

AIR FORCE JOURNAL *of* LOGISTICS

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Logistics 21st Century

Air Force Fitness Culture: Are We There Yet?

Can We Help? DoD Humanitarian Assistance Programs

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**Special
Feature**

Unfortunately, 24 percent of the force still has not achieved adequate fitness levels to meet Air Force standards or help decrease personal morbidity and mortality risks associated with low-level fitness. The Air Force should pat themselves on the back for taking a giant step forward, but then immediately set a course on continued advancement.

logistics

21st Century Logistics

Air Force Fitness Culture: Are We There Yet? Can We Help? DoD Humanitarian Assistance Programs

This edition of the Journal presents two featured articles: “Air Force Fitness Culture: Are We There Yet?” and “Can We Help? DoD Humanitarian Assistance Programs” In the first article Colonel Thomas F. Roshetko examines the evolution of Air Force fitness and the options for reaching full program effectiveness. Areas of discussion include military fitness requirements, Air Force Fitness Program history, and the Fit-to-Fight Era. He concludes with Air Force Fitness—The Way Ahead. That section recommends developing a better Air Force fitness culture by improving alignment of health and fitness issues. Colonel Roshetko suggests several program adjustments, including renaming the Air Force instruction, limited use of random testing, approving wear of pedometers in uniform, and better analysis of fitness data.

In the second featured article Mr W. Darrell Phillips examines the limited role of, and fiscal constraints upon, the Department of Defense (DoD) in providing foreign humanitarian assistance. He concludes that as the focus of the Global War on Terrorism shifts to other locales, and disasters occur in various foreign countries, DoD’s role will continue to expand and transform. The creation of United States Africa Command will undoubtedly lead to a closer engagement with the nations and peoples of Africa, and accompanying increases in humanitarian assistance. The Commanders’ Emergency Response Program (CERP) has been a major factor in *winning hearts and minds* in Iraq and Afghanistan. He also notes that a major question will be whether Congress will apply CERP, or some variant of it, to future conflicts or peace missions.

Air Force Fitness Culture: Are We There Yet?

Thomas F. Roshetko, Colonel, USAF

Introduction

The Air Force significantly overhauled its fitness program in 2003 and released a new fitness Air Force instruction (AFI) in January 2004. Since that time, Air Force leadership has reevaluated this program several times, resulting in multiple program updates. Overall, subjective and objective data reflect an improved fitness commitment across the Air Force. Unfortunately, after 61 operational months, it appears that the program remains short of accomplishing its primary goal of motivating “all members to participate in a year-round physical conditioning program that emphasizes total fitness, to include proper aerobic conditioning, strength and flexibility training, and healthy eating.”¹ This article will evaluate the evolution of Air Force fitness and some options for reaching full program effectiveness. Areas of discussion will include military fitness requirements, Air Force Fitness Program history, and the Fit-to-Fight Era. It will conclude with *Air Force Fitness—A Way Ahead*, that recommends developing a better Air Force fitness culture by improving alignment of health and fitness issues. The conclusion will also suggest several minor program adjustments including renaming the AFI, limited use of random testing, approving

**Special
Feature**

wear of pedometers in uniform, and better analysis of fitness data.

Military Fitness Requirements

Department of Defense Fitness Requirements

Department of Defense Instruction (DoDI) 1308.3, *DoD Physical Fitness and Body Fat Programs Procedures*, provides the legal directive for military fitness. Specifically, DoDI 1308.3 charges each military branch to be responsible for assuring Service members maintain physical readiness through appropriate nutrition, health, and fitness habits. It is stipulated that at a minimum, physical conditioning must include aerobic capacity, muscular strength, muscular endurance, and desirable body fat composition.² A fitness program must therefore be designed to enhance fitness and general health, meet the Services’ specific mission requirements, and include an annual assessment of each member’s fitness.³

Air Force Fitness Requirements

AFI 10-248, *Fitness Program*, serves as the Air Force’s policy to meet DoDI 1308.3 and its objective is to assure that airmen attain physical fitness levels sufficient to meet the global Air Force mission. This document provides detailed administrative procedures, assigns responsibilities to 28 different individuals and offices, extols the benefits of fitness, describes required reports, and lists disciplinary action for noncompliant airmen. The AFI details minimal



Article Highlights

Through the decades, the Air Force Fitness Program walked a twisted path to arrive at its present status. Rather than focusing on assuring regular personal conditioning, the Air Force has spent decades searching for the latest and greatest annual evaluation tool.

Today, Air Force leadership can be proud of building the strongest fitness program in Air Force history. Improvement in personal fitness and total force fitness is evident by significant reductions in poor fitness test scores and slightly improved fitness activity levels. Unfortunately, 24 percent of the force still has not achieved adequate fitness levels to meet Air Force standards or help decrease personal morbidity and mortality risks associated with low-level fitness. The Air Force should pat itself on the back for taking a giant step forward, but then immediately set a course on continued advancement. Specifically, the Air Force must direct efforts toward building an Air Force fitness culture that emphasizes robust, comprehensive fitness lifestyles, rather than a fitness program that focuses on annual fitness testing and administrative details.

In “Air Force Fitness Culture: Are We There Yet?” Colonel Thomas F. Roshetko examines the evolution of Air Force fitness and options for reaching full program effectiveness. Major areas of discussion in the article include military fitness requirements, Air Force Fitness Program history, and the Fit-to-Fight Era. He concludes with Air Force Fitness—The Way Ahead. In that section he makes the following recommendations.

exercise requirements for each airman, including aerobic conditioning in the 70 to 85 percent maximum heart rate range for 20 to 60 minutes. It states that this should be done 3 days per week to maintain current fitness levels and 4 to 5 days per week to improve fitness levels. It also stipulates that strength training requires moderate weight bearing through a full range of motion using all major muscle groups at least 2 to 3 times per week. The annual fitness assessment serves as a primary compliance measure. The test consists of four scored components: a 1.5-mile run, a 1-minute push-up, a 1-minute crunch, and an abdominal circumference (AC) measurement. Summed component points produce a single composite score based on a 0 to 100 scale. Airmen must achieve 75 points or greater for a *passing* score. Airmen scoring below 75 are entered into an interventional program to include education, exercise oversight, and must retest within the next 45 to 90 days.

Air Force Fitness Program History

1947 to 2001: The Searching Years

Through the decades, the Air Force Fitness Program walked a twisted path to arrive at its present status. Rather than focusing on assuring regular personal conditioning, the Air Force has spent decades searching for the latest and greatest annual evaluation tool. In his autobiography, *A General's Life*, General Omar Bradley provides fitness frustration examples dating back to World War II. He states: “The rudest shock we experienced with the draftees was the discovery that they, the prime of America, were generally in appallingly poor physical condition. Only a few were capable of hard sustained physical exertion that we knew they would experience in combat.”⁴ In response, the Army instituted an intense 16-week physical conditioning for recruits. Because of war conditions, the Army felt little need to push formalized fitness beyond basic training. In fact, not until the draft ended in 1973, did the Army become concerned about retaining fit soldiers, with a primary focus on the growing obesity problem.⁵

At first, the Air Force continued the training camp only Army program when it became a separate Service in 1947. Later that year the Air Force published a three-paragraph fitness regulation leaving implementation to the major command's (MAJCOM) discretion.⁶ The Air Force Fitness Program remained essentially unchanged from 1947 to 1959, when the Air Force School of Aviation Medicine concluded that “the overall state of physical fitness in Air Force personnel is poor.”⁷ At that time the Air Force instituted mandatory weekly physical exercise, but set no mandated fitness standards until 1962. For the next seven years the Air Force assessed conditioning via age-based weight standards and a timed five-component strength test.⁸

During the 1960s, Air Force Major (Dr) Kenneth Cooper, developed a fitness conditioning program for astronauts. His efforts revolutionized preventative medicine and created *aerobic* conditioning. He pioneered cardiovascular exercise and in 1969 the Air Force implemented his fitness plan. Unfortunately, the Air Force primarily focused on an annual 1.5 mile run rather than emphasizing Dr Cooper's weekly exercise point system. The annual run test remained in place for 23 years, but during this time the Air Force did nothing to proactively push personal fitness programs.

Article Highlights

In 1992, in what may be considered one of the Air Force's all-time controversial decisions, the Air Force implemented an annual submaximal heart rate test called cycle ergometry. This was done at the behest of those pushing for greater science and safety. It was decided that riding a stationary bike for 8 to 14 minutes would maximize safety and still adequately assess military fitness. With this implementation, the organization most responsible for pioneering aerobics walked further away from the very research that had taken the wellness world by storm. Several problems resulted from cycle ergometry testing, but the most important was the Air Force once again relegated year-round personal aerobic conditioning to secondary importance. Just 14 years earlier, Major Cooper used data from 5,000 airmen to publish the world's most comprehensive study on health improvements secondary to aerobic exercise.⁹ Although Major Cooper identified several assessments to measure individual fitness levels, he repeatedly emphasized daily personal fitness conditioning as the key to increased health and wellness. Dramatically, he highlighted the unfortunate fate of American farmers as a clarion call for increased physical fitness. He stated:

Years ago, you could predict, sight unseen, that they were all in excellent condition. Not so today. The farms...have become so mechanized...the rural men are not much better off than their sedentary city brothers. The young recruits...today (1968) show little difference between boys raised in the city and...on a farm. Sad, but true.¹⁰

Unfortunately, AFI 40-501, *The Air Force Fitness Program*, changed only the test process and not the overall Air Force fitness mindset. The AFI required commanders to allow members to exercise three times per week on duty unless "mission requirements directly prohibit doing so."¹¹ It also required airmen to "meet and maintain Air Force fitness standards through participation in a regular and consistent exercise program throughout their military service, and into retirement."¹²

Despite this mandatory requirement a 1995 DoD survey found that only 50 percent of airmen self-reported meeting exercise standards, ranking the Air Force last of the four Services.¹³ In April 2002, the Air Force Population Health Support Division (PHSD) determined self-reported minimal fitness activity levels had increased to 65 percent.¹⁴ Both of these surveys are likely inflated since most studies of self-reported exercise prove to be exaggerated. In fact, studies show self-reported conditioning programs become more inflated in direct proportion to decreasing levels of fitness and increased levels of excess weight.¹⁵ Furthermore, Air Force leadership's test-centric myopia can be illustrated further by the fact that no Air Force forum ever requested exercise activity data. Therefore, in 2003, the Air Force Fitness Program Manager needed to run a special query report for the working group designing the Fit-to-Fight Program (at that time called WarFit).¹⁶

The cycle ergometry era can be complemented for attempting to better quantify testing, but unfortunately, the test's limitations diluted the results. In fact, in the mid-90s, the Uniformed Services University of the Health Sciences (USUHS) evaluated cycle ergometry's effectiveness. Under controlled studies, USUHS determined that 77 percent of tests had a predictive error rate greater than one standard deviation. The report stated, "In sum, the Air Force test...is unreliable and underestimates VO₂ [maximal oxygen uptake or aerobic capacity] (on average) by approximately 15 percent."¹⁷ Furthermore, the error rate was 960

- Develop a fitness culture not a fitness program, including renaming the Air Force Instruction
- Establish limited random fitness testing
- Permit the wearing of a pedometer plus one other device on the waist when in uniform
- Improve health and wellness center staffing
- Increase analysis of fitness data

Article Acronyms

- AC – Abdominal Circumference
- AD – Active Duty
- ADAF – Active Duty Air Force
- AFB – Air Force Base
- AFFMS – Air Force Fitness Management System
- AFI – Air Force Instruction
- AFR – Air Force Reserve
- AFSPC – Air Force Space Command
- AFSVA – Air Force Services Agency
- ANG – Air National Guard
- BMI – Body Mass Index
- CDC – Center for Disease Control
- DDRP – Drug Demand Reduction Program
- DoD – Department of Defense
- DoDI – Department of Defense Instruction
- EPR – Enlisted Performance Report
- FAB – Fitness Advisory board
- FPM – Fitness Program Manager
- GE – General Electric
- HAWC – Health and Wellness Center
- HE – Health Educator
- HPM – Health Promotion Manager
- NASA – National Aeronautics and Space Administration
- OPR – Officer Performance Report
- PHA – Periodic Health Assessment
- USUHS – Uniformed Services University of the Health Sciences
- WBFMP – Weight and Body Fat Management Program

times more likely to underestimate fitness than to overestimate fitness.

To accommodate these (and other) test sensitivities minimal passing scores were set between the seventh and eighteenth percentile range of the adult United States (US) population. Thus airmen who barely passed cycle ergometry testing reflected fitness levels equivalent to the least fit civilians. Despite these low standards, at the conclusion of calendar year 2002, only 73.15 percent of the airmen who took the test achieved a passing cycle ergometry score. In addition to these poor test results, 22.8 percent of the Air Force did not complete the required annual test.¹⁸ Most importantly, because cycle ergometry measured a submaximal heart rate response, there was limited ability to predict the Air Force fitness capabilities under intense combat conditions.¹⁹

2001 to 2004: The Origin of Fit-to-Fight

Many times experts conceive of better ways to do things, yet need to wait for the right opportunity to introduce the idea. So exercise physiologists and health promotion experts across the Air Force anxiously waited for a chance to improve the Air Force fitness culture. In November 2001, the door to changing the fitness program opened slightly and the full weight of the AF/SGP (Air Force Flight Surgeon) office and many field offices applied pressure.

While presenting an overview on Air Force medical issues to AFSPC leaders, Colonel Steve Meigs, surgeon, Air Force Space Command (AFSPC/SG), reviewed findings from two DoD studies regarding similar prevalence of obesity between active duty and civilian males (59 percent and 62 percent, respectively).²⁰ He also noted the studies estimated costs related to this excess body weight.

- Direct Care Medical Costs = \$23.9M
- Lost Productivity Costs = \$4.2M
- Lost Work Days = 33,645 (approximately 157 lost full time equivalents)²¹

Command Chief Bruce Brady, 90th Space Wing (SW/CCC), FE Warren Air Force Base (AFB), politely interrupted Colonel Meigs' presentation, seeking clarity about the Air Force Weight and Body Fat Program (WBFMP). In essence, Chief Brady felt that the program unfairly punished moderately heavy members who were capable of meeting all duty responsibilities and presented a professional image. Likewise, he stated, some overweight members avoided similar discipline, because tape measuring procedures to determine body fat favored members with thick necks. Chief Brady's question prompted a spontaneous and aggressive discussion between wing commanders and fellow chiefs. Witnesses state that General Ed Eberhart, Commander, Air Force Space Command (AFSPC/CC), let the conversation continue for 30 minutes before calling a halt. He then directed Colonel Meigs to have his SG staff evaluate the WBFMP via the following statement.

We spend a lot of money every year assisting our personnel in tobacco cessation and alcohol abuse treatment but do very little to assist those having trouble maintaining weight standards. It seems like we could do better.²²

Chief Brady had firmly hit on a challenging regulation. AFI 40-502, *The Weight and Body Fat Management Program*,

required members exceeding weight-height standards to have body fat assessed by anthropometric taping. Those exceeding body fat standards required formal enrollment in an education and disciplinary program with seven separate phases. The AFI dictated that commanders take an aggressive series of actions leading to administrative discharge for those not attaining body fat standards. Regardless of fitness levels, excessive body fat levels resulted in disciplinary action. In addition, enrollees had to meet body fat standards prior to WBFMP disenrollment, even if they reduced their weight to proper standards.²³ Thus, airmen who met Air Force weight standards were actually discharged from the Air Force. Furthermore, despite mandatory enrollment processes for everyone exceeding weight standards, it appeared that commanders unequally enforced WBFMP enrollment for officers and enlisted personnel.²⁴ According to Dennis Davis, HQ AFPC/DPSART (AFPC Data Retrieval Section), between January 1993 and May 2001 the Air Force discharged 4,086 enlisted members and 76 officers for failure to meet WBFMP standards, an astonishing 54 to 1 ratio.²⁵

The HQ AFSPC/SG clinical staff quickly determined the answer to General Eberhart's tasker lay in improving airmen's fitness rather than solely concentrating on body fat reduction. General Eberhart agreed and created the AFSPC WarFit pilot fitness program to run concurrently with the WBFMP. Over the next 24 months AFSPC, in concert with the AF/SGP staff, assessed a series of fitness options directed at increasing personal fitness, improving commander and airman fitness education, and field testing a composite fitness assessment. Specifically, the WarFit Program emphasized duty time workouts three times a week and unit-led group workouts at least once a week. The assessment included the four-part score now used as the Air Force Fitness Test.

WarFit succeeded immediately in several areas, but most dramatically among those enrolled in the WBFMP. Upon initial WarFit testing, 28 percent of those enrolled were identified with fitness composite scores reflecting low health risks. Dramatically, 40 percent of enrollees with high health-risk indicators were able to achieve low risk standards after completing a 3-month intensive WarFit Program. By contrast the official WBFMP Mandatory Fitness Improvement Program demonstrated only a 14 percent conversion of personnel from high to low health risk.²⁶

These results paralleled civilian research which identified poor physical fitness as a greater health threat than body fat. In these studies, obese men, as defined by body mass index (BMI) greater than or equal to 30 kg/m², reduced their cardiovascular disease risk by 333 percent after establishing moderate to high fitness levels. In contrast, unfit lean men, with BMIs between 18.5-24.9 kg/m², had 2.2 times the relative risk for mortality compared to obese men who were fit (see Figure 1).

Dr Steve Blair, president and chief executive officer of the Cooper Institute (of Major Cooper fame), a leading researcher of these studies stated: "It is better to be fat and fit than it is to be a normal weight and unfit in terms of mortality predictors. You cannot determine how fit someone is by looking at them."²⁷

Dr Rick Kausman, Australian Medical Association spokesman, concurs advocating for fitness over body size. "We've been brainwashed to believe that healthy weight is a size 8.... We're clearly not all meant to have a BMI of 22, or be a size 8 or 10. Human beings are meant to come in all shapes and sizes."²⁸

AFSPC and AF/SGP, with support of the Air Force Chief of Staff (AF/CC) began marketing WarFit information across the Air Force in 2002. Overall, WarFit met strong support, but consistently leadership raised concerns regarding “being able to afford” duty time for workouts and about the fairness of the abdominal circumference. Repeatedly, WarFit presenters answered duty time concerns using extensive corporate studies, including the National Aeronautical Space Administration (NASA) and General Electric (GE) aircraft. These civilian studies showed work hour fitness programs resulted in increased individual productivity, increased employee retention, and decreased employee sick days.²⁹ Abdominal measurement issues were addressed via many health care studies identifying fitness as more important than fatness, with abdominal circumference serving as an independent risk indicator for cardiovascular related morbidity and mortality.

Air Force Chief of Staff, General John P. Jumper, took great interest in the AFSPC effort, and via the Air Force Medical Operations office directed the Human Systems Information Analysis Center to coordinate an independent technical review of the proposed program before making Air Force-wide changes.³⁰ A panel of six civilian fitness and nutrition experts, along with Colonel Karl Friedl, US Army, Military Operational Medicine Research Program director, concluded:

This programmatic approach should be considered a significant improvement in the Air Force fitness assessment and health screening policies. To ensure its acceptance...the Air Force should promote the emotional appeal of the program and minimize...the punitive measures. The program will need strong leadership support and aggressive marketing with an emphasis on establishing a *culture of fitness* (emphasis added).³¹

The 22-page report, while supportive of the program, identified numerous issues to beware of including the challenge of correlating body fat directly to a fitness-centric test. One reviewer stated, the “exact weighting” of categories is difficult, but the proposed scoring system is “certainly an educated judgment call.” A second reviewer corroborated that the category cutoffs points are “somewhat arbitrary and subjective,” but “seem reasonable and justified in terms of our general knowledge of the relation between aerobic fitness levels, body fat and risk for morbidity, and adequacy for physical readiness.” In direct contrast, one panel member hesitated to endorse the cut points saying: “A great deal of additional work is needed to determine the reliability and validity of this scheme.” In summary, the panel accepted the Fit-to-Fight assessment tenets as pragmatic, but untested, firmly agreeing that continued cut-point assessments would be required as additional data becomes available.³²

The report put greater emphasis on creating robust health-fitness knowledge and stimulus. One panel member stressed the importance of communication by saying, “Structure, organization, consistency, communication, communication, communication, and general corporate culture are keys to your success.”³³ A second member pleaded, to concentrate on the positive carrot and go lightly on the “looming career-stopping” stick. Additional direction exhorted the Air Force to market the program to each airman, directing them to understand the “relationship among fitness, fatness, and health, and work toward inculcating fitness” into a lifestyle.³⁴ In the end, the panel supported the proposed Fit-to-Fight Program as a strong plan, but argued that success required strong execution from the highest level of Air Force leadership down to each airman.

General Jumper accepted the panel’s recommendation and directed the Air Force surgeon general to create a Fit-to-Fight Program, including a new AFI that combined AFI 40-501, *The Air Force Fitness Program* and AFI 40-502, *Weight and Body Fat Measurement Program*. In preparation for the change, in late 2003, General Jumper directed added attention to fitness across the Air Force. On 1 January 2004, AFI 10-248, *Fitness Program*, became operational.

In the January-February 2004 TIG Brief, General Jumper addressed the Air Force, stating that the amount of time we spend on fitness is not “consistent with the growing demands of our growing warrior culture. It is time to change that.” Later in the letter he stated, “Over the past several months, I have received extremely positive feedback regarding our fitness changes. I’ve personally observed some outstanding leadership out in our Air Force—commanders and supervisors leading from the front and making fitness a priority in their daily schedules.”³⁵ The Fit-to-Fight Era was off and running.

The Fit-to-Fight Era

The fitness program debuted with enthusiasm and great support. Almost overnight, airmen of all ranks improved their fitness focus. Data since program inception shows the Air Force has collectively improved fitness conditioning. Air Force bases now bear witness to daily group exercise, a site fairly nonexistent prior to 2004. Unfortunately, several Fit-to-Fight components require additional attention. Below are a series of Fit-to-Fight brags and concerns.

Increased Fitness Center Usage and Facility Improvement

Air Force Services Agency (AFSVA) data reflects a “36 percent increase in fitness center usage since the onset of Fit-to-Fight.”³⁶ In support of Fit-to-Fight, AFSVA revitalized their primary mission to a three-prong approach.

- Support unit commanders’ fitness programs
- Support fitness improvement program enrollees
- Provide on-site, interactive customer service with equipment

In addition, AFSVA has exponentially elevated fitness facility quality as defined by a *star-level* grading system ranging from 1 (poor) to 5 (excellent). Since 2002, using this Air Force 5-star level program scores, AFSVA increased from three 5-star programs to 29, and 4-star level programs increased from 4 to 29 out of a total of 144 Air Force fitness centers. Though the star-

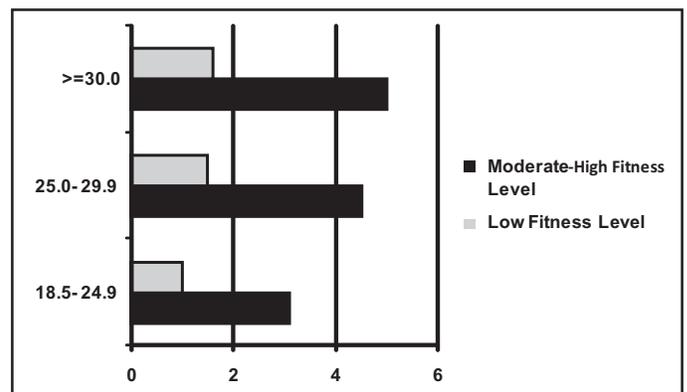


Figure 1. Mortality Risk Based on BMI and Fitness Level

level program began prior to Fit-to-Fight's inception, the new fitness push aligned well with this AFSVA goal. As a result, fitness center personnel refocused their effort to better meet customers' needs. Now commanders and airmen enjoy better facilities for their increased workouts. In turn, the better fitness center programs helped improve many facilities' star rating.³⁷ Due to facility usage demand, the Air Force also increased space requirements for 61 planned fitness center construction projects.³⁸

Decreased Poor Fitness Scores

A substantial decrease in the percentage of *poor* composite fitness scores indicates that Fit-to-Fight is a success. According to annual Air Force fitness reports (see Figures 2 and 3) the percentage of poor fitness scores among both genders and enlisted personnel increased slightly in 2005 before substantially decreasing in 2007.^{39 40 41} Officers in the poor category decreased in 2005 and 2007. (Note. This author has been unable to obtain a copy of the 2006 report.)

When the Air Force components are separated there is variation noted in the improvement rate of poor fitness scores. According to the 2007 annual report active duty Air Force (ADAF) poor fitness rates were reduced to 2.89 percent, whereas poor rates for the Air National Guard (ANG) and the Air Force Reserve (AFR) were reduced to 4.75 percent and 8.75 percent, respectively. Interestingly, while ANG and AFR poor category

rates declined each of the three recorded years, the ADAF increased in 2005 before significantly dropping in 2007 (see Figure 4).

Air Force Fitness Advisory Board

In 2006, the commander for the Air Force Medical Operations Agency (AF/SG3) created an Air Force Fitness Advisory Board (FAB) for the purpose of assessing "scientifically valid and defensible research and guidelines that support fitness policy."⁴² Establishing the FAB demonstrates the Air Force plans to continually refine the Air Force Fitness Program. In fact, under guidance of the FAB, the Air Force Audit Agency conducted a Fit-to-Fight Program review at 15 Air Force locations between August 2007 and June 2008. The audit report, date 11 December 2008, identified significant variation in program implementation between squadrons and across the Air Force. The report suggested several improvements in the areas of unit-level fitness policies, fitness test exemptions, group exercise, and administrative action for airmen with poor fitness scores.⁴³ The FAB is currently reviewing these recommendations and plans to provide new Air Force guidance in the future.

Emphasizing Test Compliance over Personal Fitness Program

Air Force leadership's test-focused mentality continues to inhibit greater fitness progress. During WarFit marketing, the AFSPC/SG staff continuously warned audiences that overemphasis on the annual test risked program success. In fact, the WarFit presentation included several slides that simply said, "It's About a Personal Fitness Program." According to Deena Ellin, WarFit co-designer, prior to presentations the speakers would disperse laminated cards printed with those words. Whenever audience questions or comments became too focused on fitness test issues, the presentation speakers would have the audience hold up these cards. In fact, many times the audience spontaneously raised their cards without being prompted.⁴⁴ Unfortunately, as of today the Air Force still directs greater attention to the test than on each airman developing a year-round aerobic, strength, stretching, and nutrition physical conditioning program. The test addresses how well an airman does for one hour each year, but does not reflect whether the airman worked out 156 days a year, as required for those attempting to maintain

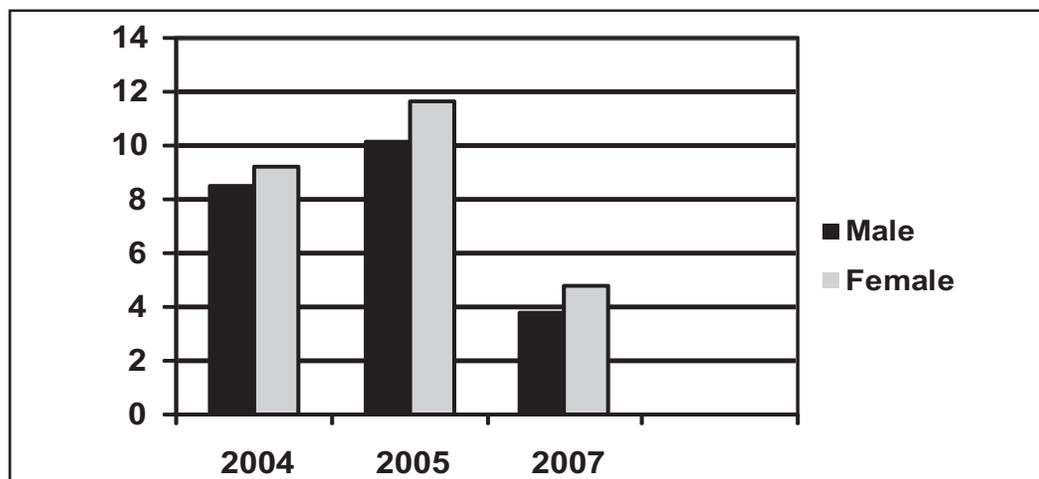


Figure 2. Percentage of Total Force Air Force Personnel in Poor Fitness Category by Gender

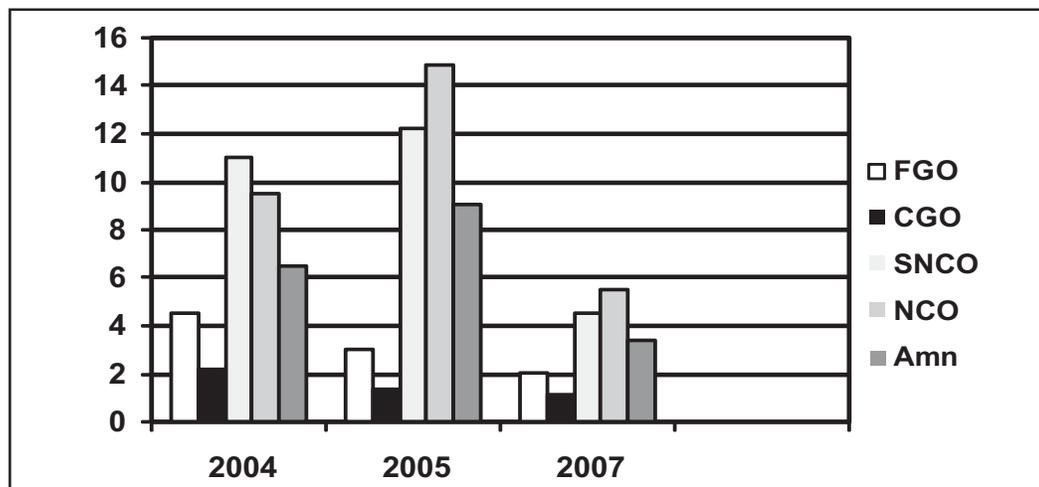


Figure 3. Percentage of Total Force Air Force Personnel in Poor Fitness Category by Rank

their current fitness level, or 260 times a year, as required, if they are trying to improve their current fitness level.

Individual and population fitness workout data is gathered on two separate military surveys, but unfortunately they do not align with the Air Force fitness assessment databases. One source of fitness activity can be extracted from the periodic DoD health-related behavior surveys which anonymously obtain active duty fitness behavior. Results have been published nine times since 1980.⁴⁵ The last

publication occurred in December 2006 and reported survey information collected from April to August 2005. This edition notes that in 2005 only 66.9 percent of active-duty airman reported having moderate or vigorous physical activity in the past 30 days for 3 or more days per week. This percentage dropped to 45.9 percent when the question was restricted to only vigorous activity.⁴⁶ This is an alarming low rate considering this survey was conducted 16 months after the Air Force initiated Fit-to-Fight. It also identified only a slight improvement over the 64.9 percent rate identified by the Air Force Population Health Support Division in 2002—two years before Fit-to-Fight was initiated.⁴⁷

A second source of fitness activity level can be extracted from the Periodic Health Assessment (PHA) data. Since January 2008, each airman has been required to complete an electronic health survey as part of their annual PHA assessments. This evaluation includes the following questions.

- In a typical week, on how many days do you do any VIGOROUS activities for at least 30 minutes that caused heavy sweating, or large increase in breathing or heart rate?
- In a typical week, on how many days do you do any MODERATE activities for at least 30 minutes that caused only light sweating, or slight to moderate increase in breathing or heart rate?
- In a typical week, on how many days do you do any physical activities specifically designed to strengthen your muscles such as lifting weight, push-ups or sit-ups?

Though data has not been formally analyzed, a cursory review of PHA questionnaire data from 156,286 airmen collected during the first 3 quarters of calendar year 2008 indicates a modest improvement in fitness activity as compared to the 2006 DoD survey report. Specifically, the percentage of airmen meeting Center for Disease Control (CDC) recommendations for weekly physical activity (two or more days of strength training and either three or more days of vigorous activity or five or more days of moderate activity) are demonstrated by the ranges depicted in Table 1.

In general, this data denotes a continued improvement in overall fitness activity among active-duty members. Yet, several issues limit absolute comparison to the 2002 and 2006 reports. PHA data is client-specific medical information, so survey data are not anonymous. In addition, PHA data summary combines

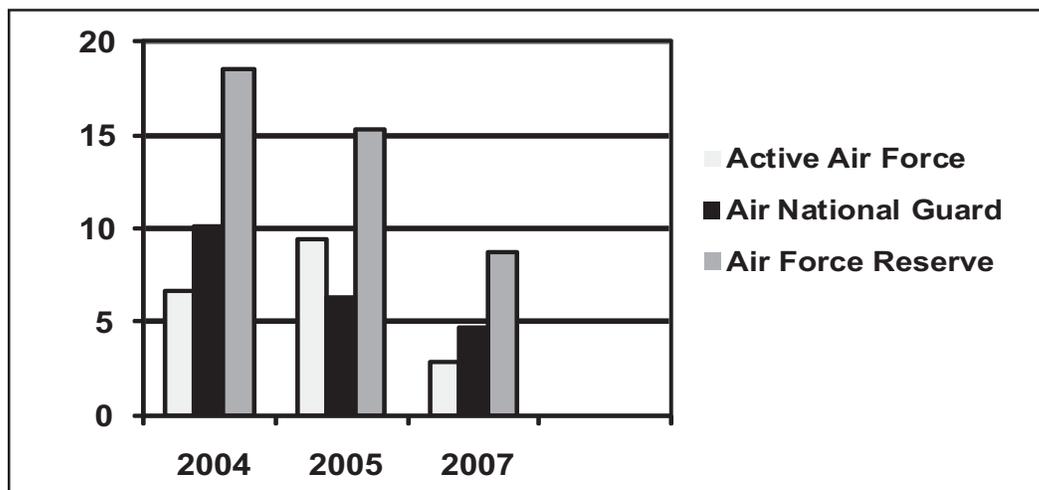


Figure 4. Percentage of Air Force Personnel in Poor Fitness Category by Component

		% Range Meeting CDC Weekly Physical Activity Goal
TOTAL SURVEY		73.18% - 75.15%
AGE	17-24	74.84% - 77.36%
	25-29	76.01% - 77.97%
	30-34	74.16% - 75.20%
	35-39	69.59% - 71.92%
	40+	66.69% - 68.01%
GRADE	Enlisted	73.49% - 75.77%
	Officer	72.01% - 72.86%
GENDER	Male	74.89% - 77.07%
	Female	66.18% - 67.36%
BMI	Healthy Weight	71.92% - 73.92%
	Overweight	74.37% - 76.53%
	Obese	73.02% - 74.04%

Table 1. Air Force PHA Activity Level Questions for First to Third Quarter 2008

compliance with aerobic conditioning and strength training, and thus depicts a better evaluation of fitness activity. The 2002 and 2006 reports were anonymous and only evaluated aerobic fitness activity. Finally, previous studies were presented as total population data, so it cannot be directly compared to subcomponents listed in Table 1.

Despite these limitations, the PHA data present several discussion points. The Air Force deserves credit for continuing to improve fitness activity levels. The PHA data indicates a 6 to 8 percent improvement in personnel meeting CDC fitness activity standards as compared to results from the less stringent 2006 DoD survey. Unfortunately, at least 24 percent of Air Force active-duty members continue to not meet AFI fitness activity requirements. Thus 61 months after the Air Force set a year-round workout goal for all members one in four airmen remain noncompliant. A closer look at the numbers presents several other findings of concern.

- After age 29, fitness activity levels drop precipitously.
- Officers work out less than enlisted personnel.
- Females work out approximately 7.4 percent less than men.

- Overweight airmen (BMI 25.1-29.9) work out more than obese airmen (BMI \geq 30).
- Overweight and obese airmen work out at a greater rate than airmen that are within healthy weight standards (BMI \leq 25).

Although conclusive evaluation requires more extensive data analysis, this cursory review presents opportunities for immediate attention. My conclusion is that senior leaders and officers are not leading by example with regard to personal conditioning programs. The low female gender activity numbers reflect a significant deficit compared to men. It is possible low female fitness levels are merely related to medical conditions such as pregnancy, but assumptions should not delay further analysis and recommended resolutions. Accolades should be given for those overweight and obese members who established fitness regimes, yet 25 percent of members with overweight health risks are not meeting the activity levels most likely to reduce their risk.

To date, the Air Force has not formally taken action to address personal fitness programs, yet has expended substantial effort refining the annual fitness exam. In fact, the Air Force has made at least eight changes to the annual assessment process. Though some fitness assessment component changes were merited and effective, at least three contributed to further distancing the Fit-to-Fight focus from the AFI's main goal. These problematic changes are discussed below.

- 2005—Added A8.4, Run times/scores will be adjusted automatically in the AFFMS for those members who test at facilities with an altitude of 5,000 feet or greater.

Rationale. Airmen running above 5,000 feet require a point adjustment to account for the effects of altitude on aerobic capacity.

