otherwise facilitating decisions related to specific contract awards and management.

How might a policy such as the one above play out in practice? Using Lawther’s criteria, certain types of services and products require contract management personnel to help determine the means by which a service is delivered or product developed or made (high complexity). To

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illustrate, major weapon systems typically require cost and performance tradeoffs before and after contract award. The analysis leading to these decisions is done in partnership with the prime contractor, but the final decision rests with the Government. The contracting officers, working with their contract specialists and technical advisors, are responsible for reaching conclusions that are prudent in the use of public monies, responsive to the need of the customer, and fair and reasonable to the contractor. This discretionary authority entails a wide berth for judgment and subjective assessment.

Contrast an order against a prepriced contract for carpeting routed through civil engineering with the appropriate specifications and details for the contractor to respond with minimal interaction with government personnel. This is low complexity in that it is characterized by almost complete discretion by the contractor in completing the order. This is not to say complications cannot develop. The contractor could fail to deliver on time, the wrong carpet color or type might be delivered, property might be damaged in the process of installation, and so on. However, the basic award and management process requires little, if any, judgment on the part of the contract specialist in cost, performance, or schedule.

A policy with guidance for assessing the complexity of contract actions provides a basis for the Air Force to ensure its determination of the inherently governmental functions in contracting is borne out by its CPS decisions. Complexity breeds risk. High-complexity actions may be more susceptible to disputes with the contractor or scrutiny by outside agencies. A project that requires significant interaction (or partnering) between government personnel and contractors necessitates clear understanding of the Government's positions on issues related to contract performance. Projects that demand multiple contractors to interact with one another as they represent their customer's interests also demand an honest broker and independent observer to ensure the Government's true interests do not get lost in the mix of corporate debate.

The notional policy proposed using Lawther's model also allows for contracted procurement services in indirect procurement activity; those activities low in complexity and unconnected to discretionary decisionmaking such as administrative tasks, filing, drafting of modifications or documents, generic contracts, procurement analysis, organization policies, contract closeout, invoice processing, or followup. All these could be segmented for use by contractors while still reserving highly complex, high-risk contracting to government personnel who have been trained and certified according to DAWIA mandates. Use of contracted procurement services for executing low-complexity actions could apply in numerous situations and provide vital support to organizations that attempt to balance a high operational tempo with resource constraints. Below are a few possible applications for contracted procurement services in a low-complexity environment.

Starting in the mid-1990s and continuing through FY03, the Air Force steadily has increased its required deployments of contingency contracting

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GPC purchases are inherently noncomplex and empower organizations to perform their own purchasing for low-dollar purchases.

officers. As shown in Figure 2, contingency contracting deployments steadily climbed throughout the 1990s and hit an all-time high with Iraqi Freedom.⁶²

With an increase in steady-state deployments comes a commensurate drain on continental US-based units from which these contracting officers deploy. As a result, organizations that lose military contracting personnel to 180-day deployments lose their corresponding productivity. One potential use of contracted procurement services is to fill the void left by deployed personnel on a temporary basis until contingency contracting personnel return to their home station.

The GPC program throughout DoD has continued to expand, amassing 3 million transactions in FY01 at a value of \$1.4B.⁶³ Recent General Accounting Office reviews have questioned whether there are sufficient people overseeing the GPC program to ensure proper expenditures and unit management for the organizations.⁶⁴ As mentioned above, GPC purchases typically take place within a \$25K threshold with the vast majority under \$2.5K. In addition, GPC purchases are inherently noncomplex and empower organizations to perform their own purchasing for low-dollar purchases. Use of contractors for low-dollar, noncomplex purchasing could free contracting organizations to shift government personnel to oversight of the GPC program, enhancing the ability of Air Force units to meet the myriad of requirements associated with Air Force Instruction 64-117. Additionally, units that find themselves strapped for resources could use contractors as GPC purchasing agents, freeing up government personnel for their core functions.

Contractors devoted to low-complexity purchasing will free personnel to surge when necessary to accomplish source selection activities. Source selection is especially time-intensive and requires considerable expertise to properly manage the intricacies of public law and the rigorous process inherent in fair and equitable competitive acquisition. Contracted procurement services will provide flexibility to the contracting office by standing in the gap created by source selection resource requirements.

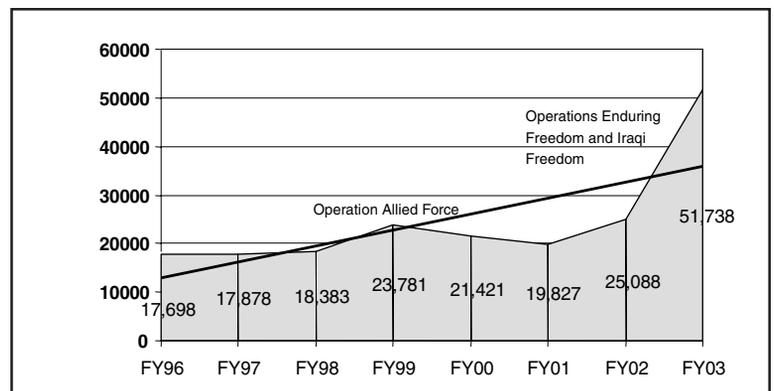


Figure 2. Contingency Contracting Deployment Days

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The contracting function is cyclical. This cycle is initiated with the beginning of each fiscal year and receipt of annual budget dollars and ends with the final obligation of fiscal year funds on 30 September each year. In between, a process of requirements and solicitation development, market advertising, contract award, and performance or item deliveries takes place. The normal cycle is illustrated by the actions executed each year; Figure 3 shows the buildup of actions executed each year at F. E. Warren AFB, Wyoming, and the Air Force Academy with a surge in the final quarter.

From a contract production standpoint, personnel are less active during the first 2 quarters of the fiscal year based on reduced demands placed on contracting by requiring organizations. The numbers bear this out. The Air Force's FY04 first quarter contract actions total 26,839. Assuming a fairly straight-line correlation to FY03, the total actions for FY04 will equate to around 227,000 actions, showing 88 percent of the year's contract actions yet to complete in the remaining three quarters.⁶⁵

Much of the time in the first quarter of each fiscal year is spent executing contract options, reorganizing administratively from the fray of the previous fiscal year end, attending and presenting training, and preparing future requirements and acquisition planning with requiring organizations. A significant number of contracting actions requiring contracting officer involvement are not received until the latter part of spring or summer.

In view of this dynamic, might there be an opportunity to reduce staffing currently associated with commodity and equipment purchasing to allow government personnel to devote more time to complex contracts that require indepth knowledge of contracting strategy and planning? In this scenario, contracting offices could hire contractors on a time and materials basis to take on small dollar purchasing and purchase order issuance in the last half of the fiscal year. This approach requires a new way of thinking about the systemic contracting cycle in an organization and how it is managed. It also requires an alternative view of the standing unit of contracting personnel required for a given contracting organization and whether contractors can be used successfully on a temporary basis to address routine, noncomplex purchasing.

The Deputy Assistant Secretary (Contracting) Executive Summary to its Procurement Transformation Strategy places customer management as one of its key themes and calls attention to the endemic deficit in customer satisfaction. It goes on to point to "the ability to proactively change to meet the customer's changing needs" as a "critical component" to effective customer management.⁶⁶ Additional flexibility in employing contracted procurement services for low-dollar, noncomplex purchasing provides an element of choice to address individual source selection needs proactively at base level or other organizational levels.

The Air Force has, by virtue of how its authorized positions are categorized in the DoD inventory, inferred a virtual CPS prohibition (Figure 3). It is not clear, however, whether that is a corporate position or

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It is incumbent on Air Force senior leadership to ensure the resources allocated for contracts are in the hands of people with the experience, training, education, and loyalties to render the best judgment possible on how those resources are expended.

a compilation of diffused judgments across Air Force contracting organizations based on each unit's interpretation of the guidance for assigning its positions to each inventory category. The notional policy proposed provides a starting point for defining CPS opportunities. It establishes contract complexity as a premise for organizations to use contractors without compromising the integrity of the inventory submittal and the corporate judgment of what is inherently governmental or exempt from competition.

Conclusions and Recommendations

The matter I allude to is the exorbitant price exacted by merchants and vendors of goods for every necessary they dispose of.... I cannot conceive that they, in direct violation of the principle of generosity, of reason and of justice, should be allowed...to avail themselves of the difficulties of the times and to amass fortunes upon the public ruin.

—General George Washington

Washington's letter refers to a key function of the acquisition and contracting field: to protect the integrity of the procurement process for the benefit of the men and women who fight wars and those who provide the funds—the taxpayers. In so doing, it is imperative that those who provide this service are focused singularly on the interests of the Government and, more precisely, the executive branch to whom the obligation falls to enforce our nation's laws. With a budget of more than \$400B, the DoD purchases as much industrial output as the six largest nations' defense budgets (excluding the United States) combined. The Air Force's budget alone exceeds China's and Japan's entire defense budgets. It is incumbent on Air Force senior leadership to ensure the resources allocated for contracts are in the hands of people with the experience, training, education, and loyalties to render the best judgment possible on how those resources are expended.⁶⁷

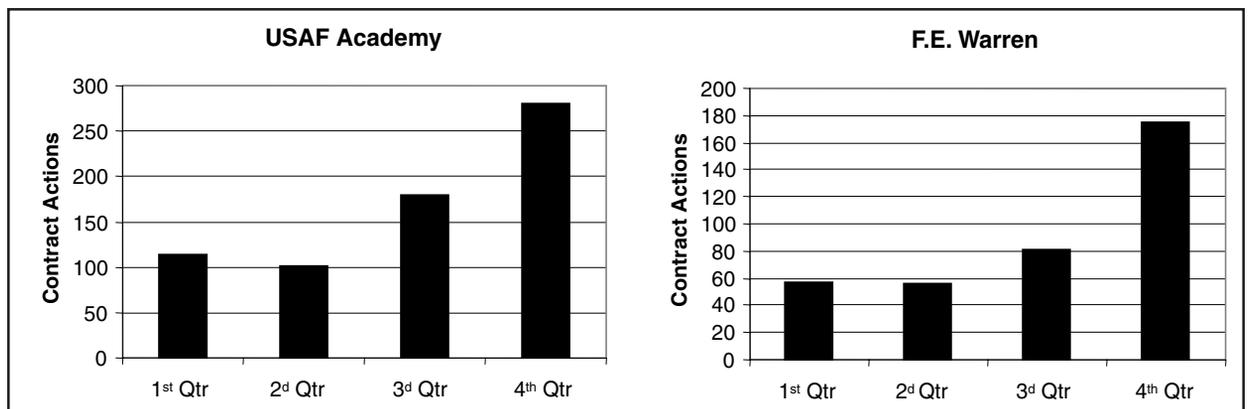


Figure 3. FY03 Quarterly Contracting Actions for the Air Force Academy and F. E. Warren AFB

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The Air Force should take heed of the experiences and lessons learned from other functional areas that have transitioned to contractor operations to avoid mistakes and to look at other alternatives. Expanding CPS use in the Air Force risks several disadvantages that could call into question the integrity of the acquisition process. That said, a deliberate strategy for contractor usage that will stand up to service, OSD, or congressional scrutiny will allow senior leadership to incorporate contractors where it makes sense within the transformational context of future initiatives.

Recent news stories published in the *St Petersburg Times* focused attention on contracting actions at Tyndall AFB, Florida, in which the price of temporary buildings rose threefold, from the original price of \$142.7K to \$509.9K.⁶⁸ Colonel Brian T. Kelly, vice commander of the 6th Air Mobility Wing at MacDill AFB, Florida, is quoted as defending his contracting unit, stating, “This acquisition was accomplished through a valid contract executed by an authorized contracting officer...every line item on their cost proposal was validated by the proper *government* offices, and all changes were negotiated by an authorized contracting officer.” Notwithstanding the veracity of the statements made and the actions taken by the contracting office, how would the story have been treated had it been known that a contractor was involved directly in the negotiated price? The public should expect that actions related to the expenditure of taxpayer dollars are taken by government employees sworn to protect the taxpayers’ interests.

Is it logical to start down a path of expanding use of contractor personnel in a field so closely associated with guardianship of public expenditures and subject to considerable political manipulation? At a time when Congress is resisting the Bush administration’s expansion of competitive sourcing and questioning the wisdom of previous outsourcing ventures, contracting organizations should exercise caution when considering expanding their numbers of contractor persons. In calendar year 2003, Congress asserted itself in submitting legislation to curb the administration’s plans to ease the process for conducting public-private competitions.⁶⁹ In addition, hearings led by the Comptroller General addressed the proliferation of government outsourcing with the following as its charter: “Improve the current sourcing framework and processes so that they reflect a balance among taxpayer interests, government needs, employee rights, and contractor concerns.”⁷⁰ Its recommendations summarize the importance of maintaining government-only professions:

It is clear that government workers need to perform certain warfighting, judicial, enforcement, regulatory, and policy-making functions.... Certain other capabilities, such as adequate acquisition skills to manage costs, quality, and performance and to be smart buyers of products and services, or other competencies, such as those directly linked to national security, also must be retained in-house to help ensure effective mission execution.⁷¹

Is there a healthy balance that can be struck within Air Force contracting organizations for public and private sector performance? It is within this context that several recommendations are made in relation to CPS use in the Air Force.

At a time when Congress is resisting the Bush administration’s expansion of competitive sourcing and questioning the wisdom of previous outsourcing ventures, contracting organizations should exercise caution.

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The Air Force should ensure that its CPS contracts do not contradict what it declares as exempt from competition or inherently governmental on the DoD inventory.

First, to uncover the potential for using contractors on a cyclical basis, to process purchase orders and delivery orders in the last quarter of each year, more research is necessary. For instance, is there a business base for this type of approach? Over the course of this research, numerous vendors were identified that provide procurement services to private industry. One commercial procurement services source, when asked whether its services could be provided on a cyclical basis such as end-of-year purchasing, stated, “Typically, customers would outsource specific sourcing events; that is, they want to purchase a particular item and may seek an expert to run an event for them. I don’t believe this is necessarily seasonal (end of year and so forth) but is probably more event driven.”⁷² The use of contractors for brief periods requires market research to determine if services by commercial sources could adjust their buying to accommodate cyclical government requirements vice steady-state support.

Second, the DAU should provide training on OFPP 92-1 in the early stages of formal contracting training. Training the workforce on the intricacies of the term inherently governmental and the potential latitude and limitations when contracting for positions implicated by the policy will better equip contract specialists and future contracting officers to advise the customer and make judgments on internal contracting of contracting tasks. DAU currently teaches a block that includes information on the term inherently governmental and OFPP 92-1 in CON 353, Advanced Business Solutions for Mission Support. The concept should be taught at more basic levels (that is CON 101 and 202) to familiarize the new contracting professional with its concepts (term definition, application, analysis for making a determination, and so forth); this is especially relevant in an ever-expanding environment of competitive sourcing but is also relevant to the issue of contracted procurement services as contracting offices begin to consider, to a greater extent, how contractors fit into their mission picture.⁷³

Third, the Air Force should ensure that its CPS contracts do not contradict what it declares as exempt from competition or inherently governmental on the DoD inventory. A review should be conducted and annual verification should take place ensuring the Air Force’s contracted procurement services and the inventory do not conflict. A dichotomy between contracted procurement services in relation to the duties of the Air Force’s almost 4,800 Contract Specialist (1102) positions must not develop unwittingly over time.⁷⁴

Fourth, the Air Force should establish policy that addresses the use of contracted procurement services and the conditions under which procurement services may be used, considering what bearing the language at Air Force Federal Acquisition Regulation Supplement 7.5, *Inherently Governmental Functions*, has on this policy. In addition, the Air Force should review the language at FAR 37.203(c)(2) to determine whether there is potential for noncompliance in relation to any current CPS contracts. It should develop a policy, such as the one described, which

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provides parameters for field units to use contracted procurement services appropriately within the context of a service position on contractor use in the procurement field. Rather than applying a policy that attempts to address every potential contracting situation, use of Lawther's complexity and risk-based approach provides a basis upon which contracting organizations can make scenario-based decisions and segregate types of requirements appropriate for contracted procurement services. The policy should assume continued expansion of CPS contractors and its potential consequences in defining Air Force policy parameters.

Fifth, the appropriate staff office should assess the root cause of contracted procurement services thus far in the Air Force. Research shows a singular focus on staffing deficits as the cause for organizations' turning to the private sector for help. Using contracted procurement services to fill manning shortfalls cures a symptom of the problem; namely, civilian hiring and military ops tempo woes. Contracted procurement services do not cure the problem. Future CPS policy should reflect that infusing private contractors to fix resource deficits is a bandaid and poor reasoning for outsourcing. Also, contracted procurement services should not entail tasks considered inherently governmental or commercial but exempt. One approach to controlling and maintaining insight into the CPS proliferation is control of the funding used for such services. For example, the Under Secretary of the Air Force for Acquisitions or the Services' program executive officer could establish itself as the holder of the purse strings for such services, thus ensuring policy discipline and insight into organizational weaknesses that may be causing unit leaders to look for private sector help.

As a part of its investigation for outlining the future of its contracting, the Army investigated the Australian acquisition system. The Australian Government outsourced its contracting function with the unintended consequence of stripping itself of the necessary capability to oversee the progress and quality of its contracted supplies and services. Ultimately, it was forced to reverse its course and reinstall a Federal workforce capability.⁷⁵ The Air Force and DoD should determine an acceptable threshold of contracted procurement services based on sound criteria and analysis of the lessons learned from other outsourcing of Federal activities. The Government has used contractors for various purposes as far back as the Continental Congress' *secret committee of trade* for procuring gunpowder, clothing, and medical supplies from overseas sources.⁷⁶ The processes and methods used to outfit and support the military have continued to evolve as the Government seeks new and smarter ways to meet warfighter needs. Services contracts have always consumed a large part of the Federal budget, but over the last decade, that portion has ballooned, especially in DoD. In a single year (2001-2002), the dollars spent on services in DoD increased 18 percent (\$93B). In addition, the last 5 years have seen the services' budget surpass that spent on equipment and supplies.⁷⁷ A new evolutionary step is being taken as the function of contracting starts down the road of *contracting for contracting* services.

The Air Force and DoD should determine an acceptable threshold of contracted procurement services based on sound criteria and analysis of the lessons learned from other outsourcing of Federal activities.

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The future acquisition transformation should not have to wrestle with unintended negative consequences of an ad hoc transition to contracted procurement services based solely on inefficient hiring practices. Now is the time to ferret out the benefits of contracted procurement services, along with its pitfalls, and structure an approach that provides a clear balance between contractor contributions and a professional Federal workforce.

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Oil Logistics in the Pacific War

God was on the side of the nation that had the oil.

—Professor Wakimura, Tokyo Imperial
University in Postwar Interrogation¹

Japan's devotion to an outdated operational strategy, rather than focusing on what effects were needed to ensure its national strategy was met, proved to be its downfall. The Japanese knew that if they did not find a secure and stable source of oil they eventually would have had to comply with US prewar demands. Once it was realized that diplomatic measures would be ineffective, the Japanese plan was to seize and secure as much oil and other resources as possible. The raid at Pearl Harbor was but a branch to achieve that overall goal.

As effective as Japanese intelligence and initial military actions were, they never were focused on the destruction of the key target that might have let them achieve their goal of keeping the Navy out of the Pacific. The Japanese strategic disregard of the fragile US oil infrastructure in the Pacific was an incredible oversight on their part. The Japanese should have attacked the US oil supply at Pearl Harbor and followed up that raid with attacks on US oilers and tankers in the Pacific. Japanese attacks, in conjunction with German strikes, on the oil supply and infrastructure would have bought the Japanese much valuable time—time that could have been used consolidating gains in its newly won territories, time that might have allowed Japan to build up such a defensive perimeter that the cost of an Allied victory might have been too high.

The Japanese were not the first to ignore the importance and vulnerability of logistics. As long ago as 1187, history shows that logistics played a key part in the Muslim's victory over the Crusaders at the Battle of Hittin. The Muslim commander Saladin captured the only water source on the battlefield and denied its use to the Crusaders. The loss of water severely demoralized and debilitated the Crusaders, contributing to their defeat and eventual expulsion from the Holy Land.²

The vulnerability and importance of logistics remains evident today. The terrorist bombing of the destroyer *USS Cole* occurred while it was in port, fueling, at Aden, Yemen, on 12 October 2000. Had it not required fueling, the *USS Cole* would not have put in at Aden, 17 sailors would not have been killed, and the Navy would not temporarily have lost a valuable maritime asset.³ There is an old saying, "Amateurs talk strategy, and professionals talk logistics." Commanders and their staffs must remember the importance of logistics to achieving the overall goal, for friendly forces, as well as the enemy.

Notes

1. Japanese bombing and naval gunfire came close to putting the US airstrip Henderson Field out of action when critical fuel supplies were destroyed. Another time, the arrival of four tankers was said to have turned the battle, "If they hadn't arrived when they did, we wouldn't have Guadalcanal" said Ghormely.
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Lieutenant Colonel Patrick H. Donovan, USAF

Lieutenant Colonel Michael J. Guidry, USAF
Colonel Guy J. Wills, USAF

The United States may find itself making even greater use of quasimilitary contractors to do a great deal of what looks like military business; for example, flying and maintaining UAVs. The use of contractor UAV pilots raises numerous issues such as predeployment training, combatant status and command authority.

Future UAV Pilots

Are Contractors the Solution?

Introduction

During the first-ever combat deployment of the RQ-4A Global Hawk unmanned aerial vehicle (UAV) in support of Operation Enduring Freedom, 56 contractors deployed as part of an 82-member military, civil service, and contractor team. Several of these contractors were needed to operate the vehicle during combat operations and served as Global Hawk pilots.¹ This was repeated during Operation Iraqi Freedom. Contractor participation in military affairs is not new. Contractors have supported military operations since the Continental Army. This support role has evolved over the years, with contractors now conducting combat-type operations. With the recent push for streamlined acquisition practices and spiral development, contractors will remain the initial cadre and best trained experts for all future UAV systems, systems that may be deployed into the combat arena well before initial operational beddown or trained military operators are available.

A contractor deployment force brings unique capabilities to the combat arena but creates unique situations for the deployment commander. Consequently, deployment commanders





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need to understand their role and responsibilities in preparing contractors for a combat deployment. Once deployed, the deployment commander and contractor need to understand their roles and responsibilities with respect to command authority, rules of engagement, force protection, and the basic care and feeding of the team. More important, the deployment commander needs to understand the numerous legal issues created with respect to the contractor pilots' combatant status, prisoner-of-war (POW) status, and the legal status with respect to host nation's legal system.

If the United States is going to continue using contractor UAV pilots in combat operations, there are three options available to clarify the role, relationship, and responsibility of the deployment commander and contractor workforce. First, the United States can do nothing and assume the risk of using potential unlawful combatants, with possible criminal repercussions against these individuals and those who direct their operations. Second, the United States could implement a sponsored reserve program, which places a portion of the contractor force in a military reserve status. This status allows for the callup of contractors to military active-duty status if their specialized combat support is needed. Finally, the United States can try to alter the treaties and redefine lawful combatants, a process which would be expected to take some time.

Contractors in Combat: Here to Stay

Throughout history, civilians have played an important role in military operations. Over time, their role has transformed from battlefield support to combat operations. As technology becomes more complex and the military continues to downsize, contractors will play a greater role in combat operations, a role that is sure to increase as the Department of Defense (DoD) strives to field weapon systems sooner.

From the Revolutionary War to Gulf War II

In the 18th century, contractors served in many tasks—as carpenters, engineers, and wagon drivers in support of the Continental Army.² Their efforts allowed the soldiers to focus on warfighting-related tasks. The contractors' role has evolved over the years, and their participation in the combat arena has increased. During Operation Desert Storm, 9,200 contractors deployed to support military operations.³ Their roles have increased over the years, to include airborne support operations. During Operation Joint Endeavor over Bosnia, contractor personnel conducted airborne surveillance missions as crewmembers on the Joint Surveillance Target Attack Radar System Aircraft.⁴ By 1996, the civilian-to-military ratio had increased to one out of ten in support of Bosnia operations.⁵ As our active-duty military force downsizes, privatization of military functions increases. From 1989 to 1999, the active-duty force was reduced from 2,174,000 to 1,453,000.⁶ Meanwhile, the military continued to fill its inventory with sophisticated equipment, increasing the military's dependency on civilian specialists or contractors. “Highly technical and complex weaponry is flooding the Armed Forces, requiring contractors

A contractor deployment force brings unique capabilities to the combat arena but creates unique situations for the deployment commander.

Future UAV Pilots: Are Contractors the Answer?

to be hired to train military operators and maintain and operate the systems.”⁷ Consequently, civilian contractors play an important role in current military peacetime and contingency combat operations. Recent operations in support of Operations Enduring Freedom and Iraqi Freedom have utilized contractors in a variety of roles, from logistics support to UAV operations. This dependency or support was not unexpected but fully supported by the DoD. In a letter to all Air Force program executive officers (PEO), the Principle Deputy Assistant Air Force Secretary for Acquisition and Management emphasized the Air Force’s desire for elevated contractor support. This individual wrote:

I will support you (PEOs) in the liberal use of undefinitized contract actions, urgent and compelling justification and authorizations, options for increased quantities, accelerated delivery options, and so forth...to ensure your government-contractor teams are geared up for this war effort.⁸

This commitment was echoed throughout the DoD. According to Secretary of Defense Donald H. Rumsfeld, “During Operation Iraqi Freedom, more than 80 percent of civilians deployed in the theater of operations were contractors.”⁹ Such contractor commitments enabled the first-ever combat deployment of the RQ-4A Global Hawk. Today, the contractor’s role has transitioned from support to conducting actual combat reconnaissance missions as Global Hawk UAV pilots were utilized during combat reconnaissance missions.

The Global Hawk is a high-altitude, long-endurance UAV designed to provide the joint force commander an extended reconnaissance capability through sustained high-altitude surveillance and reconnaissance. It can operate at ranges up to 3,000 nautical miles from its home or deployed base, with loiter capability over the target area exceeding 24 hours at altitudes greater than 60,000 feet. The Global Hawk carries a synthetic aperture radar and electro-optical (EO) and infrared sensors simultaneously which provide broad coverage and continuous spot coverage. The aircraft is designed to operate autonomously but allows man-in-the-loop control at all times from a ground-based mission control element (MCE). This command-and-control facility can be located throughout the world from within the area of operations or the continental United States (CONUS). Global Hawk’s first flight occurred on 28 February 1998 from Edwards AFB, California.¹⁰ In November 2001, in support of Enduring Freedom, 56 Global Hawk team contractors including 5 contractor pilots deployed, in support of Enduring Freedom, alongside a few military counterparts.¹¹

Prior to Enduring Freedom, in March 2001, the Global Hawk program “entered the first phase of formal defense system acquisition program” completing its advanced concept technology demonstration (ACTD).¹² The first developmental test aircraft has yet to be delivered to the Air Force Materiel Command for developmental flight testing, and its initial operational capability (IOC) date was not expected until sometime in 2006.¹³ However, six RQ-4A Global Hawk aircraft have been built. During the ACTD, the Global Hawk demonstrated the ability to conduct high-

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Future UAV Pilots: Are Contractors the Answer?

The trend of deploying nonoperational weapon systems with direct combat contractor support only will increase in the future for multiple reasons.



Figure 1. RQ-4A Global Hawk Over California

altitude, precision reconnaissance during extended flights and conducted deployments to Eglin AFB, Florida, and to a Royal AFB in Adelaide, Australia, from Edwards AFB.¹⁴ Because of these proven, yet limited, capabilities, it was sent to support both Enduring Freedom and Iraqi Freedom. Since these deployments occurred well in advance of its initial operating capability, the majority of pilots were contractors who were needed to conduct the actual combat missions.¹⁵ According to Major General Joseph P. Stein, director of aerospace operations for Air Combat Command, “The Air Force’s RQ-4A Global Hawk UAV generated 55 percent of the targeting data used to destroy time-sensitive targets in Iraq during Gulf War II.”¹⁶ Now contractors were conducting combat missions.

A Greater Role in the Future

This trend of deploying nonoperational weapon systems with direct combat contractor support will only increase in the future for multiple reasons, including Air Force manning practices, accelerated acquisition times, and further UAV concepts of operations (CONOPS) maturity. With respect to Air Force manning, changes are already in the works to produce UAV operators who will be assigned these duties as their first operational flying assignment. Secretary of the Air Force James G. Roche stated, “We recently directed that the Air Force reengineer navigator training to produce airmen equally proficient in employing both manned aircraft and UAVs. They will be known as combat system operators.”¹⁷ Until this training pipeline is functional and producing combat system operators,

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UAV pilots are former manned aircraft pilots or navigators,¹⁸ who then undergo UAV-specific training. Regardless of the source of the UAV, the Air Force system is unable to provide military trained UAV pilots to support unplanned combat deployments that occur during initial testing or concept development. Normally, the Air Force will not begin to man up the first operational unit until after a developmental weapon system is nearing completion of developmental test and evaluation. For example, the 12th Reconnaissance Squadron at Beale AFB, California, was designated the first Global Hawk operational squadron. Although the 12th was activated in October 2001, the first pilots were not programmed to arrive until January 2003. By this time, Global Hawk had flown more than 1,000 combat hours in support of the Global War on Terrorism,¹⁹ and these pilots still had to undergo a 6-month training program before they were combat ready. Consequently, the only UAV pilots available to conduct combat operations were a handful of developmental/operational test pilots and contractor pilots. This time line for manning an operational squadron will remain in place. If the Air Force were to allocate personnel and unit startup funding for every advanced concept demonstration program, well prior to a proven system demonstration of its initial system capabilities, legacy operational units' manning and funding would suffer greatly. The Air Force would waste an undetermined amount of money through this early startup if a demonstration did not go as planned or failed completely.