Counter to rationale. The AFI already requires a 42-day acclimation period for all airmen prior to testing at new locations. This accurately compensates for altitude acclimation within the testing environments. Using the over 5,000 feet logic could be equally argued for all altitudes above sea level, thus the only fair scoring system would be a sliding scale of points per run time at a series of altitude intervals. It is interesting to note that no low-altitude college or professional sports teams are spotted *altitude adjustment* points prior to a game held above 5,000 feet.

- 2005—Added 3.2.2.1, Full complement of points (30) is awarded to those with a body composition BMI of \leq 25 kg/m² regardless of AC measurements.

Rationale for change. Air Force leaders felt if weight-to-height association fell within *normal* standards, BMI should take precedent over AC and the full 30 points should be earned.

Counter to rationale. AC is an independent measure of the relative risk for cardiovascular disease. Multiple studies have determined AC risks are independent of height. Thus a male with a 40-inch AC has equal risk for cardiovascular disease whether they are 5 or 6 feet tall. Likewise for women with a 35-inch AC. Furthermore, abdominal adiposity health risks are independent of BMI.⁴⁸ At the very least, points awarded for \leq 25 BMI should not be the full 30 AC points. Lieutenant Colonel Lisa Schmidt, the original author of AFI 10-248, believes such individuals should receive at most 22.5 points, 75 percent of possible 30 points.⁴⁹

- 2007—Added fitness to officer and enlisted performance reports (OPRs/EPRs), requiring the most current fitness assessment be labeled as *met standards* (composite score 75 or greater) or *does not meet standards* (composite score less than 75), to include making report referrals, if the ratee does not meet standards.

Rationale for change. Air Force leadership desired to factor health into promotion by giving additional information to promotion boards. This reinforced the importance of fitness in the warrior ethos and provided objective criteria when assessing which airmen should be separated from the Air Force.⁵⁰

Counter to rationale. By making OPR and EPR referrals for airmen not meeting fitness standards, it essentially makes the test a pass or fail event. Unfortunately, this compromises the intended purpose of the 1 to 100 composite score scale created to depict individual health risk along a continuum. In addition, the Air Force has not yet administered the fitness program sufficiently to warrant going to such a punitive route at this time. Specifically, as noted by the Air Force Audit Agency report, "the Air Force needs commanders to improve compliance with duty time workouts as directed by AFI 10-248."⁵¹

Limited Use of Fitness Data Base

The Air Force Fitness Management Systems (AFFMS), was implemented in early 2004, and designed as the primary repository of fitness assessment information, including dates, scores, and demographic information. The AFFMS links with several other Air Force databases, including the Military Personnel Data System and the Dental Data System. In addition, the system generates a series of reports, including individual evaluations with trended composite scores over time and comprehensive unit level reports. The reports are easy to generate and appropriate levels of database access are controlled at the base level.

The basic AFFMS program works well, but improvements need to be made. Currently many composite score cells have null values, making it very difficult to assure accuracy of reports, especially those compiled for large populations. The United States Air Force School of Aerospace Medicine identified this problem while compiling a comparative fitness score study from AFFMS data for the years 2004 to 2006. Colonel Jon Casbon, an Air Force flight surgeon and primary author of the study, stated that the data needed major cleaning up and that though the final analysis seems sound it "required us to take a lot of liberties and make assumptions."⁵²

AF/SG's clinical information's branch (AFMSA/SGKRP) provided this author with a large AFFMS database in an effort to duplicate the study using 2006 to 2008 fitness data. Unfortunately, null problems remained evident in thousands of cells, making it very difficult to assure data integrity and to accurately duplicate all assumptions made during Colonel Casbon's analysis. Because of these extreme challenges this author abandoned efforts to perform a comparative study. The Air Force Audit Agency report also noted that AFFMS "data reliability showed an error rate that casts doubt on the data's validity."⁵³

On the other hand, Dr Casbon's study provides an outstanding review of fitness test assessment between three testing cycles starting at the program stand-up. The data compared individual

airmen's composite fitness scores and 1.5-mile run times between 2004 and 2006. Among the many conclusions, the study determined that:

[The] mean composite scores improved 3 to 5 percent for those in the marginal fitness category (this category was eliminated in August 2007⁵⁴) and 22 percent in the poor category. Mean score for the 1.5-mile run improved by 3 to 4 percent in the marginal group and by 10 to 12 percent in the poor group.⁵⁵

Furthermore, the study seemed to support the contention that airmen are focused on passing the fitness test and not improving personal fitness year-round.

As hypothesized, results of the study indicate the new Air Force Fitness Program had little impact on those who already met fitness standards. The proportion of individuals in the good fitness category remained essentially unchanged and the excellent category increased by only 6 percent. Despite this apparent upward migration, mean composite scores showed little change and mean 1.5-mile run times were slightly slower in the combined good/excellent group.⁵⁶

HAWC Staffing

The Fit-to-Fight Program experienced *collateral damage* because of changes made in October 2005 within Air Force Health and Wellness Centers (HAWC). In an effort to align active-duty positions with deployable skill sets and support manpower cuts, the AFMS transitioned the health promotion manager (HPM) role to a contract health educator position. Though meritorious from a force structure standpoint, the decision unintentionally shifted many HAWC administrative duties to the civilian fitness program managers (FPM). In fact, Deena Ellin states that in most HAWCs the FPM now serves as the de facto HPM.⁵⁷ The shift of these HPM duties coincided with additional FPM workload associated with maturing wing fitness programs. Specifically, the fitness AFI required FPMs to conduct fitness review panels for all members achieving three consecutive poor fitness scores. According to Ms Terri Jordan, FPM, Keesler AFB, Mississippi, these panels take only 15 to 30 minutes to conduct, but can take several hours to coordinate the schedules of all five panel members. In addition, FPMs are required to compile a three to four page post-panel report. (Note. The panels appear to foster greater testing success. Ms Jordan estimates 60 percent of airmen receiving a fitness review panel earn a composite score above 75 on their next fitness assessment.)⁵⁸

AFI 10-203, *Duty Limiting Conditions*, dated 27 October 2007, further expanded FPM responsibilities. In order to establish consistency across each base, FPMs were granted sole authority to grant fitness exemptions for any member requiring exemptions greater than 30 days or for any member required to complete their fitness assessment in the next 30 days.⁵⁹ FPMs must meet with each member and establish a personalized exercise prescription that accommodates the member's duty restriction, yet maximizes fitness conditioning. The appointment and followup requires substantial planning and coordination.

Since 2004, many FPMs have also added running gait clinics in their HAWCs. These dynamic assessments "have been used in military clinics across the country to encourage safe training and injury prevention by providing proper equipment."⁶⁰ The analysis includes videotaping airmen running barefoot and with their current running shoes. Computer modeling determines foot-ground touch points, foot shape, height of arch, and degrees of foot pronation with each stride. Once the running gait is

determined, the technician provides running education, then using a database determines the running shoe models best suited for proper fit and deemed functionally correct for the individual's gait.⁶¹ These assessments are extremely popular and take 20 to 30 minutes per airman. Per Mr Brent Cowen, FPM, Hurlburt Field, Florida, "The clients absolutely love the shoe clinics. They are appreciative...that it points them in the right direction and...that it is free of charge. I would say 98 percent of the people that we have complete this training are totally satisfied."⁶² At Hurlburt, the running gait analysis finds 75 percent of the airmen evaluated are wearing the wrong shoes.⁶³ Mr Cowen emphasized the benefit by stating, "having a shoe clinic in place provides us with very tangible results," and for those who "purchase the new shoes, the results are almost immediate."⁶⁴ Unfortunately, per Mr Cowan, the demand for running shoe analysis exceeds the scheduled appointments. Attempts are made to accommodate walk-in customers, but that is extremely "disruptive to the work flow."⁶⁵ Because of the many HPM taskings, Mr Cowan can only schedule six appointments per week, plus adds, on average, two walk-ins. In total he provides approximately 400 analyses annually. At this rate it would take 19 years to assess the entire base of 7,710 active-duty members.

Complicating the FPMs' success, many HAWCs continue to operate without the administrative support personnel that each wing is required to provide. When finally assigned these personnel need significant training to fully support all HAWC functions. Unfortunately, these employees regularly rotate out of these roles, leaving gaps and causing another steep learning curve when a replacement eventually arrives. In the meantime, the small HAWC staff must cover front desk duties, take all calls, and schedule attendance at the myriad of HAWC sponsored classes, panels, or one-on-one evaluations. A survey of FPMs in the spring of 2008 noted that only 33 percent of HAWCs were manned with permanent administrative support personnel.⁶⁶

In addition to the duties described above, the FPMs oversee administration of the installation fitness program.⁶⁷ These duties include annual training of unit fitness program monitors, approving unit group physical training programs, and conducting annual quality checks on each unit's fitness and testing program.

Since 2004 the Air Force HAWCs have experienced a *perfect storm*. As the Air Force transitioned to a robust fitness platform and improved the active-duty profile system, the FPM's responsibilities increased by approximately 50 percent.⁶⁸ Unfortunately, this coincided with a decrease in overall HAWC staffing. According to Colonel Casbon, who has evaluated this situation from the headquarters and wing level, "HAWCs are not resourced adequately to provide the assistance required by the fitness AFI"⁶⁹

Limited Fitness Education

Health and fitness education remain limited for the general Air Force population. Those scoring below 75 composite points on annual fitness testing receive education via the Healthy Living Program, Body Composition Improvement Program, or Fitness Improvement Program. Currently, no formal fitness education is mandatory for all airmen.

Ms Shannon Crumpton, Air War College exercise physiologist summarized this concern, "I believe the message was clear as to the intent of the fitness program; however, it lost its gusto not

long after roll-out.”⁷⁰ Dr Casbon provides a similar view by saying: “The educational component is lacking. How do people learn about proper aerobic conditioning, strength and flexibility training, and especially healthy eating? This is generally only offered to those who are deemed unfit in the fitness test.”⁷¹

Air Force Fitness—The Way Ahead

The Air Force Fit-to-Fight effort remains in the *toddler stage*. Fortunately, the Air Force established the FAB as a forum to continuously evaluate fitness program progress and propose improvements. Several fitness improvement options for the FAB to consider for immediate implementation are listed below.

Developing a Fitness Culture not a Fitness Program

The main goal of AFI 10-248 is for each airman to develop a robust fitness lifestyle across the spectrum of aerobic conditioning, strength and flexibility training, and healthy eating. To date, most Fit-to-Fight attention has been focused on annual testing, group exercise, and administrative action. The AFI goal remains sound, thus the Air Force must formerly develop action to meet this goal. Specifically, I suggest the Air Force change the AFI name to “Health and Fitness Program.” This simple change will call attention to the AFI’s far broader intent of establishing full spectrum health and fitness for each airman.

The FAB should also develop a series of health and fitness education tools for each airman to review. Furthermore, unit physical training leaders should regularly incorporate exercises from the education tools into group fitness activities with a brief reminder of the value this exercise adds to fitness programs. Education tools could be easily added to recurrent computer-based training requirements. Another education option would be to hold in-person briefings similar to suicide prevention and sexual assault prevention training that could include personalized health-fitness information at the unit, group, or wing level. Commanders and senior noncommissioned officers also need leadership training on health and fitness issues, specifically addressing their role in guiding subordinates to establish and maintain healthy lifestyles. The best mode of health and fitness training can be determined by the FAB, but individual and leadership education is long overdue.

Establish Random Fitness Testing

The current annual testing requirement presents several issues related to fairness and value. The annual fitness assessment meets the DoD annual test requirement, but fails to assure “Service members maintain physical readiness.” To illustrate, two members earning a 75 and a 100 composite score, respectively, both technically earn passing assessments. Yet, the statistical likelihood these members will *maintain* physical readiness for the next 12 months vary dramatically. The composite score 0 to 100 spread reflects a health-fitness continuum measured against morbidity-mortality rates and muscular endurance standards. The value of each successive test point is merely a slight decrease of risk. Thus equating a 75 score and 100 score as equally reflecting sufficient fitness for the next 365 days is incongruent with science.

The Air Force further muddied the value of annual assessments by applying the fitness scores to OPRs and EPRs, thus reinforcing a distorted pass-fail labeling. In essence, an airman earning a 75 today earns the label *pass* while the airman

earning 74.9 is labeled *fail*. From a health care and physical readiness perspective, the difference between these airmen is imperceptible. Yet, airman 75 need not prove his fitness capability for another 12 months, while airman 74.9 receives a series of beneficial and derisive interventions, to include retesting every 90 days until achieving a passing score.

Random fitness testing provides significant resolution to this problem. In essence, airmen with passing scores would be at risk for random fitness testing before the next due date. Risk of random selection could be adjusted relative to each airman’s most recent fitness score. Thus, an airman with a 75 score faces significantly greater risk of random test selection than an airman with a 95 score. Randomly selected airmen would need to test within five duty days of notification. Minimal extensions for mitigating circumstances (on leave, experiencing their menstrual cycle, within their acclimation period) would be accounted for within the rules.

Clearly, the logistics need to be worked out, but Air Force fitness experts believe random testing puts the focus on year-long fitness activity and prevents a surge effort just prior to a self-selected fitness test date. Lieutenant Colonel Laura Trent, Chief, Operational Health Promotion and Public Health (AMC/SGP) stated, “A randomized fitness exam schedule would likely improve our overall fitness.”⁷² Ms Crumpton simply states, “...random testing reinforces being at the ready” and helps members “still too conditioned to ‘the test’ rather than understanding the overall benefit received from improved health and fitness.”⁷³ Deena Ellin feels random testing would have benefit, but suggests a possible alternative option of having “units conduct a monthly or quarterly practice assessment and self-manage those individuals who did not meet standards” in order to “make it a more positive experience than a punitive requirement.”⁷⁴

Lieutenant Colonel Schmidt supports random testing, but identifies some concerns: “A random test would be a great way to keep members motivated throughout the year, but we would need to make it manageable for commanders.”⁷⁵ Colonel Casbon also believes random testing would encourage people to work out more often.

Many people get fit in time for their annual evaluation and then ease up on fitness activities the rest of the year. I think random testing would encourage people to work out often enough to be able to pass the test, and I like the idea of adjusting based on fitness score; but, I’m afraid there could be a tremendous administrative tail to random testing. Look at the drug demand reduction program. You have to build the system and processes to randomly identify people for testing. I would not want to see the additional burden placed on commanders.⁷⁶

Colonel Casbon has valid concerns, but the Drug Demand Reduction Program (DDRP) does provide historical support for random testing. Drug use amongst military members became rampant during the Vietnam War, reaching 42 percent in 1971.⁷⁷ During this period an amnesty program resulted in 16,000 Servicemen admitting to heroin use at a level requiring drug abuse treatment.⁷⁸ In response, President Nixon developed a urinalysis program for the purpose of detection, education, and rehabilitation.⁷⁹

Though successful for treatment, the nonpunitive urinalysis did not reduce drug use to acceptable levels. In fact, “the 1980 DoD Survey of Health Related Behavior Among Military

Personnel showed that 27.6 percent of Service members had used an illegal drug in the past 30 days.”⁸⁰ “The need for the stronger drug policy was further supported by a jet crash in May 1981 on the aircraft carrier *USS Nimitz*. Autopsies of 13 personnel killed in the crash revealed that 6 had recently used marijuana and the pilot had especially high levels of antihistamine not prescribed by a doctor.”⁸¹ The lethal accident and stunning survey results ushered in a punitive drug abuse detection process.

DoD established DDRP in 1981 to deter members from using prohibitive drugs which negatively impact the unique hazardous conditions associated with military work. Since its inception, DDRP has claimed stunning results. In 2007, positive active duty drug testing remained below the 2 percent goal. In fact, per Mr William O. Cooley, Air Force Drug Demand Reduction Program consultant, Keesler Air Force Base, Mississippi, the Air Force rate has remained below 1 percent for 15 consecutive years.⁸²

In 2000, DDRP studies determined that the vast majority of positive drug tests occurred among the ranks of E1 to E4 and O1 to O2. In response, DoD implemented Smart Testing and increased annual random testing among these ranks to 100 percent of the total population. Per Air Force Medical Operations Agency (AFMOA), “there was an initial small increase in positives when the program was implemented that lasted for a couple of years. However, in 2005 the positive rate was less than 2004 and continued to decrease through 2007 with 2008 expected to show further declines in positives.”⁸³

Similar to *zero tolerance* for illicit drug use, the Air Force should establish *zero tolerance* for poor fitness. Random fitness assessments would greatly support this effort and greatly reinforce the AFI year-long fitness goal. With the goal of encouraging year-long fitness, random fitness testing could be initiated using Smart Testing format. There are a many options, but I would suggest individuals with fitness scores between 75 and 85 would be at risk for random testing starting 45 days after the previous test. Members with scores of 85 to 95 would be at risk starting at 90 days. In addition, those achieving over 95 would be exempt until their annual date. Any airman not chosen randomly would test before their normal annual due date. The random selection process could be done centrally or at the wing level, and then sent down via the HAWC to unit fitness program managers. Though similar to random drug testing, the five-duty-day testing window makes the entire administrative process less time sensitive than those associated with urinalysis. The FAB should determine a feasibility study for random fitness testing.

Chief Master Sergeant Rodney McKinley, AF/CCC, has suggested testing should be conducted at least twice a year. A recent Air Force Times article also stated McKinley is encouraging commanders to direct on-the-spot testing.⁸⁴ Though possible, this practice will result in inconsistent administration between units. A random test would mitigate this risk and prevent allegation of commander bias.

Wear of Pedometers with Military Uniforms

There are many days demands of military life prevent time for formal physical workouts. Airmen, on these days, would benefit from additional walking during normal daily activities. Fitness experts suggest taking 10,000 steps per day (approximately 5 miles) as a reasonable goal to achieve adequate daily physical activity levels. Pedometers, small devices worn on waistbands, count the number of steps taken by a person over a period of time.

A review of 26 pedometers studies with 2,767 participants concluded users significantly increased their physical activity by 2,491 steps per day more than control participants. Overall, pedometer users increased their physical activity by 26.9 percent over baseline. When data from all studies were combined, pedometer users decreased their body mass index by 0.38 and noted favorable changes in their systolic blood pressure.⁸⁵

Currently, military members are restricted to wearing a single device on their waste in any uniform. Amending policy to permit a pedometer plus one other device would be a simple, pragmatic, and visionary step toward improving the Air Force fitness culture.

Improve HAWC Staffing

The AF/SG Health Promotions Operations recently secured additional HAWC manpower for bases exceeding 5,000 active-duty members. During fiscal year 2010, 24 bases will gain fitness technicians. In addition, contract health educators (HE) in the many HAWCs will be converted to government civilian employees; these civilian job descriptions will be written to allow HEs to assume the HPM role. Per Major Dana Whelan, Chief, Air Force Health Promotion Operations, these changes will help reduce the burden on exercise physiologists and reestablish a balance within the HAWCs. “It is not a complete answer for the HAWCs, but it will definitely help, especially the large HAWCs.”⁸⁶

AF/SG and the FAB should perform a comprehensive manpower study of HAWCs to determine actual staffing requirements, then aggressively provide proper personnel. Air Force leadership should ensure every wing fills the HAWC administrative position and maintain that person in place for minimal period of time (as determined appropriate by the FAB).

Increase Analysis of Fitness Data

AFMSA and FAB should develop robust use of the health and fitness data available via AFFMS, PHA surveys, and other medical databases. Studies, especially if carried out long term, could assess the impact of self-reported activity levels on health and annual fitness scores. Repeating the Casbon study using 2007 and 2008 data would be a great initial study. Refining the AFFMS data entry process to minimize null cells and other data clutter needs to be a priority, but should be fairly easy to accomplish.

Conclusion

Air Force leadership can be proud of building the strongest fitness program in Air Force history. Improvement in personal fitness and total force fitness is evident by significant reductions in poor fitness test scores and slightly improved fitness activity levels. Unfortunately, 24 percent of the force still has not achieved adequate fitness levels to meet Air Force standards or help decrease personal morbidity and mortality risks associated with low-level fitness. The Air Force should pat itself on the back for taking a giant step forward, but then immediately set a course on continued advancement. Specifically, the Air Force must direct efforts toward building an Air Force fitness culture that emphasizes robust, comprehensive fitness lifestyles, rather than a fitness program that focuses on annual fitness testing and administrative details.

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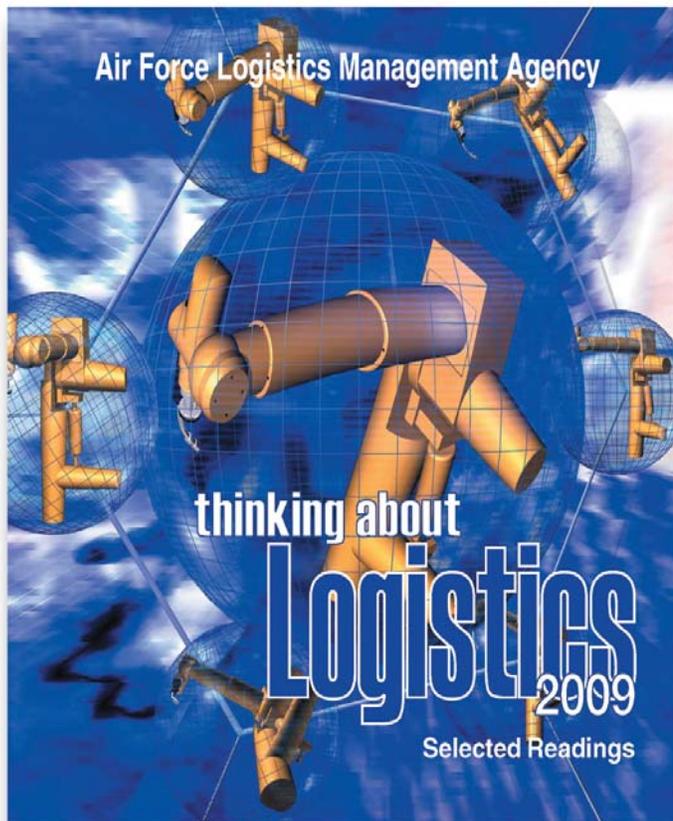
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Introduction

Throughout the Cold War and during the ongoing *Global War on Terrorism*, United States (US) military forces have engaged in a continuing partnership with the Department of State, foreign militaries, and nongovernmental organizations to provide assistance to people throughout the world. Whether as a result of armed conflict or natural or man-made disasters, people in foreign countries have become accustomed to the presence of US military personnel assisting them in a multitude of ways.

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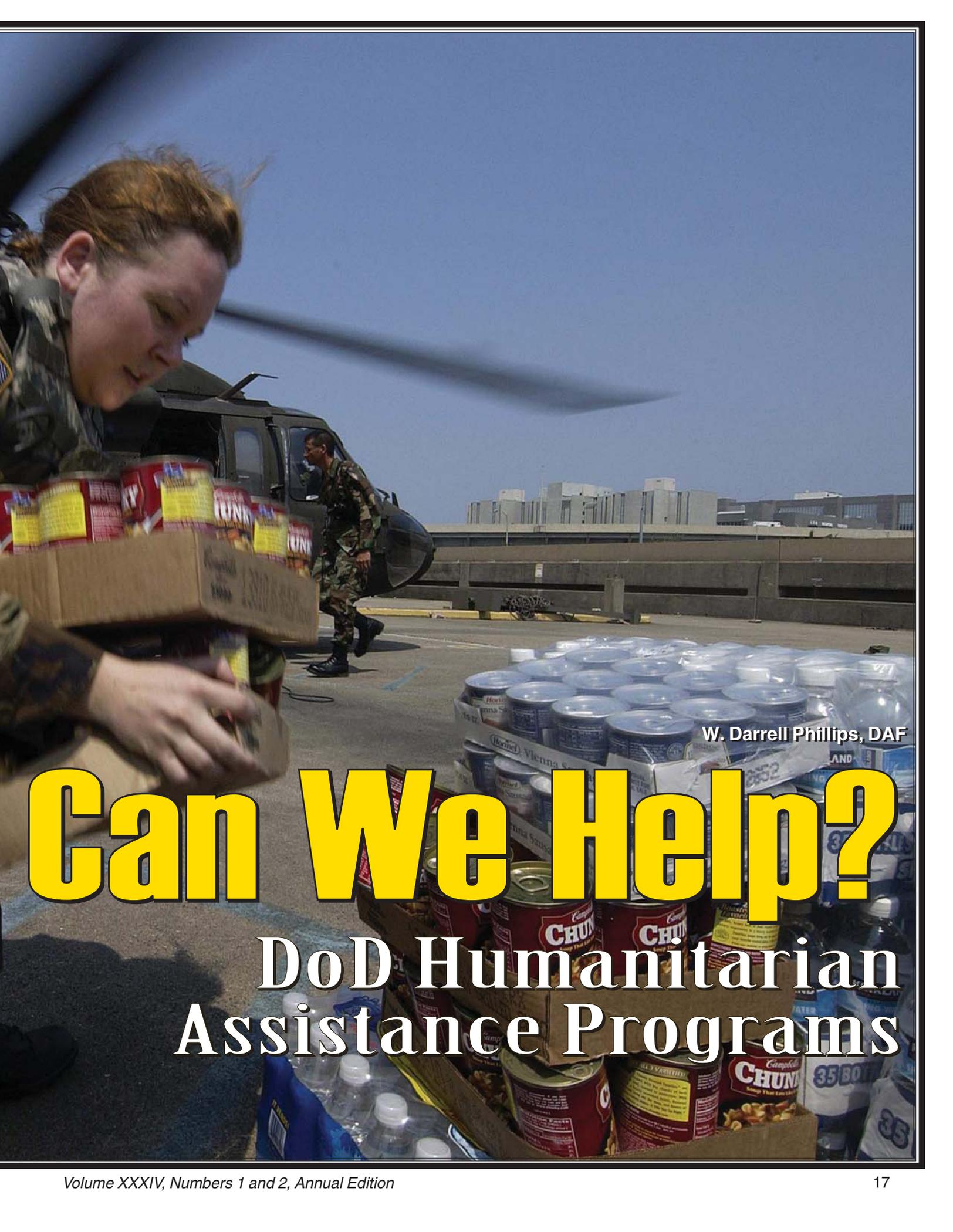
The most recent manifestation of that presence, in response to the Haiti earthquake on 12 January 2010, has again resulted in the provision of massive amounts of US military assistance. However, the reality is that the Department of State (DoS), acting under its authority contained in Title 22 of the United States Code (USC), has the primary responsibility for conducting US foreign affairs and for assisting people in foreign countries. This article will examine the limited role of, and fiscal constraints upon, the Department of Defense (DoD) in providing foreign humanitarian assistance (HA).

Authorization and Appropriation of DoD Funds

For each fiscal year, Congress passes four acts that provide authorization to continue DoD operations and appropriate funds to pay for those operations. Although the formal names of the acts may vary from year to year, they generally include a national defense authorization act (NDAA), a Department of Defense appropriations act, a military construction authorization act, and a military construction appropriations act. The point is often made, but bears repeating, that the DoD cannot incur obligations or expend funds until both the requisite authorization act and appropriations act have been enacted; to do so would violate 31 USC § 1341, a provision of the so-called *Antideficiency Act*. Each year, comptrollers and judge advocates should carefully examine the authorization and appropriations acts to determine what operations Congress may have ceased to authorize, what changes may have been made to existing authorizations, or what new operations may be authorized.

Further complicating the fiscal law arena is the body of law contained in the 50 titles of the USC. For DoD humanitarian assistance purposes, the significant titles are Title 10, *Armed Forces*, and Title 31, *Money and Finance*. However, during deployments US Armed Forces may run the risk of conducting humanitarian assistance activities which are authorized to be conducted by DoS under Title 22, *Foreign Relations and Intercourse*, and thereby using Title 10 funds to unlawfully augment Title 22 funds. Also, other USC titles may affect operations, such as Title 40, *Public Buildings, Property, and Works*, which contains the *Foreign Excess Property Act* (40 USC § 701 to 705). This act allows US Armed Forces to dispose of property that is no longer needed after the closing of an overseas installation or the end of a deployment. This is currently a major





W. Darrell Phillips, DAF

Can We Help?

DoD Humanitarian Assistance Programs

Article Highlights

Congress has shown a willingness and an ability to use fiscal law to effectuate political and military operations, and comptrollers and judge advocates must continue to monitor developments in this critical arena.

Throughout the Cold War and during the ongoing *Global War on Terrorism*, United States (US) military forces have engaged in a continuing partnership with the Department of State, foreign militaries, and nongovernmental organizations to provide assistance to people throughout the world. Whether as a result of armed conflict or natural or man-made disasters, people in foreign countries have become accustomed to the presence of US military personnel assisting them in a multitude of ways. The most recent manifestation of that presence, in response to the Haiti earthquake on 12 January 2010, has again resulted in the provision of massive amounts of US military assistance. However, the reality is that the Department of State, acting under its authority contained in Title 22 of the United States Code, has the primary responsibility for conducting US foreign affairs and for assisting people in foreign countries. This article will examine the limited role of, and fiscal constraints upon, the Department of Defense (DoD) in providing foreign humanitarian assistance (HA).

As the Iraqi and Afghan governments and security forces begin to assume more responsibility for their own national defense, there will undoubtedly be changes in the nature and extent of the humanitarian assistance that the United States, and in particular the DoD, provides. However, as the focus of the *Global War on Terrorism* shifts to other locales, and disasters occur in various foreign countries, DoD's role will continue to expand and transform. The creation of United States Africa Command will undoubtedly lead to a closer engagement with the nations and peoples of Africa, and accompanying increases in humanitarian assistance.

concern in Iraq, as US Armed Forces turn over millions of dollars of foreign excess personal property to the Iraqi government.

When Congress enacts an authorization or appropriations act, it may thereby amend or create a provision in one of the titles of the USC (for example, Section 1201 of the FY06 NDAA amended 10 USC § 401, *Humanitarian and Civic Assistance*, to add surgical care and certain types of education, training, and technical assistance to the humanitarian and civic assistance [HCA] activities which can be provided to inhabitants of a foreign country during a US Armed Forces operation). However, Congress may use an authorization or appropriations act to create or continue a requirement without ever placing it into the USC (for example, in each NDAA since 1999, Congress has imposed a requirement that DoS certify that foreign forces or military to be trained by US forces have not committed a gross violation of human rights, but it has never been enacted into Title 10 or Title 22). Comptrollers and judge advocates must be vigilant to determine the current state of the law regarding the proper obligation of operations and maintenance (O&M) funds.

The DoD Humanitarian Assistance Fiscal Regulatory Structure

Within DoD, the primary responsibility for creating humanitarian assistance doctrine and guidance is shared among the Office of the Undersecretary of Defense for Policy, the Assistant Secretary of Defense for Global Security Affairs (Partnership Strategy), the Assistant Secretary of Defense for Special Operations—Low Intensity Conflict, and the Defense Security Cooperation Agency (DSCA). However, the Joint Chiefs of Staff and the combatant commands also have a significant role. One of the major challenges in the area of humanitarian assistance is locating and understanding the various directives and guidance. DSCA publishes the most extensive guidance (most of which is accessible on the DSCA Web site at <http://www.dsc.osd.mil>), but the combatant commands, and particularly United States Central Command (USCENTCOM), publish various directives relevant to HA activities in their areas of responsibility (AOR). DSCA also manages the appropriated funds for Overseas Humanitarian Disaster and Civic Aid (OHDACA) and publishes guidance for OHDACA and for HCA activities provided under the authority of 10 USC § 401.

During the early 1980s, the General Accounting Office (now the Government Accountability Office) (GAO) investigated a series of exercises in Honduras called *Ahuas Tara*. Their findings were published as *The Honorable Bill Alexander*, Comptroller General Opinion B-213137 (63 Comp Gen 422 [1984], revised in 1986). Among other findings, GAO determined that DoD had no statutory basis to provide humanitarian assistance during exercises, deployments, and similar activities outside the United States. As a result of the opinion, Congress enacted a series of statutes in Title 10 and continues to either amend those statutes or to provide other statutory authorities as part of annual National Defense Authorization Acts and Department of Defense Appropriations Acts. Starting in FY96, Congress combined the DoD statutes into one overall funding appropriation called OHDACA. However, as time went on, the amount of annual OHDACA

Article Highlights

appropriations (usually in the range of \$50M to \$60M) was just not sufficient for the increasing demand for disaster relief and humanitarian assistance projects. Accordingly, Congress and DSCA have determined that combatant command O&M funds will be used for HCA, and that OHDACA funds will be used for the five statutes which currently are funded via the OHDACA appropriation.

Humanitarian and Civic Assistance, 10 USC § 401

10 USC § 401, *Humanitarian and Civic Assistance Provided in Conjunction with Military Operations*, permits DoD to carry out a range of HCA assistance projects. There are a number of statutory conditions which must be met:

- The assistance must promote the national security interests of both the US and the beneficiary country.
- The assistance must promote the specific operational readiness skills of the US forces who participate.
- The Secretary of State must approve all such assistance.
- The assistance shall complement, but may not duplicate, other US social or economic assistance to the beneficiary nation.
- The assistance must serve the basic economic and social needs of the beneficiary nation.
- The assistance must not be provided to any individual, group, or organization engaged in military or paramilitary activity.

Guidance for obtaining approval for and conducting HCA is contained in DoD Instruction (DoDI) 2205.02, *Humanitarian and Civic Assistance (HCA) Activities*, and DoDI 2205.3, *Implementing Procedures for the Humanitarian and Civic Assistance (HCA) Program*. DoD Instruction 2205.02 also requires the beneficiary country to approve the proposed HCA assistance.

Additionally, DSCA periodically provides HCA guidance on both their Web site and by specific messages. Their most recent message was a 1 May 2007 "Policy/Programming Guidance for FY 2008 Humanitarian and Civic Assistance (HCA) Projects and Activities." Among other matters, it warns units against undertaking projects which drastically exceed the standards of care provided by the host nation, and constructing projects that the host nation will not be able to maintain once US forces depart.

Section 401 assistance that can be funded with combatant command O&M funds includes the following items.

- Medical, surgical, dental, and veterinary care provided in areas of a country that are rural or underserved, including education, training, and technical assistance related to the care provided
- Construction of rudimentary surface transportation systems
- Well drilling and construction of basic sanitation facilities
- Rudimentary construction and repair of public facilities

Allowable funding costs include incremental expenses, such as costs for consumable materials, supplies, and services, if any, that are reasonably necessary to execute the HCA mission. Funding does not include costs associated with the military operation (such as transportation, personnel expenses, petroleum, oil, lubricants, and repair of equipment) which would likely have been incurred whether or not the HCA was provided.

Additionally, Section 401(c)(4) authorizes what was known as *de minimis* HCA, but is now known as minimal cost HCA. This

The Commanders' Emergency Response Program has been a major factor in "winning hearts and minds" in Iraq and Afghanistan. In the words of a former Chairman of the Joint Chiefs of Staff, it is "The most effective means we have of persuading ordinary Iraqis that we are there to help them and their families." A major question will be whether Congress will apply CERP, or some variant of it, to future conflicts or peace missions. Congress has shown a willingness and an ability to use fiscal law to effectuate political and military operations, and comptrollers and judge advocates must continue to monitor developments in this critical arena.

Article Acronyms

A/D – Abandonment or Destruction
APC – Accounting Processing Code
CCIF – Combatant Commander Initiative Fund
CERP – Commanders' Emergency Response Program
DoD – Department of Defense
DoDI – Department of Defense Instruction
DoS – Department of State
DSCA – Defense Security Cooperation Agency
ESP – Emergency and Special Programs
FEPP – Foreign Excess Personal Property
FRAGO – Fragmentation Order
FY – Fiscal Year
GAO – Government Accountability Office
HA – Humanitarian Assistance
HAP – Humanitarian Assistance Program
HCA – Humanitarian and Civic Assistance
NDAA – National Defense Authorization Act
NGO – Nongovernmental Organization
O&M – Operations and Maintenance
OHDACA – Overseas Humanitarian Disaster and Civic Aid
SOP – Standard Operating Procedures
US – United States
USAID – United States Agency for International Development
USC – United States Code
USCENTCOM – United States Central Command
USFOR-I – United States Forces–Iraq

could arise either during a planned HCA program or during an exercise or deployment with no planned HCA. In the legislative history of 10 USC § 401, Congress recognized that it might be appropriate to incur *minimal expenditures* of DoD O&M funds for *incidental costs* of carrying out HCA. Congress provided examples that have been incorporated into DoD Instruction 2205.02—(1) a unit doctor’s examination of local villagers for a few hours with administration of several shots and issuance of some medicine, but not deployment of a medical team to provide mass inoculations to the local populace and (2) the opening of an access road through trees and underbrush for several hundred yards, but not the asphaltting of such roadway.

Factors to consider when determining whether minimal cost assistance would incur only *incidental costs* are: in the combatant commander’s reasonable judgment, in light of the overall cost of the military operation in which the proposed expenditure will be incurred, could the combatant commander determine that the expenditure was *incidental* to the military operation?

Minimal cost assistance will be funded out of the combatant command’s O&M account. On 25 October 2006, the Assistant Secretary of Defense for Special Operations—Low Intensity Conflict and DSCA delineated a maximum minimal cost project limit of \$10,000, and required that all minimal cost projects must be approved by the appropriate geographic combatant commander. However, any project exceeding \$2,500 that has contracting issues must utilize a US government warranted contracting officer and comply with contracting laws and regulations. Units proposing to conduct minimal cost HCA must contact the appropriate combatant command for approval and funding.

Overseas Humanitarian, Disaster, and Civic Aid (OHDACA)

Each year, Congress specifically earmarks funds for OHDACA, using a combination of the *National Defense Authorization Act* and the *Department of Defense Appropriations Act*. For FY10, Section 301 of the *National Defense Authorization Act for Fiscal Year 2010* (HR 2647) authorizes the expenditure of \$109,869,000 from DoD-wide O&M appropriations.

Currently, OHDACA funding is used for five different activities, each governed by a specific Title 10 section.

- **Transport of humanitarian relief supplies to foreign countries (the Denton Program). 10 USC § 402.** The Denton Program is jointly administered by DoS, the United States Agency for International Development (USAID) and DSCA. Specific program information and application forms are at <http://dentonfunded.ohasis.org/AboutDenton.htm>. The main facets of the program are listed below.
 - The Secretary of Defense may authorize the transport, without charge but on a space-available basis, of supplies that have been furnished by a nongovernmental source and are intended for humanitarian assistance.
 - The Secretary of Defense has to determine a number of conditions exist before authorizing the transportation.
 - The transportation is consistent with US foreign policy.
 - The supplies are suitable for humanitarian purposes and in usable condition.
 - There is legitimate humanitarian need for such supplies by the people for whom they are intended.

- The supplies will in fact be used for humanitarian purposes.
- The donor has made adequate distribution arrangements for the distribution or use of such supplies in the destination country.
- The supplies may be distributed by an agency of the US government, a foreign government, an international organization, or a private nonprofit relief organization, but supplies cannot be distributed, directly or indirectly, to any individual, group, or organization engaged in a military or paramilitary activity.
- Supplies intended to respond to, or mitigate the effects of, an event that threatens serious harm to the environment (such as an oil spill) may be transported only if other transportation sources are not available, and the Secretary may require reimbursement for DoD’s costs to transport those supplies.

Obviously, space availability will wax and wane with the pace of military operations, but since its inception in 1987 the Denton Program has resulted in massive deliveries of humanitarian supplies around the world.

- **Foreign Disaster Assistance. 10 USC § 404.** The President may direct the Secretary of Defense to provide disaster assistance (including transportation, supplies, services, and equipment) outside the United States to respond to man-made or natural disasters when necessary to prevent loss of life or serious harm to the environment. Within 48 hours after the commencement of assistance, the President has to furnish Congress a report of the nature and extent of assistance provided. Executive Order 12966, *Foreign Disaster Assistance* (15 July 1995) delegated the presidential authority to the Secretary of Defense, with the concurrence of the Secretary of State (except in emergencies). This is a completely different authority than that of the Department of State’s Foreign Disaster Relief authority under 22 USC § 2292.

Pursuant to this authority, DoD organizations have provided foreign disaster relief throughout the world, in situations as varied as the Southeast Asia Tsunami in December 2004, the Pakistan earthquake in October 2005, the Philippines mudslides in February 2006, and the Burma floods of April 2008. In just the Tsunami response, DoD organizations transported approximately 24.5 million pounds of relief supplies and committed approximately \$100M in OHDACA resources.

In all likelihood, DoD organizations that will be tasked to immediately respond to disasters will have to do so initially using their O&M funds. A major consideration will be obtaining OHDACA funding reimbursement through DSCA. Accordingly, any tasked organization must determine, as quickly as possible, the appropriate code (APC [Account(ing) Processing Code] for the Army and ESP [Emergency and Special Programs] for the Air Force) and apply it to all expenditures relating to the disaster response.

- **Humanitarian Demining Assistance. 10 USC § 407.** Also known as *Humanitarian Mine Action*, this section authorizes activities for the detection and clearance of landmines and other explosive remnants of war, including necessary education, training, and technical assistance. Assistance can include training in the procedures of landmine clearance, mine

risk education, victims' assistance, and development of necessary leadership and organization skills to conduct a program. Reimbursable expenses include the travel, transportation, and subsistence expenses of DoD personnel providing the assistance, and the cost of any equipment, services, or supplies acquired for the purpose of carrying out the assistance (including certain equipment or supplies that are transferred or otherwise furnished to a foreign country as part of assistance under this section).

- **Excess Nonlethal Supplies. 10 USC § 2557.** Property (not weapons, ammunition or other equipment or material designed to inflict serious bodily harm or death) that is excess under DoDI 4160.21-M, *Defense Materiel Disposition Manual*, can be transferred to the Secretary of State, who is responsible for distribution. Examples of such property are medical supplies, furniture, ambulances, cargo trucks, dump trucks, fire trucks, forklifts, generators, tents, sleeping bags, blankets, lanterns, litters, and computers. This authority differs from the sale or grant of excess defense articles (EDA) (22 USC § 2321j, *Authority to Transfer Excess Defense Articles*), which may be lethal or nonlethal. Section 2557 authority does not include the transport of the excess nonlethal supplies, but, if necessary, the transport of the supplies may be accomplished through 10 USC § 2561. Excess property is transferred from DoD to the State Department, usually via the American Embassy in the country, to present to the intended recipient, normally a host nation government ministry, a charitable organization, or nongovernmental organization (NGO) in the host nation.
- **Humanitarian Assistance (HA). 10 USC § 2561.** The statute authorizes DoD to provide transportation of humanitarian relief and for other humanitarian purposes worldwide. In practice, two different types of transportation programs are conducted. The first is funded transportation of excess US government property that is being donated, generally pursuant to 10 USC § 2557.

The second type of funded transportation is for property that is being provided by NGOs. This is similar to the concept of the Denton Program, but is funded using OHDACA funds. Only a limited amount of OHDACA funding is available for funded transportation, so program requirements are very specific. Funded transport is limited only to surface modes, with funded airlift being reserved only for emergency (declared disaster) situations. Cargo is limited only to that which addresses basic humanitarian needs (for example, medical, food, shelter, and clothing), and the minimum cargo size to be shipped is one 20-foot shipping container (or 1,100 cubic feet equivalent). Typical property includes such items as medical supplies and equipment, clothing and shoes, wheelchairs, books, and dry milk, fruit, beans, and cereals. The Department of Defense, through DSCA, administers the funded transportation program. Information and application requirements for the funded transportation program are found at <http://dentonfunded.ohasis.org/AboutFT.htm>.

The "other humanitarian purposes worldwide" authority continues to be used for an ever-increasing variety of purposes. According to DSCA, this authority has been used for a variety of programs, including rudimentary construction and renovation of public facilities such as schools, hospitals, clinics, and orphanages; digging water wells and other sanitation and drinking water projects; and repairing and building rudimentary infrastructure such as roads and bridges. Although these projects appear at first to duplicate HCA under 10 USC § 401, there are

important distinctions between the two authorities. HCA projects are conducted using combatant command O&M funds and must be conducted in conjunction with an exercise or ongoing military operation, whereas HA projects are conducted using OHDACA funds and can be conducted as stand-alones. Also, HCA generally requires preplanned (often years in advance) activities and must promote specific operational skills of the US military participants—HA has no such requirements. Combatant commands review and endorse nominated HA projects to DSCA. DSCA coordinates proposed projects as appropriate with other DoD and interagency offices, and then approves or disapproves the projects. Once DSCA approves a project, the responsible combatant command funds the project, using OHDACA funding, and oversees project execution.

The Deputy Assistant Secretary of Defense for Partnership Strategy and Stability Operations (ASD-PS&SO) and DSCA jointly manage OHDACA and periodically provide guidance for DoD's humanitarian assistance funded with the OHDACA appropriation. Their most recent message was issued 18 November 2009 and is entitled *Policy Guidance for DoD Overseas Humanitarian Assistance Program (HAP)*. Among other matters, the guidance stresses the need for cooperation and coordination among DoD and the other actors involved in HAP, particularly DoS, USAID, international organizations, and various NGOs. The guidance also stresses building the capacity of the host nation to sustain HAP projects by emphasizing knowledge and skills transfer and sustainable, indigenous capacity, and not simply donations of supplies and equipment.

Commanders' Emergency Response Program (CERP)

When US forces occupied Iraq in 2003, they began to find stashes of money that Saddam Hussein had looted from the Iraqi people. Under the authority of the Law of Armed Conflict, US commanders were able to use these funds to assist the Iraqi people. When the funds were expended, Congress authorized DoD to use O&M funds to conduct what is known as the Commanders' Emergency Response Program, or CERP. Section 1222 of the *National Defense Authorization Act for Fiscal Year 2010* continues the authorization of the CERP program, and authorizes the Secretary of Defense to use up to \$1.3B of FY10 O&M funds for the purpose of

...enabling [United States] military commanders in Iraq [and Afghanistan] to respond to urgent humanitarian relief and reconstruction requirements within their areas of responsibility by carrying out programs that will immediately assist the people of Iraq [and Afghanistan].

Urgent has been defined as any chronic or acute inadequacy of an essential good or service that, in the judgment of the local commander, calls for immediate action. CERP funds are intended to be used for small-scale projects that, optimally, can be sustained by the local population or government.

The funding authorization limit has been reduced from those for FYs 08 and 09; and contrary to recent NDAAs, the funds will be available for only FY10. Section 1222 also continues the authority, created in Section 1202 of the *National Defense Authorization Act for Fiscal Year 2006*, for the Secretary of Defense to waive any provision of law that, if not waived, would prohibit, restrict, limit, or otherwise constrain the exercise of

authority under CERP. This provision avoids most, if not all, violations of the *Purpose Statute* and the *Antideficiency Act*. Finally, Section 1222 contains new provisions authorizing CERP funds to be used to support the Afghanistan National Solidarity Program, and to support the reintegration into Afghan society of those individuals who have renounced violence against the government of Afghanistan.

Current overall CERP guidance is contained in a December 18, 2008 Memorandum from the Office of the Under Secretary of Defense (Comptroller) and in Chapter 27 of Volume 12 of DoD 7000.14-R, *Department of Defense Financial Management Regulation*. United States Forces-Iraq (USFOR-I) provides Iraq-specific CERP guidance in the *Money as a Weapons System* standard operating procedures (SOP) (1 March 2010) and in various fragmentary orders (FRAGOs). United States Forces-Afghanistan provides Afghan-specific CERP guidance in USFOR-A Publication 1-06, *Money as a Weapons System-Afghanistan (MAAWS-A) CERP SOP*, dated December 2009. In April 2009, the Center for Army Lessons Learned (CALL) published CERP information in CALL Handbook 09-27, *Commander's Guide to Money as a Weapons System*. The handbook and various other CALL publications of interest to comptrollers and judge advocates are available online at <http://call.army.mil/call.htm>.

military operations which are not compensable under the *Foreign Claims Act*

- Payments to surviving spouses or next of kin of Iraqi or Afghan defense or police personnel killed as a result of US, Coalition, or supporting military operations (referred to as Hero or Martyr Payments)
- Payments to individuals upon release from detention from a nontheater internment facility
- Protective measures (fencing, lights, towers, guards) to enhance durability and survivability of critical infrastructure sites
- Other urgent humanitarian or reconstruction projects

However, CERP funding cannot be used for a number of costs.

- Direct or indirect benefit to US, Coalition, or supporting military personnel
- Providing goods, services, or funds to Iraqi or Afghan national armies, National Guard forces, border security forces, civil defense forces, infrastructure forces, highway patrol units, police, special police, or intelligence or other security forces
- Weapons buy-back programs or other purchases of arms or ammunition (separately authorized using other O&M funds by 10 USC § 127c)

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A wide range of projects may be conducted using CERP funds.

- Water and sanitation
- Food production and distribution, agriculture, and irrigation
- Electricity, healthcare, education, telecommunications, and transportation
- Economic, financial, and management improvements
- Rule of Law and governance
- Civic cleanup activities and civic support vehicles
- Repair of civic and cultural facilities
- Battle damage, repair, or payment for repair, of property damage that results from US, Coalition, or supporting military operations and is not compensable under the *Foreign Claims Act* (10 USC § 2734-2736)
- Condolence payments to individual civilians for the death or physical injury resulting from US, Coalition, or supporting

- Entertainment costs except for light refreshments purely incidental to either an approved CERP project opening ceremony or a conference in support of a CERP project
- Reward programs (separately authorized using other O&M funds by 10 USC § 127b)
- Removal of unexploded ordnance (unless incidental to construction)
- Duplication of service available through municipal governments
- Salaries, bonuses, or pensions for Iraqi or Afghan military or civilian government personnel
- Training, equipping, or operating costs of Iraqi or Afghan security forces
- Conducting psychological operations, information operations, or other US, Coalition, Iraqi, or Afghan Security Force operations

Also, nonappropriated funds cannot be commingled with CERP funds.

The use of CERP in Iraq has been further complicated by the creation of the Iraq Commanders' Emergency Response Program, or I-CERP. In 2007, Congress indicated that it expected the government of Iraq to fund a certain amount of CERP-type projects to benefit the people of Iraq. Those include schools, water purification plants, health clinics, city planning facilities, and protective measures necessary to secure the I-CERP projects. All I-CERP projects must be approved by US forces and US funding offices will control the expenditure of funds. Certain other eligible projects (roads, sewers, and irrigation projects, and nonreconstruction projects that promote small business development) require approval by the commanding general of the involved US major support command. CERP and I-CERP funds cannot be commingled.

Combatant Commander Initiative Fund (CCIF), 10 USC § 166a

Since FY94, Congress has authorized the Combatant Commander Initiative Fund (CCIF), which is codified in 10 USC § 166a. For FY10, Congress has appropriated \$50M of O&M funds to the Chairman of the Joint Chiefs of Staff in order to fund 10 different CCIF activities, some of which duplicate other Title 10 or Title 22 authorities. The CCIF statute avoids *Antideficiency Act* violations by stating that the funds provided "shall be in addition to amounts otherwise available for [each CCIF] activity for that fiscal year." Among other purposes, the statute authorizes CCIF funds to be used for humanitarian and civic assistance, to include urgent and unanticipated humanitarian relief and reconstruction assistance.

The statute does not require that US forces obtain any training or other benefit, and does not prohibit providing assistance to foreign military forces. Guidance is contained in Chairman of the Joint Chiefs of Staff Instruction (CJCSI) 7401.01D, *Combatant Commander Initiative Fund*.

Foreign Excess Property Act (40 USC § 701 to 705)

Another authority for DoD, as well as other executive branches, to dispose of foreign excess property (property excess to DoD needs when closing a base or redeploying forces) is the *Foreign Excess Property Act*, found in 40 USC § 701 to 705, *Public Buildings, Property, and Works* of the US Code. Various host nation government organizations or NGOs can be proper recipients of the excess property.

The Act is implemented by DoD 4160.21-M, the *Defense Materiel Disposition Manual*. The DoD organization that wants to dispose of the property has to conduct an economic feasibility analysis to determine that:

- The estimated costs of care and handling of the property exceed the estimated proceeds of a sale (will cost us more to keep it than we could get for it)
- The estimated cost of disposal by abandonment or destruction (A/D) is less than the net sales cost (will cost us less to A/D it than to sell it)

The organization has to provide public notice of the proposed A/D, and has to obtain State Department coordination, so as to

best serve US foreign policy interests and objectives in the area and to determine the proper recipient. Proper recipients include, in priority order:

- Any US government organization, institution, or entity
- Any friendly foreign government or local subdivision
- Any nonprofit scientific, literary, educational, public health, public welfare, charitable institution, hospital or similar institution if its activities are not adverse to US interests
- Foreign nonprofit institutions, but preference must be given to those organized under US law or supported by US fundraising

The Defense Logistics Agency is responsible for overall management of the Foreign Excess Personal Property (FEPP) Program in Iraq, and has already accomplished much of the economic feasibility analysis. However, due to the extremely complex nature of the FEPP program, no disposition of property should be undertaken without coordination with USFOR-I.

Conclusion

As the Iraqi and Afghan governments and security forces begin to assume more responsibility for their own national defense, there will undoubtedly be changes in the nature and extent of the humanitarian assistance that the United States, and in particular the DoD, provides. However, as the focus of the Global War on Terrorism shifts to other locales, and disasters occur in various foreign countries, DoD's role will continue to expand and transform. The creation of United States Africa Command will undoubtedly lead to a closer engagement with the nations and peoples of Africa, and accompanying increases in humanitarian assistance. The Commanders' Emergency Response Program has been a major factor in "winning hearts and minds" in Iraq and Afghanistan. In the words of a former Chairman of the Joint Chiefs of Staff, it is "The most effective means we have of persuading ordinary Iraqis that we are there to help them and their families." A major question will be whether Congress will apply CERP, or some variant of it, to future conflicts or peace missions. Congress has shown a willingness and an ability to use fiscal law to effectuate political and military operations, and comptrollers and judge advocates must continue to monitor developments in this critical arena.

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Performance-based outcomes represent the logical starting point in an environment where the need for efficiency competes with effectiveness in the decisionmaking process. They describe the expectations of performance provided to the lead command (customer) by the system program manager of a given weapon system.

contemporary issues

Capabilities-Based Resourcing for Air Force Weapon System Sustainment Preserving the Industrial Base: Is the United States Air Force Responsible?

Contemporary Issues in this edition presents two articles: “Capabilities-Based Resourcing for Air Force Weapon System Sustainment” and “Preserving the Industrial Base: Is the United States Air Force Responsible?”

In “Capabilities-Based Resourcing for Air Force Weapon System Sustainment” Colonel Scott A. Haines makes the case that the Air Force must continue the development of an efficient capabilities-based resourcing strategy for weapon system sustainment. This strategy should entrust the system program manager with the authority and ability to affect key sustainment decisions, centralize funding where possible for all funds holders within Air Force Materiel Command, and provide leadership with a program built on objective measurements. Programmers must effectively maximize risk in support of legacy systems, while identifying opportunities for diverting available resources to assist with vital recapitalization and modernization efforts. In so doing, senior

leadership must openly, and efficiently, communicate Air Force intent to the Department of Defense (DoD) and Congress. The eventual solution for a viable capabilities-based requirements determination approach for weapon system sustainment must provide the flexibility required for responding to an ever-changing strategic environment.

In the second article Lieutenant Colonel Christopher E. Kinne examines the perceived relationship between the DoD, the Air Force, and the US aerospace industry and answers the question, should the Air Force be involved in preserving the US aerospace industrial base? In answering no, he makes the case that the future of the US aerospace industry is a national issue, not an Air Force-unique issue. He also suggests that any action by the Air Force to proactively preserve the US aerospace industrial base would be contrary to the current strategic direction of the Secretary of Defense and established DoD policy.

Capabilities-Based Resourcing for Air Force Weapon System Sustainment

Scott A. Haines, Colonel, USAF

Introduction

Seven years have passed since I first stood before you at this rostrum. In that time, our country has been tested in ways none of us could have imagined.

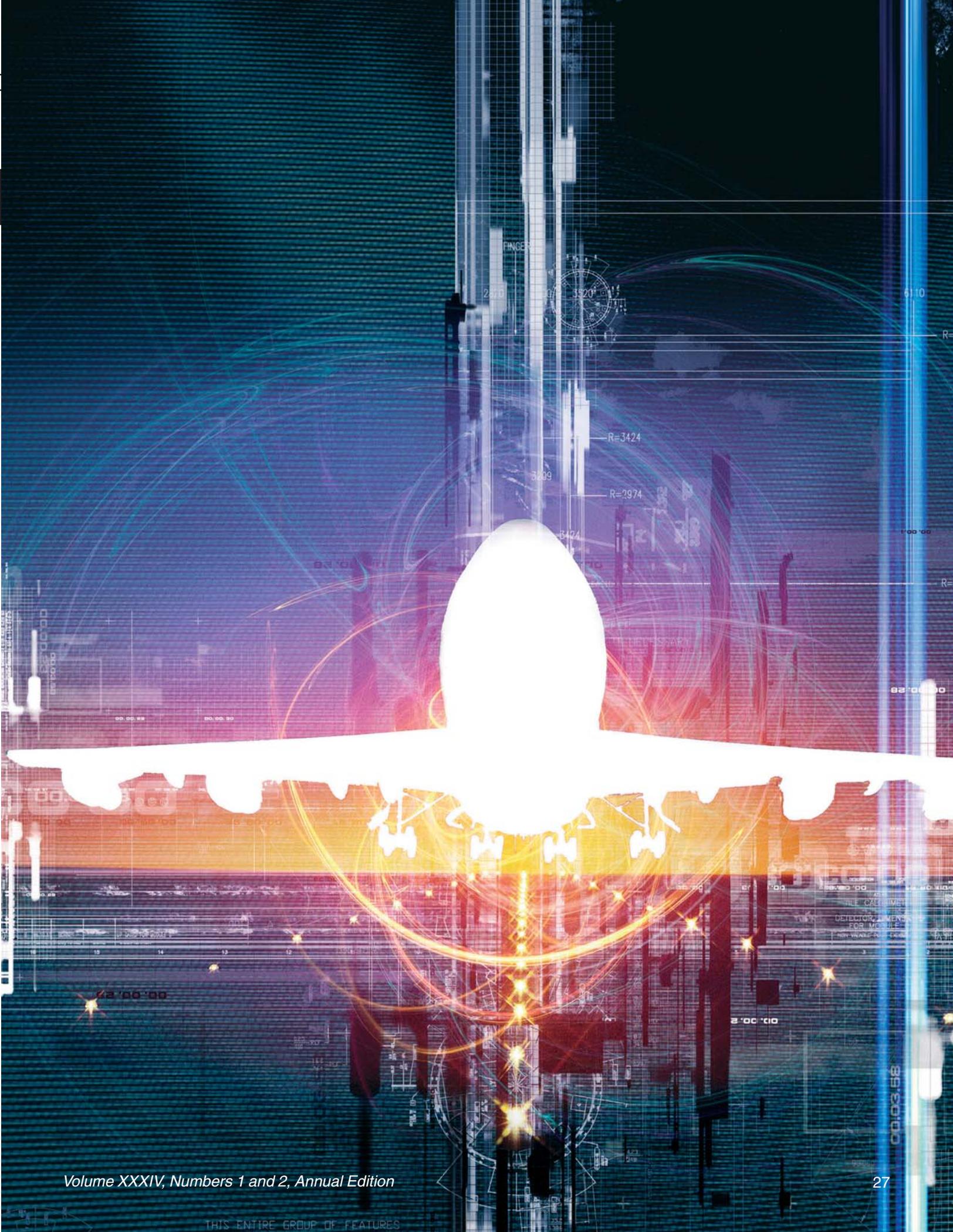
—President George W. Bush, State of the Union Address, January 2008¹

The United States Air Force never experienced a significant reduction in the scope and intensity of operations in the turbulent years following the overwhelming victory of Operations Desert Shield and Desert Storm. Today, support of United States (US) national interests consistently require over two million flying hours per year. Moreover, our airmen must accomplish this Herculean task with an aircraft inventory that is now approximately 31 percent smaller and 42 percent older than it was in 1991.² In this time of unrelenting competition for limited fiscal resources, the window of opportunity for the Air Force to implement an aggressive weapon system recapitalization and modernization plan is rapidly closing. Moreover, the Department of Defense (DoD) remains burdened by a cumbersome acquisition process that is “influenced by threat assessments to national security, national military priorities, and domestic political considerations.”³

In his book, *The Sling and the Stone: On War in the 21st Century*, Colonel Thomas Hammes laments the inability

of the US to quantify the current enemy. He identifies this problem as the impetus for adopting a capabilities-based approach to defense.⁴ As such, he stresses the importance of building military forces with a more narrow focus, based on a determination of the nature of the most likely conflict, for example, one similar to the current wars in Iraq and Afghanistan.⁵ However, notwithstanding the potential for reductions in defense spending associated with this strategy, the US simply must maintain the ability to respond to a broad range of conflicts, including a major conventional war. As such, the Air Force must focus on providing the capabilities required to support identified current and future warfighter requirements. Unfortunately, an extremely high operations tempo amidst growing fiscal shortfalls remains a stark reality. Consequently, Air Force logisticians must continue to develop and implement a capabilities-based efficiency approach for resourcing weapon system sustainment. This effort must place an emphasis on providing the appropriate mix and balance of the capabilities required in support of US National Security Strategy.

The Air Force utilizes capabilities-based planning (CBP) to “more effectively inform decisionmakers involved in the planning, programming, budgeting, and execution (PPBE) cycle, the capabilities requirements process, and the acquisition process.”⁶ Air Force Instruction (AFI) 10-604, *Capabilities Based Planning*, defines CBP as “the planning, under uncertainty, to provide capabilities suitable



Article Acronyms

AA – Aircraft Availability
AFCS – Air Force Corporate Structure
AFMC – Air Force Materiel Command
AFRC – Air Force Reserve Command
ANG – Air National Guard
CAM – Centralized Asset Management
CBP – Capabilities Based Planning
CLS – Contractor Logistics Support
CSAF – Chief of Staff of the Air Force
DoD – Department of Defense
DPEM – Depot Purchased Equipment Maintenance
EMA – Expectation Management Agreement
FY – Fiscal Year
MAJCOM – Major Command
MC – Mission Capable
OAC – Operating Agency Code
OSD – Office of the Secretary of Defense
PBO – Performance-Based Outcomes
POM – Program Objective Memorandum
PPBE – Planning, Programming, Budgeting, and Execution
SAC – Senate Appropriations Committee
SE – Sustaining Engineering
SPM – System Program Manager
TO – Technical Order
US – United States
WSR – Weapon System Review
WSS – Weapon System Sustainment

for a wide range of challenges and circumstances, all designed to achieve certain battle effects.”⁷⁷ A weapon system in and of itself does not represent a capability. Broadly speaking, capability represents “the ability to achieve a desired effect under specified standards and conditions through combinations of means and ways to perform a set of tasks.”⁷⁸ Accordingly, during development of the fiscal year (FY) 2010/11 Program Objective Memorandum (POM), the Air Force corporate structure (AFCS) began a tentative move toward defining capability in terms of Global Reach, Global Power, and Global Vigilance when deliberating on weapon system sustainment. To understand the rationale behind this decision requires a brief explanation of each of these capabilities.

According to *America’s Air Force Vision 2020*, Global Reach, Global Power, and Global Vigilance “will provide balanced aerospace capabilities key to meeting national security objectives and realizing full-spectrum dominance.”⁷⁹ Former Chief of Staff of the Air Force (CSAF), General T. Michael Moseley, further defined these three concepts in a white paper published in late December of 2007.

- **Global Reach.** The ability to move, supply, or position assets—with unrivaled velocity and precision—anywhere on the planet.
- **Global Vigilance.** The persistent, worldwide capability to keep an unblinking eye on any entity—to provide warning on capabilities and intentions, as well as identify needs and opportunities.

- **Global Power.** The ability to hold at risk or strike any target, anywhere in the world, and project swift, decisive, precise effects.¹⁰

Additionally, during the recent POM build programmers placed systems not readily identified with one of these specific mission areas in a fourth category entitled Cross-Cutter. The logistics panel and applicable mission panel members of the AFCS were primarily responsible for ensuring the placement of all Air Force weapon systems into one of these four capability areas. Not surprisingly, weapon system sustainment funding represents a significant portion of the Air Force budget. For example, the AFCS allocated \$3.5B for depot purchased equipment maintenance (DPEM) for FY10. However, this figure represents less than 62 percent of the established DPEM requirement for that year.¹¹ This raises the immediate question as to how to distribute the available resources within the four capability areas previously discussed. Clearly, answering this difficult question first requires a brief exploration of the case between efficiency versus effectiveness.

Efficiency or Effectiveness

There is nothing so useless as doing efficiently that which should not be done at all.

—Peter F. Drucker¹²

As described by *Business Dictionary*, “effectiveness is determined without reference to costs and, whereas efficiency means doing the thing right, effectiveness means doing the right thing.”¹³ Historically, public sector organizations such as the DoD approach spending primarily from the perspective of effectiveness. Certainly, when developing the Air Force budget, or any military budget for that matter, guaranteeing successful mission accomplishment, and thereby effectiveness, must take precedence. However, while this may be true, the recent US (and worldwide) economic crisis, when combined with the change in administrations, foretells a significant reduction in spending for US national defense with an emphasis on efficiency. In fact, one prominent lawmaker recently advocated a cut in defense spending of as much as 25 percent, which equates to approximately \$150B. Weapon system procurement and personnel end strength decreases represent the primary *targets* of these cuts.¹⁴ Undoubtedly, senior Air Force leaders face significant challenges regarding their ability to influence efficiency in the future force. This is due to, in part, Congressional limitations and restrictions on aircraft retirements and basing. Recent examples of weapon systems experiencing retirement restrictions include the KC-135E, C-130E, B-52, C-5, and the U-2.¹⁵

Interestingly, during a lecture delivered at Kansas State University, Defense Secretary Robert M. Gates highlighted the disproportionately high budget of the DoD in comparison to that of the State Department, and actually advocated diverting more funds to sources of soft power, such as international diplomacy and information technology. He did this, however, while also highlighting the deleterious effects of the dramatic defense cuts of the 1990s, which also included significant reductions in military manpower. In fact, current US military spending represents approximately 4 percent of gross domestic product,

well below the historic norm despite the country's current involvement in two wars.¹⁶ Unquestionably, this relatively low level of defense spending affects negatively the ability to reconstitute, recapitalize, and modernize the US military. Furthermore, the current administration of Barack Obama faces the dual challenge of "overseeing the first wartime transition of civilian power at DoD in four decades," while also addressing "the sweeping review of US military force structure, global posture, and composition called the 2010 Quadrennial Defense Review."¹⁷ This review "could reduce investment decisions to a choice between additional ground forces, which are essential to counterinsurgency operations, and capital-intensive ships and aircraft key to conventional wars."¹⁸ Indeed, current indicators, such as the stated intent by the Obama Administration to accelerate an end to the war in Iraq and an increase in the size and role of the State Department point toward more reliance on the political and economic instruments of power vice the military, at least in the immediate future.

Consequently, probable public sector spending reductions, at least for the DoD, will compel defense programmers to search for ways to operate more efficiently. As such, implementation of an aggressive efficiency-based planning and resourcing strategy for weapon system sustainment should ensure a proper balance of capabilities, while facilitating the reallocation of funding for other high-priority Air Force programs. Potentially, this includes funding for the necessary recapitalization and modernization of Air Force weapon systems. That is to say, the most efficient budget maximizes procurement while taking the appropriate risk in sustainment funding. A proper balance between efficiency and effectiveness, though a formidable challenge, remains critical for ensuring the long-term viability of an aging Air Force inventory and the nation's defense.¹⁹ With this in mind, understanding the rationale behind the decision to use Global Reach, Power, and Vigilance (and to a lesser extent the Cross-Cutter category) in the requirements determination process necessitates a clear explanation of the current definition of weapon system sustainment, particularly when considering Air Force programming actions.

Defining Weapon Systems Sustainment

I don't know what the hell this "logistics" is that Marshall is always talking about, but I want some of it.

—E. J. King, to a staff officer, 1942²⁰

Weapon system sustainment (WSS) represents a key enabler for current and potentially imminent conflicts—*fight tonight*, and a key component of preparing for future conflict, the *fight tomorrow*.²¹ Historically, programmers addressed sustainment primarily in terms DPEM and contractor logistics support (CLS). Additionally, they normally consider the elements of sustainment more or less in isolation from each other. However, beginning with the most recent POM, Air Force logisticians attempted to combine these two programs with the underfunded components of sustaining engineering (SE) and technical orders (TO) in order to create one comprehensive sustainment portfolio. A brief description of these programs follows.

- **DPEM.** Includes such commodities as aircraft, engines, software, other major end items (such as cryogenic systems,

support equipment, hush houses), missiles, nondefense working capital fund exchangeables, area support, base support, and major overhaul and rebuild of parts, assemblies, subassemblies, and end items. It also includes manufacture of parts, modifications, technical assistance, all aspects of software maintenance, and storage.

- **CLS.** Contract support for a program, system, training system, equipment, or item used to provide all or part of the sustainment elements in direct support of an approved sustainment strategy. CLS covers a variety of support elements such as flying hours, materiel management, configuration management, technical data management, training, failure reporting and analysis, depot-level maintenance (contract or partner), supply and repair parts management, and others.
- **SE.** Engineering efforts required to review, assess, define, and resolve technical or supportability deficiencies revealed in fielded systems, products, and materials. The general objective is to sustain the fielded systems, products, and materials.
- **TOs.** Technical orders for aircraft, engines, missiles, software, and exchangeables. The concept of operations is to provide user friendly, technically accurate, and up-to-date technical data at the point of use that is required, sustained, distributed and available for all users.²²

These four components do not represent end items in and of themselves, and all are vitally important to overall weapon system performance. Consequently, ensuring the appropriate balance and mix between them is necessary to provide efficiently the required weapon system capability for both newly procured and legacy systems during the potentially long road to force recapitalization and modernization. By necessity, this includes the appropriate allocation of funds between Global Reach, Global Power, Global Vigilance, and Cross-Cutters. The following sections focus on the key requirements for making this balance mix a reality. The focus includes identifying the primary offices responsible for weapon system sustainment, describing the requirements determination process, the importance of enterprise prioritization, and objectively measuring risk. AFI 10-604 alternatively defines capability as:

...the combined capacity of personnel, material, equipment, and information in measured quantities, under specified conditions, that, acting together in a prescribed set of activities can be used to achieve a desired output."²³

Figure 1 presents a simplistic depiction of the relative complexity of ensuring the appropriate capability for Air Force operations via weapon system sustainment. (As noted in this figure, WSS does not include the manpower required to generate and repair systems at the operational level.)

Responsibilities

Don't be afraid to take a big step when one is indicated. You can't cross a chasm in two small jumps.

—David Lloyd George, British Prime Minister²⁵

Centralized Asset Management

The primary responsibility for ensuring the successful implementation of an enterprise approach to sustainment rests with the Centralized Asset Management (CAM) program office



Figure 1. Weapon System Sustainment Summary²⁴

located at Headquarters, Air Force Materiel Command (AFMC). In December 2005, the CSAF endorsed a program then known as Future Financials, an “initiative focused on improving Air Force management of sustainment resources utilizing the enterprise business concept.” In general, an enterprise approach “recognizes that no single organization or command, no matter how large, is capable of autonomously providing the full breadth of logistics services required.”²⁶ The name changed to CAM in July 2006 to reflect a “broader, yet focused role” for managing sustainment issues.²⁷ Under this construct, and beginning especially with development of the FY10/11 POM, the CAM office assumed primary control for managing all elements of Air Force weapon system sustainment from a fleet-wide programming perspective. In essence, CAM does not “own these funds but, instead is responsible and accountable to Headquarters Air Force and the lead commands for their execution.”²⁸

The establishment of CAM in and of itself is a testament to the recognized value of an efficiency-based approach to requirements determination and resource allocation. CAM seeks to develop

...a financial framework that facilitates, leverages, and enhances our reengineered logistics business processes by motivating and reinforcing desired behaviors to best support expeditionary operations, improving control over operating and support costs, and providing traceability of resources to outcome.²⁹

Accordingly, CAM received a designation under a unique operating agency code (OAC) as an Air Force sustainment account. Unfortunately, several Air Force funds holders function outside the CAM OAC, providing unique challenges both throughout the program build and during the year of execution. In particular, Air National Guard (ANG) and Air Force Reserve Command (AFRC) lobbied successfully with DoD and Congress for mandated exclusion. The resultant inability of the Air Force

to control all funding allocated for a specific weapon system hinders the ability of CAM and, to an extent, system program managers to manage the affected system from an enterprise perspective. However, at the same time, a robust CAM governance structure exists (see Figure 2), which includes the vice commanders of the major commands. This structure includes representation from funds holders outside of CAM, to include ANG and AFRC, which facilitates their involvement in the decisionmaking process for weapon system sustainment.

The CAM Executive Committee approves the proposed POM position prior to submission to the AFCS. This further emphasizes the critical role played by the weapon system lead commands, the primary advocate for all issues

affecting a weapon system, and highlights the collaborative enterprise nature of CAM. Therefore, the Air Force must continue efforts to centralize fiscal responsibility for all funds holders where possible under CAM (or at least within one central office within AFMC). Still, this may represent an insurmountable task, especially when considering Congressional support for the desires of ANG and AFRC to remain excluded.

Lead Commands

The CSAF, or an authorized representative, designates systems as weapon systems and assigns each to a lead command.³¹ According to Air Force Policy Directive 10-9, *Lead Command Designation and Responsibilities*, this designation establishes primary advocacy for Air Force weapon systems throughout their life cycle, in addition to ensuring a proper force structure balance concerning capabilities.³² Once again, stressing the necessity for efficiency, this directive establishes a “basis for rational allocation of scarce resources among competing requirements.”³³ Specifically, a lead command will:

Advocate for the weapon system and respond to issues addressing its status and use. Advocacy includes capabilities-based planning, programming, and budgeting for designated system-unique logistics issues, and follow-on test and evaluation. In addition, for advocacy issues identified above, perform and manage modernization and sustainment planning across MAJCOMs and agencies, and in coordination with system program managers (SPM) and Headquarters Air Force functional offices.³⁴

Moreover, this directive designates AFMC as the executive agent for CAM. For that reason, lead commands advocate for their weapon system sustainment requirements through AFMC in support of the PPBE process “to establish depot capabilities and sustain weapon systems under CAM.”³⁵ Clearly, lead commands play a critical role in developing comprehensive, executable weapon systems sustainment plans from a total force

perspective. They must work closely with other funds holders, CAM, and perhaps most importantly, the SPMs. Finally, their active advocacy during AFCS deliberations is vital to ensuring adequate funding for their assigned programs.