Another factor that will increase our reliance on UAV contractor pilots is the DoD's push to field new weapon systems quicker. Rumsfeld wants to reduce system acquisition times since "program start to initial operational capability is generally more than 8 years"²⁰ and, too often, stretches to 15 or 20 years for major weapons.²¹ "The need to introduce new weapon systems swiftly is clear," stated Rumsfeld. He added, "The present weapon systems acquisition process...is ill-suited to meet the demand posed by an expansion of unconventional and asymmetrical threats in an era of rapid technological advances and pervasive proliferation."²² Rumsfeld selected evolutionary acquisition or spiral development as the preferred approach to buying future weapon systems or weapons. Practically speaking, spiral development is done to provide rapid development of a project with quicker fielding of the system,²³ knowing there will be a less-than-perfect system in the beginning. This initial system will be able to meet some, but not all, of the user's requirements. Consequently, contractor pilots will play a greater role in combat operations if their particular weapon system demonstrates a unique capability early in the program. Such a possibility exists with the X-45 unmanned combat aerial vehicle (UCAV) demonstration program ongoing at Edwards AFB.

The UCAV program is a joint effort "to demonstrate the technical feasibility, military utility, and operational value of a UCAV system to effectively and affordably prosecute 21st century lethal and nonlethal suppression of enemy air defenses and strike missions within the emerging global command and control architecture."²⁵ Similar in size to an F-117

The Air Force system is unable to provide military trained UAV pilots to support unplanned combat deployments that occur during initial testing or concept development.

Future UAV Pilots: Are Contractors the Answer?

The X-45 is designed for internal carriage and release of two 2,000-pound joint direct attack munitions.

but with the low-profile, flying-wing design of a B-2, the X-45 will operate in the same flight environment as manned fighter aircraft, which currently conduct suppression of enemy air defense missions. The X-45 is designed for internal carriage and release of two 2,000-pound joint direct attack munitions.²⁶ Like the Global Hawk, the UCAV is designed to operate autonomously with a pilot monitoring its activities from a ground-based command and control shelter. If necessary, the pilot can interrupt the autonomous flight and control the vehicle. The X-45 first flew in May 2002. Now the X-45 UCAV program is completing a demonstration to validate its ability to release a precision-guided munition and destroy a ground target representing a surface-to-air missile site or associated command-and-control facilities. “The DoD envisions employing UCAV weapon systems in the post-2010 battle space to augment the manned force structure on high-risk, high-priority missions where mission success and survivability are key.”²⁷ Once the UCAV demonstrates the ability to destroy ground targets and a high-priority, high-risk mission exists, expect the UCAV to be called into action prior to operational fielding, just like Global Hawk. Although two military pilots are undergoing training, contractors are operating these vehicles, and the majority of initial operators are contractor pilots. If tasked to support combat operations, the deployment team, including the pilots, will consist primarily of contractors.

The military’s reliance on UAV contractor pilots will continue to grow based on UAV CONOPS maturity, particularly with respect to UAV reachback operations. Reachback is “a concept that enables wide geographic separation of a UAV and its command-and-control element using satellite communications and a terrestrial wide area network.”²⁸ Basically, reachback allows the military to perform UAV intelligence, surveillance, and reconnaissance collection missions over a remote area of responsibility from halfway around the world. During Iraqi Freedom, the Global Hawk was controlled from the United States while conducting combat reconnaissance missions over Iraq. According to the *Washington Times* and an Air Force source, “‘Global Hawk played an extraordinarily important role in focusing precision airpower,’ an Air Force source said yesterday, estimating that it quickened the Republican Guard’s defeat by several days and is responsible for scores of tank kills.”²⁹ Such precision airpower would not have been possible without UAV contractor pilots. Although some pilots were required to deploy forward, the majority of the UAV pilots were able to remain stateside and conduct combat missions. Reachback, depicted in Figure 3, is favorable to both the military and the contractor. The military is content because of the reduced logistical footprint and minimal predeployment training requirements. The contractor is satisfied since fewer people will be deployed to a combat area, and more contractor pilots may agree to participate. Overall, this concept easily lends itself to a greater role of UAV contractor pilots in combat operations.

Legal Implications

The trend for Air Force to rely more and more on contractor UAV pilots has raised numerous legal issues: combatant status with respect to the Law of Armed Conflict (LOAC), POW status, and the contractors' role with respect to status of force agreements (SOFA). The deployment commander must understand the legal implications of utilizing contractors as UAV

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Figure 2. The X-45 Unmanned Combat Aerial Vehicle²⁴

The trend for the Air Force to rely more and more on contractor UAV pilots has raised numerous legal issues: combatant status with respect to the Law of Armed Conflict, POW status, and the contractors' role with respect to status of force agreements.

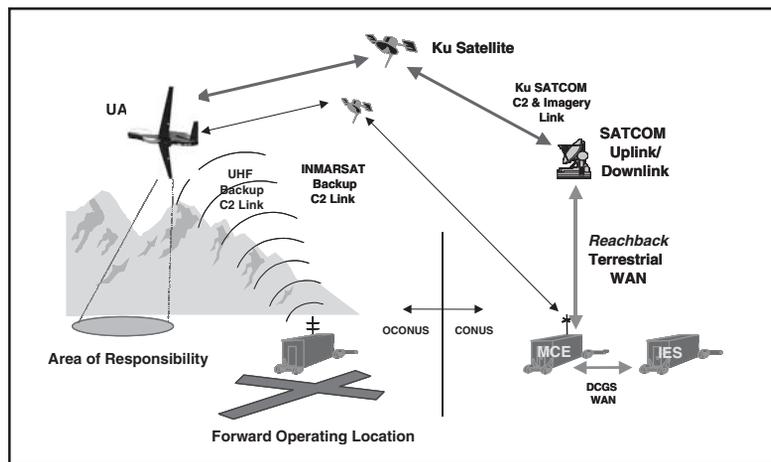


Figure 3. Reachback Command and Control Path³⁰

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An unlawful combatant is an individual who is not authorized by a state that is party to a conflict to take part in hostilities but does so anyway whereas a noncombatant is a person who is not authorized to take an active role or direct part in hostilities and does not.

pilots and the contractors' status with respect to international and host-country laws.

Civilian Vice Contractor

Prior to addressing legal issues raised with respect to using contractors in combat operations, the term contractor must be defined with respect to other civilian designators. Normally, civilians fall into three categories: DoD civilian employees, nonaffiliated civilians, and contractors. DoD employees encompass civilian support personnel, the American United Services Organization, and civilian aircrew members. Nonaffiliated civilians are those civilians who share common interests with the military and include the media, nongovernmental organizations, private voluntary organizations, and intergovernmental organizations. Contractors are those individuals or employees of an organization under contract with the DoD.³¹ This article will focus on contractors. Contractors traditionally are split into three categories: deployed systems contractors, external theater support contractors, and internal theater support contractors. The Air Force General Counsel defines deployed systems contractors as "US companies that provide operational support to military systems (for example, Predator, Global Hawk) wherever those systems may be deployed in the world."³² For this article, UAV contractor pilots will be considered deployed systems contractors even if conducting UAV operations stateside via reachback operations.

International Law and the Contractor

An important aspect of the Law of Armed Conflict is the distinction it creates between combatants and noncombatants. Combatants are "those persons who have the right under international law to participate directly in armed conflict during hostilities."³³ According to Article 43(3) of the Geneva Conventions, "Members of the armed forces of a party to a conflict are combatants; that is to say, they have the right to participate directly in hostilities."³⁴ For clarification, a member of the armed forces or military is someone who meets all the following conditions:

- Be commanded by a person responsible for his subordinates.
- Have a fixed distinctive emblem recognizable at a distance.
- Carry arms openly.
- Conduct operations in accordance with the laws and customs of war.³⁵

Consequently, if an individual takes part in hostilities without being a member of the armed forces (does not meet all of the four previously mentioned criteria), that person is an unlawful combatant, not just a noncombatant. An unlawful combatant is an individual who is not authorized to take part in hostilities but does so anyway whereas a noncombatant is a person who is not authorized to take an active role or direct part in hostilities and does not.³⁶ The key term here is *does not*. If they are noncombatants and take a direct or active role in hostilities, then they are unlawful combatants. Civilians who accompany the force in

deployed military operations are considered noncombatants. According to the Air Force, “Civilian contractor personnel accompanying Air Force forces are not combatants and must not be allowed to act as combatants during Air Force operations.”³⁷

As stated earlier, Global Hawk contractor pilots conducted combat reconnaissance missions during both Enduring Freedom and Iraqi Freedom.³⁸ A determination whether they are lawful combatants, unlawful combatants, or noncombatants requires a review of the LOAC’s definition of combatants stated earlier. First, contractor pilots need to have the right to take part in hostilities, a right only granted to the military. Recall those four rules for identifying a military member. “The requirement for distinctive emblems (most often a uniform) and carrying arms openly exists to distinguish combatants from noncombatants.”³⁹ Plus a defined chain of command is necessary primarily for discipline and to ensure operations are done in accordance with international law. Although they were contractor personnel accompanying the military force, they were not an integral part of the military or a separate military force. Consequently, UAV contractor pilots who conduct reconnaissance missions in Iraqi Freedom and Enduring Freedom could be considered as taking direct part in hostilities in violation of the Laws of Armed Conflict, making them unlawful combatants. As an unlawful combatant, a UAV operator who conducts combat missions (participating in hostilities) could be prosecuted as a criminal.⁴⁰ Of course, some will argue that UAV pilots can still be considered noncombatants since their reconnaissance missions do not impact the enemy forces or the enemy facilities directly. However, the US military takes a firm stance in its definition of direct participation to even include lookouts or guards as direct participants. The Air Force further stated, “Being a member of a weapons crew or... a crewman on a military aircraft in combat” is active participation.⁴¹ Consequently, it is easy to deduce that people who control reconnaissance vehicles over enemy territory are participating in hostilities whether they are in the same area of operations or stateside. By collecting reconnaissance information, they intend to destroy or disrupt the enemy or various enemy capabilities.⁴² Finally, had the UAV been declared operational and beddown at an operational base, contractor pilots would have been replaced with military pilots, indicating the military’s desire to conduct combat operations with lawful combatants only. These are just a few reasons to implicate contractor UAV pilots who are conducting combat mission as unlawful combatants.

POW Status

Equally important is determining what protection would be offered contractors if they are taken as prisoners of war. Article 4 of the Third Geneva Conventions describes how members of an armed force, as well as persons who accompany the armed forces without actually being members thereof, are entitled to POW status.⁴³ Army Field Manual 100-10-2 states “If captured, a contractor’s status will depend upon the type of conflict, applicability of any relevant international agreements, and the nature of

UAV contractor pilots who conduct reconnaissance missions in Iraqi Freedom and Enduring Freedom could be considered as taking direct part in hostilities in violation of the Laws of Armed Conflict.

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Deployment commanders should seek the same protection or legal status for their contractor workforce that is afforded military personnel.

the hostile force.”⁴⁴ Normally, a contractor would be considered a noncombatant, and all noncombatants are protected persons and are afforded some level of enhanced protection under the Law of Armed Conflict.⁴⁵ As determined in the preceding paragraph, the UAV contractor pilots could be considered unlawful combatants. Although they may retain POW status, they could be tried for war crimes.⁴⁶ According to the US Supreme Court, “Lawful combatants are subject to capture and detention as prisoners of war by opposing military forces. Unlawful combatants are likewise subject to capture and detention, but in addition, they are subject to trial and punishment by military tribunals for acts which render their belligerency unlawful.”⁴⁷

Status of Force Agreements

Combatant status and POW treatment deal primarily with international law. The deployment commander must understand the relationship contractors will have with the host nation’s laws and legal system. One of the greatest challenges facing the deployment commander of contractor personnel is determining the contractor pilot’s status while in the deployed country with respect to legal agreements or SOFAs. Deployment commanders need to work this issue with the staff judge advocate’s office as soon as they are notified of an upcoming deployment that utilizes contractor personnel. A SOFA is defined as “Any type of binding international agreement that seeks to order and arrange the competing legal and jurisdictional claims of receiving and sending states.”⁴⁸ These SOFAs are necessary since they are legally binding, international agreements that create a legal status that, absent the agreement, would not otherwise exist. Currently, only 5 of 109 SOFAs contain language that addresses contractors who support military operations.⁴⁹ Deployment commanders should seek the same protection or legal status for their contractor workforce that is afforded military personnel. The State Department is responsible for this SOFA; therefore, they should be contacted for assistance. Without a SOFA, the contractor is basically a tourist in the deployed or host country and subject to all the host nation’s laws.

Conducting Contractor Operations

Preparing a military or contractor team for deployment of an established weapon system is not an unusual experience. Preparing for a combat deployment with a weapon system, which has not even reached its first operational base, is a whole different story.⁵⁰ Such a system still may be in concept development with unique support equipment, undocumented procedures, and a workforce primarily made up of contractors. “Employing a developmental aircraft without combat crew training, validated and verified technical data, and operations guidance is not routine and may create concern among crews accustomed to robust training and compliance with Air Force and major command instructions and policies.”⁵¹ Military deployment commanders need to understand their

roles and responsibilities in preparing the entire team, including contractors, for a combat deployment, and in carrying out the mission while deployed.

Team Preparation

Once a decision has been made to deploy an unfielded UAV system, the contractor pilots need to be treated just like military pilots in preparation for a deployment. According to Joint Publication (JP) 1-0, “DoD civilians and contractor employees deployed for military operations will be provided the same support and services provided their military counterpart.”⁵² Commanders will provide the necessary resources to support, train, clothe, equip, and sustain the civilian workforce in the operational area. Contractors need to undergo various forms of training, receive intelligence and legal briefings, be issued equipment, and ensure they are medically fit to deploy. The military will provide nuclear, biological, and chemical defense training, basic first aid and firearm safety to the contractor.⁵³ Weapons certification may or may not be accomplished for the contractors, as contractors will be issued firearms for self-protection only. According to JP 1-0, commanders, with approval from combatant commanders, may issue contractor personnel firearms when unusual circumstances exist and the contractor has received the necessary training.⁵⁴ Since training may not be available once deployed, the local commander may want to conduct weapon certification. The judge advocate or legal office needs to explain Geneva Convention provisions, the Uniform Code of Military Justice (UCMJ), and the Code of Conduct.⁵⁵ Normally, base readiness or mobility personnel will conduct this training. However, the base readiness section may not be able to support such an unexpected training requirement. With a stable, fielded weapon system, the mobility or readiness officer already has identified those military or DoD civilians who will deploy and assigned them to various mobility positions. Within this system, the mobility officer is able to track completed training, forecast training requirements, and meet the training demand with an adequate number of instructors and trainers and class dates. The same logic applies to equipment. With an established system and deployment personnel previously identified, equipment will be stockpiled on base or at a known location. The deployment commander may need to borrow equipment from other bases and create a unique training schedule to train and equip the deployment force. When a contractor force on a concept development or pre-operational weapon system requires deployment training and equipment issue, the deployment commander needs to remain flexible and become creative in scheduling training and acquiring the necessary deployment equipment.