Other Funds Holders

Using commands work sustainment issues through the lead command for their applicable weapon systems. However, as implied earlier, non-AFMC managed programs do not fall within the auspices of CAM. As an example of this, Air Force Space Command advocates for sustainment of, and maintains overall responsibility for, the majority of space systems. Other funds holders not centralized under CAM include (but are not limited to) ANG, AFRC, Air Force Special Operations Command, Major Force Program 11, and the Air Force Weather Agency. The fact that so many organizations remain outside the CAM structure shows that CAM manages Air Force weapon system sustainment from an enterprise perspective, but only to a point. As such, the complex challenge for efficient coordination of sustainment requirements continues between all of the major participants—AFMC/CAM, the lead and supported commands, AFCS mission and support panels, and perhaps the most important players, the SPMs. Once again, whenever feasible, the Air Force must maximize the centralization of the weapon system sustainment portfolio, preferably within CAM.

System Program Manager

Strictly speaking, the SPM is “the individual designated in accordance with criteria established by the appropriate component Air Force acquisition executive to manage an acquisition program.”³⁶ Ultimately, the SPM maintains responsibility and accountability for a weapon system throughout the life cycle of the program.³⁷ This includes development of a sustainment plan with an adequate balance between DPEM, CLS, SE, and TOs, as appropriate. Additionally, the SPM retains responsibility for system engineering integrity and must approve all proposed permanent and temporary modifications (as does the lead command).³⁸ The SPM plan must develop a total force perspective through close collaboration with the lead command, CAM, and non-CAM funds holders.³⁹

Historically, the importance of the relationship between the SPM and lead command was evident but often varied in its effectiveness. For instance, the two offices work together in developing, signing, and distributing an expectation management agreement (EMA) that provide the details of the sustainment and modification plans previously mentioned.⁴⁰ However, during the year of execution the lead command maintained primary control over funding and frequently diverted resources to higher priorities

within the command. High-value but low-visibility programs such as SE and TOs often suffered in consequence of such diversions. Conversely, CAM makes it easier for the SPMs to exercise additional control over funding priorities for their programs. Understandably, the lead commands retain a key voice in the expenditure of these funds, but the increased integration of and role of the SPMs can help ensure the long-term viability of Air Force weapon systems. As such, all key players—CAM, lead commands, funds holders, AFCS panel members, SPMs—must work closely together to ensure that the Office of the Secretary of Defense (OSD) and Congress have a clear understanding of the Air Force’s rationale for sustainment planning, including the requirements determination process. Ultimately, the responsibility for sustainment decisions must reside in one central location. With this in mind, the SPM serves as the logical focal point for final decisions regarding specific actions proposed for weapon system sustainment.

Requirements Determination

The first prerequisite for any regular logistics system is, of course, an exact definition of requirements.

—Martin Van Creveld⁴¹

Not surprisingly, the process to determine and define system requirements represents one of the most difficult challenges for programmers. Defense of budgetary requests without a traceable, validated requirement seldom ends in success, especially in today’s resource-constrained environment. Surprisingly, many well established programs lack objectively definable requirements, or even if they do the process is ambiguous and difficult to explain. The Joint Requirements Oversight Council maintains that requirements “are not handed down on tablets of stone but should instead be seen as outputs of decisions reached after consideration of challenges, desired capabilities, technical feasibility, economics, organizational realities, and other factors.”⁴² Above all, efficiency-based resourcing demands a well

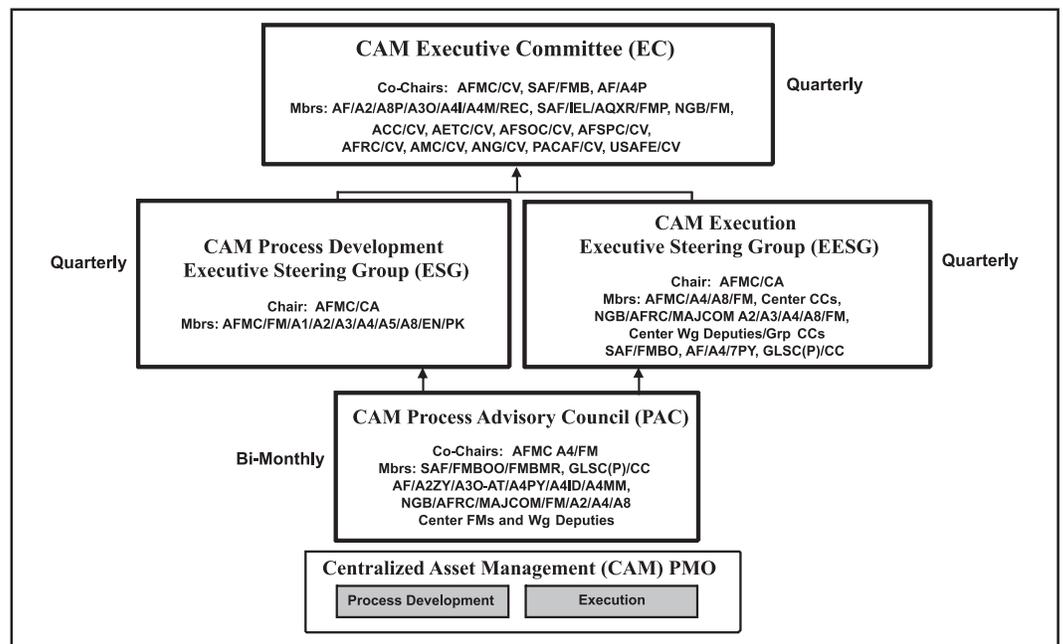


Figure 2. CAM Governance Structure³⁰

defined, measurable approach for requirements determination based on a proper balance of the desired capabilities.

Historically, the AFCS deliberated on funding for weapon system sustainment based primarily on established DPEM and CLS requirements. Additionally, in most aspects, programmers presented senior decisionmakers with the unconstrained requirement individually for each weapon system or, at the most, broken out by MAJCOM, but only for DPEM and CLS. Consequently, discussions frequently marginalized the importance of some aspects of weapon system sustainment, for example, sustaining engineering and technical data. The time-constrained nature of AFCS deliberations precludes an in-depth discussion on each weapon system. Unfortunately, in practice only the high-visibility programs pushed by Air Force senior leadership, a key member of the AFCS, or perhaps one of the mission panels, normally receive full vetting. Indeed, this adds further value to discussions centered on funding a specific capability, such as Global Reach, Global Vigilance, Global Power, or Cross-Cutters.

Assuredly, a cumbersome requirements determination process led to a solution that was little understood (some would say) by the AFCS. This process centers on the Maintenance Requirements Review Board (MRRB), an Air Force panel that

requirements determination process. SPMs currently provide sustainment requirements using the Centralized Access for Data Exchange system.⁴⁵ CAM now monitors the requirements process through the following three distinct phases.

- Define Requirements
- Collaboration
- Validate and Prioritize⁴⁶

Not surprisingly, Air Force funding decisions for weapon system sustainment receive critical scrutiny, not only from OSD, but also from Congress. To be sure, any major change in how the Air Force makes weapon system sustainment funding decisions must survive a detailed analysis from both these entities. Ironically, this represents a tremendous challenge for any efficiency-based approach for sustainment. The Congressional Depot Caucus, a group of members with defense depots in their districts, closely monitors DoD spending for depot maintenance, purportedly out of concern for “military readiness and capabilities.”⁴⁷ For example, Title 10 United States Code, Section 2466 directs that “not more than 50 percent (known as 50/50) of the funds made available in a fiscal year to a military department or a defense agency for depot-level maintenance and repair

Performance-based outcomes represent the logical starting point in an environment where the need for efficiency competes with effectiveness in the decisionmaking process. They describe the expectations of performance provided to the lead command (customer) by the system program manager of a given weapon system.

“*assures all* (emphasis added) valid depot level maintenance requirements are evaluated and scheduled for appropriate fiscal year accomplishment.”⁴³ This panel consists of Air Staff members and representatives for the commands that will use the system, as well as AFMC engineering and aircraft maintenance experts.⁴⁴ Additionally, using commands meet annually for a logistics support review with the air logistics centers to discuss their requirements. Understandably, the requirements workload consistently changes up to and including the budget year of execution because of unforeseen requirements changes caused by such things as unanticipated maintenance issues and problems and shifting MAJCOM or Air Force priorities. Nevertheless, this process represented the logical result of an attempt to determine accurately the total anticipated sustainment requirement for each system. Subsequently, when presenting the DPEM/CLS program for PPBE consideration to the AFCS, the logistics panel presented its recommendation in terms of the total dollars required based on this unconstrained requirement. The AFSC then established a funding decision based on a percentage of this requirement. In short, a cumbersome unconstrained requirements determination process presented a *bill*, and the AFCS made a decision on how much of the bill the Air Force could afford to pay. With this in mind, CAM continues efforts to simplify the

workload may be used to contract for the performance by non-federal government personnel.”⁴⁸ This law, designed to protect the government’s industrial capability, places significant limitations on the flexibility that would otherwise be afforded the Air Force when making critical sustainment decisions. By specifically mandating that federal government personnel complete a minimum of 50 percent of depot-level maintenance and repair, the law precludes the ability to make best-value decisions, and to take advantage of capabilities only available in the private sector.⁴⁹ Additionally, Congress routinely directs minimum funding levels for depot maintenance and issues written reprimands in Congressional legislation to the military departments when they fail to meet these expectations. For instance, one Senate Appropriation Committee (SAC) report contained the following.

SAC considers a vigorous depot maintenance program to be integral to maintaining military readiness. Growth in backlogs above certain thresholds could negatively affect force operations and degrade readiness in the near future. Therefore, SAC directs the military services to allocate funding for depot maintenance programs requested in their annual budget submissions at levels equal to or greater than 80 percent of the annual requirements for airframes and engines, combat vehicles, and ships.⁵⁰

Understandably, Congress equates depot backlogs with the ability of the military departments to sustain an acceptable level of combat readiness.⁵¹ Additionally, the depots base all aspects of work force management on projected funding, including personnel hiring, equipment purchases, and parts ordering. As such, it becomes increasingly difficult to efficiently expend funds added during the year of execution. Finally, Congress has historically asserted that the military departments “willfully delete or refuse to commit funding for other high-priority programs” which, if left unfunded, create depot backlog and negatively affect readiness.⁵² Ironically, over time DoD recognized the inherent value of the Air Force’s cumbersome requirements determination process, both in terms of its measurability and its ability to influence specific programs. Consequently, the Air Force faces an uphill struggle with both DoD and Congress in changing the current process. Implementation of CAM and, perhaps most importantly, a capabilities-based enterprise approach to sustainment funding, represents a critical first step in winning this battle.

Enterprise Prioritization

*It is no use saying, “We are doing our best.” You have got to succeed in doing what is necessary.*⁵³

—Winston S. Churchill

As previously mentioned, the Air Force implemented CAM as a tool to manage sustainment from an enterprise perspective. CAM seeks to reform the prioritization process through enterprise sustainment for weapon system and mission support based on “measurable criteria and effects.”⁵⁴ Similarly, the US Army implemented the Single Army Logistics Enterprise to provide an environment that “builds, sustains, and generates warfighting capability through an integrated logistics enterprise based upon collaborative planning, knowledge management, and best-business practices.”⁵⁵ In other words, the Services now recognize the necessity of prioritizing requirements across the enterprise to maximize the limited funds available in today’s fiscally constrained environment. With this in mind, CAM combines an integrated view of the total sustainment costs for all Air Force weapon systems with a risk-based prioritization approach.⁵⁶

Senior leaders view risk from many different perspectives, both positively and negatively. In *Developing Resource-Informed Strategic Assessments and Recommendations*, RAND researchers define risk as “a measure of those negative consequences of uncertainty that can be recognized and are appropriate to account for.”⁵⁷ Uncertainty is the central concept in this definition. As military theorist Carl von Clausewitz wrote: “Countless minor incidents—the kind you can never really foresee—combine to lower the general level of performance, so that one always falls far short of the intended goal.”⁵⁸ On the other hand, placing uncertainty and chance aside, maximizing acceptable risk by programmers translates into the efficient use of limited resources within additional high priority programs. During the FY10/11 POM build, key CAM leadership attempted to define risk by placing weapon systems into one of three tiers based primarily on lead command assessments.

- **Tier 1.** Weapon system requires the highest level of mission readiness. Risk taken against this weapon system will gravely impact national defense and emergency management

objectives (operational expectation, weapon system availability, and training production).

- **Tier 2.** Risk taken against this system will moderately impact national defense and emergency management objectives (operational expectation, weapon system availability, and training production).
- **Tier 3.** Risk taken against this system may impact national defense and emergency management objectives (operational expectation, weapon system availability, and training production).⁵⁹

The difficulty of this approach lies in the apparent subjectivity inherent in the process. The individual commands established criteria on how and why to place a weapon system within a specific tier. In addition, how to translate the tiers into a measurable performance, in the form of performance-based outcomes (PBOs), within the Reach, Power, and Vigilance capability portfolios, represents an even greater challenge. A critical tenet in performance-based logistics, PBOs must be measurable and aligned to warfighter needs. Additionally, they must focus clearly on optimization of weapon system “readiness, availability, reliability, cycle time, and affordability.”⁶⁰

Measuring Performance and Risk

Take calculated risks. That is quite different from being rash.

—General George S. Patton, Jr, USA⁶¹

As stated previously, during past POM cycles, the AFCS established a position on a funding level for weapon system sustainment (specifically, DPEM and CLS) based on support for a percentage of the established unconstrained requirement. Generally speaking, the using commands submitted an initial request based on the stated requirement, and the AFCS funded a portion of this request based primarily on available funding. The DPEM/CLS cell at Headquarters Air Force then worked with AFMC and the lead MAJCOMs to make minor funding adjustments between programs based on specific weapon system requirements identified as critical. The final recommended funding position submitted to OSD measured and quantified risk with an emphasis on “the number of programmed depot maintenance and whole-engine overhaul deferrals.”⁶² Once again, upon receiving an approved budget, the using commands and AFMC adjusted these projections (in the truest sense) prior to and during the year of execution due to changing requirements and priorities. Generally, the MAJCOMs funded the requirements for each weapon system as budgeted whenever feasible. However, with a few exceptions, they retained control of their funding allocations, and maintained flexibility to reallocate based on changing requirements and new priorities.⁶³ Consequently, the so-called *budgeted deferrals* in practice rarely manifested themselves, making it virtually impossible to produce an audit trail demonstrating the impact to the portion of the requirement not funded by the AFCS, and subsequently OSD and Congress. Though some deferrals actually occurred, the depots normally reflowed their production schedules, thereby preventing the grounding of aircraft or spare engine shortages. However, in essence, this invalidated the request for funding argument used by logistics programmers during the POM build. Finally, the availability of supplemental funding during the year of execution, if received early enough in the year, frequently

compensated for a portion of the funding shortfall. By contrast, the implementation of CAM began a fundamental change in the requirements determination and funding processes for weapon system sustainment and, ultimately, how programmers measure performance and risk.

PBO represent the logical starting point in an environment where the need for efficiency competes with effectiveness in the decisionmaking process. Simply stated, PBOs “describe the expectations of performance provided to the lead command (customer) by the SPM of a given weapon system.”⁶⁴ The established performance outcome “is based on collaboration between the lead command and SPM and starts with customer *desired* outcomes tempered with SPM constraints.”⁶⁵ Interestingly, the rationale behind defining standards falls in line with historical guidelines for Air Force logisticians. For example, Air Mobility Command’s *Metrics Handbook for Mobility Forces* lists the following general purposes for establishing standards: “measure usage of resources required/allocated, measure performance against operational requirements, inspire performance.”⁶⁶

Until recently, many logisticians considered a weapon system’s mission capable (MC) rate the key indicator for weapon system health and performance. Simply stated, MC rate is “the percentage of possessed hours that aircraft can fly at least one of its assigned missions,” which translates into operational readiness for a given weapon system.⁶⁷ However, Air Force senior leaders recognized the need for a more analytical method for determining weapon system effectiveness. Consequently, in 2003, the CSAF “directed establishment of Air Force standards rooted in operational requirements and resources dedicated to the weapon system.”⁶⁸ Subsequently, in FY04, the Air Force adopted the aircraft availability (AA) metric as a primary determinant of fleet health and performance, using the MC rate as the logical starting point.⁶⁹ The AA calculation determines the percent of an aircraft fleet available for established operational mission requirements and readiness.⁷⁰ Eventually, the CSAF adopted AA as a primary weapon system health metric for use during his weapon system reviews (WSR), conducted biannually. Finally, in the absence of a logical alternative, logistics programmers replaced percent funded with AA as the key funding determinant during FY10/11 POM development and deliberations.

During the most recent POM deliberations, the Logistics Panel took a significant step toward using PBOs as a key determinant in both advocating for, and allocating available funding. Specifically, they used current CSAF WSR aircraft availability standards and applied the following criteria to each weapon system (see Figure 3 for a graphic depiction of this concept).

- **Green.** System is forecasted to achieve performance within 2.5 percent of AA target/standard.
- **Yellow.** System is forecasted to achieve performance between -2.5 percent to -5.0 percent of AA target/standard.
- **Red.** System is forecasted to achieve performance below -5.0 percent of AA target/standard.⁷¹

Though clearly intended as an objective criterion, some subjectivity eventually went into determining these three standards. Additionally, aircraft do not represent all Air Force weapon systems and, consequently, not all systems have

established AA standards. As such, SPMs and lead commands must work closely with air staff and AFMC representatives in developing objectively measurable AA or similar mission readiness standards for all Air Force weapon systems. The initial attempt to base funding decisions on projected AA standards during the FY10/11 POM build was an example of the difficulty of applying current thinking to such a complicated task. Though based on expected performance outcomes (AA standards), it nevertheless remained difficult to quantify the operational impact of not funding a specific capability (Reach, Power, Vigilance, or those systems identified as Cross-Cutters). Clearly, the key players involved must build on this limited success when determining a direction for the future.

Conclusion

He who will not apply new remedies must expect evils; for time is the greatest innovator.

—Viscount Francis Bacon⁷³

An accurate description of a growing proportion of the Air Force inventory must now include the word aged vice aging. The aggressive recapitalization and modernization plan envisioned for the future force by recent Air Force senior leaders appears less and less attainable with the passage of time. The current economic crisis and a growing emphasis on domestic spending issues add to the growing opposition to procurement of increasingly expensive modern weapon systems. Likewise, the current wars in Iraq and Afghanistan support those who argue that the US should focus on counterinsurgency efforts and soft power. There remains the possibility that the US could use savings garnered by ending the war in Iraq for recapitalizing and modernizing the force. However, in all likelihood, a redoubling of the effort in Afghanistan will negate these savings. In consequence, the overall cost of maintaining existing legacy systems will continue to escalate into the foreseeable future. As such, Air Force logisticians must accept the potential for, and the reality of, a shrinking portfolio and, therefore, must seek efficiency in weapon system sustainment funding, versus the historical desire for effectiveness in public spending. The current fiscal situation demands a capabilities-based approach to requirements determination with a focus on performance-based outcomes.

The FY10/11 POM build witnessed a concerted effort at utilizing an enterprise approach to funding weapon system sustainment. All of the key decisionmakers, including CAM, lead commands, major funds holders, applicable AFCS representatives, and most importantly the SPMs, worked toward the common goal of maximizing every dollar spent on weapon systems sustainment. Most importantly, despite initial resistance from OSD, emphasis within the Air Force shifted toward capabilities-based resourcing. Understandably, difficulties (and confusion) frequently occurred as organizations found themselves outside of their historical comfort zones. For example, lead commands and funds holders witnessed a reduction in their influence concerning funding choices for their primary weapon systems. Interestingly, to overcome these difficulties, the SPMs must serve as the single focal point for consolidating inputs and making final, well informed, sustainment decisions for the weapon systems for which they bear ultimate responsibility. Of

Lead Command	Program Group (CAFDEx)	FY10 OAC 87 TAI/	SPM Asst/Ao Std/Ao	FY10 Funding (\$M)	FY11 OAC 87 TAI	SPM Asst/Ao Std/Ao	FY11 Funding (\$M)
Tier 1							
AMC	C/KC-135	181	72.2/70.3	345.5	185	73.3/71.4	355.4
AMC	C-5	36	38.7/???	41.5	37	38.7/???	40.8
AMC	C-17	172	83.9/72	236.4	172	83.9/72	242.9
AMC	C-130	102	69/57	136.8	92	69/57	130.1
AMC	C-130J	37	82/62.8	75.8	53	82/34	102.3
AMC	KC-10	59	77.8/54	356.2	59	77.8/44	378.6
AETC	T-1A	179	69.2/???	60.8	179	69.2/???	60.8
AETC	T-43	3	70/???	7.8	0	0/???	3.9
AMC	VC-25	2	NS	80.1	2	NS	137.4
AETC	T-6	450	61/???	113.5	450	61/???	115.5
AMC	C-32	4	NS/2 grounded	50.8	4	NS/2 grounded	55.7
AMC	C-37	10	NS/70	40.6	10	NS/70	40.6
AMC	C-40	4	NS/75	48.1	4	NS/75	55.1
AETC	T-37/38	475	T38 58/53-55	31.9	473	T38 58/53-55	31.8
AETC	UH-1H/TH-1H	24	60.6/60.1	1.2	24	60.6/60.1	1.2
AFSPC	UH-1N	62	NS/???	8.6	62	NS/??#+	8.9
Tier 2							
AFMC	C-12	18	NS/9 grounded	6.7	18	NS/4 grounded	8.0
AMC	C-20	10	NS/???	25.1	10	NS/???	25.1
AMC	C-21	57	NS/???	28.5	57	NS/???	28.5
ACC	E-9	2	MCR 80/	5.8	2	MCR 80/	5.8
AMC	Loaders			17.1			21.8
Tier 3							
AETC	Academy	17	NS/"REDUCED AA"	3.9	17	NS/"REDUCED AA"	3.9
TOTAL GLOBAL REACH 1,904				1,722.5	1,910		1,854.1

Figure 3. Weapon System Assessment Criteria Example⁷²

equal importance, the Air Force must continue developing the philosophy codified in the establishment of CAM. The concept embodied in CAM still exists, at least partially, in name only, as long as AFMC lacks the authority to establish one office responsible for overseeing all sustainment accounts for the Air Force (including the current non-CAM funds holders). Of course, this requires support from not only Air Force senior leadership, but also DoD and Congress. Similarly, the recent POM witnessed the beginning of much needed change in the requirements determination process.

The unwieldy, unconstrained process for determining requirements proved inadequate for a fiscally constrained environment requiring efficiency over effectiveness. Consequently, AFMC and CAM moved aggressively toward a more refined process in the months leading up to the FY10/11 POM. Initial funding baselines considered historical obligation trends: known program content changes; aircraft inventory, flying hour, and performance adjustments; and, adjustments from SPMs and lead commands.⁷⁴ However, this approach represents only the beginning of the necessary refinement in defining requirements. In addition to the initiatives listed above, the Air Force must pursue reform in the development of CLS contracts in order to provide more flexibility and affordability in an area that consumes an increasingly disproportionate percentage of sustainment resources. Likewise, relief from the previously mentioned Congressional 50/50 legislation must be a key component of the way-ahead plan for how the Air Force affects

a permanent *fix* to the requirements determination process. This would significantly increase the flexibility afforded logisticians when making key sustainment decisions. Finally, logistics programmers must discount *anticipated* supplemental funding when developing weapon system sustainment requirements and shortfalls during the POM build. The volatility of today's fiscal environment significantly diminishes the likelihood of continuing supplementals, and logisticians simply cannot afford the implications of a budget crafted with this *assumed* funding. Above all, programmers must base resourcing decisions for weapon system sustainment on desired and required capabilities.

An efficiency-based requirements determination process must maximize acceptable risk. This implies an identification of shortfalls in projected capability, opportunities for reallocation of funding to other areas, and the identification of surplus capabilities.⁷⁵ Accurately measuring the amount of risk already taken, as well as identifying opportunities for additional risk, represents one of the greatest challenges for programmers. Repeated attempts by Air Staff representatives and AFMC consistently fell short in developing a measurable, logical process for a risk-based requirements determination process. Finally, just prior to the FY10/11 POM, programmers implemented a *bucketized* approach described earlier in this paper. Defining requirements in terms Global Reach, Power, Vigilance, and Cross-Cutters, combined with the three-tiered approach to risk, represented a significant departure from the cumbersome *percent-*

funded approach of the past. Though the AFCS initially accepted a capabilities-based approach as a valid process for defining requirements, deliberations revealed the necessity for further refinement of this concept. The final solution for a capabilities-based requirements determination process must stand the test of time—that is, it must retain flexibility to adapt in an ever-changing resource constrained environment.

The Air Force must continue the development of an efficient capabilities-based resourcing strategy for weapon system sustainment. This strategy should entrust the SPM with the authority and ability for affecting key sustainment decisions, centralize funding where possible for all funds holders within AFMC (CAM), and provide leadership with a program built on objective measurements. Programmers must effectively maximize risk in support of legacy systems, while identifying opportunities for diverting available resources to assist with vital recapitalization and modernization efforts. In so doing, senior leadership must openly, and efficiently, communicate Air Force intent to DoD and Congress. The eventual solution for a viable capabilities-based requirements determination approach for weapon system sustainment must provide the flexibility required for responding to an ever-changing strategic environment.

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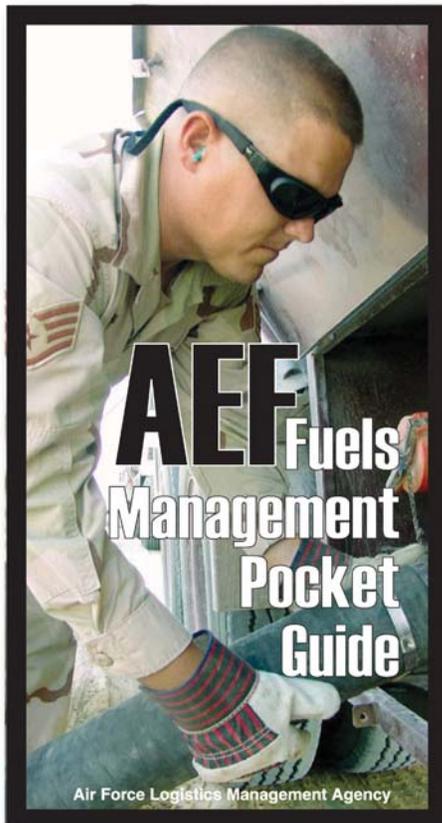
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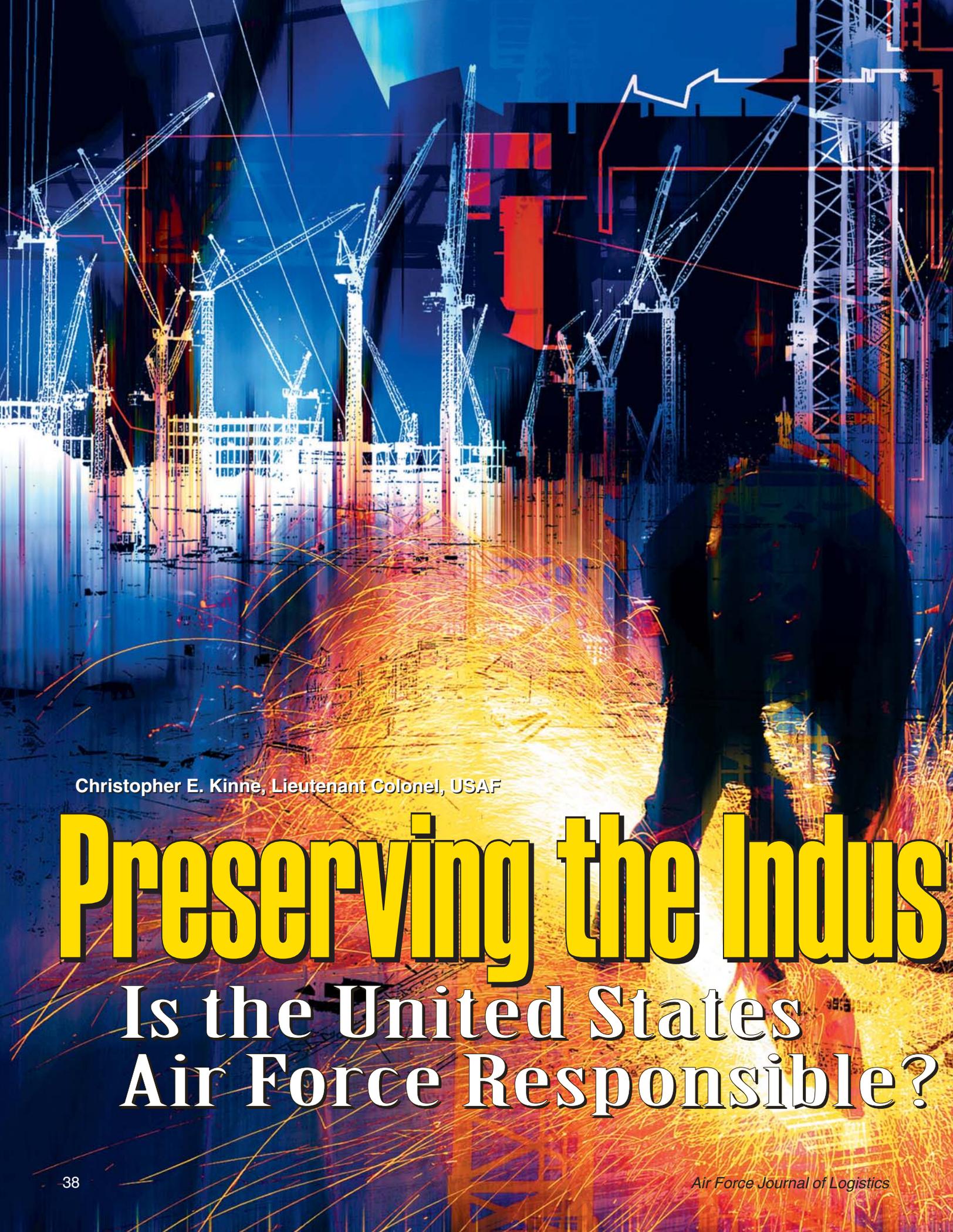
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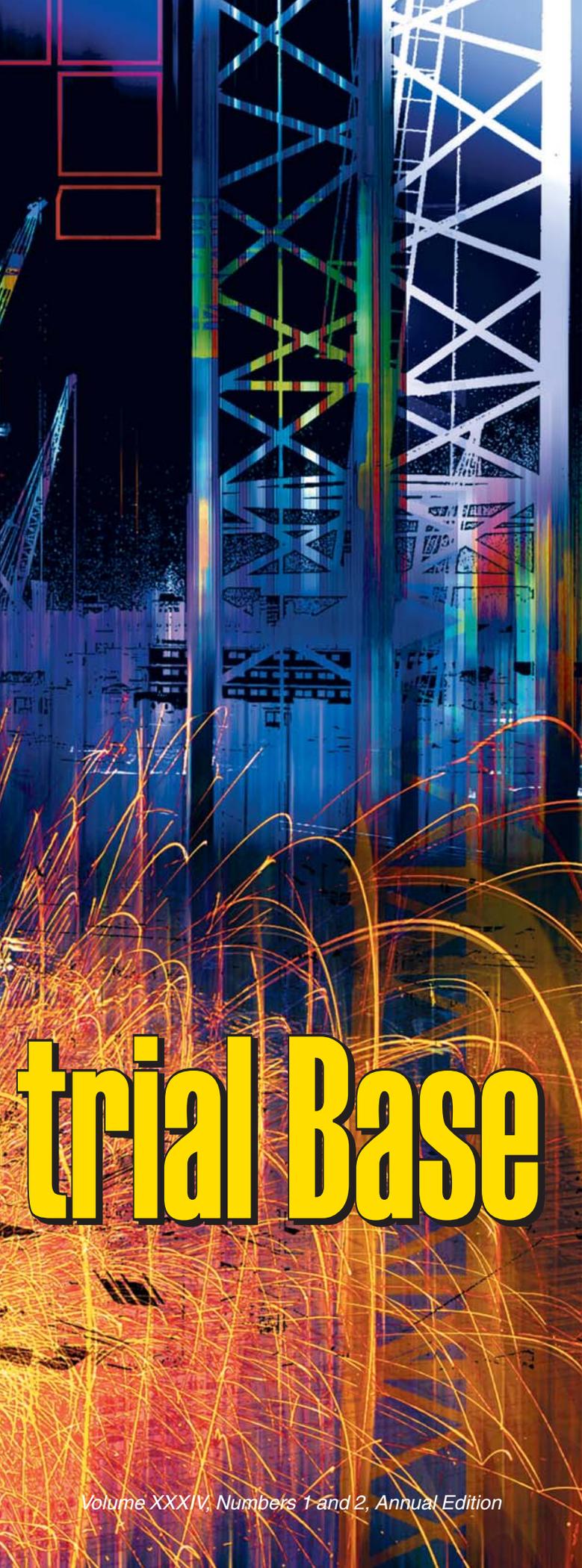
Generating Transformational
Solutions Today; Focusing the
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The background is a complex collage. It features numerous white and yellow construction cranes of various sizes, some with their jibs extended. The scene is set against a dark blue and black background, with bright orange and yellow sparks or light trails radiating from a large, glowing sphere in the center. The overall aesthetic is industrial and high-tech.

Christopher E. Kinne, Lieutenant Colonel, USAF

Preserving the Indus

Is the United States
Air Force Responsible?



trial Base

Introduction

The United States Air Force should not attempt to proactively manage the US aerospace industrial base for the purpose of preserving a domestic development and manufacturing capability to produce future generations of US military aircraft weapon systems. It is the mission of the Air Force to fly, fight, and win in air, space, and cyberspace.¹ It is not the mission of the Air Force to sustain the US aerospace industry. Preservation of the US aerospace industry is a national policy issue that should be addressed by the President of the United States in partnership with the US Congress. They are the only entities that can appropriately balance the military needs of the Department of Defense (DoD) and the Air Force against the other competing requirements within the United States.

The current Air Force mission—and those that preceded it—are often interpreted by airmen as implying that aircraft and their associated weapon systems are fundamentally required. This perception by airmen reflects a culture of aeronautical innovation that has its roots in the earliest days of the Army Air Corps and the infancy of the Air Force. In his 1997 work, *Architects of American Air Supremacy: General Hap Arnold and Dr Theodore von Karman*, Major Dik Daso observed, “both Arnold and Karman developed a similar vision for military aviation: the United States needed a cooperative aeronautics establishment which coupled civilian scientific and industrial expertise with the practical needs of the Army Air Corps.”² Dr von Karman articulated this vision in his December 1945 report to General Arnold entitled, *Toward New Horizons*, which was the first report of the newly formed Army Air Force Scientific Advisory Group. In his cover letter to General Arnold, Dr von Karman says: “The men in charge of the future Air Forces should always remember that problems never have final or universal solutions, and only a constant inquisitive attitude toward science and a ceaseless and swift adaptation to new developments can maintain the security of this nation through world air supremacy.”³

The technological push of the Air Force served it well throughout the Cold War. The Service successfully developed and operated many weapon systems, including advanced aircraft that were designed, tested, and manufactured in the United States. However, today, the Air Force is faced with the challenge of continuing to pursue technology advances within the limitation of reduced budget authority and increasing unit costs for each new weapon system. In addition, a myriad of laws, policies, and procedures have evolved to control and regulate the efforts that lead to the fielding of new weapon systems. The defense segment of the US aerospace industry is caught in the middle and has suffered as a result.

The US aerospace industrial base has changed dramatically since the end of the Cold War and the military procurement boom of the 1980s. As Pierre Chao, an analyst with the Center for Strategic and International Studies observes: “the 1990s were the perfect storm of events, which led to defense industry consolidation (70 industry firms became 5 between 1984 and 2004).”⁴ While the US defense industry was consolidating, the global marketplace was expanding and aerospace emerged as a major point of international economic competition between the United States and its largest market competitor, the European Union (EU). The fact that “Washington and Brussels currently

Article Acronyms

CRS – Congressional Research Service
DoD – Department of Defense
DoDIG – Department of Defense Inspector General
EU – European Union
GAO – Government Accountability Office
GDP – Gross Domestic Product
NDIA – National Defense Industrial Association
PPB – Planning, Programming, and Budgeting
US – United States

are working to resolve a number of issues, including a dispute between the aerospace manufacturers, Airbus and Boeing,”⁵ demonstrates the importance of the issue to both the United States and the EU.

The transatlantic economy dominates the world economy by its sheer size and prosperity. The combined population of the United States and EU now approaches 800 million people who generate a combined gross domestic product (GDP) of \$26.8T (\$13.6T in the EU and \$13.2T in the US). This sum was equivalent to 56 percent of world production or GDP in 2006.⁶

The commercial market place moves on. It does not wait for defense funding if it is not forthcoming. The surviving aircraft companies now look for opportunities to share costs and manage opportunities within the worldwide economy. For example, Boeing has greatly expanded its use of non-US subcontractors and nontraditional funding. A Japanese group will provide approximately 35 percent of the funding for the B-787 design project (\$1.6B). In return this group will produce a large portion of the aircraft’s structure and the wings (this will be the first time that a Boeing commercial product will use a non-US built wing). Alenia of Italy is expected to provide \$600M and produce the rear fuselage of the aircraft.⁷

However, where does the US aerospace defense industry go in the future? The Air Force had very few aircraft in development and production in 2008 and the manufacturing lines are dwindling—a situation that seems out of place for a nation that had a robust aerospace industry throughout much of the 20th century.

This article examines the perceived relationship between the DoD, the Air Force, and the US aerospace industry. It also answers the question, should the Air Force be involved in preserving the US aerospace industrial base? In answering no, this article asserts that the future of the US aerospace industry is a national issue, not an Air Force-unique issue. The article also suggests that any action by the Air Force to proactively preserve the US aerospace industrial base would be contrary to the current strategic direction of the Secretary of Defense and established DoD policy.

Background

There is no shortage of interest in the US aerospace industry. By one recent count, there are more than 400 different US-based Web sites that represent elements of the US aerospace industry.⁸ The scope of these Web sites range from colleges and universities to national academies, from aerospace workers’ associations to airline carriers and airports, and from state and national government agencies to corporate industry. Each individual Web

site serves a group that has a vested interest in the future of the aerospace industry. The purpose of this background section is to present perspectives from five US defense-related constituencies that represent a broad spectrum of ideas, with a particular focus on the issues that are most related to US national security and the question of the Air Force’s role in preserving the aerospace industry. The five constituencies considered are as follows.

- The Office of the President of the United States
- The United States Congress
- The Department of Defense (DoD)
- The DoD acquisition community
- The US defense and aerospace industry.

Perspectives from a Recent Presidential Commission

Early in his first term, President George W. Bush established a bipartisan presidential commission to examine the future of the US aerospace industry.⁹ To ensure a broad, bipartisan effort, the President only appointed 6 of the 12-member commission. The other six were appointed by the leadership of the US House of Representatives and the US Senate. The commission was chartered on July 19, 2001, to “study the issues associated with the future of the United States aerospace industry in the global economy, particularly in relationship to United States national security. [They were also chartered to] *assess the future importance of the domestic aerospace industry for the economic and national security of the United States* (emphasis added).”¹⁰ The commission was asked to study a broad spectrum of topics.

- The budget process of the US government
- The acquisition process of the government
- The financing and payment of government contracts
- International trade and the export of technology
- Taxation
- The national space launch infrastructure
- Science and engineering education¹¹

The commission had a great deal to say about these topics. After months of meetings and discussions covering the broad spectrum of topics, the commission published its final 300-plus page report in November 2002. The commission report begins with a positive statement about the US aerospace industry and claims in its opening sentences that “the role of aerospace in establishing America’s global leadership was incontrovertibly proved in the last century...[and] aerospace will be at the core of America’s leadership and strength in the twenty-first century.”¹² However, the report also includes nine recommendations that address many concerns of the aerospace industry and the panel members themselves. The commission identified several trends it believed must be corrected to both preserve the US aerospace industry and to improve US national security. Most importantly, the commission observed: “The contributions of aerospace to our global leadership have been so successful that it is assumed US preeminence in aerospace remains assured. Yet the evidence would indicate this to be far from the case.”¹³

In highlighting its concern about the future preeminence of the US aerospace industry, the commission observed: “The US aerospace industry has consolidated to a handful of players—

what was once more than 70 suppliers in 1980 is down to 5 prime contractors today. Only one US commercial prime aircraft manufacturer remains. Not all of these surviving companies are in strong business health.”¹⁴ The commission also noted: “New entrants to the industry have dropped precipitously to historical lows...[and] the industry is confronted with a graying workforce in science, engineering, and manufacturing...[and] the US K-12 education system [is failing] to properly equip US students with the math, science, and technological skills needed to advance the US aerospace industry.”¹⁵

Addressing part of the national security issue, the commission noted:

Other countries [specifically in Europe and Asia] that aspire for a great global role are directing intense attention and resources to foster an indigenous aerospace industry. This is in contrast to the attitude present here in the United States. We stand dangerously close to *squandering the advantage* bequeathed to us by prior generations of aerospace leaders.... *A healthy aerospace industry is a national imperative*. The administration and the Congress must heed our warning call and act promptly to implement the recommendations in this report (emphasis added).¹⁶

Among the nine recommendations of the commission, one stands out as particularly relevant to the question of the Air Force

constitutional obligations. When issues suddenly become current events, it can be useful to examine the history of the issue—where the issue came from and who cared about it when. As a case in point, the status of the US aerospace industry became an issue during the July 22, 2008 Senate confirmation hearings for the secretary of Air Force and Air Force Chief of Staff nominees. During a line of questioning about the KC-X tanker source selection activity, Secretary of the Air Force nominee Michael Donley asserted: “aerospace is an international business.”¹⁹ In response, Senator Hillary Clinton responded:

I’m very well aware that we live in an international economy, but I’m also extremely conscious of the impact of decisions made by our government with taxpayer dollars that undermine our competitiveness for the long run and eliminate jobs and thereby undermine technical skill acquisition in a way that I think will come back to haunt us. So this is something that I take very seriously.²⁰

Senator Clinton did not reveal the motivation for her expression of concern, but it is likely that her thoughts and opinions had been shaped by the GAO and the CRS. In an April 2008 CRS report entitled *Air Force Air Refueling: The KC-X Aircraft Acquisition Program*, William Knight and Christopher Bolkom reported that

The US aerospace industry has consolidated to a handful of players—what was once more than 70 suppliers in 1980 is down to 5 prime contractors today. Only one US commercial prime aircraft manufacturer remains. Not all of these surviving companies are in strong business health.

role in preserving the US aerospace industrial base. The commission recommended “the nation adopt a policy that invigorates and sustains the US aerospace industrial base.”¹⁷ The panel essentially recommends the US government take a much more direct and overt role in the future of the aerospace industry. The recommendation includes such steps as:

- Tasking the Defense Science Board to develop a national policy that will invigorate and sustain the US aerospace industrial base
- Continuously developing new experimental systems, with or without a requirement for production
- Maintaining and enhancing critical national infrastructure when it is in the nation’s interest
- Revising procurement policies to include prototyping, spiral development, and other techniques, which allow the continuous exercise of design and production skills¹⁸

Perspectives from the US Congress

Members of the US Congress use both the Government Accountability Office (GAO) and the Congressional Research Service (CRS) to help understand issues while fulfilling their

...the commercial aircraft industry, like the personal computer and automobile industries, has globalized, drawing on the relative strengths of specialized suppliers of components and expertise from around the world. As a result, the two primary manufacturers, Boeing and Airbus, have both outsourced key parts of their production processes to overseas firms.²¹

Senator Clinton’s expression of concern was not new or unique. As early as 1993, national security risks related to the US aerospace industry were being identified by the GAO in reports to congressional requestors concerned with the trend of defense industry mergers and acquisitions. In a report entitled *Defense Industrial Base: An Overview of an Emerging Issue*, the GAO reported:

DoD has taken the position that free market forces generally will guide the restructuring of the defense industrial base. We believe that this is *not a realistic strategy* for ensuring that government decisions and industry adjustments will result in the industrial and technological capabilities needed to meet *future national security requirements*. A key reason for this is that *defense company officials* are understandably concerned with maximizing the returns for investors and *are not specifically accountable for how the long-term changes in the defense industrial base affect national security* (emphasis added).²²

The same GAO report also states:

DoD has not taken a strong proactive role in assessing US reliance on foreign sources and foreign investment relating to the defense industrial base...[and] consequently, DoD generally does not know whether and to what extent it relies on foreign technology and products to meet its critical needs. *Such information is necessary to assess national security risks* (emphasis added).²³

By 1997 the focus of the GAO regarding defense industry consolidation seemed to be evolving from the issue of national security to the risks to competition potentially caused by fewer vendors in the marketplace. In a report entitled *Defense Industry: Trends in DoD Spending, Industrial Productivity, and Competition*, the GAO shifted the discussion from a concern about national security and implied that consolidation in the defense industry is an acceptable outcome resulting from a natural cycle of events. The 1997 report states:

The business environment for defense industry has also changed over the years. Since the end of World War II the number of aircraft contractors dropped from 26 to 7 in 1994. The size and nature of the defense industrial base is critically shaped by the amount and emphasis of US defense outlays. *Recent debate has centered on the effect of the post-Cold War reduction in defense spending and its effect on the viability of the industrial base.* Although this downward trend in budget outlays and particularly in procurement spending is sizable, *it is one of four times in post-World War II history that the industrial base has had to adjust to changes in national security requirements.* In historical perspective, *defense funding drawdowns are not unique* (emphasis added).²⁴

In 1998 GAO did not address national security concerns at all. In a report titled *Defense Industry: Consolidation and Options for Preserving Competition*, the entire discussion had moved to concerns about the potential risk to competition between contractors. For instance, the report states:

The sharp decline in spending by DoD since 1985 has resulted in a dramatic consolidation of the defense industry, which is now more concentrated than at any time in more than half a century. As the single customer for many products of the defense industry, DoD must have the ability to identify and address potential harmful effects of mergers and acquisitions. *Questions have been raised about whether the consolidation has gone too far—adversely affecting competition in the industry.* Many defense industry mergers and acquisitions are recent, so there is little evidence that the increased consolidation has adversely affected current DoD programs. Antitrust reviews have identified some problems, and remedies have been implemented. However, *the consolidation could pose future problems unless DoD improves its ability to identify problem areas and devises alternative ways to maintain competition* in defense acquisition programs (emphasis added).²⁵

Clearly, the tone of the GAO reporting suggests the interest in the US Congress trended toward the state of competition in the US aerospace industry. Perhaps the statement from (then) Senator Clinton indicates national security issues are part of the discussion again. If so, the national security issues might be partly addressed by Secretary Clinton in her new role as the US Secretary of State in the Obama administration.

Perspectives from the Department of Defense

Secretary of Defense

Secretary of Defense Robert Gates, who served in the Bush administration and continues to serve in the Obama

administration, recently published an article in *Foreign Affairs* outlining his strategy for the DoD and his philosophy and intent for the department. Secretary Gates asserted: “The defining principle of the Pentagon’s new National Defense Strategy is *balance* (emphasis added).”²⁶ In Secretary Gates’ vision, balance means striking equilibrium between the urgent need to recapitalize the DoD weapon system inventory and the immediate need to support current conflicts in the global war on terrorism. Secretary Gates proposed:

It would be irresponsible not to think about and prepare for the future, and the overwhelming majority of people in the Pentagon, the Services, and the defense industry do just that. But, we must not be so preoccupied with preparing for future conventional and strategic conflicts that we neglect to provide all the capabilities necessary to fight and win conflicts such as those the United States is in today.²⁷

Secretary Gates recognized that balance means some modernization efforts will have to be slowed down or stopped outright. He suggested

...that although US predominance in conventional warfare is not unchallenged, it is sustainable for the medium term given current trends...[and acknowledged the] current strategy knowingly assumes some additional risk...[that] is prudent and manageable.²⁸

Secretary Gates also recognized that implementation of the National Defense Strategy will require a partnership between the DoD, Congress, and the President. He asserted:

The country’s national security capabilities are still coping with the consequences of the 1990s, when, with the complicity of both ends of Pennsylvania Avenue, key instruments of US power abroad were reduced or allowed to wither on the bureaucratic vine. The National Defense Strategy offers a slow, steady, balanced approach to recovery.²⁹

DoD Policy

In accordance with Section 2504 of Title 10, United States Code, the DoD submits an annual report on US industrial capability to the Committees on Armed Services of the Senate and the House of Representatives. Among other things, the annual report includes statements of DoD policy and

...a description of the methods and analyses being undertaken by the Department of Defense alone or in cooperation with other federal agencies, to identify and address concerns regarding technological and industrial capabilities of the national technology and industrial base...[and] a description of the assessments”³⁰

conducted by the DoD.

The March 2008 report, submitted by the Office of the Under Secretary of Defense for Acquisition, Technology and Logistics (Industrial Policy), defines DoD national security industrial policy as based on *ideal* industry characteristics. An infinitely robust industrial base is not the ultimate objective of the Department (emphasis in the original).³¹ The ideal industry characteristics define an industry that is *reliable*, *cost-effective*, and *sufficient* to meet strategic objectives. The annual report is a carefully worded policy statement. The definitions of *reliable*, *cost-effective*, and *sufficient* never explicitly suggest that DoD is responsible for sustainability of the US defense industry.³² However, the March 2008 report does recognize that, “DoD research, development, acquisition, and logistics policies, analyses, and decisions guide and influence industry in four

fundamental ways.”³³ The report makes special note of the fact that DoD incorporates industrial base-related policies into its acquisition regulations to protect national security [and to] preserve critical defense industrial and technological capabilities”³⁴ when necessary. DoD acknowledges that it can use a “variety of means including funding innovation in science and technology, and encouraging competition through acquisition strategies and contract provisions to preserve industrial capability.” DoD also asserts that adequate regulations exist to preserve industrial capabilities vital to national security on a case-by-case basis, but that the standard for intervention into the industrial base is high in order to ensure that limited DoD resources are not expended unnecessarily.³⁵

On the specific topic of globalization and international competition, the stated DoD objective is to “leverage globalization benefits and commercial markets while minimizing risks.”³⁶ Furthermore, the DoD states:

Even if the Department could afford to rely only on domestic sources, it would not want to. The United States does not own all the good ideas, nor make all the best products. Many of them come to us from our allies and trading partners.... The Department does not, and cannot, drive global commercial markets. Instead of hoping that global commercial markets will adapt to the Department, the Department must adapt its practices to be more of a conventional customer wherever possible.³⁷

With respect to the risk of foreign sources of supply, the 2008 report asserts the following.

Foreign dependence usually does not equate to foreign vulnerability. The Department is not vulnerable if it is dependent on reliable foreign suppliers, just as it is not vulnerable when it is dependent on reliable domestic suppliers. Foreign vulnerability would occur only if the Department was dependent upon suppliers from a single or small group of countries that had the capability and political will to halt shipments to DoD in time of need, and when such delivery denial would cause direct and unacceptable impact to operations.³⁸

To demonstrate the minimal risk of this vulnerability, the report offers the fact that:

The Department procures very few defense items and components from foreign suppliers. In fiscal year (FY) 2006, the Department awarded contracts to foreign suppliers for defense items and components totaling approximately \$1.9B, less than 1 percent of all DoD contracts; and only about 2.4 percent of all DoD contracts for defense items and components. This report concludes that the Department employs foreign contractors and subcontractors judiciously, and in a manner consistent with national security requirements.³⁹

On the subject of domestic source restrictions, the report states, “the Department generally opposes statutory domestic preference proposals that preclude or impede its ability to procure world class products and capabilities on a *best value* basis or when it impairs effective Defense cooperation with friends and Allies.”⁴⁰ At the same time, DoD recognizes “the availability of domestic production capabilities for critical defense technologies is an essential element of national security [and asserts] that in calendar year 2007, the DoD had 23 projects underway specifically designed to establish, expand, maintain, or modernize industrial capabilities required for national defense.”⁴¹

Commenting on the effect of mergers and consolidation, the same 2008 report states:

The DoD’s decisions take a long view on competition. In the case of potential last-of-type platforms such as Joint Strike Fighter, for example, DoD selected from one industry team in order to minimize costs and maximize program efficiency. Its winner-take-all acquisition strategy decision was not anticompetitive. Rather, it reaffirmed DoD’s recognition of the need to focus the resources of the tactical fighter industry on unmanned and other futuristic systems. While market forces and a strong budget normally sustain credible competitive sources, for some critical defense products the number of suppliers may be limited.⁴²

A final interesting perspective comes from the DoD input to a Department of Homeland Security report in May 2007 entitled *Defense Industrial Base: Critical Infrastructure and Key Resources Sector-Specific Plan as Input to the National Infrastructure Protection Plan*. This report presumes that the US defense industrial base exists and does not focus on preserving the economic enterprise itself as a matter of national security. Rather, it is focused on the infrastructure that supports the industry. The report strives to “identify those assets, systems, networks, and functions that, if damaged, would result in unacceptable consequences to the DoD mission, national economic security, public health and safety, or public confidence.”⁴³

Formal DoD Assessments

DoD assessments of the US defense industrial base evolved and became more sophisticated and nuanced during the George W. Bush administration. Perhaps this increasing level of sophistication reflects a greater level of attention to the subject out of concern for national security, or perhaps it mostly reflects recognition of the subject’s political sensitivity. The changes in reporting between 2005 and 2008 illustrate the apparent political sensitivity.

In 2005, a broad statement of the defense industrial environment asserted, “The Department does not concur with concerns raised by some that the US defense industrial base is in crisis.”⁴⁴ The 2005 report also asserted “The overall economic outlook for the US aerospace/defense industry is positive [because] aerospace sales...increased 8 percent [in the last year].”⁴⁵ The report concludes as follows.

The Department of Defense is a relatively small player in the overall US economy (about 3.75 percent of the gross domestic product) and Department leverage within the overall US manufacturing sector is limited. Many US industries once dominated by DoD demand now are focused on, and dependent on, commercial markets. . . . Nevertheless, it is desirable—and absolutely necessary—that the Department take whatever steps are necessary to ensure the industrial base on which it depends remains sufficiently reliable, innovative, and cost-effective to meet the nation’s national defense requirements. The Department is doing so and will continue to do so.⁴⁶

The 2006 and 2007 reports included assessments of the aerospace sector that are similar to those included in the 2005 report. In addition, the 2006 and 2007 reports started to shift the focus of discussion toward second and third tier suppliers and raw material rather than prime contractors. As one example, the 2006 report discusses aircraft structures design and manufacturing capabilities, as well as the castings and forgings market. As another example, the 2007 report highlighted titanium availability as a significant issue within the aerospace industrial base.

The 2008 report continued the themes from 2007, with a particular emphasis on the titanium issue within the aerospace industry. However, the tone of the reporting seemed to change. The previous reports generally presented only facts and information. The assessments did not make specific changes or even recommendations based on the circumstances. Rather than simply stating facts or providing facts, the 2008 report was written in such a way that the reader is left with unanswered questions. The 2008 report discussed the status of a variety of aircraft production lines as well as research and development funding streams, but the report never actually advocated for any change. It is left to the reader to reach a positive or negative conclusion. The same report referred to an internal Air Force report entitled *Annual 2007 Air Force Industrial Base Assessment* (December 2007), which stated that

The overall outlook for the industry is positive primarily due to increased commercial aircraft orders and increases in US defense spending...[but] over the next 10 years multiple military aircraft production lines will go cold precipitating the need for a new round of consolidation in order to reduce infrastructure costs.⁴⁷

Rather than make specific assessments or recommendations, the report included open-ended statements noting that many of

solutions to efficiently and effectively provide required capabilities and guaranteed best value for the government. Our assessment is that the consolidation of the industrial base, caused by unstable defense demand, has reduced the benefits of competition, introduced industrial organizational conflict of interest issues, and made every defense contract a “must win” situation for the prime contractors. The net result is that *the US industrial base is fragile*. It will relearn very expensive lessons with every program and *will require the rebuilding of infrastructure*, tailored to each new program.⁵⁰

Despite this assessment of a fragile industrial base, acquisition policy has not changed. Defense acquisition programs continue to deal with the issue, sometimes as an intentional element of the procurement strategy. For instance, Assistant Secretary of the Air Force, Ms Sue Payton, stated “during testimony to Congress [about the KC-X tanker source selection effort], ‘job creation, location of assembly and manufacturing were not part of this evaluation criteria, according to the law’ and that ‘industrial capacity was not part of the evaluation criteria.’”⁵¹

An additional factor the acquisition community struggles with is the *Buy American Act*. In 1999, Colonel Joe Smythe suggested:

The *Buy American Act* and its subsequent modifications represent one of the most visible and egregious remnants of US protectionism. Its very existence refutes the US desire to only level the playing

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the issues faced by the military aircraft sector involve budgetary and recapitalization tradeoffs. Examples of these tradeoffs include:

- Continuing C-17 production or upgrading the C-5 fleet and maintaining two development teams for fighter engines
- Competing domestic and foreign aircraft designs
- Determining the mix of manned versus unmanned systems⁴⁸

Perspectives from the Acquisition Community

In June 2005, Acting Deputy Secretary of Defense Gordon England established an *Acquisition Action Plan* to respond to the “growing and deep concern within the Congress and within the Department of Defense (DoD) leadership team about the DoD acquisition processes.”⁴⁹ The resulting *Defense Acquisition Performance Assessment* (published in January 2006) included assessments and recommended performance improvements. Among these assessments was the following commentary about the defense industry.

Successful acquisition requires a stable environment of trust and confidence between government and an industrial base that is responsive and healthy. This fosters competition for ideas and

field in international trade. It has been used in the past to justify congressional protection of specific industries with an associated burden to DoD.⁵²

Perspective from the Defense and Aerospace Industry

The National Defense Industrial Association (NDIA) publishes an annual white paper entitled, *Top Issues*. The top issues evolve annually as trends in the industry evolve. The 2004 version of the white paper labeled sustainment of the US industrial base a top issue. In that paper NDIA noted:

The adequacy of a viable US defense industry to provide the equipment needed by warfighters in performance of their national security responsibilities is critical for the ultimate success of the transformational programs of the DoD...It is NDIA’s position that the US defense industrial base needs to review and reassess its ability to domestically produce critical items necessary for the timely support of the Armed Forces.⁵³

This position began to evolve in 2005 with the association’s assertion that “broad based protectionism does not benefit the US defense industrial base.”⁵⁴ In 2006, the report suggested that globalization was good for the US industrial base,⁵⁵ and by 2008 there was no discussion of the US aerospace industrial base at all.

Two white papers produced by the Aerospace Industries Association of America, Inc, in late 2008 suggested that the US aerospace industry is healthy and doing well “following four years of remarkable expansion...[and] continued growth in 2008.”⁵⁶ The same analysis also stated, “As the global financial crisis continues to bring many industries to their knees, aerospace is largely flying above the storm.”⁵⁷ Although much of this success is attributable to civil aircraft sales, defense sales are also doing well. But much of the defense spending is attributable to “supplemental spending to support troops in Iraq and Afghanistan. . . . [which has] led to large increases in procurement for additional equipment, spares, and maintenance.”⁵⁸

The supplemental funding has not helped with the growing modernization requirements. The 2008 Aerospace Industries Association white paper stated that “defense modernization is not optional.... America has deferred defense and aerospace modernization to the point that modernization and recapitalization are increasingly lengthy and expensive. The bill is now due.”⁵⁹

Analysis

The fate of the US aerospace industry is a national security issue that should be determined by the President of the United States in partnership with the US Congress. Working together, the President and Congress should decide whether the US government will proactively engage in preservation of the industry or whether free market forces will be allowed to decide the outcome of this historically critical element of the US economy and defense establishment. The President and Congress have sufficient information with which to make the necessary national security decisions. The *Final Report of the Commission on the Future of the United States Aerospace Industry* lays out nine detailed recommendations for consideration. The recommendations cover a wide range of aerospace issues, including education reform, military research and development, commercial aviation, and space systems and launch. Well considered and bipartisan, the commission report and its recommendations should form the basis for decisions made by the President and the Congress about the future of the US aerospace industry.

The Air Force is not responsible for the future of the US aerospace industry. The Air Force is responsible for organizing, training, and equipping a force capable of accomplishing the missions assigned by the President and the Secretary of Defense. There is no legislative or policy basis for the Air Force to attempt to proactively manage the US aerospace industrial base for the purpose of preserving a domestic capability for producing future generations of US military aircraft weapon systems. In the absence of any specific national security policy regarding the defense industrial base, DoD has decided to allow free market forces to determine the general fate of the defense industry while preserving the possibility of acting when necessary to protect certain segments of the critical technology infrastructure. In general, these segments are second- and third-tier suppliers of subcomponents and raw materials. The DoD has generally decided not to act to preserve domestic US prime contractors.

There is no requirement for additional information about the state of the US aerospace industry and the associated risks of a dwindling industrial infrastructure. These issues have been well

documented by many groups, public and private. The important issue is for the senior leadership of the United States—the President of the United States and the US Congress—to deal with the risk assessment and make some critical decisions about how the United States will develop and manufacture aerospace systems while also assuring national security. DoD is responsible for providing the military instrument of power to the country. It is the responsibility of the President of the United States and the US Congress to determine how best to acquire and sustain the military instrument of power.

Pierre Chao observed in 2008 that the US industrial policy debate is usually focused on the spectrum of sourcing options ranging between global and national markets, with the key issue being how to get technology to the US warfighter while preserving US jobs and assuring a source of supply.⁶⁰ Unfortunately, this policy dilemma is not well served by the current state of the US military acquisition system because, as Chao also noted, the military is primarily in a sustainment mode where costs are increasing to maintain the same capability. The defense industry, however, is positioned earlier in the acquisition cycle—system development—where there is more opportunity for competition, new ideas, and profit.⁶¹ As a result, the defense industry, which is considered a candidate for government intervention, is not necessarily interested in the current business being offered by DoD. A national security policy decision needs to be made—sustain the old systems with whatever part of the industrial base wants to do the work, or develop new systems and encourage innovation across the defense and aerospace industries.

Unfortunately, the national security establishment often fails to make this kind of key national security decision. Members of Congress and the President, recognizing that the defense and aerospace industry represents a significant number of jobs in the US as well as a significant portion of the gross domestic product, continue to focus on competition when competition is not the issue. With a few notable exceptions—most recently, the Darleen Druyun scandal comes to mind—DoD and the Air Force play by the rules and procure military systems through robust competitive processes. In 1998, David Cooper of the Government Accountability Office submitted testimony before the Senate Subcommittee on Acquisition and Technology, Committee on Armed Services that stated “there is little evidence that the increased consolidation has adversely affected current DoD programs.”⁶² Mr Cooper’s testimony included a table that showed the number of contractors providing fixed-wing aircraft reduced from eight to two between 1990 and 1998 (only Boeing and Lockheed Martin remained).⁶³

Two of the six contractors identified in Mr Cooper’s testimony who left the fixed-wing aircraft market in the reported period (Northrop and Grumman) later merged and attempted to reenter the aerospace market with a European partner as a global competitor for the KC-X tanker program. In 2007, Senator John McCain’s staff asked the DoD Inspector General (DoDIG) to independently review the KC-X program and advise him on whether the Air Force request for proposal for the Air Force KC-X Aerial Refueling Tanker Aircraft Program contained impediments to competition.⁶⁴ The DoDIG concluded that with minor modifications to acquisition strategy (nonmaterial findings), the Air Force effort was sufficient in assuring

competition and fair prices.⁶⁵ This was a positive finding for DoD and the Air Force, but it ignored the larger issue. What was the right decision for US national security? Are there risks associated with international participation in the tanker program?

The DoD appears to have concluded that it is an acceptable national security risk for the defense industry to continue to consolidate when driven by free market forces. The DoD industrial policy 2008 report to Congress stated:

The DoD's decisions take a long view on competition. In the case of potential last-of-type platforms such as Joint Strike Fighter, for example, DoD selected from one industry team in order to minimize costs and maximize program efficiency. Its winner-take-all acquisition strategy decision was not anticompetitive. Rather, it reaffirmed DoD's recognition of the need to focus the resources of the tactical fighter industry on unmanned and other futuristic systems.⁶⁶

In other words, the DoD is focused on new ideas (read transformation). It does not want to be stuck preserving an industry base that may no longer be fully relevant to the elements of military instrument of power it wishes to procure.

The DoD position also appears unconcerned with issues such as the limited supply of some materials, even when the

Global titanium demand also is increasing. However, there is limited information available on projected worldwide titanium production or production capacity. It is not clear whether titanium prices are likely to increase, stabilize, or decline. DoD weapon systems primarily use specialty metals which are produced by the same US suppliers that produce metals for the commercial markets. The Department is a very small consumer of commercial grade metals. However, tight commercial markets could negatively impact the viability of US metals suppliers, and ultimately DoD weapon system programs.⁶⁸

However, "The Department's smaller share of the market for raw materials lessens its ability to influence the market...in a global marketplace it is more difficult to separate defense and commercial needs and trends."⁶⁹

Perhaps industry consolidation and reduced access to materials are issues, but DoD doesn't know how to deal with them—or is unwilling to. Anthony Cordesman, of the Center for Strategic and International Studies, has suggested a lack of leadership is the fundamental issue. He says the senior leadership of the national security establishment should be asking the critical national security questions, but isn't. According to Cordesman:

The problem does not lie in defense industry, program managers, mid-level officers and officials, or in the procurement process. It

The problem does not lie in defense industry, program managers, mid-level officers and officials, or in the procurement process. It lies in a fundamental failure to take hard decisions and force the overall defense procurement process to become realistic in making easily foreseeable judgments about risk and feasibility, to contain costs, and to create a mix of program objective memorandum and PPB goals that the nation can actually afford.

competition for those materials is international and other nations are considered in a risk assessment. In the case of titanium, the DoD analysis is primarily focused on price impacts of global demand, concluding:

Specialty metals as a percentage of the unit recurring flyaway cost represent a small portion of military aircraft prices. Although additional steel and aluminum price increases appear unlikely, the potential for future titanium price increases remain. Significant future titanium price increases could lead to aircraft price increases for which the Department would have to plan. For example, a 50 percent titanium price increase would increase the unit price of an F-22A by \$1,274,000 and the FY05-11 buy (104 aircraft) by \$132,454,000.⁶⁷

This price analysis, although interesting, only blithely addresses the real national security issue that price is irrelevant if you cannot get any of the material in the first place. The same DoD report states:

lies in a fundamental failure to take hard decisions and force the overall defense procurement process to become realistic in making easily foreseeable judgments about risk and feasibility, to contain costs, and to create a mix of program objective memorandum and PPB [planning, programming, and budgeting] goals that the nation can actually afford.⁷⁰

If some fundamental national security policy decisions were made, the acquisition system could respond accordingly. As the 2006 Defense Acquisition Performance Assessment observed, "the current acquisition system delivered the foundation of our military power; [it] is, and must remain, our strategic advantage"⁷¹ The question is how to get to those decisions. Cordesman, citing Loren Thompson from the Lexington Institute, noted that the

Pentagon doesn't have a coherent plan for how it will sustain global air dominance over the next 30 years without a sufficient number of F-22s, because it has convinced itself that unconventional warfare is the wave of the future. Making decisions by default is not leadership; it is an abdication of responsibility.⁷²

Cordesman goes on to say:

Recent statements in Congress have failed to address any of the real issues affecting national security and the future of the Air Force, but they have defended the program [F-22] on the narrow ground of constituent interest.⁷³

Existing DoD acquisition policies covering the development and production of weapon systems are sufficient to implement the current DoD policy and the de facto national security decision that has been made. The government acquisition community can work with those elements of the worldwide industrial base who choose to participate in the procurement process. Consistent with existing policy, the Air Force will provide annual assessments of the status of domestic and foreign sources of supply, which will support a risk assessment that will be integrated into an overall defense capability risk assessment and reported to Congress. When, or if, the President and Congress choose to react to these risk assessments, the Air Force will be ready.

Conclusion

The Air Force is dependent upon, but is not responsible for the aerospace industrial base that supports it. The Air Force should not attempt to proactively manage the US aerospace industrial base for the purpose of preserving a domestic capability of producing future generations of US military aircraft weapon systems. There are well-established policies and procedures for informing DoD, the US Congress, and the President of the United States when the Air Force is concerned that limitations in the aerospace industry might threaten the Air Force's ability to execute its mission and thus threaten US national security. The Air Force should use these policies and procedures to report the health of the aerospace industrial base when necessary, but it should not make decisions about how to react to the status unilaterally.

The Air Force needs to concentrate on executing its mission today—to fly, fight, and win in air, space, and cyberspace. This mission fulfills the objective of balance established by the Secretary of Defense who has determined that significant focus needs to be placed on the current war on terrorism and not modernization. If the Secretary of Defense's strategy has a detrimental effect on the US aerospace industry then that is a national issue that needs to be addressed by the President of the United States in partnership with the US Congress. These two national security institutions are the only entities with the responsibility of balancing the military needs of the DoD and the Air Force against other competing requirements in the United States.

The Air Force should advise DoD and national leadership what capabilities it requires in order to execute the missions assigned. The Air Force also should advise DoD and national leadership about the risks associated with the global aerospace marketplace. It should do nothing more, nothing less.

The way ahead for the United States is not as clear. In the wake of the 2008-2009 economic crises, the two most recent US presidential administrations, in partnership with the US Congress, have provided significant financial bailouts to two very different, but fundamental elements of the US economy—the banking community and the auto manufacturing industry. Clearly, President Bush and President Obama, as well as their

partners in the US Congress, concluded that these bailouts were necessary to support the economic well-being of the country and therefore the national security of the United States. Perhaps it is time for the aerospace industry to be considered part of the conversation as well. The nine recommendations included in *Final Report of the Commission on the Future of the United States Aerospace Industry* would be a good place to start.

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First, DoD evaluations and assessments of industry segments or specific industry-related issues help identify future budgetary and programmatic issues and inform policy-making and requirements generation. Second, DoD defense system acquisition strategies and decisions shape the technological and programmatic focus of industry. Third, the Department incorporates industrial base-related policies into its acquisition regulations to protect national security, promote competition and innovation, and, in certain specific cases, preserve critical defense industrial and technological capabilities. Finally, decisions made on mergers and acquisitions involving defense firms directly shape the structure of the industry.
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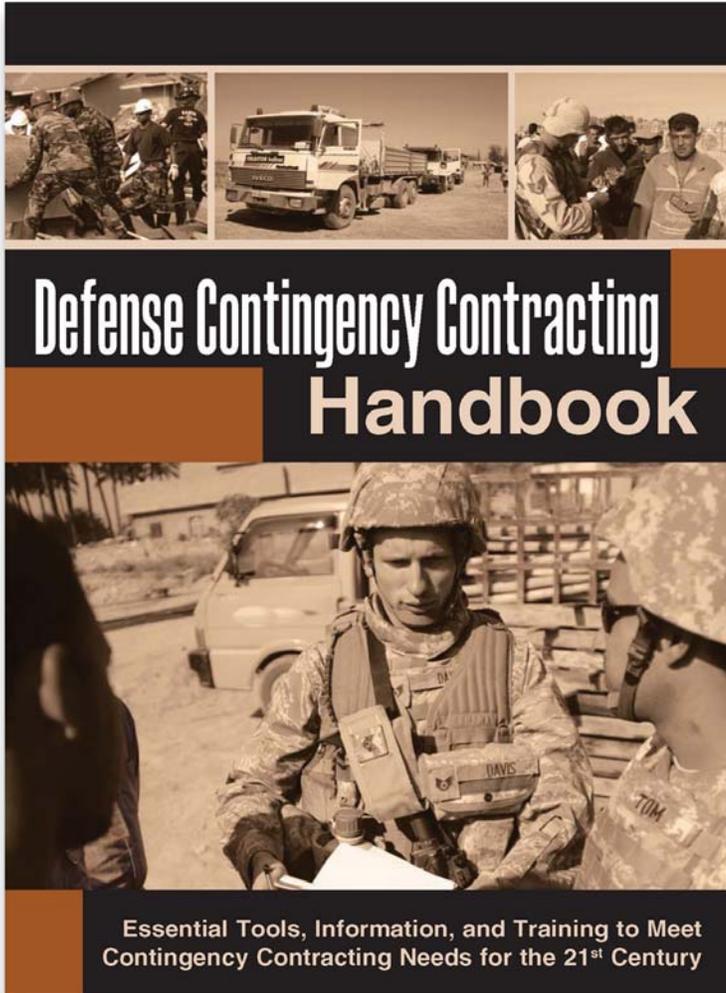


If I had to sum up in a word what makes a good manager, I'd say decisiveness. You can use the fanciest computers to gather the numbers, but in the end you have to set a timetable and act.