The base medical support agencies will conduct medical and dental examinations; psychological evaluations to ensure fitness of duty and HIV testing are optional.⁵⁶ These examinations can overwhelm the base medical support team, depending on the time line and size of the deployment team, just like the base readiness employees. Information produced from the

Contractors need to undergo various forms of training, receive intelligence and legal briefings, be issued equipment, and ensure they are medically fit to deploy.

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Contractors who accompany the force are not authorized to wear military uniforms, except for specific items required for safety or security, such as chemical defense equipment, cold weather equipment, or mission-specific safety equipment.

medical exam is critical in determining the overall wellness of contractors and their deployability status. A traditional military member's health status is well-documented whereas a contractor's overall health condition is an unknown. Certain inoculations could do more harm to the contractor than good. It is imperative that contractors undergo physical fitness and medical exams once they are notified of a possible deployment. The Air Force medical team also will inoculate contractors with the necessary immunizations for the specific country they will deploy to. Depending on the demand, this requirement can overwhelm a base's supply system. Anthrax and smallpox vaccinations are mandatory.⁵⁷ Refusal of certain inoculations may result in a nondeployable status. The requirement for these numerous inoculations makes the fitness exam a definite requirement. The deployment commander needs to be prepared to insert other contractors into the deployment team as existing team members are classified nondeployable. Once again, flexibility and resourcefulness are key.

Just like military personnel, contractors will require official identification cards that will serve to record their Geneva Convention status. Contractor pilots will be issued a DoD Form 489, Geneva Conventions Identity Card, or common access card, which contains similar information, along with personal identification tags (dog tags). These tags will contain full name, social security number, blood type, and religious preference. Contractors are required to wear these identification tags at all times when deployed, just like their military counterparts.⁵⁸ Although identification tags are mandatory, contractor uniforms are optional. The contractor must not wear a uniform except for unique circumstances. If uniforms are worn, commanders are to ensure contractor uniforms are clearly distinguishable from military uniforms.⁵⁹ "Contractors who accompany the force are not authorized to wear military uniforms, except for specific items required for safety or security, such as chemical defense equipment, cold weather equipment, or mission-specific safety equipment."⁶⁰ Uniforms are used to distinguish combatants from noncombatants or enemy combatants.

The military will provide legal assistance for deploying military personnel to produce a last will and testament, power of attorney, or other necessary legal documents (when a lengthy absence is expected). "Contractor personnel generally will not be eligible to receive legal assistance from military or US government civilian attorneys."⁶¹ However, such legal assistance may be made available for combat deployments if it is included in the contract that covers the deployment. Regardless, the deployment commander needs to ensure deploying contractors have their legal needs in order. Still, there are outstanding issues, which are not easily addressed, such as life insurance. Since the "military environment is inherently dangerous and may result in death or personal injury"⁶² to the contractor or damage to the contractor's property, life-insurance companies are reluctant to provide insurance for individuals in a combat zone. Once in combat conditions, the contractor's life-insurance policies

may be voided or the premium driven sky high. According to Mike Klein, president of MMG Agency, Inc, a New York insurance firm, “Insurance rates for civilians skyrocketed—from 300 percent to 400 percent more than normal.”⁶³ There is the possibility a deployed contractor may be entitled to compensation from the Government or from the contractor’s company insurance policy. This is a complex topic and requires a review of the Longshore and Harbor Workers Compensation Act,⁶⁴ Defense Base Act, and War Hazards Compensation Act.⁶⁵

Deployment Practices and Procedures

Once deployed, deployment commanders need to fully understand their role and responsibilities with respect to force protection, the basic care of their mixed military contractor team, command authority, discipline, and rules of engagement. The terms of the governing contract will dictate how deployment commanders handle numerous situations. The deployment commander’s primary concern is the safety of the team. Depending on the situation, force protection of contractors is the responsibility of the contractor, the chief of missions⁶⁶ to the country deployed, or the deployment commander. Issues related to force protection off base might require discussions with host-nation officials and contracting officers. These issues may be addressed in the SOFAs. During some contractor deployments, contractors have resided in off-base quarters that do not offer protection and create significant force-protection concerns.⁶⁷

Deployment commanders must take care of their team in country with respect to basic necessities.

Generally, the terms of contracts that contemplate performance in deployed locations will dictate that living conditions, privileges, and limitations of contractor personnel should be equivalent to those of the units supported unless the contract with the Government specifically mandates or prohibits certain living conditions.⁶⁸

The military may provide for basic necessities such as lodging, food, and transportation in country, but these issues need to be identified in the contract.⁶⁹ Medical care for contractors may be made available during contingency operations,⁷⁰ but again, the specifics, including level of care, must be covered in the contract.

The greatest challenge to deployment commanders is in understanding their command authority with a contractor workforce. According to Air Force Pamphlet (AFP) 10-231, civilians may be subject to military law when serving with or accompanying an armed force *in time of war*. However, the US Supreme Court has ruled *in time of war* to mean a congressionally declared war and not contingency operations.⁷¹ If war is declared, civilians will be subject to the UCMJ. This allows the military commander, who is responsible for those activities in which contractors are participating, to discipline the contractors when necessary. The last time Congress declared war was in 1941 as America entered World War II. Since then, the United States has been involved in military operations other than war or contingency operations without an official declaration of war. Without this war declaration, military commanders have no command

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“Untrained civilians can walk off the job any time they want, and the only thing the military can do is sue them later on.”

authority over contractor personnel. A contractor cannot be ordered to do anything, including the services defined in a contract. “The warfighter’s link to the contractor is through the contracting officer or the contracting officer’s representative.”⁷² “Control of civilian contractor personnel is tied to the terms and conditions of the government contract; therefore, key performance requirements should be reflected in the contract.”⁷³ Consequently, the deployed commander needs to understand fully the contractual relationships as outlined in the contract. The wording in this contract impacts a variety of areas including basic needs, medical assistance, and security arrangements. The contracting official needs to fully document command authority and disciplinary actions and procedures in the contract, which guide deployed contractor actions.

“This lack of command authority over civilian contractors presents a burden on commanders who are accustomed to having their orders carried out.”⁷⁴ The contract may not cover all contingencies. Consequently, contractor actions may be detrimental to the operation, but commanders may have no recourse for discipline as they would with a military member. During Iraqi Freedom, “US troops suffered through months of unnecessarily poor living conditions because some civilian contractors hired by the Army logistics support failed to show up.”⁷⁵ According to Peter W. Singer, author of *Corporate Warriors*, “Untrained civilians can walk off the job any time they want, and the only thing the military can do is sue them later on.”⁷⁶ The contract does not provide penal authority for military commanders to enforce orders to civilian personnel.⁷⁷ Although deployment commanders may not have UCMJ authority over their contractor workforce, they may have *hire and fire* authority, if stipulated in the contract. If the commanders are not satisfied with the performance of a particular contractor, they can have that person removed from the deployment team. The loss of a job and related source of income may be a significant motivator for the contractor to conform to the rules and regulations or demands of the commander.⁷⁸

A major area of concern for the commander when dealing with aircraft operations is adherence to rules of engagement (ROE). All military aviators have received ROE training since their initial operational assignment. Contractor pilots need to be educated on rules of engagement and need to comply with these rules. ROE are defined as “Directives issued by competent military authorities that delineate the circumstances and limitations under which US forces will initiate or continue combat engagement with other forces encountered.”⁷⁹ Rules of engagement ensure that national policies and objectives are reflected in the action of the commanders in the field. Since the deployment commander will rarely, if ever, have UCMJ authority over contractors, specific criteria need to be identified in the contract to ensure contractors comply with the rules of engagement and what actions the commander can take if ROE violations occur. Similar contract clauses need to be developed that discuss LOAC violations and failure to perform. Contract clauses should focus on motivating actions to succeed versus punishment if failure occurs.

Solutions

Contractors not only provide a vital service but also may be the only individuals trained to operate a particular weapon system. Consequently, they may play an important role in combat operations. However, their use creates unique challenges for the deployment commander, including deployment preparation, command authority, and combatant status. There are several methods to deal with the issues raised by the use of contractors in combat operations, which would assist deployment commanders in conducting their mission. Three methods or solutions will be discussed: do nothing and accept the risks of current practices, use a sponsored reserve, or seek to change Hague and Geneva conventions by creating a combatant contractor legal category.

Do Nothing and Hope for the Best

The first solution is to keep the current practice and accept the risks associated with UAV contractor pilots who conduct combat operations. This may seem a reasonable choice, particularly if military commanders always rely on reachback operations in conducting UAV operations. Reachback operations give the contractor the protection of stateside basing and security. Although some pilots will need to deploy to the launch and recovery base, these pilots will control the vehicle only in friendly or neutral territory before handing off control of the vehicle to CONUS-based pilots. Therefore, their status could be considered noncombatants. Of course, this solution would work as long as the United States continues to win these small-scale contingencies and contractor pilots' risk of being captured remains low.

Sponsored Reserve Solution

Similar to changing the rules is to use what the Air Force Directorate of Strategic Planning has termed sponsored reserve. The Air Force defines sponsored reserve as "a contract or agreement between the military and a providing contractor or government agency, which includes a provision that a specified portion of the provider's workforce will be members of a military reserve component (Guard or Reserve) as a condition of employment."⁸⁰ The development of a sponsored reserve involves a variety of issues, ranging from legal to fiscal.⁸¹ Simply stated, members of the contractor's workforce would be designated as part of the DoD's inactive reserve force. These contractors turned reservist would be recalled when needed for contingency operations in accordance with established regulations. Prior to their recall, the selected contractors would be trained per standard mobility requirements. This policy would be in effect until the Air Force establishes the initial operating capability for the weapon system. A similar policy is already in affect in the United Kingdom. The United Kingdom Sponsored Reserve Act requires each defense contractor "to have a specified number of its employees participate as military reservists."⁸²

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The Air Force and DoD need to change their current procedures, which rely on contractors to conduct combat or combat support missions.

Rule Change: A Lengthy Process

A long-term solution—the opposite of doing nothing—is to change the rules that govern the Law of Armed Conflict and those that determine combatant status. The Law of Armed Conflict results from “Hague Law (named for treaty negotiations held over the years at The Hague, Netherlands) and Geneva Law (named for treaty negotiations held over the years at Geneva, Switzerland).”⁸³ The Hague Conventions were drafted in 1899 and 1907, and the latest Geneva Conventions were drafted in 1949. One alternative may be to create a combatant contractor legal category. Such changes need to address command relationships and disciplinary authority. More important, worldwide approval would be necessary, and such an agreement may take years.

Recommendation

These are three solutions available in order to utilize contractors as UAV combat pilots. The Air Force and DoD need to change their current procedures, which rely on contractors to conduct combat or combat support missions. The *do nothing* and rule change options are not appropriate. The best overall solution is not to use contractors in combat as combatants. Reality, however, requires contractors so the sponsored reserve option needs to be implemented.

Doing nothing is an unacceptable option. As stated earlier, UAV contractor pilots who conduct combat operations could be considered unlawful combatants. Although they will retain POW status if captured, they could be tried for war crimes or other criminal acts. With the recent establishment of the International Criminal Court, these contractors could be persecuted anytime they leave the safe confines of the US protective borders. “Thus, the person sought by the International Criminal Court would be restricted in his or her travels overseas.”⁸⁴ Contractor UAV pilots who conduct combat operations would be unable to travel internationally without fear of criminal prosecution. Furthermore, chief executive officers of the company employing these contractors may not want their employees labeled war criminals and do not want to soil the company’s public image.

The do-nothing option is inappropriate for the contractors, and failure to follow the rules would affect the deployment commander. The Constitution describes—in Article VI, clause 2—how ratified treaties become the law of the land.⁸⁵ “The United States is committed to following the Law of Armed Conflict,⁸⁶ as are its military commanders and citizens. Furthermore, military commanders have taken an oath in which they have agreed to support and defend the Constitution of the United States. By allowing contractors to conduct combat operations, military commanders are violating this oath, the Law of Armed Conflict, and other treaties that the United States has agreed to abide by. These commanders may be punished within the context of the UCMJ. These same commanders might be tried for lack of command responsibility for directing these contractors to conduct combat operations. This failure to obey the laws of armed conflict could also jeopardize the US leadership position on the world

stage, especially if the United States intended to criticize other countries' wartime procedures or any LOAC violations.

The extreme of taking the do-nothing approach is trying to change established military traditions, customs, and laws. These laws, as stated in the Hague and Geneva conventions have, "developed over the centuries through the customs of States"⁸⁷ and have withstood the test of time. These rules originally were created to distinguish military personnel from civilians and are just as applicable today as they were in previous wars. Although recent terrorist activities have made conducting military operations difficult, the moral and legal obligations of distinguishing between military members and civilians are still important.

The best solution is to develop and then implement the sponsored reserve plan. A sponsored reserve would alleviate all the problems identified earlier, ranging from deployment spinup to compliance with the Law of Armed Conflict. Military commanders would have the option to select those individuals in the contractor workforce that they want to train for sponsored reserve duty and assign those individuals to the appropriate mobility positions. By identifying these individuals early in the program, the unit deployment manager could prepare training schedules and stockpile equipment, eliminating all the unknowns that existed with preparing a majority contractor force with minimal notice. "Contractual agreements regarding military training requirements, military performance standards, and mobilization requirements must be explicit to allow the contractor the tools needed for planning and scheduling."⁸⁸ If the weapon system the contractors were developing were needed in combat, the sponsored reserve personnel would be recalled as reservists. Since these reservists are part of the military, the deployment commander would have UCMJ authority. All players need to fall under the purview of the UCMJ, where all individuals can be treated fairly and equally.

The DoD would use only those contractors who are willing to participate in this policy. The contractors would be reluctant to turn down potential large government weapon system contracts just because of this policy. Of course, the military would need to find ways to compensate the contractors if they are contractually obligated to support combat operations. It is very unlikely that a well-paid contractor would be willing to take a significant pay cut to conduct combat operations. The majority of these contractors may have served 20-plus years in the military already with numerous deployments. Although the contractors who supported the Global Hawk deployments were all volunteers, they were paid in excess of their military counterparts.

The implementation of a sponsored reserve would benefit the Air Force since it would guarantee combat support of a weapon system well before the system is operational or properly manned by the Air Force. A combat deployment should benefit the contractor through the successful demonstration of its product; failure easily could be blamed on system immaturity. Most important, as military members, UAV pilots no longer would be considered unlawful combatants, and deployment commanders

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The Air Force and DoD need to develop better guidelines for properly integrating contractors into combat operations or utilize a sponsored reserved program if it intends to continue using contractors.

would be able to focus on conducting effective combat operations, not legal ramifications.

Conclusions

According to Eliot Cohen, Professor of Strategic Studies at Johns Hopkins University's Nitze School of Advanced International Studies, "The United States may find itself making even greater use of quasimilitary contractors to do a great deal of what looks like military business; for example, flying and maintaining UAVs."⁸⁹ The use of contractor UAV pilots raises numerous issues such as predeployment training, combatant status, and command authority. Until the Air Force and the DoD fully address these issues or stop using contractors as UAV combat pilots, the combatant commander needs to understand current regulatory guidance and how it applies to contractors who conduct UAV combat operations and impacts on mission accomplishments. These issues will multiply with the weaponization of UAVs and contractor operators or pilots who conduct weapon deliveries.

Because of the limitations on contractors who conduct combat operations, the Air Force and DoD need to develop better guidelines for properly integrating contractors into combat operations or utilize a sponsored reserved program if it intends to continue using contractors. This method would remove contractors from under the distasteful banner of unlawful combatant, demonstrate the US desire to comply with international laws, and provide the deployment commander with a more functional fighting force. This option would best serve the needs of the US military establishment and contractor force.

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Success will be measured by how well financial managers apply resources to execute the vision and mission across the full spectrum of operations. With this focus and leadership skills that emphasize people, performance, and results, financial managers can become proactive force multipliers for all Air Force operations.

Financial Managers

Becoming Strategic Force Multipliers

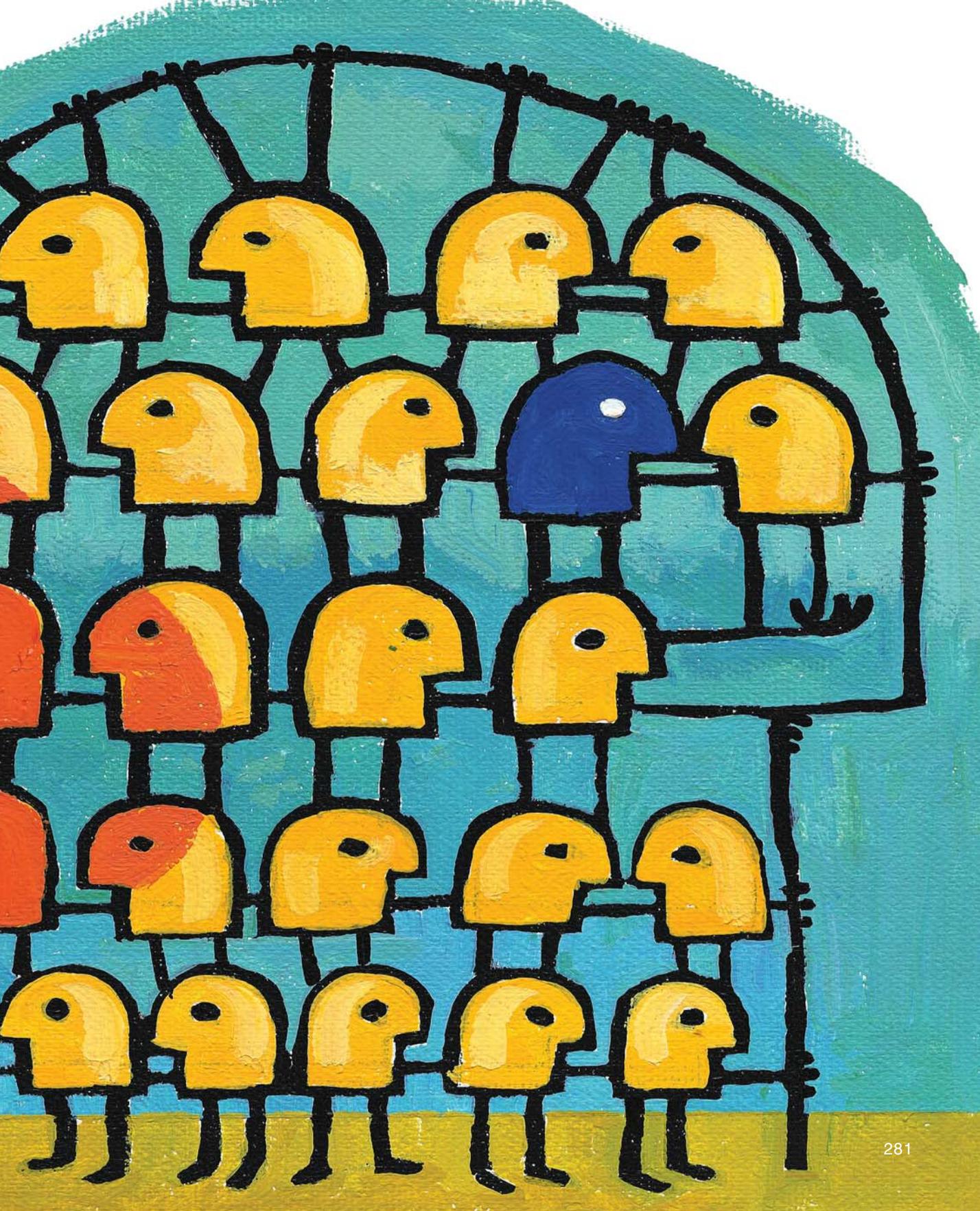
Introduction

Financial Managers...strategic partners recognized as the ultimate source for financial and management information; a world-class team providing high-quality, customer-focused decision support and financial services.

—Michael Montelongo, Assistant Secretary of the Air Force
(Financial Management and Comptroller)

The Secretary of the Air Force for Financial Management and Comptroller (SAF/FM) defines the role of financial managers and states sound financial management is at the core of Air Force transformation and needed for all successful organizations. Financial managers can become *force multipliers* by providing accurate and reliable decision support and financial services for all wing organizations. In today's environment where requirements exceed





Financial Managers: Becoming Strategic Force Multipliers

Comptrollers must earn a seat at the strategic table by establishing credibility at the tactical and operational levels.

resources and funds decentralization has empowered wing commanders to make tough resource allocation decisions, comptrollers must develop the strategic leadership skills necessary to see through the eyes of the commander. With group and squadron commanders working in functional stovepipes, comptrollers must be able to see across the full spectrum of operations to balance resources against the wing's requirements. To meet the needs of the wing, comptrollers need to establish strategic partnerships with the wing commander and senior staff in a team effort to leverage available resources to maximize operations.

To establish a strategic partnership with the wing commander and senior staff, comptrollers must earn a seat at the strategic table by establishing credibility at the tactical and operational levels. Comptrollers can accomplish this by building high-powered teams focused on providing first-class customer service and support to the wing populace and commanders. To be successful, one must understand the objectives outlined in the SAF/FM vision and strategic plan, as well as the leadership skills needed to operate in a senior leadership position. Understanding the strategic vision and leadership skills necessary to succeed will help comptrollers focus on matching resources and services to the wing's highest capability requirements. While providing expert advice to the wing commander is critical to becoming a force multiplier to the commander, it will require the entire efforts of the comptroller squadron to ensure effective execution. Therefore, building a strong tactical foundation—based on people, performance, and results—is critical to meeting the operational requirements of the wing.

Comptrollers must be able to balance resources and requirements across all functional areas, ensuring each organization has enough resources to be successful. The partnerships established with other commanders and their organizations help determine funding priorities and services. Executing the strategic leadership skills to operate in this environment will help wing comptrollers develop the eyes of the commander and transform financial managers into force multipliers for all wing operations.

Why is this important? Over the last decade, the US military has gone through many changes. The end of the Cold War brought about a peace dividend in the form of reduced budgets and manpower. Although the 1997 Quadrennial Defense Review (QDR) focused on winning two simultaneous regional conflicts such as Iraq and North Korea, a force that had drawn down 40 percent was asked to perform 45 contingency operations from 1990 to 1997 compared to 16 during the entire Cold War period.¹ The increased operations tempo placed great stress on the people, equipment, and infrastructure. Although the top-line Air Force budget has increased in recent years, the events of 11 September have increased demands to fight the War on Terrorism and meet a wide range of worldwide threats.² The competition for national resources will require strategic leaders to match limited defense funding against the right capabilities at the right time.

Because of the terrorist attacks of 11 September 2001, the US military faces an environment of rapid change requiring capabilities for a wide

range of missions. It is important that the military transform to maintain its superiority of air and space capabilities. Air Force Transformation Flight Plan—Fiscal Year (FY) 2003-2007 seeks to determine future requirements for the Air Force while fighting the War on Terrorism and adapting to the numerous worldwide threats. To match resources to the real-world threat scenarios, transformation is mandatory, and efforts are underway to transform the planning, programming, budgeting, requirements, and acquisition processes.³

In the 2003 QDR Report, the Secretary of Defense stated we must transform our military from a threat-based strategy to one that focuses on capabilities.⁴ We must leverage our limited resources and manpower to meet the demands of the increased operations tempo. Transformation Flight Plan-FY03-07 states, “America’s airmen often are sent in harm’s way to provide national security and international stability. We owe it to our airmen to provide them with the best resources and tools available to accomplish their vital mission—we want to win the next conflict with a score of 100-0.”⁵ According to the Secretary of the Air Force, “Superb financial management is the lifeblood of a dynamic world-class enterprise.”⁶ “Without resources, a vision is just an illusion,” states former wing commander and current Deputy Assistant Secretary of the Air Force (Budget).⁷ The message is simple—the importance of matching limited resources against our nation’s highest defense priorities is now more important than ever, and financial managers will play a key role as force multipliers.

The Vision, Strategic Plan, and Force Development

*If strategic planning is the brain of any successful organization,
and a talented workforce the heart, then superb financial
management is the lifeblood of a dynamic world-class enterprise.*

—Dr James Roche,
Secretary of the Air Force⁸

The Vision

To become strategic partners and force multipliers, all financial managers and comptrollers should become familiar with the SAF/FM vision statement and strategic plan. It offers a challenge and focus for success—“comptrollers need to become strategists—business partners, top advisors—to commanders with the purpose of meeting wing and warfighter needs.” In today’s changing strategic environment, senior leadership across the Department of Defense (DoD) highlights the need to leverage limited resources and manpower to meet the demands of increased operations against a wide range of threats. The services provided by the comptroller and staff help leadership make the right strategic choices while making existing operations more effective and efficient. Therefore, it is critical that wing comptrollers move beyond transaction or process-based operations and focus on the financial

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Success is measured by accuracy, timeliness of financial information, and quality of service.

services and analysis that match available resources against the right requirement at the right time.

According to the vision statement, success is measured by accuracy, timeliness of financial information, and quality of service. Armed with accurate and timely information and sound advice from a well-trained professional team of financial managers, comptrollers can focus on providing the commander and senior staff with advice on the most effective use of resources. The vision statement challenges comptrollers to revector their role toward decision support with greater involvement in developing strategy. It requires going beyond normal transaction-based accounting and standard budget execution data. Comptrollers should move from reaction-based leadership to a proactive solution-based mindset by anticipating requirements and developing winning financial strategies for the wing. As stated in the vision statement, “We must be bold. We must be the people who tell leadership ‘how we can’ not ‘why we can’t.’”⁹

The Strategic Plan

The SAF/FM strategic plan states financial management is a critical enabler for all Air Force operations. It outlines the Air Force financial management actions that will help shape the future of the world’s best air force by leveraging the budget, cost estimating, and financial operations capabilities. Its goal is to provide “greater clarity about key priorities so that we are all on the same page.”¹⁰ The SAF/FM vision statement provides the focus for shifting the emphasis in the roles of comptrollers from transactions toward decision support:

Strategic partners recognized as the ultimate source for financial and management information; a world-class team providing high-quality, customer-focused decision support and financial services.¹¹

Five strategic goals help bring the SAF/FM vision into focus. They are:¹²

- Become a partner in strategic Air Force decisions.
- Recruit, prepare, and retain a well-trained and highly educated professional team for today and tomorrow.
- Make processes efficient and effective to produce accurate and relevant financial information, complemented by sophisticated decision support.
- Reduce our cost structure by employing leading-edge technologies that continuously streamline financial management processes and increase capabilities.
- Provide our customers with world-class service.

The three strategic themes below, merged with the five strategic goals above, provide the framework and mindset to develop the culture of a successful comptroller organization. It will require strong leadership to make the vision a reality, but the payoff is significant and required to help maximize wing mission capabilities (Table 1).¹³

Strategic Goals	Strategic Themes		
	Warfighter Support	Strategic Resourcing and Cost Management	Information Reliability and Integration
1. Strategic partner		X	X
2. Well-trained, highly educated professional team	X	X	X
3. Efficient processes, accurate financial information, sophisticated decision support	X	X	X
4. Reduce costs			
5. World-class service	X		X

Table 1. Relationship Between Strategic Goals and Strategic Themes¹⁴

- **Warfighter Support.** Financial management will be an expeditionary-focused workforce, ready to deploy, support those deployed, and maintain effective home-station operations. This means providing the most cost-effective financial services to airmen around the world. The FM community, as a strategic partner to the warfighter, will provide timely and accurate services to support commanders and other senior leaders.
- **Strategic Resourcing and Cost Management.** Financial management will maximize resource effectiveness and cost efficiencies by linking systems, activities, and resourcing strategies to outputs and performance. The work under this theme includes linking the programming and budgeting process to performance and capabilities (to create a performance management structure) and identifying and pursuing innovative resourcing strategies. These efforts benefit the warfighter by providing the optimal mix of resources for Air Force operations, financial management operations, service delivery, and cost management.
- **Information Reliability and Integration.** Work undertaken here will produce relevant, accurate, and timely financial information that is integrated seamlessly into the financial environment so that all the information needed to perform business analysis is readily available. This theme addresses the information needs of our commanders and senior leadership and satisfies the regulatory requirements of sound financial management at all levels within the Air Force.

The FM community, as a strategic partner to the warfighter, will provide timely and accurate services to support commanders and other senior leaders.

As strategic leaders, comptrollers must be able to lead and motivate their team to achieve these objectives. It is the strength and execution of

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To become a strategic partner and see through the eyes of the commander, the competencies for leading the institution must be understood and developed early.

the team that ultimately will determine the success of the strategic plan. Therefore, the strategic themes are built on the foundation of people who are charged with the successful execution of the plan at all levels of wing operations (Figure 1). To effectively lead the squadron to success, comptrollers must develop the strategic eyes of the commander to understand needs, develop financial strategies, and execute a game plan to maximize capabilities. Executing a successful game plan at the tactical, operational, and strategic levels will enable financial managers to become strategic force multipliers for the wing commander.