—Lido Anthony (Lee) Iacocca

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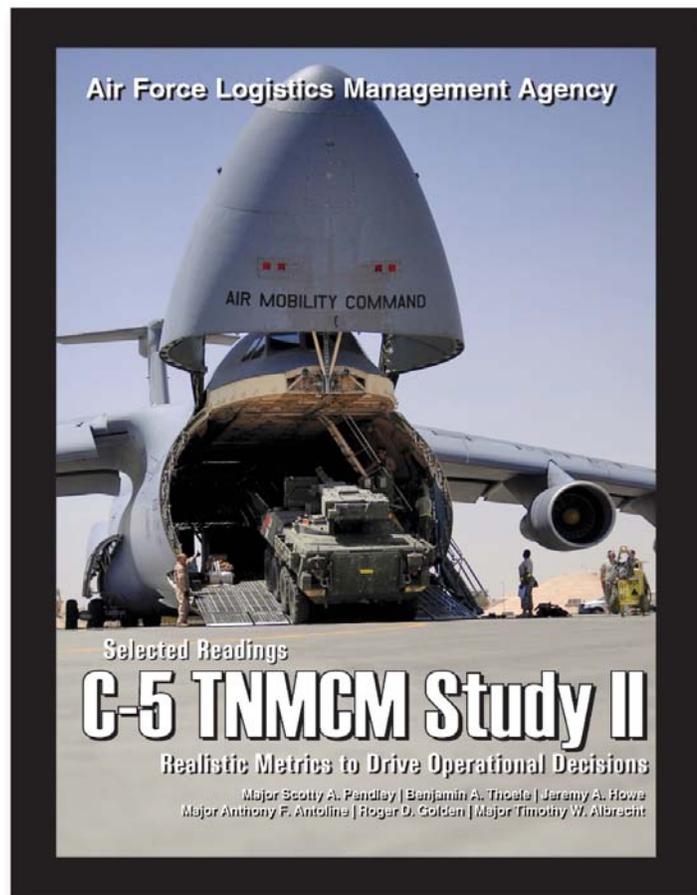
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No other technological advance has altered the nature of warfare or the way we fight it as much as the airplane. It changed fundamentally the way we think about fighting by creating a viable way to access the third dimension.

Challenges

21st Century Logistics

Understanding Airpower

Clearing the Air: Airpower Theory and Contemporary Airpower

Twenty-First Century Logistics Challenges presents one article in this edition: “Clearing the Air: Airpower Theory and Contemporary Airpower.” This article was included in this edition of the Journal to provide an educational resource for Air Force logisticians and to improve their understanding of airpower and its uses.

In the article, Colonel Raymond P. O’Mara notes that in just one century, airpower has proven to be a tremendously valuable tool for decisionmakers. Early airpower theorists recognized that airpower was different than other forms of power and that, if used correctly, could decisively affect a conflict. The access it provides makes it a faster, more flexible, and more precise than any other form of military power. Airpower has redefined persistence and ability to mass through technological advances, further increasing airpower’s strengths.

Airpower’s greatest strength is its flexibility in application. Air forces can perform missions from strike to humanitarian relief, rapidly and precisely. The forces themselves are flexible

across the spectrum, able to shift from sanction enforcement to strike and back, using the same aircraft and aircrew. Airpower makes the best use of the human ability to adapt to a situation. Economically, these facts make air forces a tremendous value. Airpower provides the best return for every dollar spent across the defense spectrum. However, airpower is not a substitute for all other forms of power. It is best used in combination with the other tools available to decisionmakers in order to meet policy objectives. Each form of military power has strengths based upon its command of its physical medium. We are most effective when we employ each branch of our force to its strengths, with each supporting as necessary.

He concludes, airmen need to control airpower. Only airmen can truly understand the strengths and, equally important, the limitations of airpower. The danger of the limitations is that, if not minimized, they can severely reduce the advantages of airpower’s strengths. Airmen must be able to understand this, and express it to our decisionmakers.

Clearing the Air: Airpower Theory and Contemporary Airpower

Colonel Raymond P. O'Mara, USAF

Introduction

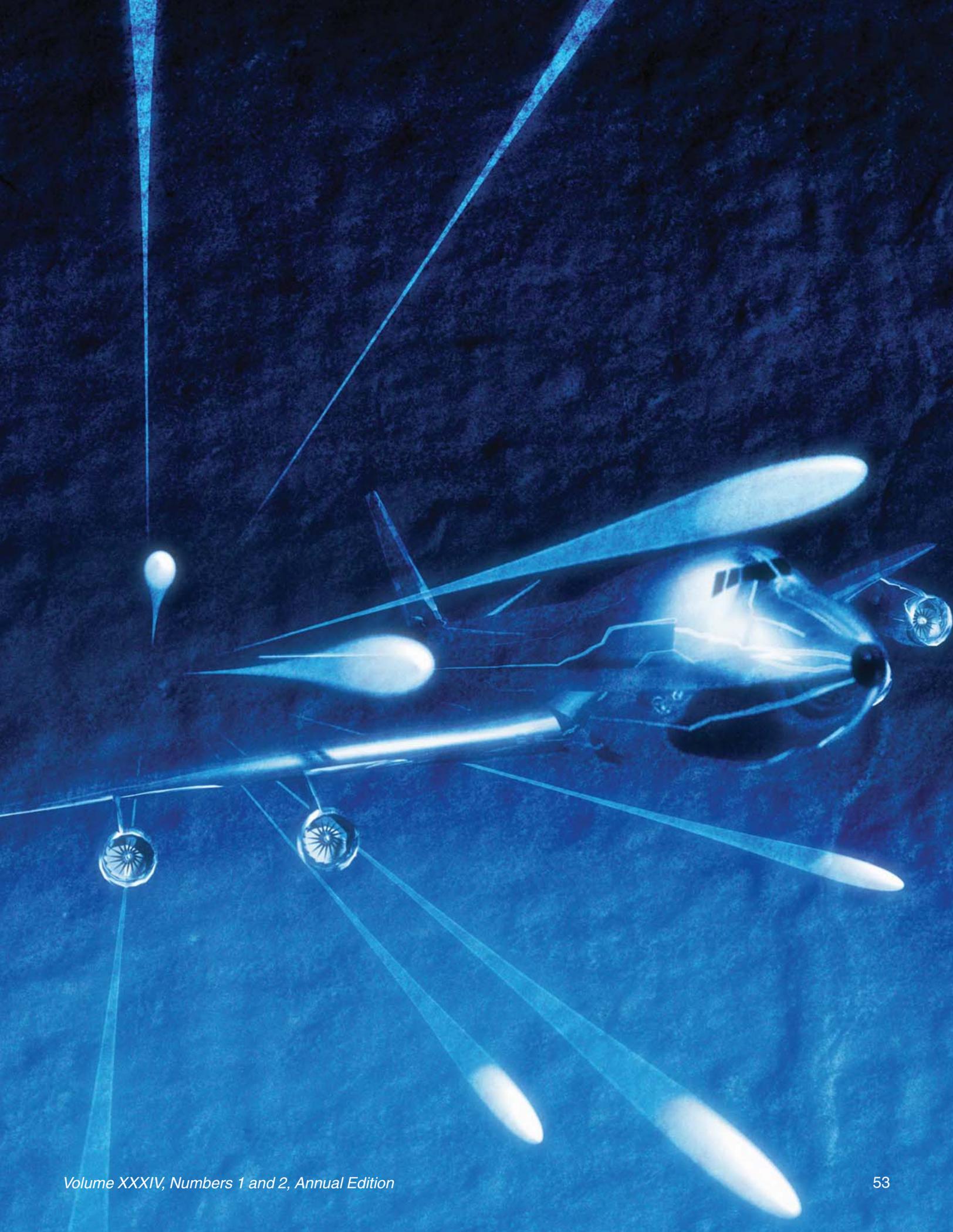
The United States finds itself engaged in a global conflict unlike any other it has ever faced, either in scope or length. The long-term commitment of military forces demands serious consideration of its structure. Efforts to transform America's military are underway, but we need to examine the very basis of our thinking with regard to its use. As we alter the shape and capabilities of our Armed Forces, we depend more on interoperability and synergy to get the mission accomplished. We must make sure that our Armed Forces are used in a fashion that will leverage their strengths to the maximum extent possible. To do that, we must reevaluate each arm of the military and the theory that underpins its use. Airpower, the newest form of military power, is no exception to this requirement.

No other technological advance has altered the nature of warfare or the way we fight it as much as the airplane. It changed fundamentally the way we think about fighting by creating a viable way to access the third dimension. Likewise, from conventional bombs to precision weapons, nuclear weapons to ballistic missiles and satellites, a wide variety of technologies have been developed to exploit this new dimension of warfare that, combined with the aircraft itself, gives rise to a new form of military force—airpower. In the current resource-constrained environment, it is critical now more than ever that we understand the true

nature and capability of airpower. It is only through this understanding that we can optimize the tools at our disposal in order to employ military power to fulfill the political goals of our country.

The advent of the aircraft also spawned a new field of military theory, one aimed at explaining best how to use the third dimension. With the possible exception of nuclear deterrence theory, airpower theory has been the most contentious form of military thought yet developed. Because the first airpower theorists, and many that followed, used their ideas to justify the establishment of a separate air service (thus taking missions and resources from both land and sea forces), debates of airpower's value and role have always been clouded by bureaucratic infighting. Accusations of zealotry on the part of airpower advocates and unthinking obstructionism on the side of skeptics have made it difficult to discuss the true nature of airpower's capability and potential. Incredibly, even today, some are calling into question the need for an independent Air Force.¹

In order to capture airpower's true capability and potential, it is necessary to strip away arguments both for and against a separate air service. We must examine airpower theories in their most basic form and assess their current value by examining the record of their application in warfare. By establishing what portions of established airpower theories have stood the test of time, we can use these results to create a true picture of airpower, define what makes it unique, and then determine how best to use it in the current context and beyond.



Power and Airpower

Airpower is different from ground or sea power. Originally viewed as just another way to attack enemy forces on the ground, the airplane evolved beyond a form of mobile artillery the first time enemy aircraft fought each other in air-to-air combat. The fact that aircraft could perform multiple missions such as reconnaissance, strike, and air defense, and do so in ways that could not be accomplished by other weapon systems, demanded that we think about airpower differently than the way we think about ground or sea power.

But what is airpower? What makes it unique from the other forms of military power? Before we answer those questions, we must first define *power*.

Power is that which allows one entity to influence another entity or situation. With another *entity*, influence is the ability to change a decisionmaker's mind to choose a path desired by the one exerting the influence. That change may be either positive or negative. A positive change is that which influences an entity *to do* something. A negative change occurs when an entity is influenced *to stop doing* something. With regard to a *situation*, influence is the ability to change the conditions of that situation in a desired direction. The manner in which power is applied, not necessarily the type of power applied, will determine the direction of the desired change, either positive or negative. Power also encompasses the ability *to prevent* another entity from exerting influence upon you.

From the above definition, we can reason that airpower is the ability to apply influence through the use of the third dimension. Dr Phillip Meilinger noted that in addition to air vehicles and the ability to fly,

...most observers go on to note that airpower...encompasses the personnel, organization, and infrastructure that are essential for the air vehicles to function. On a broader scale, it includes not only military forces but also the aviation industry, including airline companies and aircraft and engine manufacturers.²

Thus, airpower is the sum total of the ability to apply influence through air, space, and everything that supports that ability.

The Development of Airpower Thought

Airpower has been an integral part of modern warfare since World War I. Today, it is no longer a mysterious new force, and while arguments may still rage as to whether airpower can be *the* decisive factor in winning a war, it is not possible to state with any credence that airpower is not *a* decisive factor in warfare. We need only look to Operation Allied Force over Kosovo, "the third largest strategic application of airpower by the United States since World War II, exceeded only by the Vietnam War and Operation Desert Storm in scale and intensity,"³ as an example of this decisiveness. The success of airpower as the sole military instrument in the North Atlantic Treaty Organization (NATO) victory

...despite the multiple drawbacks of a reluctant administration, a divided Congress, an indifferent public, a potentially fractious alliance, a determined opponent, and —not least—the absence of a credible NATO strategy surely testified that the air instrument has come a long way in recent years in its *relative* combat leverage compared to that of other force elements in Joint warfare.⁴

This rise as a decisive military force occurred in less than a century in the face of rapid technological change.

Traditionally, new technologies are developed into weapon systems, and then integrated into fighting forces, and doctrine is ideally then developed before use in combat. The rapid rate of technological advance in the aerospace realm left little time for this process. Airpower theory, like aviation technology, developed very rapidly. By comparison, technological advances in land and sea power came at a much slower rate. This pace allowed ground and sea power theory and doctrine to develop in a more measured fashion, and new technologies were assimilated more smoothly. The pace also allowed traditionally conservative practitioners of the warfighting craft to become used to the technological advances and adapt to their use. Advances such as the submarine and gunpowder, which was a proven concept by 1776, took hundreds of years before they became integrated into theory and doctrine, although it may be argued that armored warfare proceeded on the same rapid timeline followed by air warfare. However, the relative advance in air technology was far greater than that of armored vehicles over the same period of time.

Debates about the effectiveness of airpower and the best way to employ it have been clouded from the beginning. Any advocacy for the use of airpower was seen as a bureaucratic move to take missions (and the accompanying funding) from another Service, and was frequently characterized as outlandish claims that airpower alone could *do it all*. The airpower advocate was automatically branded an *airpower zealot*. While Billy Mitchell, the charismatic airpower theorist and strong advocate of an independent air Service, certainly advocated an air force that was less expensive than naval ships for coastal defense in the 1930s, nobody has since argued seriously that airpower can replace land and sea power or win wars on its own. It is time to retire the strawman that any advocacy for the use of airpower is an assertion that airpower can completely replace land or sea power. Airpower, just as land and sea power, when used correctly with other appropriate military elements of power, can be a highly effective—even decisive—tool. To use airpower correctly, however, we must first understand what airpower can do.

To establish a clear picture of airpower and its potential as a military element of power, we can turn to the ideas of the past and see how airpower thought has evolved, identifying the ideas and concepts that have been proven through its application. With this done, we can then assess airpower's suitability as an instrument of power in the present context, and shape our thinking for its application in the future. By removing the separate Service argument, we can see what early theorists understood and saw as potential for this new capability. There have been many notable airpower theorists, but five in particular laid the foundation of airpower theory as it exists today: Giulio Douhet, William C. Sherman, William "Billy" Mitchell, John C. Slessor, and John Warden. Sherman and Slessor are much less well known than Douhet, Mitchell, and Warden, but this quintet had the most significant impact on airpower thought in the last century.

Airpower: The Theorists

Airpower theorists focused on three major topics: command of the air, targeting with airpower, and airpower missions. Every theorist we will examine addressed these topics, mixing personal experience, original thought, and the unique context in which

they lived in an attempt to define the unique and appropriate use of airpower.

Giulio Douhet

Giulio Douhet was the first airpower theorist. Born in Italy in 1869 and commissioned as an officer in the Italian artillery in 1882, he began thinking about airplanes in 1909 and had formed the core of his airpower thought by the middle of World War I.⁵ His landmark treatise on airpower, *The Command of the Air*, was first published in 1921. Douhet recognized that airplanes had the potential to significantly change the way wars would be fought in the future. Perhaps the most significant airpower theorist of all, many of his original ideas have either formed the basis for or have been included in most subsequent airpower theories. Criticism of his theory is abundant, but the fact remains, as Phillip Meilinger has noted, that “most of his successors, knowingly or not, merely wrote commentaries on his ideas and predictions.”⁶

Main Theoretical Ideas

Douhet realized that the airplane could have a revolutionary effect on warfare. He believed that the airplane’s inherent speed and ability to reach any point within an enemy country meant that an attacking air force could bypass enemy fielded forces and provide a shortcut to victory.⁷ It was possible (in his mind) to bring the fight directly to the enemy civilian populace and destroy their will to continue fighting, thus avoiding the drawn-out attrition at the battle front that characterized World War I. Douhet envisioned masses of heavily armed, combat-survivable bombers armed with explosive, incendiary, and poison-gas bombs directly attacking the enemy’s civilian population and infrastructure. The principal key to the success of these attacks was something that he called *command of the air*.

Command of the Air

Douhet believed that, because they could now be overflown by attacking air forces, ground and sea forces had become much less significant. Every square inch of an enemy’s territory was exposed to aerial attack, and since they could not defend against such attacks, the disposition of ground and naval forces was irrelevant to the outcome of the war. Logically, to Douhet, “if one no longer needed to control the ground, then the forces used to control it diminished in significance.”⁸

In order to take advantage of airpower’s ability to overfly ground forces and attack the enemy, it was necessary to secure the ability to operate at will in the third dimension. This was to be achieved by attaining command of the air, which Douhet defined as:

To be in a position to wield offensive power so great it defies human imagination. It means to be able to cut an enemy’s army and navy off from their bases of operation and nullify their chances of winning the war. It means complete protection of one’s own country, the efficient operation of one’s army and navy, and peace of mind to live and work in safety. In short, it means to be in a position *to win*. *To be defeated* in the air, on the other hand, is finally to be defeated and to be at the mercy of the enemy, with no chance at all of defending oneself, compelled to accept whatever terms he sees fit to dictate.⁹

In short, to Douhet, “to have command of the air is to have *victory* (italics in original).”¹⁰

Douhet ultimately believed that if a country lost command of the air, it was possible that it might surrender without further fighting. “The side that lost control of its own airspace would realize what was in store and surrender rather than face devastation.”¹¹ To ensure survival, it was fundamental that a country maintain command of the air to prevent an enemy from subjecting it to aerial attack. To that end, he advocated for the acquisition of only those forces that could maintain command of the air and wrest it from the enemy—air forces. This belief laid at the heart of his rationale for an independent air force.

The method of attaining command of the air is a distinguishing characteristic of Douhet’s theory. For him, it was necessary to reduce the enemy air force “to a negligible number incapable of developing any aerial action of real importance in the war as a whole.”¹² Douhet believed that it was more effective to destroy enemy air forces by attacking them while they were still on the ground, rather than by engaging them in the air. He posited “destroying an enemy’s airplanes by seeking them out in the air is, while not entirely useless, the least effective method. A much better way is to destroy his airports, supply bases, and centers of production.”¹³

This idea of destroying “the eggs and the nests”¹⁴ was driven by Douhet’s belief in the offensive capability of the aircraft. He believed that firepower, rather than speed, was the critical capability an aircraft must possess, although he made it very clear that the inherent speed of aircraft was a great advantage over surface-bound forces. In his view, a slower, heavily armed aircraft could withstand the attack of pursuit aircraft and carry out its mission, therefore, destroying aircraft while they were still on the ground was the most effective way to destroy the enemy’s air force.¹⁵

During the Arab-Israeli Six Day War in 1967, the Israelis conducted a Douhet-inspired air campaign to gain command of the air over the Middle East. At the outset of the war, they executed a “preemptive attack designed to destroy the Egyptian Air Force and its airfields.”¹⁶ During this attack, and the ensuing ones over the next two days on the rest of the Arab air forces, the Israelis destroyed 416 aircraft, 393 of them on the ground. Israel achieved complete air superiority (command of the air), and freed their ground forces from the threat of aerial attack.¹⁷ Similarly, during the first day of Operation Barbarossa in World War II, the Germans destroyed over 1,800 Soviet aircraft, most of them on the ground.¹⁸ This achieved almost complete air superiority and gave Wehrmacht forces freedom of movement over the entire battlefield for the opening phase of the operation. Indeed, in every conflict since World War II, the country with the offensive initiative and political freedom to attack the necessary targets strove to destroy the enemy air forces on the ground.

Airpower Targeting

Witnessing the carnage of World War I, Douhet concluded that the war “had demonstrated the inevitability and totality of wars and that modern technology had produced an unbreakable stalemate on the ground.”¹⁹ He saw the airplane as the means of breaking that stalemate, realizing that “*it is possible* to go far behind the fortified lines of defense without first breaking through them (italics in original).”²⁰ With the entire enemy country vulnerable to attack from the air, it created an entirely new set of targets. As Phillip Meilinger noted, “Douhet was perhaps the first person to realize that the key to airpower was

targeting, because although aircraft could strike virtually anything, they should not attempt to strike everything.”²¹

Douhet believed that:

...aerial offensives (should) be directed against such targets as peacetime industrial and commercial establishments; important buildings, private and public; transportation arteries and centers; and certain designated areas of civilian population as well. To destroy these targets three kinds of bombs are needed—explosive, incendiary, and poison gas—apportioned as the situation may require. The explosives will demolish the target, the incendiaries set fire to it, and the poison-gas bombs prevent fire fighters from extinguishing the fires.”²²

With airpower’s ability to reach every corner of a country, Douhet saw the battlefield limited only by the physical boundaries of the nations engaged in the war. Thus, in a case of circular reasoning, he believed that all of the hostile nation’s citizens became combatants, since they were exposed to attack from the air.²³ In other words, civilians were legitimate targets because of the fact that they *could be* attacked.

Douhet’s focus on targeting the civilian population was founded in his belief that “attacking an enemy’s population would inspire it to revolt, and thus lead a government that cared about its people to discontinue its policies.”²⁴ He based this idea upon his reading of the British public’s panicked reaction to the German aerial bombing attacks on London in 1915.²⁵ Although sporadic and unfocused in execution, the German bombing campaign against London had a significant effect on both Douhet and the British population. The public outcry over a lack of a coordinated British defense against the attacks led to the creation of the independent Royal Air Force (RAF) in 1918.²⁶

Douhet’s choice of aerial attack weapons was a combination of explosive, incendiary, and poison-gas bombs. He chose this mixture specifically to cause the greatest amount of terror and destruction possible.²⁷ This mix of weapons would allow an attacking air force to “completely wreck large areas of population and their transit lines during crucial periods of time when such action might prove strategically invaluable.”²⁸

To conduct these aerial attacks, Douhet proposed the use of an aircraft with an extensive combat radius, speed sufficient only to enable it to avoid aerial combat, enough armor to protect the crew, and enough bombs to destroy its targets and complete the mission. Even though it was intended to avoid aerial combat, this *battleplane* would include some defensive weaponry for the sake of the crew’s morale.²⁹ Douhet envisioned this battleplane as a cheap alternative to expensive ground and naval forces. Douhet came from a country with relatively modest resources. He saw the battleplane and its ability to defeat an adversary by attaining command of the air as an economic way to defend his country.³⁰

Although he saw an economic benefit in the battleplane, Douhet’s focus on an aircraft whose principal capability was bombing was driven by his core belief that airpower was the ultimate offensive force. Possessing superior speed and being independent of the limitations of geography suffered by surface forces, the airplane was

...free to choose the point of attack and able to shift its maximum striking forces; whereas the enemy, on the defensive and not knowing the direction of the attack, is compelled to spread his forces thinly to cover all possible points of attack along his line of defense, relying upon being able to shift them in time to the sector actually attacked as soon as the intentions of the offensive are known.³¹

This single-minded focus on the offensive shaped Douhet’s thoughts on how to employ airpower and for which missions it was appropriate.

Airpower Missions

At the time Douhet wrote, radar did not exist and pursuit aircraft, while slightly faster than bombers, were rather lightly armed. Approaching bomber formations were difficult to detect and, in Douhet’s estimation, even more difficult to shoot down. Consequently, he saw no possibility of an effective aerial defense against bomber aircraft.³² Additionally, Douhet discounted the effectiveness of any type of ground-based air defense. He considered “the use of anti-aircraft guns (as) a mere waste of energy and resources.”³³ While later in his life he admitted that *auxiliary* aircraft, such as pursuit fighters, might be useful to fend off attacking defensive fighters, he remained steadfast in his belief that there was no effective defense against an attacking bomber formation. For Douhet, bombardment, as the single best method of gaining command of the air, was the primary mission of the air force.

While the bombardment mission held primacy, Douhet recognized that auxiliary aircraft could play a valuable role as reconnaissance assets. He believed that a long-range, fast reconnaissance aircraft was necessary to photograph enemy territory. This was needed for “effective targeting, not only to pinpoint objectives but also [to] determine the effectiveness of air attacks on those objectives.”³⁴ Beyond this concession, Douhet’s airpower theory focused on the bomber.

Results

Douhet constructed a remarkable theory. He provided a framework that allowed him to explain what he saw as airpower’s unique capabilities, apply them to the strategic situation as he saw it, and act as a vehicle to predict future behavior. He established the idea of command of the air, a concept that, as we shall see, dominated early airpower theory development and eventually became a necessary condition for success in warfare. Douhet also identified numerous capabilities unique to airpower, surprise and speed principal among them. The multidimensional character of airpower’s use of the third dimension enabled an aircraft to conduct a massive surprise attack against an enemy, *anywhere* on the ground. The speed with which such an attack could be made was also crucial. Douhet understood that, as with warfare on the land and sea, the idea is to inflict as much damage as possible in as short a time as possible to maximize the effects of the attack on the enemy’s ability to recover, or even resist.³⁵

Douhet identified three of the major mission areas that would develop within air combat: bombing, pursuit, and reconnaissance. While dismissive of all but bombing, he did understand that there were multiple elements of airpower. The only major mission area we now recognize that he did not address was airlift. This may be attributed to an over concentration on the offensive nature of airpower as much as the technological limitations of the time. Even the largest bombers of Douhet’s time carried relatively small payloads. Douhet is not alone in his lack of attention to airlift. None of the theorists examined here addressed airlift as a principal mission for airpower.

Many of his ideas, though, are easy to criticize 90 years after they were written. His assertion that direct attacks against the enemy’s civilian population would break its will to continue fighting and force the government to surrender remains

unsubstantiated. “He grossly overestimated both the physical and psychological effects of bombing. Populations did not break as quickly as he thought they would under the weight of air attack.”³⁶ This, however, is more a critique of the effect of the use of power on the civilian population rather than the use of airpower. This is an important distinction. The direct attack of a civilian population, whether by air, land, or sea, is unlikely to cause its will to suddenly collapse. Occupational land forces might exert more direct control over a population, but sudden collapse of its will is doubtful without the application of a great deal of force.

Another often-criticized aspect of Douhet’s theory is his choice of weapons. It is difficult, however, to dismiss offhand this part of the theory. As David MacIsaac points out, Douhet assumed that explosive, incendiary, and poison-gas munitions would be used “in the correct proportions” in aerial attacks against the enemy population and industrial infrastructure. The fact that the Allies’ World War II bombing campaign did not cause the collapse of the will of either the German or Japanese civilian population does not necessarily disprove Douhet’s theory.³⁷ Not only was poison gas not used, the German populace was not the sole target of the Combined Bomber Offensive (CBO). British missions, conducted at night, directly targeted the German population, but the American daylight campaign largely targeted German industry and transportation.³⁸ Also, the CBO was not a nonstop, continual assault, which was a key requirement in Douhet’s strategy. A lack of aircraft in 1943 and inclement weather throughout the war thwarted Allied attempts to keep their foot on Germany’s throat.

The attacks did, however, show some of the results that Douhet had predicted. During his post-war interrogation Albert Speer, Adolf Hitler’s Minister for Armaments during the war, stated that the 1943 bombing attack on Hamburg had a devastating effect on the German population. He believed that further attacks on Hamburg, completely destroying it, or similar attacks on six or eight other German cities would have crippled German civilian morale.³⁹ Similarly, Douhet’s assertion that there was no defense against air attack has been proven wrong. Improvements in anti-aircraft artillery, the development of surface-to-air missiles, and the advent of integrated air defense systems have all been effective at destroying aircraft in the air. The first battleplane, the B-17 Flying Fortress, was not fully effective until it had defensive fighter escort to counter Luftwaffe aerial defenders.⁴⁰ Radar gave the Germans warning of the direction and timing of impending bombing raids and enabled them to mass their air defense fighters against the incoming Allied formations. Douhet, however, cannot be blamed for not forecasting major advances in science and technology.

Another enduring concept that Douhet developed was the battleplane. Envisioned as an economical alternative to expensive land and sea forces, this concept of a do-everything multi-role bomber would shape combat aircraft development in the United States for much of the next century. The B-17, arguably the first incarnation of the battleplane, was followed by the B-24, B-36, and B-52, all of which were self-protecting, heavy bombers. Multi-role fighter bombers from the F-111 through the F-16 and F-15E are close conceptual cousins to these aircraft. Development of these aircraft was not cheap. Improving flight and weapons capability and implementing new technologies took many years of expensive development and testing. The

modern incarnation of the battleplane, the stealthy B-2 bomber, illustrates the point. Able to penetrate enemy defenses, strike its targets and return to base, the B-2 is decidedly not cheap at an estimated cost of \$2B per aircraft.

One final key element of Douhet’s theory requires examination. He theorized that with sufficient airpower capability, ground forces would be necessary only to hold enemy forces in place while airplanes overflew them to attack the civilian population and subsequently win the war. Aside from Operation Allied Force, there has not been a case where air attack alone has won a war. In every other instance, airpower has been employed in conjunction with ground (and where possible) sea power.

Giulio Douhet’s airpower theory was founded on his concept of command of the air. His desire to roam the enemy’s skies without interference from enemy air forces drove his strategy of destroying those forces while they were still on the ground. More significantly, command of the air was a necessary condition in order for Douhet to execute his bombing strategy. Without command of the air, Douhet’s strategy was meaningless. The need for *total* command of the air did not dominate the thinking of all airpower theorists. A different approach to the concept and an alternate way to achieve it is a distinguishing characteristic of early airpower thought in the United States.

William C. Sherman

Giulio Douhet’s airpower theory provided the point of departure for virtually every theorist who followed. While seemingly all airpower theories were ultimately *tainted* by the discussion of a separate air service, one of the most balanced was advanced by Major William C. Sherman, a United States Army officer who remains relatively unknown to this day. Born in 1888 and a 1906 graduate of West Point, Sherman gained some combat experience in World War I and was one of a small group of Air Service officers who congregated around Billy Mitchell. While discussing Mitchell’s ideas may seem the next logical step in examining the development of airpower thought, many of his ideas were actually adaptations of Sherman’s thoughts.⁴¹ Sherman published his theory of airpower in 1926 in a book entitled *Air Warfare*, which was as much a discussion of airpower theory as it was a training manual for aerial warfare. Unfortunately, Sherman died the next year and the core of his thoughts had to be carried forward by others. Sherman was no less an advocate for a separate air service than Mitchell, but “was more intellectual in his advocacy and less zealous in his approach.”⁴²

Main Theoretical Ideas

Before evaluating Sherman’s ideas on command of the air, airpower targeting, and missions, it is necessary to examine the basic structure of his theoretical beliefs about airpower. Unlike Douhet, Sherman did not advocate for an independent air force as the sole viable military element for his country. He acknowledged the need for land and sea forces and, as such, tried to present airpower as a separate, distinct force with unique capabilities and limitations. He intended his theory “to describe in a general way the powers and limitations of aircraft, and to indicate what may reasonably be expected of our airmen, when the nation is again confronted with the necessity of waging war.”⁴³ Unquestionably a visionary, Sherman’s greatest contribution came from his understanding of airpower as a

separate *type* of force and his ability to encapsulate that idea in terms familiar to military men of his time.

Sherman used existing military concepts to describe airpower's unique strengths and limitations—the principles of war. By using terms common to practitioners of the art of war on land, sea, or air, Sherman was able to establish what made airpower a separate, distinct force without resorting to abstract concepts. He warns about drawing analogies between land and air forces too strictly when thinking about airplanes, stressing that while air warfare remains a human endeavor, understanding the intrinsic differences in air warfare is the only way to truly understand airpower.⁴⁴ This laid the foundation for the argument that airpower was most effectively employed by those who understood its strengths and limitations—airmen. He begins, not unlike Clausewitz, by addressing the nature of war itself, then proceeds to describe airpower in terms of what he viewed as airpower's weaknesses—time, or persistence, and mass. He then discusses economy of force, which, when applied incorrectly, became another weakness of airpower. Sherman then stresses what he believes are airpower's strengths—the offensive and simplicity. With this conceptual framework established, he was able to describe how airpower could be best used to exert military influence.

Sherman begins his discussion by identifying war as a “conflict of moral forces. A decision is reached not by the actual physical destruction of an armed force, but by the destruction of its believe (sic) in ultimate victory and its *will to win* (italics added).”⁴⁵ Sherman, like Douhet, was heavily influenced by the carnage of World War I. He witnessed that, although the Germans surrendered and accepted the terms of the armistice, their armed forces remained intact. Four years of attrition had not defeated the German army itself, but the German nation's will to continue using it.⁴⁶ Sherman believed, regardless of the addition of the airplane as an instrument of war, that the enemy's will to fight would remain the crucial element in warfare and that all force available must be focused on breaking that will. This belief shaped his thoughts on targeting.

Sherman realized that the airplane's ability to overfly ground forces gave unique access to the enemy that could change the way that some of the principles of war applied to airpower. Conversely, he knew that operating from the air imposed some limitations on airpower's ability to influence the battle. He used these differences and limitations to lay the groundwork for his discussion of airpower targeting and missions.

The first distinction between land and air warfare that Sherman draws is that, unlike land forces, reaching a military decision in the air does not come about by the direct clash of like forces. Instead, he draws a parallel between air and naval forces. Ramming aircraft together, as with warships, accomplishes little. It is the use (or *threatened* use) of the destructive power of the airplane and its weapons against a target on the ground that can force a decision.⁴⁷ Similarly, he drew another parallel between air and sea forces regarding their effect within the environment in which they operate. Short of blockade operations, naval forces do not generally seize and hold territory (or sea space). The ability of warships to move relatively rapidly across the sea enables them to project power to a point on the globe without actually occupying it. Airpower has this same ability to project power, but has an advantage in that air covers the entire globe.

With regard to land forces, Sherman notes that air forces are employed more by groups of individuals rather than large military formations. This relative solitude greatly reduces the possibility of a disastrous mass panic spreading through the ranks, but equally prevents the camaraderie and mutual support that can exist in ground forces, spurring them to fight beyond their limits.⁴⁸ In itself, this may seem insignificant, but it illuminates the fact that airpower differs from other forms of power on all levels, starting with the human element.

Sherman's discussion of the principles of war begins with what he perceives as airpower's limitations—persistence and mass. In land warfare, battles were generally carried on “until the fortunes of the field had been definitely decided in favor of one or the other opponent.”⁴⁹ In aerial battles, persistent combat was difficult to attain, and frequently indecisive. The opportunity for combat was limited by the fuel capacity of an aircraft, “and the difficulty of securing a decision in so short a time is greatly increased.”⁵⁰ This technological limitation obviously influenced the way airpower could be used and what effects it could have. However, identified as such it provided an opportunity for technological improvement. In January 1929, Air Corps pilots kept the *Question Mark*, a Fokker C-2 transport aircraft, airborne for over 151 hours by refueling it in flight.⁵¹ On the heels of the successful, record-setting flight, aerial refueling was developed as a successful operational concept, enabling aircraft to fly longer missions and maintain greater persistence in the battle.

While limited sortie duration may limit persistence, airpower does, however, project a persistent *threat* of destructive force. As Sherman noted, this threat may be sufficient to force a decision, echoing a thought advanced earlier by Douhet. During Operations Northern and Southern Watch over Iraq, Coalition air forces enforced United Nations sanctioned no-fly zones through a combination of aerial occupation and ground alert missions. Aerial refueling extended the periods of aerial occupation, and when Coalition forces were not physically in Iraqi airspace, the threat of retaliation from air forces on ground alert presented a sufficient threat of destructive reaction that the Iraqis did not commit significant violations of the no-fly zones. Thus, because of airpower's speed and access through the third dimension, the principle of persistence applies differently to air forces than it does to land or sea forces. Airpower can effectively project the threat of the use of force without actually occupying enemy airspace or territory. In a similar fashion, nuclear-armed bomber and intercontinental ballistic missile forces projected the threat of the use of force between the United States and Soviet Union during the Cold War. This mutual *persistent* threat of aerial attack has influenced foreign policy and national objectives for more than five decades.

Sherman regarded the principle of *mass* equally important in aerial as well as land combat.⁵² Sherman took his lead from Napoleon, understanding that an inferior force could defeat a superior one by concentrating superior numbers at a decisive time and place.⁵³ Because it was difficult to coordinate actions in the air without radio communication, the concept of coordinated, mass air attack was not a universally accepted one among the Armed Forces.⁵⁴ Sherman's identification of these technological limitations focused technology development on ways to overcome them. During the Battle of Britain (from July through September of 1940) two technological innovations enabled outnumbered RAF fighters to defeat a numerically

superior German air force. Radar detection provided advance warning of impending Luftwaffe attacks, and radio communications enabled outnumbered British Hurricanes and Spitfires to mass their numbers and conduct coordinated attacks on the German formations, ultimately defeating them.

Having identified some of the weaknesses of the airpower forces of his time, Sherman then addressed the principle of *economy of force*, highlighting that because of limitations in persistence, the skillful leader must concentrate limited strength at the point of *decisive action*, to the exclusion of other, less decisive points.⁵⁵ Herein lies two of the most important ideas regarding airpower. It must be concentrated to be effective, and it takes a *skillful leader* to employ it.

The lack of adherence to the principle of economy of force in North Africa at the Battle of Kasserine Pass (February of 1943) was responsible for one of American airpower's great failures. Allied air forces, already in short supply, were distributed to individual ground commanders to be used as each saw fit for his own needs. During the German offensive, Allied airpower was employed in small *penny packets*. This dilution of capability produced largely uncoordinated air action, focused almost entirely on defending assigned ground units, rather than executing offensive operations against enemy air and ground forces. "American air support was desultory at best, while the Luftwaffe threw itself into the fray with élan and vigor."⁵⁶ This failure spurred a radical change in the Allied air forces command and control structure. Control of Allied air forces in the region was centralized under RAF Air Marshall Sir Arthur Tedder, commander of the new Mediterranean Air Command. Air Vice Marshall Sir Arthur Coningham assumed command of the subordinate Northwest African Tactical Air Force, whose mission was "first and foremost, the neutralization and destruction of enemy air forces; next...the destruction of enemy columns by light bombers and roving fighter-bombers."⁵⁷ This assignment of central responsibility and shift to the offensive enabled the Allied forces to seize the initiative from the Germans.