Force Development

The SAF/FM strategic plan challenges comptrollers to become strategic partners with the commander. To become strategic partners with the wing commander, comptrollers must understand the enduring competencies required of senior leaders who are charged with leading at the strategic level. The Air Force's new Force Development concept places an emphasis on the development of senior leaders through the tactical, operational, and strategic levels. The goal of Force Development is to create strategic leaders who have a wider perspective of the issues. By developing officers through a method that takes them out of their career stovepipes, senior officers will have the necessary skills and enduring competencies to meet a wide array of real-world challenges needed to lead our institutions.¹⁶ The Force Development model lists three enduring competencies and the characteristics that officers should develop as they increase in rank (Figure 2).

To become a strategic partner and see through the eyes of the commander, the competencies for leading the institution must be understood and developed early. Why? Unlike other squadron commanders, who work directly for a group commander, the comptroller is the only squadron commander who works directly for the wing commander. Other squadrons operate in functional stovepipe environments focused mainly on the operational requirements of their unit and group. Their group commanders provide the wing commander the strategic link between the group and operational squadron. To balance requirements against limited resources effectively, comptrollers cannot operate in a stovepipe environment; they must understand the full spectrum of requirements in all functional areas. Developing strategic leadership skills early allows comptrollers to acquire the strategic lens of the commander and facilitates better advice and decisionmaking across all functional areas.

It is also the responsibility of the comptroller squadron commanders to develop their organization into the *supporting lens* needed to provide the right service at the right time. A high-performance team with an understanding of the wing's operational requirements allows comptrollers to get a clear view of the strategic environment. Blending strategic leadership skills into the operational and tactical aspects of the squadron allows all financial managers an opportunity to share in the development of the strategic plan. This provides vision, a sense of direction, and purpose

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for the organization. Involving and empowering the comptroller team helps grow future comptrollers and financial managers at all levels. Developing the skills of the comptroller team helps build a solid foundation at the tactical level. As a result, all stakeholders in the process are involved and motivated to achieve the high results. With a strong team and the right strategic leadership skills, comptrollers can develop a culture that is willing to move from a transaction-based, process-oriented unit to a proactive high-performance team motivated to provide world-class financial service and support to the wing.

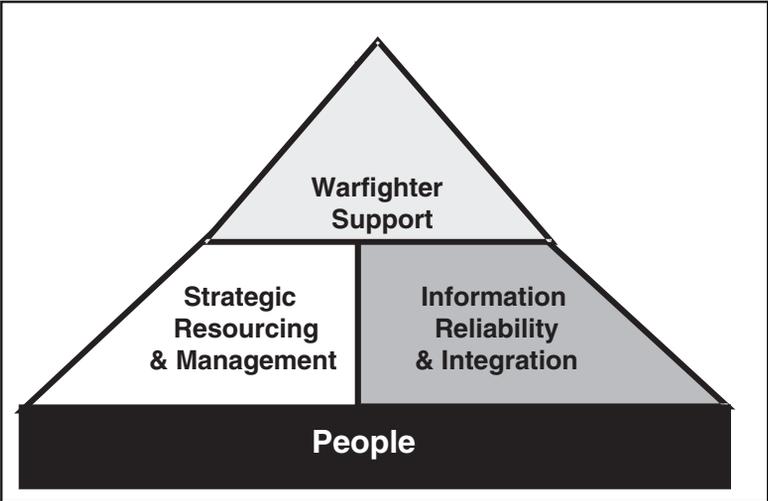


Figure 1. Force Development¹⁷

All stakeholders in the process are involved and motivated to achieve the high results

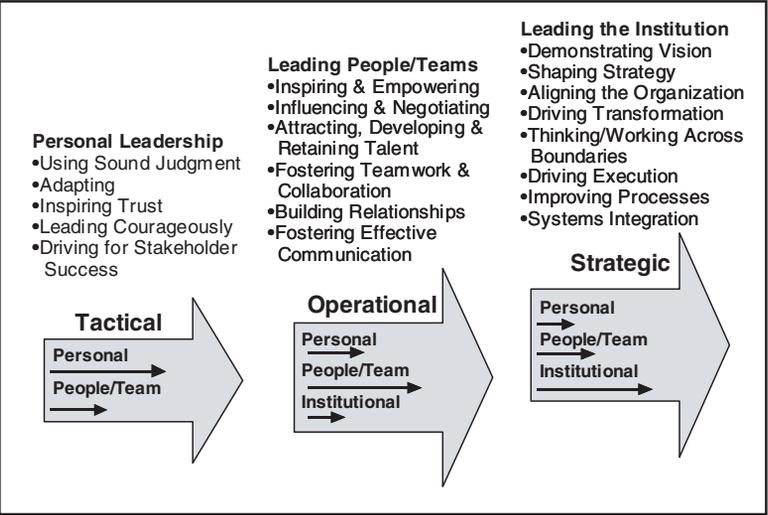


Figure 2. Air Force Force-Development Leadership Model

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To become an effective strategic partner to the wing commander, effective command leadership is necessary to build a strong foundation at the tactical or squadron level.

Comptrollership and Command—Building the Foundation for Success

As the SAF/FM Strategic Plan states, “Great organizations align their values and visions with their actions and results.”¹⁸ A key aspect of comptroller leadership is being able to link the strategic vision of the wing back to their unit and then inspire the team to execute a successful game plan. For any high-performance team to be successful, they must be able to master the fundamentals before embarking on initiatives for positive change. If the squadron is unable to master the fundamentals, comptrollers will find themselves bogged down in day-to-day operations answering complaints or chasing budget data. To become an effective strategic partner to the wing commander, effective command leadership is necessary to build a strong foundation at the tactical or squadron level.

Command—Are You Ready?

The opportunity to become a wing comptroller also brings the greatest honor and privilege given to any Air Force officer—the opportunity to command. While the duties of a wing comptroller play a significant role in the tactical, operational, and strategic success of the wing, command leadership sets the tone for developing a high-powered organization, establishing credibility with your peers, and earning the empowerment from senior leadership. This credibility helps earn comptrollers a *seat at the table* on the wing’s strategic leadership team, allowing the comptroller squadron an opportunity to influence the wing’s performance through dynamic financial management.

Command is the ultimate test of leadership. From the time commanders take the flag from the wing commander, their actions are visible and judged by their people, fellow squadron commanders, group commanders, and the wing commander—the comptroller’s boss. To prepare for the ultimate responsibility, one should reflect by asking, “Am I ready?” In *Sharing Success, Owning Failure*, Colonel Dave Goldfein highlights questions from Major General Richard B. Meyer’s book *Company Command: The Bottom Line*. These questions can help prepare anyone for command.¹⁹

- Are you willing to dedicate yourself 24 hours a day, 7 days a week, if necessary, for your unit and your troops?
- Is your family willing to bear the sacrifices?
- Are you willing to lead by example in everything you do—to live in a fishbowl with your personal and professional life open to view?
- Do you understand that loyalty is a two-way street?
- Can you challenge your troops to go the extra mile, knowing the challenges may increase while the rewards remain the same?
- Are you willing to put your neck on the line and take risks when necessary?
- Are you willing to make the tough decisions, regardless of the consequences?

- Are you willing to take responsibility for everything that happens or does not happen in your unit?
- Are you willing to support your boss completely and wholeheartedly, even if the person is someone you do not like?
- Are you willing to sacrifice your career to protect and preserve the dignity of your troops?

Command is a difficult and rewarding challenge. It is not about filling squares in one's career. It is about serving the people in the squadron command and wing. It is a total commitment; preparing yourself to answer yes to these questions before assuming command will help establish that commitment from day one.

As the Chairmen of the Joint Chief of Staff recently stated, there are many books that focus on actions leaders need to take, but it is the functional qualities of good leadership that distinguish an "effective unit from a poor one."²⁰ Listing five qualities of leadership, "selflessness, loyalty, moral courage, delegation, and character," Meyers states the most basic quality of good leadership is character. He further states that character of leaders fosters trust and allows strategic relationships to develop between peers and superiors. It fosters a bond between leaders and subordinates. His message is clear, "When you find leaders with character, there is inevitably a long line waiting to follow them."²¹

Character does matter. In *Sharing Success and Owning Failure*, senior noncommissioned officers (NCO) were asked their expectations of a good commander. In summary, they wanted a commander who possessed good character and lived by core values. The SAF/FM vision statement remains grounded in the core values—integrity, service before self, and excellence—but it is the strength of the comptroller's character and leadership that will make core values a part of the organization's culture. In an article entitled "Reflections on Core Values," former Air Force Chief of Staff General Michael Ryan stated:

Our challenge is not just to understand the core values, we must live them. Not in some phony "holier than thou" way—people see through that—but in a conscious choice to do our best each day. Moreover, as we do, we will build on the trust that makes us a great team, a great family—a great Air Force.²²

Core values are more than lipservice; they should be ingrained in the organization and form the cement for a strong foundation. Being firmly planted in the organization's culture will help establish credibility and trust from other squadrons and the senior staff. Knowing the comptroller squadron is dedicated to doing the right thing for the right reasons, the wing's senior leadership will empower the organization to make tough strategic resource allocation recommendations and decisions. Changing the organization's culture is a difficult task and cannot be done by the commander alone.

Team Building

Bo Schembechler, former head football coach at the University of Michigan, said, "You will never get the same effort from one man's seeking

The most basic quality of good leadership is character.

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*Building an effective team
focused on producing results
is critical in today's
changing environment.*

glory as from a group of men pulling for a shared goal.”²³ The role as a comptroller squadron commander is very similar to that of a head football coach. The commander’s job is to build a high-performance winning organization. The commander must be able to assess the talent, put leadership in the right places, and give the team a game plan that keeps them on the offensive side of the ball. Staying on the offensive means giving employees “the information, skills, incentives, and responsibility to be innovative and make decisions to improve their work processes.”²⁴ The most adverse factor to high performance and positive change is the leader who moves from the tactical to the operational level and continues to micromanage. Building a proactive, high-powered team is critical because, as a strategic leader, comptrollers are not on the field executing. Comptrollers do not compute travel vouchers, pay bills, verify accounting data, or input budget information into the financial plan. The comptroller sets the direction and standards, works with the staff to develop a winning, executable game plan, and rewards the team for their efforts. That’s coaching—the most important aspect of a good leader in a fast-paced environment.

In *Leading Change*, John Kotter gives four characteristics for building an effective team capable of operating in a fast-paced environment.²⁵ His four characteristics, as applied to comptrollership, which help to maximize performance and team development, are:

- **Position power.** Do you have experienced middle-level NCOs who are capable of teaching airmen the fundamentals of their jobs? Are they in the right places to effect positive change?
- **Expertise.** Do your airmen have the expertise necessary to execute the gameplan? Is their knowledge sufficient to promote intelligent innovation?
- **Credibility.** Do you have enough people in the right places to ensure services are provided accurately and on time? Nothing establishes credibility faster than delivering the service on time or ahead of schedule.
- **Leadership.** Do your senior NCOs, senior civilians, and officers possess the leadership skills that can motivate mid-level NCOs and airmen in their areas? In most cases, they do, and they will feed off your energy—do not disappoint them.

Urgency

Building an effective team focused on producing results is critical in today’s changing environment. Once leadership is put in the right place, it is time to get started. A 2-year assignment as a comptroller squadron commander does not lend itself to months of evaluation before moving forward. In *Leading Change*, Kotter states the “biggest mistake people make when trying to change organizations is to plunge ahead without establishing a high sense of urgency in fellow managers and employees.”²⁶ Based on feedback from the predecessor, the major command staff, and

your boss, comptrollers should have a reasonable understanding of the health of the organization. Performance metrics, unit compliance, operational readiness, and squadron self-inspections should offer insight into fundamental operations. In addition, each comptroller squadron is required to have a quality assurance (QA) program. An effective QA program should be the centerpiece for continuous improvement, providing a list of open items and status of corrective actions from the assessments above. If this information is not available through your QA program, it should provide red flags that immediate action may be required. Waiting too long to determine the strengths and weaknesses of the squadron could cause the organization to become complacent, which is one of the “greatest barriers for effectively implementing positive change.”²⁷ An effective team focused on continuous improvement will solidify the tactical foundation for the squadron, which will allow the comptroller to focus on the operational and strategic needs of the wing.

The Five Ps: People, Purpose, Pride, Professionalism, Product

Continuous improvement at the organizational level requires leaders and commanders to balance the needs of the wing, squadron, and individuals of the unit. General William L. Creech, former commander of Tactical Air Command, authored *The Five Pillars of Total Quality Management*. In a speech detailing his concepts, Creech preached, “A successful organization must be based on core values and principles that are in harmony with the essential nature of human beings.” Operating in an environment of constant change, his model provides practical advice on how to succeed in any real-world organization. The model focuses on five spheres—people, purpose, pride, professionalism, and the product (Figure 3).²⁸ All five are important and must work in harmony to maintain the balance of the organization. Leaders keep the harmony in check by understanding the needs and requirements within each sphere.

People. People are the building blocks for a successful organization. As outlined in the SAF/FM strategic plan, the strength of your foundation rests on the strength of our people. As Creech states, “One should always consider the people first, treat them well, and place paramount importance on their welfare, morale, and the opportunity to grow and excel.”²⁹ Leaders must understand the personal and professional needs of their people.

Leaders keep the harmony in check by understanding the needs and requirements within each sphere.

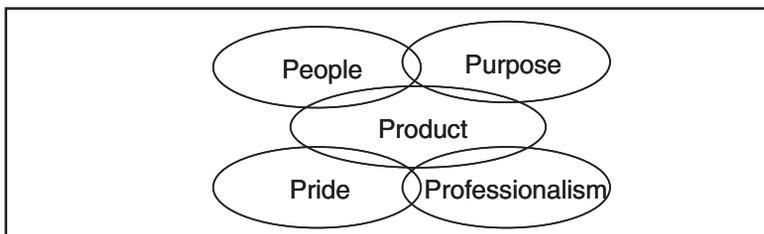


Figure 3. Five Ps Model³⁸

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Successful teams maintain an offensive mindset.

Comptrollers must be able to maximize team performance while providing people new opportunities to broaden their skills. The decision to move an experienced pay and travel NCO into budget is an example. Determining the right time to meet the professional needs of the individual while maintaining support to the warfighter will always be a leadership challenge. Involving the players and supervisors in those decisions helps maintain balance and keeps the team motivated.

Purpose. Leaders must be able to instill a strong sense of purpose. This unity of effort instills a strong sense of commitment and direction.³⁰ As a strategic leader and commander, it is your responsibility to help your organization see the big picture. Strategic leaders, along with their leadership team, learn how to simplify mission objectives in terms the youngest airmen in the organization can understand. Helping the organization understand its impact on warfighter support or the wing's resource decision process establishes a strategic purpose for the organization. Establishing a clear vision and communicating it creates a unifying effort. In *Lincoln on Leadership*, the author states President Lincoln consistently and effectively reaffirmed his vision for the United States by providing grassroots leadership securing a connection between leadership and the people. The author contends organizations prosper or die based on the leader's ability to embody and communicate the organization's vision and purpose.³¹

Pride. The goal of strategic leaders is to create high-powered organizations where people are empowered and understand the role and responsibilities and how their efforts contribute to the mission. Ninety-five percent of the people come to work wanting to succeed and be winners.³² Great leaders capture that feeling, provide focus, and develop a climate that produces pride. Personal pride is the fuel that drives people to accomplish great things.³³ Developing squadron pride around focused objectives ensures high-performance execution.

As mentioned, in today's environment of change, successful teams maintain an offensive mindset. In preparing for inspections, I have found organizations that take a proactive approach are often the most successful. Early in my career, an inspector provided six questions that could turn a reactive organization into a proactive unit at all levels. The author (Martin) quickly integrated them into the QA program and used the questions to establish pride of ownership and continuous improvement throughout the squadron. It proved effective because individuals understand their role and can measure their success. Individuals and supervisors get feedback for continuous improvement and focus training efforts. The information also allows leadership to reward the hard work and efforts of the team. The six questions developed over the years are:

- What am I responsible for?
- What is the process to complete the task accurately and on time?
- How do I measure the results?

- Are my customers satisfied?
- Do I identify improvement areas and get focused training to improve?
- What are the results of my efforts?

With effective leadership, these questions move an organization from a reactive environment to a proactive one. Imagine the inspector who sits down with your youngest airmen who initiates the following scenario.

I am Airmen Smith, and I am responsible for these areas. Here is the process I follow to complete the task right and on time. I measure the results by tracking my efforts with this metric. Based on surveys, my customers are satisfied with the service I provide. Although I try to do my best, the data reveal I could improve in this area. My supervisors and I identified the root cause, and I received focused training to improve the results. As a result, my areas are exceeding standards, and my efforts are helping the wing accomplish its mission—that's pride of ownership.

Professionalism. Pride breeds professionalism. According to Creech, “Excellent leaders facilitate professionalism. More than that, they insist on it.”³⁴ The six questions not only promote pride but also establish a standard of professionalism. They provide a measure of success. Great leaders combine personal needs, provide a purpose and vision, and establish pride of ownership. This creates a winning environment and promotes professionalism. Insist on high standards, draw the line, and then create a winning environment where professionalism is a part of the organization's culture and a standard everyone is willing to maintain and enforce. The results will be impressive.

Product. The SAF/FM vision states success as the wing's strategic partner will be measured by the accuracy and timeliness of financial information, success in the second part by quality of service, timeliness, and cost.³⁵ To meet the operational and strategic requirements of the wing, performance metrics should provide an assessment of services provided to customers. If the metric does not meet standards, it might indicate a problem with training, or it might signal a significant problem that will affect the wing's performance. Metrics should measure timeliness and accuracy of services and how the wing's resources are helping to maximize wing capabilities. Comptrollers should leverage new automation tools that provide accurate, real-time information, allowing more time to conduct decision support analysis. New automated tools are available at the major commands and provide valuable information tools needed for critical resource allocation decisions at the wing. According to Creech, “When performance is measured, it improves. When performance is measured and compared with other units, performance improves more. And when performance is measured and compared and significant improvement is recognized and rewarded, then productivity really takes off.”³⁶

The Five Ps Model illustrated in Figure 3 is just that, a model. It is a tool to help develop a performance mindset. As Creech states, the leader's role is to make the organization better.³⁷ Determine what works best for the squadron and develop a culture focused on people, performance, and

Performance metrics should provide an assessment of services provided to customers.

Financial Managers: Becoming Strategic Force Multipliers

The importance of applying limited resources to the right capability at the right time is essential for meeting warfighter requirements.

results. Developing a winning culture will focus the comptroller team on supporting warfighter needs in the tactical environment and allow the comptroller to focus on the operational and strategic needs of the wing, which will ensure you a seat at the strategic table.

Leading in an Operational Environment— Providing the Balance Between Resources and Requirements

We have to admit that we are in ruts. We are in stovepipes. We have been taught to think one way. We have been taught to defend our prerogatives.... We've got to break out of that....

—General John Jumper³⁹

In the early 1990s, the Air Force Chief of Staff, General Merrill A. McPeak, reorganized the wing under the wing composite structure.⁴⁰ Before that time, wing comptroller squadrons were aligned under the resource management group. The new structure placed comptroller organizations reporting directly to the wing commander. This was supposed to remove bias from any one group and allow comptrollers to work across all functional areas to solve financial issues without bias from any one group. This also thrust the comptroller as a key member of the staff, acting as the wing's senior financial advisor. This change was significant and important in a decade that saw budgets and manpower decreased by one-third while the operations tempo increased fourfold.⁴¹ Now our military must be able to respond with multiple capabilities to a variety of worldwide threats. The importance of applying limited resources to the right capability at the right time is essential for meeting warfighter requirements. Comptrollers must possess the skills to view the entire spectrum of operations through the commander's strategic lens and then pursue innovative resourcing strategies that link funding to outputs and performance.⁴²

Be Everywhere, Know Everything

Shortly after the comptroller's transition to the wing commander's staff, I received my first assignment as a wing comptroller. During an initial feedback session with my wing commander, he told me he expected only two things from me—"be everywhere and know everything." In other words, my job was to know as much as possible about every wing organization, to balance requirements effectively against available resources. As the wing's senior financial advisor, I realized those two things are the essence of comptroller responsibilities at the wing level. In the wing, the comptroller is a member of the wing commander's staff for a reason. The comptroller squadron must work across all functional areas to solve issues and ensure funds maximize wing capabilities. To become an effective strategic partner, comptrollers must be proactive in developing financial strategies with group and squadron commanders. While the wing commander may write the performance report of the

comptroller, feedback on how well the comptroller organization supports warfighter needs determines the final grade.

Wing comptrollers must realize their analysis and advice impacts the full spectrum of operations. Expert financial analysis is required to determine the impact of all decisions not only to the immediate squadron or group but also to the second and third order. For example, applying funding to an old F-16 hardened aircraft shelter may not compete well against other clear-cut readiness shortfalls; however, consider the impacts. The doors on the shelter will not close. This allows snow in during the winter and extreme heat and rain in during the summer. Combined with poor lighting, it is no surprise airmen are slow turning jets for sortie generation. By providing doors that open and close, climate controls, and proper lighting, airmen are able to increase productivity and quickly turn jets. It also had a tremendous impact on morale and retention rates. The decision to fund was not based on the facility requirement alone. It was based on a comptroller's assessment of multiple functional areas and the impact on operational capabilities. This is a good example of how the comptroller team can leverage performance information to "seamlessly integrate resourcing strategies to maximize outputs and performance."⁴³ Inspiring the team to achieve these types of results requires thinking across boundaries, integrating information, demonstrating vision, and driving effective execution—all characteristics of strategic leadership skills needed to lead the institution.⁴⁴ This helps transform comptroller organizations into force multipliers and establishes the comptroller as an effective strategic partner to the wing commander and senior staff.

According to John Kotter, in *What Leaders Really Do*, leadership sets the direction of the organization. Effective leaders create strategies for what the organization should look like over the long term.⁴⁵ While wing commanders provide the strategic vision for the wing, they rely on the senior staff to implement the requirements to achieve the vision. But remember, without resources, visions will never become realities. By establishing a level of credibility through the example described above, commanders will turn to the comptroller for innovative resourcing strategies to ensure resources are maximized to achieve the vision.⁴⁶ As commanders realize the importance of information integration and strategic resourcing, few strategic decisions will be made without the comptroller at the table. Therefore, comptrollers must be everywhere and know everything to provide expert advice on applying limited resources across the full spectrum of operations.

Build Command Relationships

To add value to the strategic partnership, comptrollers must be engaged actively in all activities across the wing. It is not an option; in fact, it is a graded item. This was one of the comptroller expectations that Martin's second wing commander communicated during the initial feedback session. The relationships comptrollers develop with other commanders and wing staff agencies allow them to be everywhere and know everything.

Effective leaders create strategies for what the organization should look like over the long term.

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A strategy has to be constructed and owned by those who will execute it, and leaders must be in charge of developing the substance of the strategic plan.

To effectively develop a financial strategy to maximize wing capabilities, comptrollers must understand the requirements and capabilities of each group and squadron. As the wing commander's primary advisor, comptrollers must be able to link group and squadron requirements to the wing commander's vision, while maintaining a balanced resource allocation plan.

In *Execution, The Discipline of Getting Things Done*, the authors state an effective strategy lays out, in specific terms, the direction of the unit and how it will get there. To be effective, a strategy has to be constructed and owned by those who will execute it, and leaders must be in charge of developing the substance of the strategic plan.⁴⁷ Developing an effective resource allocation plan requires buy-in from other squadron and group commanders. It also requires the ability to listen and understand their needs. As mentioned earlier, character matters. Comptrollers who establish credibility and trust with their people and wing organizations can be proactive in developing successful financial strategies. Although the comptroller and staff are the architects of the wing's financial game plan, without consensus of the wing's senior leadership, unity of effort is rarely established. Meeting the operational requirements of your fellow squadron commanders, while maintaining a balance between resources and requirements, builds the strategic partnership with the wing commander and senior staff.

Your Team's Role

According to Noel Tichy, author of *The Leadership Engine*, "Winning companies know that games are won and lost on the playing field." He contends winning is about leadership—at all levels in the organization.⁴⁸ As previously mentioned, comptrollers cannot do it alone. It is a team effort. While the comptroller may have the perfect game plan for executing resources, it is the comptroller team that executes on the field and is ultimately responsible for the victory. They are the comptroller's eyes. It is the comptroller's responsibility, along with the staff, to teach them to see through *strategic lens* so they know what to look for. Tichy suggests, "Great leaders teach others to be leaders, not followers. They accomplish their goals through the people they teach. They have clear ideas and values, based on knowledge and experience, and they articulate those lessons to others."⁴⁹ Keeping the seat at the strategic table will depend on how well the comptroller team supports and executes the required actions needed to maximize the wing's capabilities. With the right focus and energy, mission requirements blend with the five Ps, resulting in high performance, financial services, and support to the wing. Remember, it begins and ends with people, with the product anchoring the center—never underestimate the team's impact on wing operations. Provide them the leadership and empower them to become wing force multipliers.

The comptroller's financial analysis flight is the architect of the wing's financial game plan for identifying requirements and executing resources to achieve the wing's objectives. They are the comptroller's expert

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advisors. While the comptroller strives to become a strategic partner with the wing commander and senior staff, the financial analysts should become strategic partners with group and squadron resource advisors. By establishing strategic partnerships with the groups, the analysts become experts of the group capabilities and requirements. The analysts work with the resource advisors to determine funding priorities, identify shortfalls, and develop financial plans. This requires analysts to venture out into the units. Face-to-face interaction allows analysts to learn the unique requirements and perspectives of the group and squadron commanders. One way to achieve this is to revitalize resource management teams. Resource management teams are made up of representatives from various support activities. Led by comptroller personnel, resource management teams visit units to work with commanders on how to improve operations and services. This helps integrate all functional areas and builds unity of effort for wing operations. Armed with this information, the financial analysis experts can help the comptroller understand the unique financial requirements of each wing organization. The comptroller and staff then can shape strategy and lean forward to meet the capability needs of the wing.

Timely and accurate support to the warfighter makes the financial services flight a force multiplier for the wing. A financial service is an effects-based operation. In fact, the effect on morale and productivity is measured at least twice a month when people open their leave and earnings statements. Rarely do people notice when pay and travel services are done correctly. However, when a pay or travel issue exists, it has a negative impact on wing operations. Imagine the maintenance troop with a pay problem, working under extreme time constraints, trying to find time to go to finance to fix a problem. The lost duty time and frustration have a negative impact on flight-line productivity and safety. Maintenance troops who know their pay is correct spend more time on the flight line focused on proper procedures for maintaining sortie production. Financial services personnel should never underestimate the impact they have on operational performance. Understanding the financial services required by the different units and tailoring a service plan to meet the specific needs will result in measurable increases to wing capabilities.

For the comptroller organization to be a force multiplier for wing operations, comptrollers must be focused, inspire and empower their people, be able to influence and build consensus with group and squadron commanders, and shape strategy for the wing commander. The comptroller is provided many opportunities to marry up the comptroller organization with the operational requirements of the wing. The comptroller already has a *seat at the table* for many advisory boards on the wing commander's staff. Whether it is at a nonappropriated funds oversight committee meeting, a civilian employment management board, a facilities utilization board, the cost-per-flying-hour working group, or the comptroller's own financial management board, comptrollers are given a voice to shape strategy and align resources with requirements. With commanders in those

Timely and accurate support to the warfighter makes the financial services flight a force multiplier for the wing.

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The US military must transform to preserve its current advantages.

meetings fighting for resources in their individual stovepipes, the wing commander will turn to the comptroller to maintain the strategic balance. To establish oneself as an effective strategic partner with the wing commanders, comptrollers must *get smart* on all operational agendas to balance limited funding across all functional areas. As Creech states, in an article entitled “Organizational and Leadership Principles for Senior Leaders,” “the leader must be proactive, dynamic, informed, and involved.”⁵⁰

Becoming the Strategic Force Multiplier

A budget is much more than a collection of numbers. A budget is a reflection of a nation’s priorities, its needs, and its promise.

—President George W. Bush⁵¹

The Need for Strategic Change

From a section of the QDR Report entitled “Managing Risks,” Secretary of Defense Donald Rumsfeld discusses “balancing the demands of the present against preparation for the future, consistent with the strategy’s priorities.” He outlines the challenges of operating in an era with reduced budgets and limited manpower. Since the end of the Cold War, our budgets and forces have been downsized, putting great strain on infrastructure, equipment, and people.⁵² One dimension of managing this risk laid out in the article is the “ability to develop management practices and controls that use resources effectively.” He furthers states, “DoD will work to achieve a transformation in business practices, with a particular emphasis on financial management.”

The Transformation Flight Plan also provides the perspective and need for strategic leadership. The Chief of Staff and the Secretary of the Air Force discuss the need for transformation as the military adapts to “profound changes in the nature of conflict and the conduct of war brought about by dramatic advances in technology, as well as the new international security environment of the post-Cold War. More than ever, the US military must transform to preserve its current advantages. It also must shift from a “threat-based to a capabilities-based approach to ensure national security.”⁵³ Understanding the needs and requirements of each unit on base, comptrollers can maximize resources and leverage the strategic capabilities of the wing across the spectrum of operations.

Strategic Vision

The new Force Development concept attempts to give future senior leaders opportunities to develop a broader view of operations. This will allow them to reduce some of the functional bias of their primary specialty, developing additional skills and widening their strategic lens.⁵⁴ As the commander’s chief financial advisor, comptrollers must also widen their lens and view the wing through the eyes of the wing commander. Since the end of the Cold War, forces have been downsized by one-third, but operations have increased fourfold.⁵⁵ The War on Terrorism will require

our forces to meet demands across the globe, using the new expeditionary mindset. This will require commanders to maximize flexibility and strategically reallocate resources when priorities change.