The principle of *the offensive* holds primacy in Sherman's theory. Sherman, as Douhet, saw little defensive value in airpower, but Sherman's judgment was applied to the defense of land forces from air attack. Strategically placed ground forces could certainly provide a persistent defense against attacking ground forces. However, the ability of air forces to attack from any direction made it impossible to guarantee a defense against them, even with local numerical aircraft superiority.⁵⁸ However, as will be shown by his belief in the utility of the pursuit mission, Sherman understood the value of defending aircraft from attack by other aircraft.⁵⁹ The principle of the offensive was closely linked to another of airpower's strengths—surprise.

Sherman realized that, like land and sea power, it is necessary to concentrate air forces in decisive areas at a time and place which the enemy does not expect, and that airpower's ability to exploit the third dimension is an advantage over land and sea power when seeking surprise.⁶⁰ The Arab-Israeli Six Day War in 1967 illustrates how the Israeli use of airpower's inherently offensive nature and ability to surprise set the stage for victory. As Chaim Herzog highlighted:

The outstanding event of the Six Day War was the initial air strike when the Israeli Air Force...in a carefully-planned attack, took the Egyptian and other Arab air forces by surprise and, after three hours of concentrated activity, had gained complete superiority in the air

on all fronts. This move paved the way to victory for the ground forces.⁶¹

Having framed airpower's strengths and limitations in terms common to all warfare, Sherman then developed a theory that, as we shall see, has proven remarkably resilient over the course of time.

Command of the Air

Sherman recognized the need for aircraft to have freedom of action in order to effectively execute their missions. This freedom of action derived from a situation where friendly forces controlled the air sufficiently enough that they could execute these missions without undue interference from the enemy. However, Sherman's concept of *control* of the air was more limited than Douhet's idea of *command* of the air. He saw control of the air as "not an absolute but a relative condition...generally restricted in scope and fleeting in duration."⁶² For him,

...[control of the air] may be said to exist when friendly aircraft can carry out their assigned missions with only rare interruptions by hostile pursuit aviation, while hostile airplanes...generally have to fight to perform their allotted tasks.⁶³

This meant that control of the air was constantly contested and a temporary phenomenon as long as the enemy still had pursuit aircraft capable of engaging friendly air forces. The challenge, then, was to determine the best way to destroy the enemy air forces. Sherman believed that the first duty of the air arm was to wrest control of the air from the enemy by seeking out enemy air forces and destroying them *wherever they might be found* (emphasis added).⁶⁴ His belief that enemy air forces should be attacked on the air and on the ground stands in contrast to Douhet's strategy of avoiding aerial combat and destroying the enemy air forces on the ground.

The British victory in the Battle of Britain in 1940 provides an example of Sherman's concept of gaining control of the air. The Germans, with the offensive initiative, planned an air campaign originally directed against the RAF, both on the ground and in the air.⁶⁵ The British, on the other hand, did not have bombers with suitable range to attack German air forces on the ground in Europe. Massed, coordinated fighter attacks were the only method available for the defense of the British Isles. The two-month long aerial contest turned into a battle of attrition for both sides, which the British won in September when the German high command decided that it could no longer sustain the losses it was suffering. The RAF did not completely destroy the Luftwaffe, but its fighters did attain control of the air by reducing the German air forces to a level where their ability to influence the war over Great Britain was reduced to conducting only contested bombing raids, mostly at night.⁶⁶

Regardless of their differences in opinion on the best way to get command of the air, Sherman believed, as did Douhet, that attaining it was the primary mission of air forces. Command of the air was necessary to execute their respective targeting strategies.

Airpower Targeting

Sherman's targeting theory was founded on his belief that the object of warfare was to destroy the enemy's will to fight. In his opinion, "aviation forces had a twofold mission: to attack the moral and material resources of the enemy."⁶⁷ He classified targets as either *strategic* or *tactical*, a convention that, as we

will see, has caused a great deal of confusion over the years as airpower thought has developed.

Sherman's strategic aerial attack strategy focused on destroying the enemy's morale. He believed that "one should put enemy population centers, supply systems, and other rearward objectives under pressure in an effort to paralyze an entire society."⁶⁸ Sherman envisioned a Douhetian contest where countries would bomb each other's cities until one side gave up.⁶⁹ Like Douhet, Sherman understood the concept of classifying every civilian as a combatant in a nation during wartime. However, unlike Douhet, he believed in a measure of restraint when it came to directly bombing them.⁷⁰ For Sherman, the decision to bomb enemy cities was a political matter, and the true focus of his bombing strategy was on the enemy supply system.⁷¹ In longer wars, he felt:

Long range of the bomber should be utilized to the full, and every sensitive point and nerve center of the system put under pressure, in an effort to paralyze the whole (supply system).⁷²

This belief that bombardment was best focused on the enemy supply system had the greatest effect on Sherman's peers. It formed the basis of the *Industrial Web Theory* which was developed at the Air Corps Tactical School in the years between World War I and World War II and became the core of Air Corps bombing doctrine. This doctrine constituted the bulk of Air War Plans Division - Plan 1 (AWPD-1), which was the Air Corps' plan for defeating Germany during World War II through strategic bombing.⁷³

Another departure from Douhet's bombing strategy was Sherman's inclusion of a tactical target set. He recognized that a need may arise to directly support army forces on the ground and, as will be discussed, he envisioned a separate mission for that function. Sherman also realized that in a situation in which "the decisive battles were expected to be fought out within a month or two, it would have little or no influence on the campaign to conduct a concentrated air offensive against the industrial centers of the enemy."⁷⁴ In this case, he believed that the pressure had to be put on the enemy in a more immediate fashion by concentrating bombing on "the various depots and places of storage, or at the lines of communication."⁷⁵ This idea of bombing the enemy's logistical support system nearer the actual battlefield developed into the battlefield interdiction mission.

Airpower Missions

In spite of his belief that the aviation service should be an independent arm of the military, Sherman acknowledged the prevalent view within the US Army that "air activity was in support of the ground battle."⁷⁶ To accommodate this ground force support mission within his own theory of strategic airpower, Sherman saw two distinct components of aviation: air service aviation, which served as an auxiliary to ground forces, and air force aviation (bombardment, pursuit, and attack) whose purpose was to gain and exploit control of the air. Air service aviation receives relatively little attention in Sherman's book, limited to a chapter on aerial observation. He concedes that observation aviation's "reason for existence lies in its ability to furnish desired information to the combatant arms for whom it works (the Army)."⁷⁷ Sherman focused his writing primarily on air force aviation and his "emerging strategic conception of airpower."⁷⁸

As a supporter of Billy Mitchell, Sherman firmly believed that airpower's true strength laid in strategic bombing, but he was not singularly focused on that mission. In order for strategic bombing to succeed, the air force first had to establish control of the air. Unlike Douhet, Sherman believed that the instrument for attaining that control was pursuit aviation. Its mission was to:

Seek out and, to the extent possible, destroy the enemy's air force, especially enemy pursuit aviation. After achieving control of the air, the mission of the air force [meaning bombardment and attack at this point] was then to destroy the most important enemy targets on the surface.⁷⁹

Possessing no adequate protection against aerial attack, Sherman believed that airpower's inherent offensive capability made "a vigorous offensive the best defense—it is almost the only form of action which leads to successful issues in air warfare."⁸⁰

Although Sherman proposed pursuit as the primary mission for gaining control of the air, he realized that the *purpose* of gaining control of the air was to enable attack, bombardment, and observation aircraft to perform their missions.⁸¹ While he did not see an inherent defensive capability in airpower, he realized that pursuit aircraft could indirectly provide defensive support for friendly aircraft through the destruction of hostile pursuit forces.⁸² Sherman believed that the best protection for friendly aircraft did not always come through visually attaching pursuit aircraft as a defensive, escort force for observation, attack, or bomber forces. Escorting slower aircraft nullified speed, one of the pursuit aircraft's main strengths, leaving it vulnerable to attack from defensive pursuit forces (a battle that Sherman was sure that the escorts would lose). With the defensive escort eliminated, the observation, attack, and bombardment forces would be easy targets for attacking enemy air forces. Since there was little to be gained and much to be lost by staying with attacking aircraft, Sherman believed that often the pursuit mission was most effectively accomplished by allowing pursuit aircraft to act offensively, hunting down the enemy and forcing the engagement.⁸³

The relative benefit of close escort versus sweep missions has been hotly debated for over 80 years, and both sides of the argument can still be heard during mission planning and debriefs at Red Flag today. However, during World War II, escort pursuit fighters proved invaluable to Allied success in the CBO in both roles. Initially, American and British bomber crews suffered severe punishment from the Luftwaffe on bombing missions against targets that were out of the range of escorting P-47s and Spitfires. The arrival of the P-51, however, meant that bomber formations could be escorted all the way to their targets deep in the heart of Germany. The Mustangs were able to challenge the German defenders and had great success destroying Luftwaffe aircraft. However, upon taking command of Eighth Air Force Bomber Command in 1943, Jimmy Doolittle changed the prevailing pursuit tactic from close escort to sweep missions. Groups of Allied fighters roamed the skies over Europe, taking the offensive and challenging the Luftwaffe everywhere they could find them.⁸⁴ This shift in tactics spawned a battle of attrition that crippled the Luftwaffe, virtually eliminating its ability to challenge the Allies command of the air over Germany.⁸⁵

As it was the centerpiece of his theory, Sherman, like Douhet, spent a great deal of effort defining the bombardment mission. Though an avid supporter of pursuit, he considered the bomber "as the supreme air arm of destruction."⁸⁶

From the very nature of the weapon, bombardment aviation is used for strategic purposes rather than tactical, using these two words in a rather general sense. It is equipped with such powerful means of destruction, that it is obviously uneconomical to employ it when the lighter weapons of attack aviation will suffice.⁸⁷

Here we begin to see Sherman associating a specific mission (bombardment) with a specific target set (strategic). However, it seems that he is somewhat uncomfortable with this convention, as we shall see in his discussion of potential bombardment targets. Sherman divided bombardment targets into four categories, listed in order of importance.

- Large centers of population
- The enemy's system of supply
- Fortifications
- Sea craft of all kinds⁸⁸

The first two categories show an appreciation for strategic effect and fall fully within Sherman's strategic goal of paralyzing the enemy's supply system. The latter two categories, however, do not fit into the strategic bombardment strategy. Sherman classified these target sets as strategic based upon the platform that could both reach and destroy them. Fortifications were included because only large bombers could carry enough bombs to destroy them. Likewise, sea craft could easily obtain safe haven out of range from smaller attack aircraft, which could neither reach the ships nor carry sufficient bombs to destroy them. Technological limitations that originally drove strategic target classification sometimes actually included targets that were not part of the enemy war-making capacity. This convention of classifying targets based upon the type of platform that could destroy them has confused the airpower debate for decades.

Sherman's third primary airpower mission was attack aviation. He found it difficult to draw a sharp distinction between attack and bombardment aviation. The two missions had "so many characteristics in common, that much that is said...in regard to one, is almost equally applicable to the other."⁸⁹ Sherman believed, in general, that attack aviation existed for the destruction of personnel and bombardment aviation existed for the destruction of material.⁹⁰ He willfully acknowledged, though, that it was not a rigid rule. Attack aviation could be used to destroy railroad tracks or strike at small buildings, while bombardment aviation could be used to destroy personnel, although usually only when it was necessary to destroy the vessel or building that they were in as part of the overall strategy.⁹¹

Sherman considered attack aviation as primarily a support element for ground troops. Attack aviation's

Primary objectives are determined by the direct or indirect needs of ground troops. Nevertheless, it is a serious, if not a fatal, error, to ignore the peculiar characteristics of attack aviation, and to employ it in blind conformity with the detailed operations of ground troops. Such a procedure may not result in disaster, but it will certainly fail to utilize the full value of this arm.⁹²

Sherman makes an important distinction regarding troop support. Attack aircraft had the ability to strike targets that could not be struck by artillery, targets behind the fielded forces such as railroads and bridges, which could limit the enemy's ability to continue fighting. Tying airpower directly to land forces for use only as a form of precision artillery was far too restrictive,

not allowing the commander to take advantage of airpower's flexibility to attack targets across the battlefield.

Results

Sherman developed a remarkably comprehensive theory of airpower, making a case for its use and importance by using logic and a framework that could be understood by other men at arms. He believed that airpower's inherently offensive nature meant that it was best used for targeting the enemy's will to fight through strategic bombing. Unlike Douhet, though, he understood that airpower could be usefully applied across the entire battlefield.

Sherman's basic ideas, framed on his selected principles of warfare, have stood the test of time fairly well. He identified two early shortcomings of airpower—lack of persistence and lack of mass. Technology, in the form of aerial refueling has increased aircraft sortie length, and thus improved airpower's level of persistence. The 24-hour defensive combat air patrols that reestablished command of the air over the United States following the terrorist attacks on 11 September, 2001 were possible only because the defensive fighters could refuel from airborne tankers. Technology has also improved airpower's ability to mass. British success in the Battle of Britain showed how radar and radio communication enabled the numerically inferior RAF to concentrate their defensive forces on incoming German raiders, maximizing their offensive effect.

The advent of precision weapons has increased airpower's ability to mass. During World War II it took hundreds of bombers to damage a single factory. With the increased precision of present day weapons, the concept of mass must be reevaluated with regard to airpower. A single B-2 can carry 80, 500-pound bombs, each able to hit a different target. The ability to strike that many targets in one mission constitutes a mass attack from the air.

The principles of offensive and surprise, two of airpower's inherent advantages identified by both Sherman and Douhet, have also held up well. The success of offensive aerial campaigns during Operation Desert Storm proved airpower's destructive potential (when employed correctly). The six-week aerial onslaught suffered by the Iraqi forces set the stage for the lightning-quick ground victory achieved by Coalition forces. Although often "referred to as the 100-hour war, in reality it was the 1,100-hour air war that enabled the Coalition to defeat the world's fourth largest army and sixth largest air force in only six weeks and with the loss of only 240 allied lives."⁹³ Of the numerous examples of successful surprise attack, the Israeli success during the Six Day War showed explicitly how surprise can overcome shortcomings in both persistence and mass.

As with Douhet's theory, the success of Sherman's thoughts on strategic bombing remains a touchstone in the debate about airpower's effectiveness. As the intellectual forefather of the Industrial Web Theory-based strategic bombing campaign against Germany, Sherman's record is unclear. Attempts to measure the effect of the CBO on the overall outcome of the war have been the topic of countless articles and books. As Richard Overy points out:

The impact of bombing was wide-ranging and ultimately devastating for the German war effort...It inflicted terminal decline on German forces by interrupting supplies and destroying German airpower. And bombing hastened the demoralization and social impoverishment of Germany's urban population.⁹⁴

Those convinced of airpower's effectiveness readily point out that the Germans did not surrender until Allied armies had taken Berlin by defeating the Wehrmacht. Attempts to prove assertions on either side of the argument "remain clouded with ambiguity."⁹⁵

The record regarding his ideas on pursuit aviation is less ambiguous. The success of the P-51 during World War II proved the value of pursuit aircraft in both close escort and sweep missions, as well as the concept of destroying an enemy air force in the air. The concept of gaining and maintaining air superiority by engaging the enemy in the air has become embedded in US air doctrine. To this day, we continue to build faster, more maneuverable, more capable fighter aircraft whose purpose it is to eradicate enemy aircraft from the skies over our own as well as enemy territory. However, in every war since World War II, we try, as the Israelis did in 1967, to destroy enemy air forces on the ground first.

Unlike Douhet, Sherman did not live long after his theory was published in 1926, and it was left to others to promote and advance his thought. One of those who did was, arguably, America's most recognizable airman.

William "Billy" Mitchell

Billy Mitchell was America's first widely recognized airpower theorist. As mentioned previously, most of the core ideas he espoused were not his alone. What Mitchell provided was a refinement of the ideas of that brilliant group of airmen surrounding him, including William Sherman. Mitchell's true strength was his ability to capture the public's imagination while eloquently, if forcefully, explaining airpower's capabilities and advantages over naval and land forces while advocating for an independent air force. Proving himself in combat during World War I, Mitchell led nearly 1,500 Allied aircraft in what was then the largest-ever air operation during the September 1918 attack at Saint-Mihiel.⁹⁶

A controversial visionary, Mitchell spent his time trying to advance the cause of a separate air service at the expense of the Army and Navy. Mitchell's contribution to airpower theory was that he was

The first prominent American to espouse publicly a vision of strategic airpower that would dominate future war. He believed that aircraft were inherently offensive, strategic weapons that revolutionized war by allowing a direct attack on an enemy country's 'vital centers'—the mighty industrial areas that produced the vast amount of armaments and equipment so necessary in modern war.⁹⁷

Although we see once again a strategic bombing emphasis, Mitchell's ideas differed in one significant way from those espoused by Douhet. Like Sherman, Mitchell did not advocate the indiscriminate bombing of civilians.⁹⁸ Mitchell's drive and belief in strategic bombing provided the focus for airpower thought and aircraft development in the years leading up to World War II. Lieutenant Colonel Harold George and other members of the *Bomber Mafia* from the Air Corps Tactical School used Sherman's ideas, as voiced by Mitchell, to create AWPD-1 and Air War Plans Division - Plan 42 (AWPD-42), the strategic bombing plans for Europe during World War II.⁹⁹

Mitchell's ideas were driven significantly by his desire for a separate air service. His single-minded pursuit of strategic bombing (to support the formation of an independent air arm)

led him to exclude any real consideration for using airpower in support of land or sea forces. Indeed, he saw airpower supplanting naval forces for coastal defense and long-range strike.¹⁰⁰ For a broader, more inclusive airpower theory, we need to look to the Royal Air Force.

John C. Slessor

John C. "Jack" Slessor served as Commander-in-Chief, Mediterranean Allied Air Forces during World War II and eventually as Chief of Staff of the Royal Air Force. Having worked for Sir Hugh Trenchard, the British strategic bombing advocate, he believed that the primary role of airpower was strategic bombing. However, he recognized that the armed forces' object in war was to defeat the enemy's will to fight by using all forces available; naval, land, and air. While serving as an instructor at the British Army Staff College at Camberley from 1931 to 1934, Slessor developed extensive ideas about how airpower could be used in support of ground forces.¹⁰¹

Main Theoretical Ideas

Slessor believed in many of the popular airpower theories of the day, including the notion that strategic bombardment was the primary role of an air force and that control of the air was a prerequisite for all air operations.¹⁰² However, his time as an instructor at Camberley moderated his views, and he realized that airpower could play a vital role in support of army ground operations. It was on this topic that he focused his writings.

Command of the Air

Slessor adhered to the concept that gaining air superiority was the first job of an air force, but he kept his focus on the overall objective of the war.

The object of the air force in a campaign of the first magnitude in which great armies are engaged is the defeat of the enemy's forces in the field, *and primarily of his army* (italics added).¹⁰³

On the surface, this seems like a statement of the obvious. At the time, however, it was not an idea that was commonly held among airmen. Slessor's concept of command of the air was very similar to Sherman's. He wrote that air superiority "means the capacity to achieve our own object in the air and to stop the enemy [from] achieving his."¹⁰⁴ Gaining air superiority was Slessor's first priority because, "without it, ground operations would be nearly impossible."¹⁰⁵

As a participant in World War I, he had experienced major air combat, but cautioned against drawing dogmatic conclusions from a war that was dictated by "the narrow specialized conditions of trench warfare."¹⁰⁶ He realized that since air operations were focused primarily on supporting the ground armies, the particular nature of that war meant that air superiority, or command of the air, was necessary only within a few miles of the front battlelines.¹⁰⁷ In future wars, he realized that the nature of the three-dimensional space over "the battlefields is so immense that absolute command is hardly ever practicable."¹⁰⁸

A reflective, disciplined, and impressive thinker,¹⁰⁹ Slessor had a very broad view on the best way to achieve air superiority. Simply put, "the ideal method obviously would be to destroy the hostile aircraft either in the air or on the ground."¹¹⁰ As such, it was obvious to him that action against enemy air forces is a joint responsibility of both fighters and bombers.¹¹¹ As with

Douhet and Sherman, Slessor believed in the offensive character of airpower, and shaped his targeting strategy as such.

Airpower Targeting

Slessor envisioned a future war on the continent of Europe in which the RAF and army would have to work together. Success would require close coordination between the ground and air forces. In such a situation, he saw strategic bombing as peripheral to the overall goal of the deployed force. Slessor believed that the true objective of airpower was to isolate the battlefield through disrupting and destroying the enemy's lines of supply.¹¹² Previously addressed by Sherman, Slessor developed this idea of battlefield interdiction in much greater detail.

Slessor created two categories for battlefield interdiction: enemy *fighting troops* and *supply*.¹¹³ The second category included rail lines and roads used for maneuver, command headquarters, and "the whole range of food-supply and munitionment, from the raw material in the mine through all the processes of production and manufacture" as well as the delivery mechanisms.¹¹⁴ Slessor's theory applied the same reasoning as that used for strategic bombardment. The objective of both interdiction and bombardment was to stop critical war-making or war-support processes and materiel from being used by the enemy's armed forces.

As Sherman realized, a strategic bombing campaign, targeted against the enemy's industrial supply system, could take an extended period of time to be effective. By destroying the enemy's logistical support after production, but prior to the delivery of materiel to the field, Slessor realized that attacking air forces could place more pressure on enemy forces. Additionally, in a short war where the effects of a strategic bombing campaign might not be felt, eliminating enemy supplies in this fashion could have a much more immediate effect on the enemy's ability and will to fight. Used in combination with strategic bombing, battlefield interdiction places greater stress on an enemy's capacity to wage war and creates a much more complete bombing strategy.

During March, 1943, Slessor's ideas were tested by Allied air forces in Italy. Operation Strangle was a battlefield interdiction campaign that "sought to disrupt rail transportation by attacking railyards, rolling stock, and railroad bridges throughout an interdiction zone that extended from Rome to Florence and irregularly across the breadth of the peninsula."¹¹⁵ The ultimate goal of Strangle (in which airpower alone was intended to defeat the Germans in Italy) was to starve the German war machine in Italy and thereby force an evacuation of the peninsula.¹¹⁶ Ultimately, Allied airpower did not drive the Germans from Italy. However, the campaign was extremely well executed, and the destruction of the rail system severely limited German tactical mobility, forcing them to move supplies at night by trucks over inadequate roads. The ensuing German ammunition shortage proved critical in the next phase of the Italian campaign, Operation Diadem, reducing the German ability to resist and enabling the Allied ground forces to defeat them at Monte Cassino.¹¹⁷ Operation Strangle was a decisive factor, but showed how difficult it is for airpower alone to defeat fielded ground forces.

Airpower Missions

Slessor believed that battlefield interdiction was the best way to support ground troops, but did not limit his thinking to this issue

alone. He understood that under certain circumstances, direct attack of enemy troops in contact with friendly troops was necessary—known today as close air support (CAS). These three circumstances were

...*in attack*, to assist the army to break the crust of very highly organized defences; *in pursuit*, to turn an enemy's retreat into a rout; and *in defence*, to hold up the advance of a victorious enemy, and enable our own rearguards to get clear and reorganize the defence (italics in original).¹¹⁸

Because flying close to the ground exposed aircraft to much greater danger, certain conditions had to be met before these missions were to be attempted. First, air superiority was required. Second, ample reserves of personnel and aircraft were required to compensate for the inevitably high rate of losses. Clearly, airpower was better suited for interdiction and bombing and these CAS missions were for emergencies only.¹¹⁹

In order to be successful in these missions, Slessor stressed the need for close, continual coordination with the ground forces to ensure that the correct targets were attacked and that friendly troops were not inadvertently attacked.¹²⁰ This recognition of the need for joint coordination in combined air and ground operations was visionary. He was the first major airpower theorist to suggest that success in close air support or interdiction missions was dependent upon this coordination.¹²¹

Results

Jack Slessor's contribution to the field of airpower theory went beyond his recognition that direct support of the army was a legitimate role for airpower. No less a believer in the benefit of strategic bombing, he recognized that the air force could support the army without calling into question its own independence, but that support had to be well coordinated in order to be effective. It is important to remember, however, that Slessor was in the Royal Air Force, which had been independent from the Army for almost two decades by the time he was teaching at the Army Staff College. Slessor's idea of interdicting enemy supplies before they got to the battlefield restored some balance to the theoretical discussion that, by the time his book appeared, was fiercely divided into strategic and tactical camps.

More importantly, Slessor espoused the need for unified action in warfare. Clayton Chun points out that based on Slessor's own experience in Italy in 1944, he did not believe that airpower alone could defeat a disciplined, determined army and that it could not completely stop the movement of strategic reserves from the rear to the front lines.¹²² Slessor's balanced approach seems rare among the theorists of his time. While we do not have an example of airpower alone defeating a disciplined, determined army, recent experience in Operation Desert Storm illustrates the effectiveness of battlefield interdiction. Coalition air forces very effectively targeted Iraqi rail lines, highways, and roads linking the Iraqi army in Kuwait to Baghdad. According to Thomas Keane and Eliot Cohen:

...strikes against key bridges on the main lines of communication between Baghdad and Basra, as well as armed reconnaissance flights along those routes, succeeded in reducing the flow of supplies to the Iraqi army, even if the air attacks did not completely sever those lines and isolate the theater.¹²³

Keane and Cohen further point out that, although enough supplies made their way to the inert army in Kuwait,

...the evidence is not of an army facing starvation, but of an organization in which the distribution system had ceased to function: distributions appeared illogical, and goods were generally absent, hoarded, or lying unused. Airpower had dismembered the Iraqi army's transportation system within the theater, and communication between army units, which might have remedied some of the supply problems, was itself under attack.¹²⁴

The battlefield interdiction campaign severely weakened the Iraqi army, leaving it ill prepared to face the eventual Coalition ground offensive.

Slessor's ideas about the success of well-coordinated air and ground operations have been proven time and again. After improving coordination and procedures following the Battle of Kasserine Pass, combined Allied air and ground operations became increasingly effective. One of the most successful Allied coordinated air and ground operations occurred in Europe in the Falaise-Argentan pocket in August of 1944. German forces were hammered by combined infantry, armor, artillery, and air attacks directed against those units desperately attempting to escape eastward.¹²⁵ These attacks threw the Wehrmacht forces back toward Germany, forcing them to abandon valuable equipment and supplies in their haste. During Operation Desert Storm, the Coalition victory in the Battle of Khafji demonstrated the value of CAS operations through integrating air and land forces—especially at night, in bad weather, and under demanding combat conditions.¹²⁶ Today, in Iraq and Afghanistan, Coalition air and ground forces are working together almost seamlessly as a truly integrated force.

Slessor constructed his theory by integrating the ideas of those who had written before him with his own personal experience and thoughts. The full integration of the radio into aircraft enabled his ideas about close air and ground force coordination to come to fruition in a way that Sherman could only have dreamed about. Both Douhet and Sherman were able to see airpower's potential well beyond the technological limitations of their time. The ability to integrate technological advances into existing theory and adapt those advances into new aerial warfare concepts has been a hallmark of the well known airpower theorists. The works of Douhet, Sherman, Mitchell, and Slessor laid the foundation for the one airpower theorist who was not hamstrung by technological limitations—one who could truly implement what airpower had promised for almost a century.

John Warden

Colonel John Warden is arguably the first person since World War II to offer a comprehensive airpower theory. Credited as the man who devised the central idea for the air campaign for Operation Desert Storm, Warden developed a theory that radically altered contemporary airpower thought. The traditional theory of strategic bombing dominated airpower thought and theory for decades, evolving only to incorporate nuclear weapons. Nuclear weapons brought a new field of theory to the forefront—nuclear deterrence and coercion, but these had more to do with the application of power, regardless of how it was applied. However, the fact that nuclear weapons were (and are) predominantly delivered by airpower (bombers and ballistic missiles) further artificially constrained the relationship between strategic and tactical airpower. Nuclear came to mean *strategic*, and everything else was *tactical*. This influence was so strong that it dictated the organizational structure of the US Air Force.

Strategic Air Command contained long-range nuclear bombers and nuclear intercontinental ballistic missiles and Tactical Air Command contained smaller, conventional aircraft (although many had a tactical nuclear strike role). This simple construct dominated airpower thought until Warden redefined strategic and tactical targets.

Command of the Air

Air superiority was Warden's number one goal. He believed that "its possession is needed before other actions on the ground or in the air can be undertaken."¹²⁷ Warden's thoughts on air superiority were captured in his book *The Air Campaign: Planning for Combat*. In it, Warden establishes that not only is air superiority a necessity, since "1939 no country has won a war in the face of enemy superiority...(and) no state has lost a war while it maintained air superiority."¹²⁸ His concept of command of the air combines those of Douhet and Sherman by establishing two levels of command of the air: air supremacy and air superiority. "*Air supremacy*...means the ability to operate air forces anywhere without opposition. Local *air superiority* gives basic air freedom of movement over a limited area for a finite period of time (emphasis added)."¹²⁹

Warden's method of gaining air superiority is an extension of Slessor's idea that the method should depend on the context of the particular situation of the war. Ultimately, the objective is to keep the enemy from using the air for his benefit, while retaining the benefit of its use for yourself. The level of effort expended on gaining air superiority depended upon two variables. First, whether or not the friendly commander had the opportunity for offensive action, and second, the vulnerabilities of the enemy's forces and their supporting infrastructure. When possible, Warden advocated for offensive action against the key enemy vulnerability that would eliminate the enemy's ability to conduct air operations or block friendly air operations.¹³⁰ It was this idea of a key vulnerability that guided Warden's theory of how to use airpower.

Airpower Targeting

The main idea behind *The Air Campaign* is that airpower has a unique ability to achieve the strategic ends of war with maximum effectiveness and minimum cost.¹³¹ This core idea has inspired every strategic airpower theorist, beginning with Douhet. Warden held that airpower's inherent speed, range, and flexibility allow it to strike the full spectrum of enemy capabilities in a swift and decisive manner.¹³² Warden constructed a new model for analyzing an enemy, identifying critical elements that, if attacked successfully, could lead to strategic success. This Five Ring model formed the basis of his strategic targeting plan.

Warden's model viewed the enemy as a system, with strengths and vulnerabilities that made up *centers of gravity* (COG).¹³³ These COGs were arranged in rings, from the theoretical center of an enemy state or organization, as follows.

- Leadership targets
- Means of production
- Infrastructure
- Population
- Fielded forces

The most important ring was leadership.¹³⁴ Warden realized, just as others before him, that to get an enemy to do your will, it

was necessary to find a way to make him change his mind. While Douhet, Mitchell, and subsequent theorists saw the enemy's economy as the focus of strategic bombing, Warden saw the enemy's leadership as the key strategic target.¹³⁵

Warden's ultimate goal was to force the enemy to comply with friendly objectives.

At the strategic level, we attain our objectives by causing such changes to one or more parts of the enemy's physical system that the enemy decides to adopt our objectives, or we make it physically impossible for him to oppose us. The latter we call *strategic paralysis* (italics in original).¹³⁶

Warden posited that targeting the center leadership ring would have more strategic effect on the enemy, thus making it preferable to attacking the outer rings. The leadership ring, therefore, served as the focus of Warden's concept of attack, and the implicit message is that destruction or neutralization of the leadership COGs produces total *physical* paralysis of the system (italics in original),¹³⁷ thus leading to a victory independent of events on the actual battlefield.

Warden realized that circumstances or objectives might limit the ability to attack the center ring, thus dictating attacks on outer rings.¹³⁸ Attack upon the COGs within these outer rings could be expected to inflict "partial physical paralysis but unbearable *psychological* pressure upon the leadership (italics in original)."¹³⁹

In a perfect execution of Warden's theory, all COGs were to be targeted simultaneously, or in parallel, to produce a more decisive effect.¹⁴⁰ This idea of attacking an enemy in parallel in both time and space was possible only through the use of airpower. This is what made Warden's theory an airpower theory vice a theory of simply where to apply force. In his view, only airpower's speed and reach make it the single force able to attack COGs in parallel across an enemy system. Persistent, massed air attack has been a key pillar of each of the airpower theories examined. Every theorist before Warden struggled with technological limitations that limited airpower's effectiveness. Warden was the first theorist who was almost completely free of technological limitations.

The advent of precision weapons had a revolutionary effect on the concept of mass and airpower. Whereas bombing inaccuracies during World War II required hundreds of bombers dropping thousands of bombs to destroy a target, today a single aircraft with a single laser-guided bomb can achieve the same effect. It is now possible to simultaneously attack more targets within the enemy system, applying pressure to more points at the same time. Additionally, the advent of stealth technology has given aircraft access to targets that were unreachable by legacy aircraft, exposing more of the enemy system to attack. The value of stealthy aircraft carrying precision weapons was proven in Operation Desert Storm. F-117s carrying precision guided bombs flew only 2 percent of the attack sorties, but destroyed nearly 40 percent of the strategic targets.¹⁴¹ The technological shortcomings that had so limited past theorists' actual success had finally, largely, been overcome.

Airpower Missions

Warden realized the need for all of the same airpower missions as his predecessors. His first priority was attaining air superiority through bombing enemy air capability on the ground or engaging their aircraft in the air. Air superiority had to be gained

first, by whatever means necessary. Warden's emphasis, however, was on strategic attack, but not in the same sense that Douhet and Sherman emphasized strategic bombing with large bombers. With Warden's new model, strategic targets were defined as those that, if attacked, would have the greatest effect on the enemy leadership, independent of the type of aircraft carrying out the attack. The importance of the enemy leadership in Warden's system model, however, shaped his attitude toward attack of other, less critical enemy capabilities and the airpower missions that carried them out.

Warden recognized the value of battlefield interdiction, but preferred to execute these missions only after air superiority was established. "Interdiction operations should not be done at the expense of something more important. That something more important almost certainly will be air superiority."¹⁴² When necessary, Warden preferred to attack interdiction targets that benefited both the ground commander and the gaining of air superiority, such as enemy fuel supplies. Since interdiction sorties destroyed enemy equipment at or near their source, Warden viewed them as more efficient, therefore more preferable, than CAS. Warden recognized CAS as a vital air mission, but suggested that this scarce resource be committed where the ground commander would commit his last division or artillery brigade—his operational reserve.¹⁴³ In other words, CAS was the last priority mission for airpower.

Results

While Warden's theory is certainly related in concept to ideas developed earlier in the century, it is more than a gilded Industrial Web Theory. Sherman's theory envisioned an enemy country as an integrated and mutually supporting system but one that, like a house of cards, was susceptible to sudden destruction. If one attacked or neutralized the right bottleneck, the entire industrial edifice could come crashing down.¹⁴⁴ While Sherman did view the enemy as a system, his theory was economically focused. Warden's theory is not so constrained. At its root, Warden's theory, as applied to an overall strategy, is about defining the most critical enemy COGs and attacking them for maximum effect.

As mentioned earlier, Warden was the principal architect of the strategy that became Instant Thunder, the air war plan for Operation Desert Storm. As such, he deserves a great deal of credit for the Coalition success during the Persian Gulf War.¹⁴⁵ The emphasis placed on gaining air superiority enabled the Coalition to rapidly establish air supremacy over the battlefield, which enabled freedom of maneuver for both air and ground forces.¹⁴⁶ The Instant Thunder air campaign established that although airpower cannot hold ground, it can deny it to enemy forces.¹⁴⁷ Also, it showed that with strategic surprise, airpower could threaten any known static political, economic or military target with the maximum precision and the minimum collateral damage and casualties.¹⁴⁸

Warden's Five Ring model has been the subject of much debate and controversy, and he has modified it in the years since it was first conceived. Whether it encompasses the best approach to employing airpower against an enemy is not resolved, but there is no question that Warden's theory is the most comprehensive one on strategic attack produced to date. In it, aerospace technology and airpower thought finally come together at the same point. Warden also changed the discussion of strategic

versus tactical airpower. According to Phillip Meilinger, Warden moved the concept of strategic airpower away from a solely nuclear-based capability, illustrating that conventional forces could have strategic effects.¹⁴⁹ This is, perhaps, Warden's greatest contribution to the field of strategic thought.

Since Douhet, Sherman, and Slessor each wrote on airpower over 70 years ago, little has truly changed in the realm of airpower thought. Even John Warden's theory, at the core, is an application of the same basic concepts that can be traced back to Giulio Douhet. Warden benefited from the fact that technology had largely caught up to the promise of earlier theories, enabling him to see more clearly how airpower could be used to win a war. That is not to say there has been no advance. On the contrary, each theory refined previous thought and added to the overall body of knowledge, making airpower a more useful instrument. What made these three early theorists and their intellectual successor John Warden distinctive was that they recognized airpower's unique speed, reach, and access. They sought the solution as to how best to use that unique capability within the conditions that prevailed during their own time.