Today, the Air Staff and major commands are reducing the amount of centrally funded accounts and pushing the funds down to the bases, giving them resource allocation flexibility for the tough tradeoff decisions. On a moment's notice, the comptroller should have a good understanding of all operations knowing what requirements need immediate funding, where that funding will come from, and what requirements can be deferred. As mentioned, by working effectively with group and squadron commanders at the operational level, the wing commander will turn to the comptroller for tough financial decisions and the strategic game plan. Major General Stephen Lorenz, Air Force Director of Budget, states in his *Twelve Points of Leadership*, "taking a strategic look at the organization and the second and third order of effects will allow you to see the boss' concerns."⁵⁶ This is an important strategic leadership characteristic in today's operating environment.

The Comptroller and the Commander

Leadership is paramount in the strategic environment. Effective leadership at the tactical and operational levels will earn you a seat at the wing commander's table as one of the strategic advisors. Wing commanders are the final approval authority for all resource decisions. In an environment where funding and shortfalls are being pushed to the commander, it is important for commanders to understand what their responsibilities are and what the comptroller offers in the strategic partnership. In an article published by Colonel Paul Hough, entitled "Resource Management for Commanders: An Evolving Strategy," he provides financial tips for wing commanders. Using his words and a few of the author's (Martin) own, the following provides a good summary of how comptrollers can maximize the strategic partnership with the wing commander.⁵⁷

- Comptrollers must understand their role. They are the wing's chief financial officers. They are the key advisors for reviewing budget requests, validating the wing's requirements, and providing recommendations for the best use of resources to achieve the unit's mission.
- Assess the financial health of the wing as soon as possible after taking command. Get to know the commanders at all levels and ensure their priorities are included in budgets and implemented during execution.
- Get the most out of the budget. Stay focused on vision and mission requirements. Look for ways to find money to be force multipliers.
- Be the honest broker. Ensure that the real needs of the mission are funded first and a game plan exists to match the right resources to the required capability.
- Balance the needs of the mission with infrastructure and quality-of-life concerns. Constantly financing mission concerns at the expense of

It is important for commanders to understand what their responsibilities are and what the comptroller offers in the strategic partnership.

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Close interaction with the major command comptroller staff will establish a link between the wing and major command's financial strategy.

long-term infrastructure and quality of life eventually will have a negative impact on the wing's production and its people in the long run. Have a plan and market your needs to the major command for help.

- Remember, the mission is second only to the law. Appropriated dollars must be used for their general purpose according to the funding guidance from command and according to the law. Establish a good relationship with your staff judge advocate. If the answer is no to a funding question, look for alternate solutions that meet the objectives of the wing commander but have the moral courage to say no if necessary.

Understanding your role in the strategic process makes you a strategic partner to the wing commander and staff. Strategic thinking requires one to explore what may be worth doing and why. Its application is about choosing the "ways, places, and times to get at the heart of the matter."⁵⁸ Understanding how the wing operates and the organization's role in execution allows comptrollers not only to see through the eyes of the commander but also to implement positive change.

As the senior financial advisor to the wing commander, comptrollers must be able to paint a strategic picture of the Air Force and major command's financial game plan. As the SAF/FM strategic plan states, "Effective strategic resourcing will be maximized by linking the programming and budgeting process to performance and capabilities."⁵⁹ Close interaction with the major command comptroller staff will establish a link between the wing and major command's financial strategy. This will help the wing get out in front of the existing processes. One of Lorenz's "Twelve Points of Leadership" is, "Life is about balancing shortfalls."⁶⁰ Knowing where the capability shortfalls exist and how they can be resolved helps shape strategy and drives focused execution.

Comptrollers should leverage information and cost-management efforts to maximize wing capabilities. Several of the major commands now require financial plans to address how projected funding supports the required capabilities of the wing. Rather than comparing next year's projected funding to current and prior year execution to determine shortfalls, numbers are used to assess the capabilities of each group at the wing. For example, based on a funding bogey, an operational group could assess how it can execute the assigned flying hours, equip pilots, maintain the aircraft, send personnel to critical training, meet deployment requirements, and support the squadron with base operating support. A capability rate is then assigned, and shortfalls are narrated in terms of increasing capabilities based on the current threat environment rather than narrating historical budget data. This change involves the stakeholders and paints a strategic picture for the wing that everyone involved can understand. It transforms a budget document into an assessment of a wing's capabilities, provides strategic direction, applies limited resources for the right capability, and better competes for additional funding at the command. As stated in the SAF/FM strategic plan, it shifts the roles of

comptrollers from transactions to decision support and validates the value of the comptroller as a strategic partner to the wing command.

Execution

The SAF/FM vision challenges comptrollers to become strategic partners with commanders and to imagine a wing that operates at peak efficiency. However, the ingredient that turns any vision statement into reality is focused execution. This is the first point in Lorenz's "Twelve Points of Leadership." It states, "Keep your eye on the target—focus, focus, focus. Stay focused on every objective in every situation. Being focused allows you to screen out unrelated and distracting issues that try to creep in."⁶¹ In *Execution, the Discipline of Getting Things Done*, the authors define execution as:

...the missing link, the main reason companies fall short of their promises, the gap between what a company wants to achieve and the ability of their organizations to deliver it, a discipline requiring a comprehensive understanding of a business, its people, and its environment, and the way to link the three core processes of any business—the people process, the strategy, and the operating plan—together to get things done on time.⁶

Why is this definition important? Many organizations have good intentions and high expectations. What makes an organization truly successful is focusing on the operational and strategic requirements of the wing. While your organization may seem to be executing at the unit level, is it contributing to the strategic requirements of the wing? Is your execution providing the wing accurate and timely advice to make critical operational decisions? Is customer service ensuring people are paid on time and helping to maintain morale and productivity in the wing? Do your financial products delivered to higher headquarters represent the funding required to meet current and future capability requirements of the wing?

Successful leaders know how to link good strategy and tactics during execution. In *Sun Tzu for Success*, the author provides a useful definition:⁶³

- Strategy determines the allocation of resources. It is the plan.
- Tactics deal with the use of resources. It is the implementation of the plan.

Effective execution will require your staff to have a comprehensive understanding of the wing, the units, and its people. Interaction with group and squadron commanders will allow you to see the strategic needs of the wing and allow you to develop a game plan with your team to provide warfighter support, maximize strategic resourcing and cost management, and deliver reliable information for decisionmaking. That is the challenge of the Air Force Financial Management Strategic Plan and Vision—the Air Force is counting on comptrollers to transform financial managers into strategic force multipliers for the wing commander and senior staff.

What makes an organization truly successful is focusing on the operational and strategic requirements of the wing.

Financial Managers: Becoming Strategic Force Multipliers

Building an effective team requires strong leadership skills that build trust, develop the force, and inspire performance at the unit level.

Conclusion

The importance of matching limited resources against the nation's highest defense priorities is more important than ever. Commanders will continue to face an environment of rapid change requiring capabilities that can adapt to a wide range of threats across the world. To maintain superiority of air and space capabilities, the United States must leverage every available dollar to meet the needs of the warfighter. The role of financial managers as force multipliers is critical in this process. A high-powered financial management team that provides world-class service to the warfighter and "produces relevant, accurate, and timely information" will "maximize resource effectiveness by linking programming and budgeting to outputs and performance."⁶⁴

This builds trust and credibility with fellow commanders and leads to a strategic partnership with the wing commander.

The SAF/FM vision and strategic plan provide the roadmap for comptrollers to be successful in reaching this goal. The strategic plan provides the framework and expectations for maximizing service and support to the warfighter and commander. It requires comptrollers to move from a transaction-based approach to one that focuses on leveraging information and strategic resourcing to maximize the capabilities of the warfighters. However, it is leadership that will make the vision and strategic plan a reality. The Air Force development model provides core competencies required of senior leaders. While most squadron commanders operate in stovepipes, comptrollers must recognize the leadership skills required of strategic leaders and develop the ability to see through their eyes. This perspective of wing operations is required and necessary to match limited resources against capability requirements.

Matching limited resources to the right capability at the right time requires comptrollers to build high-performance teams that have a strong tactical foundation. Building an effective team requires strong leadership skills that build trust, develop the force, and inspire performance at the unit level. A strong tactical foundation rests with the strength of its people. Empowering them and providing them the right tools to be successful keeps the team proactive and looking for ways to improve services and support to the units they support. Their impact on the wing's capabilities and performance must never be underestimated. Comptrollers constantly must communicate their importance, link it to the wing's vision, and inspire their team to execute.

With a strong tactical foundation, comptrollers can focus on developing a financial game plan to maximize the capability requirements of the wing. This is a total wing effort requiring the comptroller to develop strong relationships with fellow commanders and the senior staff. The entire comptroller team must be engaged and visible in the organizations to gain a strategic perspective of the units' capabilities and requirements. Comptrollers must be able to provide the Air Force and command's strategic picture and build financial strategies to link the wing's

requirements to those goals. The comptroller must be a consensus builder, be able to achieve buy in with other commanders, and then become an effective strategic implementer of the wing commander's vision and strategy. This solidifies the strategic partnership needed to leverage limited resources to maximize wing capabilities.

The intent of this article was not to provide a checklist on how to become an effective comptroller. It was written to provide ideas and thoughts on developing skills to lead in the tactical, operational, and strategic environments simultaneously. The goal was to help create a leadership mindset that will focus comptrollers on the need to build high-performance teams, the value of creating coalitions with fellow commanders, and the importance of creating a strategic partnership with the wing commander. What is most important is the value of comptroller leadership in today's environment of limited resources and high operations tempo. Success will be measured by how well financial managers apply resources to execute the vision and mission across the full spectrum of operations. With this focus and leadership skills that emphasize people, performance, and results, financial managers can become proactive force multipliers for all Air Force operations.

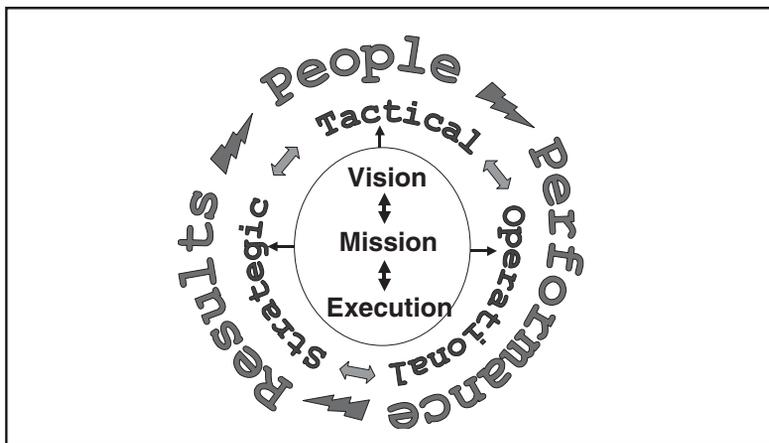


Figure 4. Comptroller Leadership Model

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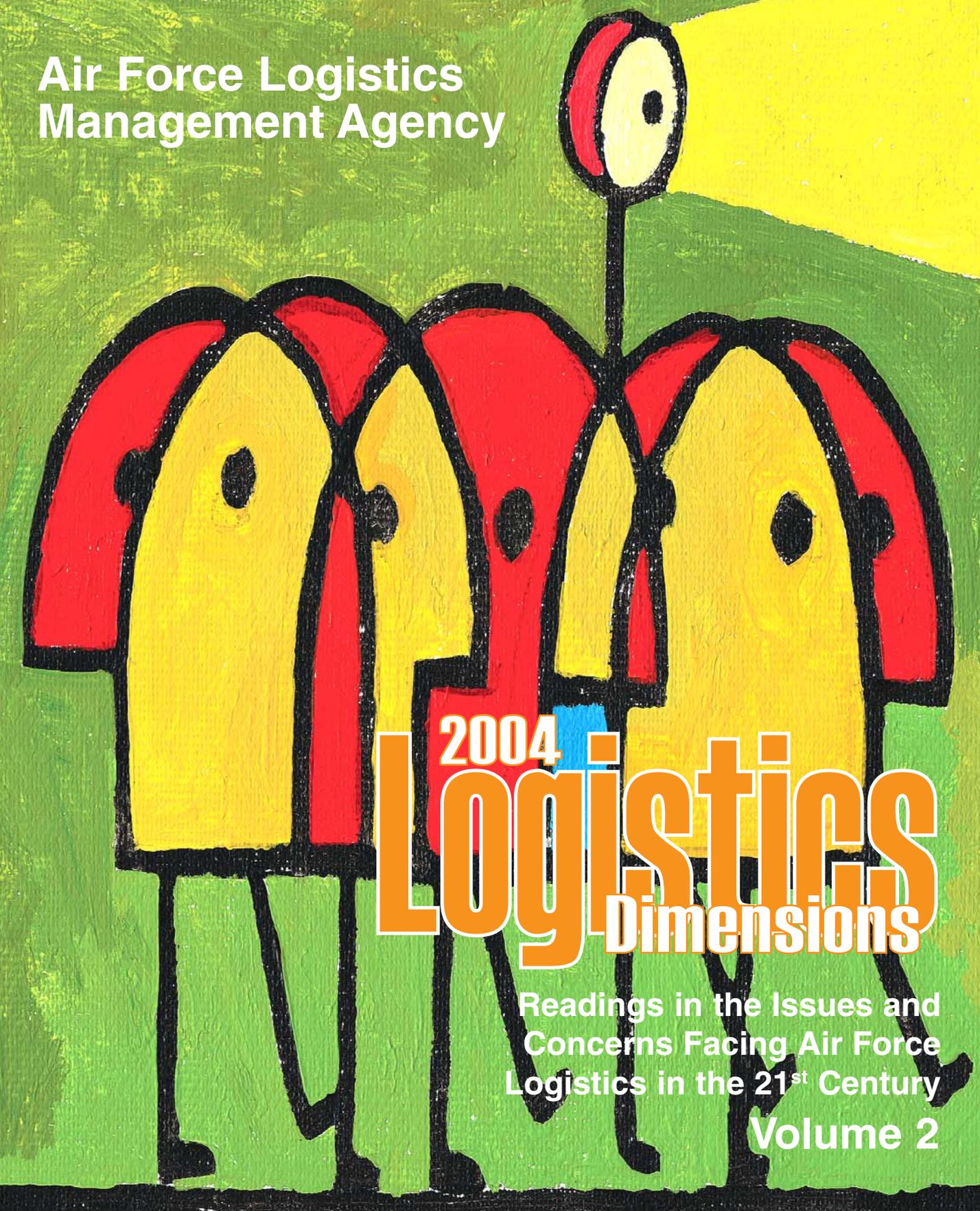
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Volume 2