Although each theorist was necessarily constrained by the technology available and foreseeable at the time, we can draw upon their writings and our experience with airpower and begin to establish a true picture of the nature of airpower.

The Lessons

The Character of Airpower

Each theorist we examined identified three characteristics of airpower that make it unique from land or sea power: speed, reach, and access. Airpower is the fastest form of military power. Not only are aircraft designed to travel more quickly, the ability to move from launching point to destination over any geographical barrier makes the necessary travel distance shorter. This unique ability to overfly obstacles gives airpower the capability to project power over much greater distances than any other form of military power. Additionally, this increased reach gives airpower access to targets that are unattainable by any other form of power. This presents the opportunity for attack against previously isolated target sets, which makes airpower a uniquely strategic form of power.

Airpower has proven to be most effective when employed offensively. From the first major aerial offensive during World War I at Saint-Mihiel through the Combined Bomber Offensive in World War II, and the Instant Thunder campaign in Operation Desert Storm, airpower created effects through massed offensive action. Even airpower's great defensive victory in the Battle of Britain was attained through offensive action. The Battle of Britain also highlighted the importance of the application of the principle of economy of force and the value of massed application of airpower against a numerically superior enemy. Reinforcing this lesson, the Battle of Kasserine Pass highlighted the importance of employing airpower in a unified manner, under the command of an airman who understands its strengths and limitations.

Command of the Air

Whether called command of the air, control of the air, air superiority, or air supremacy, the freedom to act through the third dimension and prevent the enemy's freedom of action is critical

for success in warfare. Friendly command of the air enables not only friendly air action, but enables ground freedom of maneuver by eliminating a threat that can attack from any axis.

Targeting

Effective targeting is central to success with airpower. Airpower's offensive nature and ability to reach strategic targets give it the ability to most directly influence enemy leadership and their will to fight. The search for the best strategic target set started simply with Giulio Douhet identifying industrial and commercial establishments, transportation, and the civilian population as the most sensitive enemy vulnerabilities. This developed into a more purely economics-focused theory, advanced initially by William Sherman, concentrating on the enemy's industrial war-making capacity. John Warden, with his view of the enemy as a system, widened the scope of what constituted a strategic target, shifting the focus to the enemy leadership itself. In the process, he began to break constrictive (and useless) notions about what constituted strategic and tactical airpower.

Douhet's singular focus on bombing strategic targets was expanded by Sherman to include targeting enemy infrastructure, supply, and communication targets closer to the battlefield as well as direct support for friendly ground troops. Slessor greatly refined both of these interdiction and CAS missions, establishing the need for close coordination between ground and air commanders to ensure success.

Airpower Missions

Giulio Douhet identified three basic airpower missions: bombardment, pursuit, and observation. Sherman added attack, which constituted primarily interdiction and CAS. As airpower matured over the last century, each of these missions has proven its worth as part of an overall air campaign strategy. The context of every conflict has dictated the relative importance of each individual mission.

Based on past theories and experience, airpower's unique characteristics of speed, reach, and access give it the singular ability to simultaneously apply force across the battlespace through the third dimension, from directly attacking strategic targets to directly supporting ground troops engaged with hostile forces. How then, is this capability suited for our current context?

Modern Conflict

Although conflict remains as it has been for centuries—a clash of wills—modern conflict differs from that of a century ago in its rapid pace. To be successful in this modern conflict, it is necessary to be able to rapidly adapt to changing situations, determine the correct type of influence needed to win, and act with the least amount of violence necessary.

Recent advances in communications and information technology have greatly eased transition along the peace-war continuum. Increased volume and breadth of information about an opponent and the speed with which that information is collected and processed can give greater insight into their actions. More can be known about troop movement or exercises, diplomatic initiatives, and others. Whereas we did not know where the Japanese fleet was prior to the attack on Pearl Harbor, now it would be very difficult to mount a surprise naval attack of the same magnitude. Equally, easy access to satellite imagery, for any nation with the means to pay for it, may have eliminated

our ability to execute a large-scale ground surprise maneuver such as the one executed during Operation Desert Storm.

While we may be able to see more, it is still difficult to divine intent. Just as Josef Stalin missed the impending German invasion in 1941, we missed Saddam Hussein's intent to invade Kuwait in 1990. We may have access to more information, but there are still limitations in our ability to process it. However, if the steady advance in computer technology continues, we can anticipate greater ease in processing information. Nevertheless, the Clausewitzian concept of fog remains a factor in warfare. Handling the potential for rapid change and the imprecise knowledge of intent that is inherent in modern conflict requires the ability to rapidly apply influence at the right point at the right time.

Greater knowledge of an opponent also exposes a much wider range of elements that may be vulnerable to influence, whether economic, diplomatic, or military. This in turn provides a wider range of options with which to build an influence strategy and increase the chance of successfully attaining the desired goal. To take advantage of this greater knowledge and wider range of influence options, it is necessary to have the flexibility to change the type and nature of the influence rapidly as conditions change.

Access to greater knowledge, in addition to enabling a more focused influence strategy, means that while applying military force within that strategy there is potential for more accurate targeting. More accurate targeting leads to more discriminate targeting, or the ability to put pressure on the *correct* spot to exert the desired influence.

More accurate targeting, combined with increasingly accurate and precise munitions, also means that less violence may be used in pursuit of an objective. In the past, lack of knowledge led to strategies that were less focused on the points where influence would bring the greatest return. During past wars, many targets or target sets were attacked in an attempt to get the *right* one while accepting that many *wrong* ones would also be destroyed, creating huge levels of destruction. On a strategic scale, the CBO during World War II may be viewed this way. The Allies attacked as much of Germany's war making industry as they could identify and reach. Greater knowledge of the German economy and war machine would have led to an earlier identification of the key resource or industry that, if destroyed or neutralized, could have exerted the greatest influence on Germany's will and ability to resist. Lacking that knowledge, and arguably the technology to take advantage of that knowledge, much blood and treasure was expended in pursuit of crippling the German war machine. Warfare is violence, but the Western way of war no longer allows for the application of indiscriminate violence. The dead may argue the merits of *discriminate* violence, but warfare has become more restrained. With less violence and more accuracy comes the expectation that less damage, especially collateral, will occur.

This resultant ability to inflict less destruction has changed the way we in the West are expected to fight. Western publics are casualty aware (not casualty averse). The carnage wrought by trench-style attrition warfare during World War I almost destroyed a generation of Europeans. With the rapid pace that news and pictures get reported and distributed today, it is difficult to imagine that an event like the Battle of the Somme would be acceptable. There is a rightful expectation that all reasonable efforts will be made to minimize deaths, particularly on the friendly side, but also on the enemy side, especially among

noncombatants. This, it should be noted, is not a universally held principle. Groups, such as Al Qaeda and Hezbollah exist that use the death of noncombatants as a method of influence, sometimes with great effect. It should also be noted that no Western power has faced a total war since World War II. This expectation of minimizing casualties has been built in an era of limited wars, many of which were not considered as being in pursuit of vital national interests.

When events happen that seem outside the realm of the acceptable, they may receive a level of attention greater than is warranted. An example of this is the bombing of the Al Firdos bunker in Baghdad during Operation Desert Storm. A legitimate critical command and control target, Coalition planners did not know that some Iraqi leaders had brought their families there for protection. The resultant uproar over the incident led Coalition leaders to limit attacks on Baghdad.¹⁵⁰ In this case, not knowing that civilians were in the bunker proved more important than knowing that the bunker was a legitimate command and control target. Even with current advances in information gathering, we must acknowledge that we will, in all likelihood, never know everything. But, as our nation's military, we must expect to be called upon to act based upon what we do know and choose the best course of action based upon that knowledge. Results are known more quickly than in the past and adjustments are expected to be made when mistakes are made. Expectations of near perfection have changed the way that we must fight. Now, more than ever, success in warfare demands that we rapidly respond to changing conditions, apply the correct type of influence at the correct point, and do so with the least amount of violence necessary.

Contemporary Airpower

Command of the Air and Airpower

As a primary element of national power, military force must be able to set the conditions for its successful application. For air, land, and sea power that means first establishing command of their respective element. Command of an element is the ability to use power for desired purposes and to prevent an enemy from using that same power within that element.

Because airpower is the only form of military power that operates exclusively above the surface of the planet, its element encompasses a massive cubic area, something noted by Slessor over 70 years ago. Thus, command of the air must be tailored to meet every individual situation, based upon the overall policy guiding the use of military force. Command of the air is best viewed as similar to Julian Corbett's concept of command of the sea.¹⁵¹ Command can be local (limited in area) or general (less limited in area) and either temporary (limited in time) or permanent (less limited in time). An example of general permanent control of the air is the airspace over the continental United States (although local command of the air was lost over New York City and Washington, DC temporarily in September 2001). A local temporary condition could exist in a target area where attacking forces seize the airspace over a target to protect attacking aircraft from being attacked.

Command of the air has two elements: using the air for desired ends and preventing use of the air by adversaries for their desired ends. As such, command of the air need not be contested to be obtained. During Operation Desert Storm, Coalition air forces

seized command of the air from the Iraqis, facilitating the success of both the air and ground offensive campaigns. After the cessation of hostilities, following the imposition of the United Nations-mandated no-fly zones, the Coalition maintained command of the air over Iraq south of the 32^d parallel and north of the 36th parallel for years during Operations Southern Watch, Northern Watch, and Provide Comfort. For the vast majority of those operations, this command of the air was not challenged by the Iraqis, but Coalition forces maintained it nonetheless. Coalition air forces could operate as desired within the no-fly zones, and the Iraqis were prevented from using the same area for their own purposes. During peacetime, when command of the air is not contested, command of the air means using the third dimension as you wish, without interference. Airpower and command of the air are inseparable. Airpower is that which allows you to gain, maintain, and exploit command of the air.

As discussed, Douhet and Sherman held different views about the path to gaining command of the air. Douhet believed in bombing airfields and aircraft on the ground. Sherman (and Mitchell) believed command of the air could also be gained by challenging the enemy air force in the air. Both methods can and should be used as the circumstance dictates. This, however, can begin to cloud the definition of what constitutes airpower. Unquestionably, a B-2 dropping joint direct attack munitions on a runway, preventing enemy air forces from taking off is airpower. A special forces team that accomplishes the same thing from the ground may not be airpower, but that is immaterial. The intent of the mission is to keep the enemy from using the third dimension and to gain command of the air. A similar situation exists with air defense artillery. Ground based missile systems cannot fly or float, so they seem to be land power forces. However, their very reason for existence is to maintain local command of the air. The importance of these distinctions lies in the question of command and control of forces.

Exploiting Command of the Air

Exploiting command of the air is the first and most critical role for airpower. Once gained, airpower can be applied as is required to attain the ultimate goal in the conflict. Airpower's application is defined through *where* it can apply influence (targeting) and *how* it can apply influence (missions).

Targeting

Airpower has certain unique strengths that make it appropriate for use in modern conflict. It provides access and is fast and precise in application.

- **Access.** Since air covers the earth, airpower can reach any target on its surface. No other force has the degree of access to the globe that airpower has. Past limitations in the amount of distance that can be covered due to limited aircraft fuel supply have been mitigated by more efficient engines and aerial refueling. With aerial refueling, aircraft can remain in the air almost indefinitely. With adequate aerial refueling resources, the human flying the aircraft becomes the flight duration limitation. In spite of technological improvements such as aerial refueling, aircraft remain limited by the amount of fuel that they can carry. Airpower still remains the fastest form of military power. However, as Sherman pointed out, airpower is a fundamentally different form of military power. Because

it is unique, the principles of war do not apply in the same way that they do for land power or sea power.¹⁵² When applying them to airpower, we must think of the principles differently. Airpower's speed and reach has created the persistent *threat* of the use of destructive force, enabling it to exert influence over a much wider geographic area, land or sea, in a way that other, slower forms of military cannot.

- **Fast and Precise in Application or Response.** Airpower is a technology-based capability. As time has progressed, that capability has vastly improved. The speed and range of aircraft have both increased dramatically since Douhet, Sherman, and Slessor wrote. Aircraft can travel fast, and with aerial refueling can cover great distances. Aircraft flight paths are not limited by geography. The fact that aircraft can fly a straight line from departure to their destination means that they can take the shortest and fastest route. Aircraft fly faster than any land or sea based force, and air forces can respond more quickly to any point on the globe than any other force, short of one that is already deployed to the point of crisis. Sovereign countries may refuse permission to fly through sovereign airspace, but airpower has the ability to fly around these denied areas. Land and sea power are affected much more negatively by access denial. In the lead up to Operation Iraqi Freedom, the Turkish government denied the Coalition permission to stage the US 4th Infantry Division from Turkey. This eliminated the ability to attack Iraqi forces from the north, a major piece of the Coalition ground strategy.¹⁵ Airpower remains the fastest way for decisionmakers to apply power. Precision is one of airpower's unique strengths. Precision helps mitigate a limited ability to mass, in the conventional sense of the principle of war. John Warden's concept of strategic paralysis by parallel attack illustrates the point. Because weapons can be delivered with precision, fewer are needed to destroy targets. This makes more assets available to attack more targets across the entire spectrum of the enemy's capability and ability to resist. "Parallel attack deprives (the enemy) of the ability to respond effectively and the greater the percentage of targets hit in a single blow, the more nearly impossible his response."¹⁵⁴ This, again according to Warden, comes close to the Clausewitzian concept of ideal war by striking the enemy at numerous points simultaneously.¹⁵⁵

Missions

Airpower is particularly well suited for combat operations and the projection of military power. Every theorist since Douhet has improved the way that airpower is used in combat. This improvement has been possible because of airpower's inherent flexibility. It has the ability to apply different forms of influence with the same platforms, the same people, and the same doctrine and training. From force application, aerial defense, reconnaissance and surveillance, and airlift, airpower can be tailored to serve many objectives. Air forces are designed to be flexible. An F-16 can transition from flying no-fly zone enforcement sorties, enforcing United Nations sanctions, to dropping bombs on terrorist training camps on the next mission. This transition can occur within the same day, with the same aircrew flying the same aircraft. That kind of capability defines flexibility. No other force exhibits the same inherent flexibility as airpower.

The US Army is, by necessity, becoming very accomplished at counterinsurgency operations. This new capability has come, however, at the expense of conventional combat capability.

Discussions of whether we need, now or in the future, a strong conventional ground force are immaterial. Proficiency at one mission has come at the expense of another capability. Air forces are not subject to the same limitation. The same ability to drop precision weapons in major combat operations can be used in counterinsurgency operations. Working in close coordination with ground troops, as Jack Slessor envisioned, aircraft can strike singular, high value targets, even in an urban environment. This level of integrated capability was impossible 25 years ago. The same aircraft, weapons, personnel, and skill set can be used for operations ranging from low-intensity to high-intensity conflict without any loss of operational capability.

Airlift is the one unique mission that was ignored by all of the airpower theorists examined in this article. Airlift, along with aerial refueling, is among the most critical capabilities that airpower provides. It gives decisionmakers many options with regard to the type of influence that can be exerted on a given situation. In February 2008, the US Air Force delivered more than 225,000 pounds of food, medicine, and cold weather supplies¹⁵⁶ to the People's Liberation Army in China to help relieve suffering caused by severe cold weather. In 2005, the US Air Force conducted "the largest humanitarian relief effort since the Berlin Airlift in 1947"¹⁵⁷ to help the victims of a tsunami in Southeast Asia. Airpower was not the only instrument used in the tsunami relief operation, but as with the China relief mission, airpower was able to get the relief to the point of need the fastest. The ability to provide this type of assistance is a form of influence in itself, one that is not available with other forms of power.

Airpower has another key attribute that makes it far more flexible than ground or sea power. Because of its temporary nature, air forces are not generally viewed as occupation forces. The Coalition air forces enforcing the United Nations sanctions enjoyed a level of international tolerance that would not have existed if they had been forces on the ground in Iraq. This *aerial occupation* was not seen in nearly the same negative light in which United States' ground occupation forces are currently viewed. *Boots on the ground*, while possibly desirable for the type of operation now underway in Iraq and Afghanistan, seems to represent a more committed action on the part of the United States. Occupation of sovereign territory is a more significant action than penetration of sovereign airspace. Similarly, penetration of sovereign waters by naval forces carries much of the same negative connotation. Airpower gives decisionmakers more flexible options if they desire to deliver force.

The Use of Airpower

As a form of power, airpower provides access, speed, precision, and flexibility available from no other form of power. Power, however, is only as useful as the policy that guides its use. It is incumbent upon airmen, as the ones who understand the nature of conflict and the strengths and limitations of airpower, to advise policymakers on its use. Once the decision is made to use airpower, it is up to the airman to develop a strategy with the available capabilities and resources that best supports that policy. Airpower can be applied across the spectrum, from peace to conflict, and as a tool of all three instruments of statecraft: economic, diplomatic, and military. Airpower can enforce aerial blockades, such as no-fly zones. Its inherent speed can aid the diplomatic process by moving people and intelligence rapidly to points of crisis. It can provide great diplomatic and

humanitarian assistance by delivering critical relief supplies to a disaster-ravaged area. It can strike nearly any target located on the face of the earth with relative speed. As capable as airpower is, though, it is most effective when used in concert with other elements of power.

Airpower, as with each other element of power, has strengths and weaknesses, but it alone is uniquely suited to apply influence across all levels of warfare: strategic, operational, and tactical. At which level airpower is used is not defined by the type of platform that exerts the influence. To understand this, we need to break the convention started by Douhet that strategic airpower equals big bombers, attacking the enemy's war making capacity far behind the battle front. Strategic targets are ones that, if attacked, have the most direct effect on the enemy's decision whether to continue fighting. They may be located within range of and vulnerable to attack from smaller aircraft or systems. John Warden understood this as he constructed his model of the enemy as a system. It is the enemy itself, and its inherent weaknesses, that defines which targets are strategic, not the type of aircraft that can reach or destroy them.

The ability to rapidly reach out to almost any point on the earth and influence a target is a tremendous capability. As our ability to gather knowledge about a particular situation continues to increase, airpower's strengths will make it a force of choice, but we must make sure that force is appropriate. The relative ease with which we can apply influence through the air with little perceived risk may incline some to advocate the use of airpower when it is not the appropriate force or force is inappropriate. In the vast majority of cases, airpower must be employed in conjunction with other elements of power. While the application of airpower may be an excellent strategic tool, there are situations where the ability to strike a target rapidly may be needed in support of another form of power. Jack Slessor was absolutely correct when he advocated the strategic application of airpower while acknowledging the possibility of operating in support of ground forces. That operation, though, must remain in the hands of airmen so that airpower is applied in accordance with its strengths and not compromised by its weaknesses. It is critical that we continue to work together with land and sea forces, improving our ability to work together to maximize our capability.

Conclusion

Airpower and the Future

In just one century, airpower has proven a tremendously valuable tool for decisionmakers. Early airpower theorists recognized that airpower was different than other forms of power and that, if used correctly, could decisively affect a conflict. The access it provides to the third dimension makes it a faster, more flexible, and more precise than any other form of military power. Airpower has redefined persistence and ability to mass through technological advances, further increasing airpower's strengths.

What, then, is unique about airpower relative to other forms of military power? Land forces have great influence in a small area, one that is restricted to land. As seen in the case of an occupation force, perhaps too much at times. Land forces, while extremely strong, are by comparison to other forces, rather immobile. Sea forces also exert great influence over a relatively small area, but, by nature of their mobility, can exert influence

farther than land forces. Sea forces, though, are limited by their need for water to operate. The reach and power provided by aircraft carriers is due almost solely to the fact that they employ influence through airpower. Air forces exert influence over a large area, but that influence may be lesser in scope than either land or sea forces in their respective elements. Airpower does not suffer the stigma of an occupation force, so it is more easily used in a crisis. Air forces are the most mobile and have the most reach.

Airpower's greatest strength is its flexibility in application. Air forces can perform missions from strike to humanitarian relief, rapidly and precisely. The forces themselves are flexible across the spectrum, able to shift from sanction enforcement to strike and back, using the same aircraft and aircrew. Airpower makes the best use of the human ability to adapt to a situation. Economically, these facts make air forces a tremendous value. Airpower provides the best return for every dollar spent across the defense spectrum. However, airpower is not a substitute for all other forms of power. It is best used in combination with the other tools available to our decisionmakers to best fulfill our policy objectives. Each form of military power has strengths based upon its command of its physical medium. We are most effective when we employ each branch of our force to its strengths, with each supporting as necessary.

Finally, airmen need to control airpower. Only airmen can truly understand the strengths and, equally important, the limitations of airpower. The danger of the limitations is that, if not minimized, they can severely reduce the advantages of airpower's strengths. Airmen must be able to understand this, and express it to our decisionmakers.

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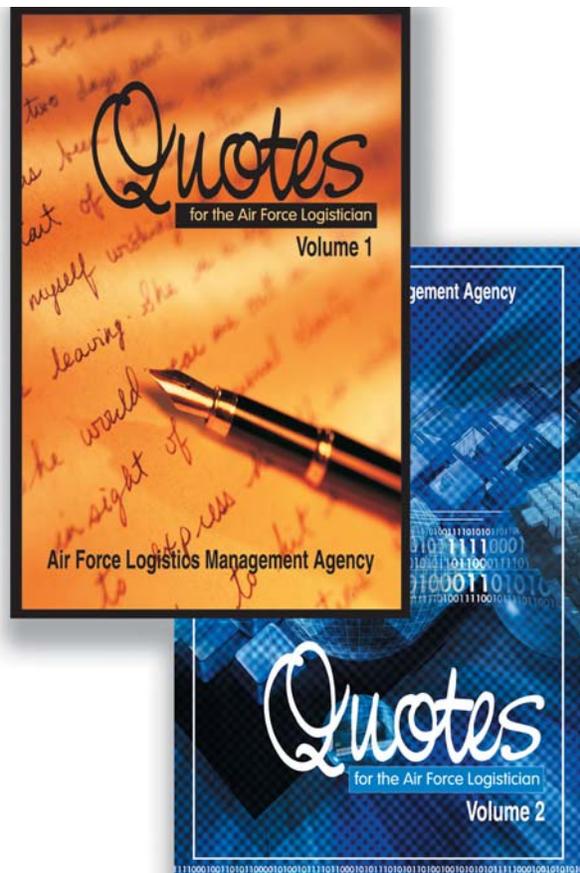
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Eccles. The second section is a collection of snapshots from the history of logistics presented as vignettes.

Logistics Pioneer

Rear Admiral Henry E. Eccles

When the fundamentals are understood, the technical details can be more readily developed. When the fundamentals are ignored or not understood, no amount of technical skill and effort can compensate.¹

—Rear Admiral Henry E. Eccles, US Navy

If logistics is the bridge between economics and military operations, logistics plans must be interwoven with national, strategic, and tactical plans at all levels of command.

In today's constantly changing, expeditionary environment, logisticians must understand the fundamentals of logistics so they have the capability to quickly shift and adapt to meet mission requirements. Although logisticians often learn on the job, they also gain knowledge from mentors, by reading, and by studying logisticians from the past. One such logistician is Rear Admiral Henry Eccles, a pioneer in military logistics whose work and lessons on leadership are still applicable today.

Admiral Eccles graduated from the United States (US) Naval Academy in 1922. He then served on submarines and destroyers for almost 20 years. After being wounded while in command of the USS *John D. Edwards* early in World War II, he served as the head of Advanced Base Section, US Pacific Fleet. While assigned to the Pacific Fleet, Admiral Eccles played a key role in planning, construction, and support operations for the Pacific campaigns. During this assignment, he became a subject matter expert in logistics.² Admiral Eccles' affinity for logistics lingered after the war ended, and in 1946 he was selected to establish the Naval War College's logistics department. He officially retired from the Navy in 1952, but his association with the military and logistics continued for another 30 years.

In an effort to synthesize some of Admiral Eccles' contributions to logistics as a strategic leader, this article will first illustrate how he exhibited the three technical competencies of strategic leadership as defined by the US Army War College. Next, the article will highlight how he was a creative thinker. Finally, it will describe how his ability to communicate illustrates one aspect of a strategic leader's interpersonal competencies. Many of Eccles' contributions as a "strategist, logistician, philosopher, and moralist of war"³ occurred after his retirement, while he taught and lectured military personnel. As a result, the majority of examples cited throughout this article will be culled from his books, papers, and lectures on military logistics.

The US Army War College's *Strategic Leadership Primer* describes the strategic leader technical competencies. They include appreciating Joint, interagency, multinational, and intra-agency (JIMI) relationships; maintaining political and social competence; and understanding organizational systems and associated relationships.⁴ These competencies are interrelated, and Admiral Eccles displayed each during his years as a strategic leader and thinker.

Admiral Eccles served on the Allied Forces Southern Europe staff during its formative years, and shared his opinions, conclusions, and recommendations for officers working on future Allied staffs in a paper published in *Proceedings*. His article illustrates an appreciation for working with multinational partners, and his many recommendations and observations are still relevant. For example, the paper provides thoughts on overcoming language barriers and it highlights the importance of understanding

He stressed the importance of incorporating logistics into all levels of planning, to include national security policy planning, Joint planning at both the strategic and operational level, planning at the Service level, and planning at the tactical level.

command and administrative relationships. It also recommends studying the history and culture of a host country prior to deploying, and concludes by describing the incredible cooperation displayed by the nations serving on the staff.⁵ Today, this article remains pertinent and provides excellent recommendations for anyone serving alongside international partners.

The political and social strategic leader competency includes having the “ability to participate effectively in the interdepartmental process inherent in national security policy formulation.”⁶ In addition to his appreciation for JIMI relationships, Admiral Eccles advocated the importance of logistics within the overall security policy and planning process. In the preface of his book *Military Concepts and Philosophy*, Rear Admiral Eccles wrote, “no military theory can stand alone; it must be related to political and economic theory...these relationships will be overlapping and interweaving.”⁷ The book focuses on these interwoven relationships, to include outlining his theory of “Logistics—the Bridge,” which defines logistics as the bridge between the economic system and combat forces.⁸ In this capacity, logistic support of tactical forces is essential to meeting specific strategic objectives. Eccles advocated a strategic vision in which logistics provides the bridge linking national security policy with military operations.

If logistics is the bridge between economics and military operations, logistics plans “must be interwoven with national, strategic, and tactical plans at all levels of command.”⁹ Admiral Eccles wrote and taught extensively on this subject. He stressed the importance of incorporating logistics into all levels of planning, to include national security policy planning, Joint planning at both the strategic and operational level, planning at the Service level, and planning at the tactical level. Eccles’ concept of logistics as a bridge demonstrates his grasp of national security policy formulation, as well as his strategic vision and leadership. His thoughts are still applicable today.

Other senior leaders also recognized Admiral Eccles’ appreciation for JIMI relationships and the political environment. In a special issue of the *Naval War College Review* (published on behalf of the 25th anniversary of Admiral Eccles’ retirement from the US Navy), Ambassador (retired) Thomas S. Estes crafted a piece highlighting the admiral’s grasp of civil-military relations, and his great appreciation for the link between politics and military planning.¹⁰

Systems understanding, the final strategic leader technical competency, is grasping how an organization (or process) fits within the total Department of Defense (DoD) framework.¹¹ Admiral Eccles wrote and taught extensively on how logistics is a key factor within the JIMI and political arenas, and how both areas contribute to the overall DoD framework. Eccles wrote extensively on the relationship between strategy, logistics, and tactics. He believed these relationships are so interconnected that, if a commander thinks of any of these elements in isolated terms, “he has lost his perspective.”¹² Based on his experience managing logistics for the Pacific Theater during World War II, he also wrote and lectured on the advantages and disadvantages of providing overseas logistic support to forces by either establishing military bases or by providing mobile logistic support. A number of factors figure into the criteria for

Eccles’ concept of logistics as a bridge demonstrates his grasp of national security policy formulation, as well as his strategic vision and leadership.

Article Acronyms

DoD – Department of Defense
JIMI – Joint, Interagency,
Multinational, and Intra-
agency
US – United States

One logistic principle discussed throughout his work is the *logistic snowball*, which describes how all logistics activities and programs tend to become large, thereby making logistics ineffective or unmanageable.

determining which is optimal in a given situation. Eccles argued special research is always required prior to making a decision due to the “enormous political-military and economic importance of this subject.”¹³

Strategic leaders must be able to think strategically, which includes being able to think using five different thinking lenses. One of the lenses, thinking creatively, is defined as having the “ability to produce novel ideas that are valued by others.”¹⁴ Since Admiral Eccles wrote about logistics extensively, many of his creative ideas can be found in his notes and books, and are still studied today. One logistic principle discussed throughout his work is the *logistic snowball*, which describes how all logistics activities and programs tend to become large, thereby making logistics ineffective or unmanageable.¹⁵ This concept has been adapted to today’s logistics environment, and is studied in many supply chain and logistics management programs. An example of the logistics snowball principle is the stockpiling of inventory. Another idea he wrote and lectured about extensively, based on his experience in the Pacific, is command control of logistics and the importance of centralizing logistics in a theater of operations.¹⁶ Although this may seem obvious, it is a concept logisticians still struggle with today. Some of his ideas, such as options for organizing staffs to control logistics, are reflected in the most current edition of Joint Publication 4-0, *Joint Logistics*.

Strategic leaders must also possess a number of interpersonal competencies, to include having the ability to communicate. As a strategic leader, Admiral Eccles communicated his ideas extensively both internally to the military and externally through writing and lectures. Over the course of his life, he wrote four books and published over 30 articles on logistics. In addition, the US Naval War College Library (named on his behalf) includes many unpublished works, correspondence, lecture notes, and other material.¹⁷ Finally, the admiral mentored many senior leaders, to include serving as a “trusted confidant to numerous presidents”¹⁸ at the Naval War College. His ability and desire to teach and communicate are critical examples for all DoD strategic leaders to follow.

An incredible strategic leader and thinker, Admiral Eccles’ contributions to military logistics are extensive and timeless. This article described his strategic leadership in terms of JIMI relationships, political and social competence, and his understanding of systems. It also highlighted his creative thinking ability, as well as his ability to communicate through writing, lecturing, and mentoring. The article provides only a small snapshot of Admiral Eccles’ contributions to military logistics. As a strategic leader and thinker, Admiral Eccles understood the importance of thinking in time—which is reflecting on history and applying it to current issues.¹⁹ In his article “Introduction to Papers” he wrote, “...full understanding comes only when an idea is examined in different contexts, circumstances and times...and its validity and permanence are tested.”²⁰

All military personnel, especially logisticians, should study his timeless work and apply it to the many logistic challenges faced today.

Notes

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12. Eccles, *Logistics in the National Defense*, 21.
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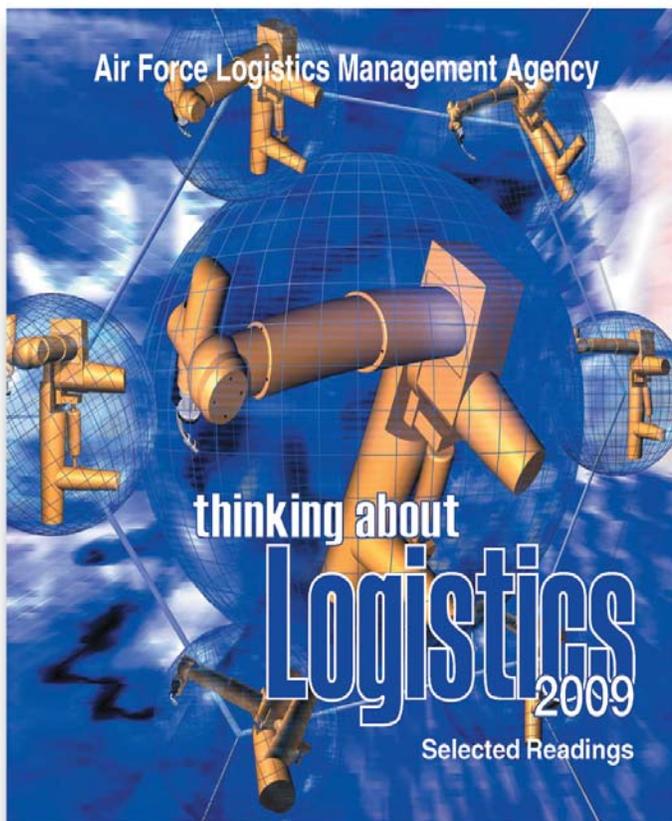
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18. Hardistay, *Naval War College Review*, 1.
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Snapshots from History Logistics Vignettes

Thinking About Logistics

Understanding the elements of military power requires more than a passing knowledge of logistics and how it influences strategy and tactics. *An understanding of logistics comes principally from the study of history and lessons learned.* Unfortunately, despite its importance, little emphasis is placed on the study of history among logisticians. To compound matters, the literature of warfare is replete with triumphs and tragedy, strategy and tactics, and brilliance or blunders; however, far less has been written concerning logistics and the tasks involved in supplying war or military operations.¹

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 three major wars (and several minor wars or conflicts) since the turn of the century are more directly linked 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 illustrates this point.

As the machinery of the allied coalition began to turn, armchair warriors addicted to action, and even some of the hastily recruited military experts, revealed a certain morbid impatience for the “real war” to begin. But 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.²

Unfortunately, the historical tendency of 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. Arguably, logistics of the 21st century will remain, in the words of one irreverent World War II supply officer, “The stuff that if you don’t have enough of, the war will not be won as soon as.”³

Notes

1. John A. Lynn, ed, *Feeding Mars: Logistics in Western Warfare from the Middle Ages to the Present*, San Francisco: Westview Press, 1993, vii.
2. Charles R. Shrader, *U.S. Military Logistics, 1607-1991, A Research Guide*, New York: Greenwood Press, 1992, 3.
3. Julian Thompson, *The Lifeblood of War: Logistics in Armed Conflict*, Oxford: Brassys’s, 1991, 3

The Editors, *Air Force Journal of Logistics*

Unfortunately, the historical tendency of 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.

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 the 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 behavior. 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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Group Captain Peter J. Dye, RAF

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 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.”¹ 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....”² 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.

Notes

1. Charles R. Shrader, *U.S. Military Logistics, 1607-1991, A Research Guide*, New York: Greenwood Press, 1992, 3.
2. Shrader, 9.

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The Themes of US Military Logistics

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

- 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.

The Editors, *Air Force Journal of Logistics*

Historical Perspective

The battle is fought and decided by the quartermasters before the shooting begins.

—Field Marshal Erwin Rommel

No matter their nationality or specific service, military logisticians throughout history have understood the absolute truth represented in the above quote. Whether they were charged with supplying food for soldiers, fodder for horses or the sinews of modern war—petroleum, oil, and lubricants, they have understood that victory is impossible without them—even if, sometimes, it seemed their vital contributions were forgotten or ignored. None of the great military captains of history were ignorant of logistics. From Frederick the Great to Napoleon to Patton, they all understood the link between their operations and logistics. The great captains also have all understood that history had much to teach them about the nature of the military profession. Yet, military logisticians do not often spend time studying the history of military logistics.

There are at least three general lessons from history that might prove of some use in understanding how best to prepare for the future. The first of these is the best case operationally is often the worst case logistically. The second is promises to eliminate friction and uncertainty have never come to fruition. And the third is technological change must be accompanied by organizational and intellectual change to take full advantage of new capabilities. While these lessons are not exclusive to logistics, when applied to the understanding and practice of military logistics, they provide a framework for understanding the past and planning for the future.

Colonel Karen S. Wilhelm, USAF (Ret)

Concentration and Logistics

To win in battle we must concentrate combat power in time and space. Strategy and tactics are concerned with the questions of what time and what place; these are the ends, not the means. The means of victory is concentration and that process is our focus here. There are only four key factors to think about if we seek success in concentration. This is not a simple task. Although few in number, their impact, dynamics and interdependencies are hard to grasp. This is a problem as much of perspective as of substance. It concerns the way we think, as much as what we are looking at. The factors are not functions, objects or even processes. They are best regarded as conditions representing the nature of what we are dealing with in seeking concentration. They are as follows. Logistics is not independent. It exists only as one half of a partnership needed to achieve concentration. Why is understanding this so important? Logistics governs the tempo and power of operations. For us, and for our enemy. We have to think about the partnership of operations and logistics because it is a target. A target for us, and for our enemy. Like any target, we need to fully understand its importance, vulnerabilities and critical elements to make sure we know what to defend and what to attack. All military commanders, at all levels of command, rely on the success of this partnership. How well they understand it will make a big difference concerning how well it works for them and how well they work for it.

Wing Commander David J. Foster, RAF

Lessons from the First Deployment of Expeditionary Airpower

The lens of history speaks to many of the issues that are significant in today's expeditionary airpower environment. Particularly relevant are the lessons learned during first deployment of expeditionary airpower by the Royal Flying Corps during WWI. These include:

- The use of airpower is an expensive proposition.
- Maintaining aircraft away from home station demands considerable resources.
- Attrition from active operations is often very high.
- Effective support demands the ready availability of spares.
- Transport and protecting the transportation system is critical.
- Preserving mobility (the ability to redeploy quickly) is a constant battle.
- The supply system must be adequate in scope with a margin in capacity to meet unplanned events.
- The essential *lubricant* is skilled manpower.

Group Captain Peter J. Dye, RAF